CAN SCHOOL LUNCH CHOICES CONTRIBUTE TO THE ONSET OF CHILDHOOD OBESITY RATES?

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CAN SCHOOL LUNCH CHOICES CONTRIBUTE TO THE ONSET OF CHILDHOOD OBESITY RATES?

A Thesis

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Abstract

of

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Statement of Problem

Obesity rates in children and adolescents have reached epidemic proportions across the United States. This rise in obesity may be related to decreasing levels of physical activity among school aged children. A second factor may be the negative effects of school lunch programs, a source of much of the daily nutrition for school aged students. The purpose of this study was to examine whether there was a relationship between children’s lunch choices, including school lunch, vegetarian alternatives and lunch brought from home, and students’ levels of obesity as measured by the Body Mass Index (BMI).

Sources of Data

Participants in the study included 15 male and 25 female elementary school children aged 9-12 years recruited from two public schools. Each student completed a questionnaire that elicited information about their school lunch choices, their level of physical activity at home and at school, and their food choice preferences at home for
breakfast and dinner. The students’ height and weight were obtained from the Physical Education teacher at the two participating schools. These data were used to compute a Body Mass Index (BMI) Score for each individual student, which was converted into a BMI percentile-for-age score as a measure of level of obesity. The researcher used descriptive statistics to summarize students’ food choices and activity levels. A t-test was also conducted to test whether student gender was a predictor of their BMI score. Finally, a single factor ANOVA analysis was conducted to identify any relationship between the participants’ lunch choices and their BMI percentile-for-age scores. The results of these tests were not statistically significant.

Conclusions Reached

Results did not indicate a link between students’ gender or type of school lunch and their levels of obesity. These findings may have been a result of the number of subjects in the study, the wide range of ages included, the wording of items in the questionnaire, and/or the use of BMI scores as the sole measure of obesity. Since school aged children continue to consume a large portion of their daily nutrition through school lunch programs, further research is needed to identify the links between children’s school lunch choices and the rising rates of obesity among America’s children.

__________________, Committee Chair
Dr. Kimberly Gordon Biddle

________________________
Date
PREFACE

I have been a preschool teacher for the past decade and in my work I have noticed the growing trend of parents providing their children with lackluster meal options. The children are prone to eating these fast food type meals. They are also influenced by advertisements they on television and popular restaurants which offer toys with their high calorie fat ridden meals. The busy lives of people today, with one or both parents working and many children in daycare and or after school programs, do make it challenging for families to provide well planned and nutritionally balanced meals daily. However, parents and schools should become more aware of what our children are eating and how these types of food are physically affecting them. We as a society need to reexamine the influences that impact our children’s connection with food and proper nutrition. I am currently raising two young children who are eager to get in the kitchen and cook with me. This has been a great bonding experience for all of us. While we spend many hours preparing meals together my children have become interested in food and take a sense of pride and ownership in what they have created. This interaction has led to my children and me planning our meals together. I started out with my daughter when she was about two years old. She had a small toy kitchen with pots and pans. She quickly graduated from plastic food to mixing eggs for French toast, and then on to pancakes. She developed a knack for wanting to help prepare meals everyday. We started looking through cookbooks together and she would pick out the recipes that she wanted to try. We would then go the grocery store together and gather our ingredients. I believe
this was a real opportunity for me to get her interested in not only cooking but planning a well balanced meal for our family. She was never a picky or fussy eater, she would try everything and she quickly stored her favorites in her own recipe box. Now that my children are older I am able to delegate food preparation jobs to each of them. They are eager to help and know they are an important part of getting our food prepared. By setting an example and allowing them to be a part of the process I believe this has helped me a great deal in introducing them to foods they might never have tried in a restaurant. By involving your children in this process a bond between parent and child is formed as well as between child and food. This has worked wonders with my children who can’t wait for their next cooking endeavor.

It is through the development of my own family that I have become more aware of the importance of proper nutrition. As a parent it is my duty to educate myself about what my growing children need to properly develop their minds and bodies. Children learn by example so if I am setting a good example of proper nutrition and displaying physical activity while including them they will be more apt to take on these traits. I believe it is critical to set a good example for children to follow and hope that their natural tendency would be to repeat what they have grown accustomed to. By taking a proactive role in the nutritional path of my family I am laying the ground work for a lifetime of healthy eating and living for my children’s benefit.
DEDICATION

This thesis is dedicated to my two children. My wish for you is to live long, happy, and healthy lives and always remember to play with your food. I love you both more than you will ever know.
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Chapter 1

INTRODUCTION

There has been such an alarming increase in childhood obesity rates over the past three decades that it has been declared a global epidemic (MacInnis & Rausser, 2005). Children in our public school system are showing an increased incidence of obesity, and many have asserted that school meals have an influence on this increasing growth curve. Children’s general health and well-being is being overlooked in schools and time spent in health and physical education is being exchanged for more time allotted towards the increasing demands of academics. Although academics are of great importance, the mind and body are also important in the education of the whole child.

School lunch programs play an important role in the nutrition of elementary school students (Whitaker, Wright, Finch, & Psaty, 1993). Many elementary school students’ receive the majority of their daily nutrition through the National School Lunch Programs (NSLP), where they are able to purchase fast food type meals for low or reduced prices. Through this program, school lunches are served to approximately 31 million students per day (USDA Food and Nutrition Services, 2011).

Shannon, Story, Fulkerson, and French (2002) contend that unhealthy dietary patterns are formed in the early adolescent years. The development of these poor eating practices may cause many adolescents to incur lifelong battles with food and other health related issues. In contrast, Datar and Sturm (2004) assert that increasing physical
education courses in schools can provide children and adolescents opportunities to get accustomed to physical activity and may aid in the decrease of obesity rates in children.

**Purpose of the Study**

The purpose of this study was to identify factors that may contribute to the current increase in childhood obesity rates. Specifically, the study sought to determine if there was a relationship between elementary school aged students’ food choices, at home as well as at school, and their rates of obesity. Another goal of the study was to examine whether students’ physical activity in and out of school was related to their levels of obesity. Study participants were asked to fill out a short questionnaire regarding food choices at school, at home, and their favorite types of food consumed. The questionnaire also included items related to participants’ after school activity choices as well as their participation in physical fitness programs at school. The researcher used the Body Mass Index (BMI) as a measure of students’ obesity level. Additionally, gender differences in obesity were investigated. Given the incidence of childhood obesity in the United States it was the expectation of the researcher that overweight and obese participants would be present within the participant sample in this research study.
Significance of Study

Since children consume one-third of their daily nutritional needs from school lunch programs, nutritionally sound lunch programs are imperative in the development of healthy adolescents (Whitaker, et al., 1993). There is a plethora of information regarding public school lunch programs as well as childhood obesity but little research has examined whether there are links between school lunch choices and obesity. Identifying whether such a relationship exists is particularly important since the disease of obesity is preventable in the majority of cases, and manageable with a combination of healthy lifestyle changes.

Additionally, the study investigated the links between physical activity levels of the participants and obesity. According to Puhl and Latner (2007), there are also other related effects that the stigma of obesity has on children. Some of these effects manifest in physical attributes, while others can come from within, including increased rates of depression, withdrawal from social situations, peer pressure, teasing, and bullying. All of these effects can be related to the physical attributes that one displays as an obese person.

Methodology

This study employed a quasi-experimental comparison design to examine relationships between elementary students’ food choices, and activity levels and rates of obesity. The participants in this study were 40 elementary school students recruited from
two participating schools in an upper middle class suburban area of Sacramento. The participants were 15 males and 25 females, ranging in age from 9 to 12 years.

Data for the study were collected through questionnaires sent home with students from their school. Parents and students were asked to view and sign the appropriate consent and assent forms. The questionnaire asked students about family demographics as well as the students’ food intake and physical activity, and was to be filled out at home by each individual participant. The researcher also collected the students’ height and weight from the P.E. teacher. This information was used to compute a Body Mass Index score (BMI) for each child (Centers for Disease Control, 2010). The BMI is a nationally recognized measure used to determine if an individual is underweight, overweight, obese, or at an appropriate weight range for the person’s height and body stature.

In order to examine the food choices available to participants, a lunch menu was collected from the participating schools. The school lunches are developed using information from the United States Department of Agriculture website which promotes healthy meal options, portion control information, and an accurate account of servings per all necessary food groups (USDA, 2010). These elements are in place in compliance with the National School Lunch Programs. A lunch menu was collected from the two participating schools providing information about food choices available to school aged children. In addition to the lunch menu, a student based questionnaire was completed by the students that assessed the food choices that the participants consumed at school and home, the amount of physical activity that they participate in and various demographic questions including age, ethnicity (Appendix C). Furthermore, documentation from the
USDA’s website including a food guide pyramid where nutritional values of food are addressed and are available to use as a daily guide of food consumption is included to provide information about the nutritional guidelines that are recommended for appropriate serving sizes of food as well as the recommendations of the basic food groups (Appendix F). Additional data collected was students’ height and weight. This information was then used in conjunction with the Body Mass Index Scale or (BMI). This is a tool used to determine instances of obesity.

Four different analyses were employed with study data. First, the researcher used information from the schools’ Physical Education teacher, consisting of height and weight recordings, to compute a Body Mass Index (BMI) score for each participant; this score was then used to compute a BMI index-for-age percentile score which is a measure of obesity levels. Second, descriptive measures were used to summarize and categorize the food choice responses from the student questionnaire. Third, comparisons were conducted to examine whether gender differences existed in the students’ BMI scores and food choices. Finally, a one-way ANOVA was conducted to determine possible relationships between students’ BMI percentile-for-age scores and students’ lunch choices (i.e., children who ate the lunch provided by the school, children who ate the alternative vegetarian lunch, children who brought their lunch from home).
Definition of Terms

Body Mass Index (BMI)

The BMI is a useful instrument that is commonly used by pediatricians in the recording of typical growth patterns of infants, children and adolescents as part of a regular well-child care visit. Body Mass Index is calculated using the following mathematical formula; weight in kilograms divided by height in meters squared, rounded to one decimal place (CDC, 2010). The doctor calculates the child's BMI and determines the percentile in which it falls on the national BMI index-for-age growth chart. The BMI index-for-age percentile score indicates if the child is underweight, at a healthy weight, at risk for overweight, or obese, for their age. For the purposes of this study the BMI was computed using the BMI calculator on the CDC website (www.cdc.gov).

Nutrition

According to the American Dietetic Association (ADA, 2010), nutrition can be defined as the nourishment one’s body obtains from a variety of different food sources, as illustrated in the food guide pyramid. The guidelines for children and adolescents indicate what food should ideally be consumed in a given day: Grain group (6-11 servings), Vegetable group (3-5 servings), Fruit group (2-4 servings), Milk group (2-3 servings), and lastly the Meat and Bean group (2-3 servings). All of these serving sizes are provided as a guide to allow children and adolescents to gain maximum nutrition from properly nutrient rich foods that will aid in the formation of a growing body (see Appendix F.).
Obesity

The CDC (2010) defines obesity as having an extreme amount of body fat as well as consuming more calories than one needs to maintain a healthy body for stature. According to Yaussi (2005), a person who weighs 15% more than an average person of the same age and gender this person is deemed obese.

Overweight

The CDC (2010) defines overweight as weighing more than 10 to 15 percent more than the average person who is of the same age as well as gender. Physical stature, body type and muscular build are not included in this general assessment.

Vegetarian

According to the American Dietetic Association (2010), a vegetarian can be defined as a person who does not consume any food consisting of animal products (meat or fish). A vegetarian’s diet may consist of plant materials and or grains, legumes, nuts, seeds, and may or may not include dairy products or eggs. The vegetarian alternative lunch choice that is available in the public schools follows these guidelines.

School Lunch Program

The National School Lunch Program (NSLP) is in place in public schools. The NSLP offers lunches to students at a lower price or may be free of charge according to the income bracket that their parents or guardians are categorized.
This program served approximately 31 million students per day in 2009 (USDA Food and Nutrition Services, 2011).

**Limitations**

In addressing the research questions in this study there were many factors that may have affected the study’s outcome. First, the BMI percentile was the only measure of obesity used in this study. Second, information about food choices was limited to self-report on a student questionnaire. Another factor that contributed to the outcome was that all participants consumed all three lunch choices provided by the school as well as participated in physical activity at school and home.

An additional weakness of this particular study would be the limited sample size. Initially 620 questionnaires were distributed to three schools. However, only 40 surveys were returned. The sample is therefore too small to make meaningful comparisons in some cases. Finally, the correlational nature of the study means that causal relationships cannot be determined.

**Organization of the Thesis**

Chapter One has provided an overview of the study. Chapter Two includes a review of the current literature. This includes current literature related to the issues of childhood obesity, causes and effects of the disease, and the role that public schools play
in what types of foods they serve within their school lunch programs. Chapter Three presents the methods used in the data collection of this study, research design, and research questions along with information regarding participants and setting of the study. Chapter Four presents the results of this research study, including the results of descriptive analyses and statistical tests. Chapter Five discusses the results and addresses the research questions stated in Chapter One. In addition the study’s conclusions were addressed and recommendations for schools regarding meal options and the importance of physical education practices for children and adolescents.
Chapter 2

LITERATURE REVIEW

In order to inform the design of this study, the researcher conducted a thorough review of the literature regarding childhood obesity as well as other related topics. In the following sections, the growing epidemic of childhood obesity as well as causes and prevention aspects are examined, along with a discussion of the National School Lunch Program. Another element that heavily influences the obesity epidemic is the lack of daily physical exercise, in particular the dwindling of physical education programs in public school. The possible impacts of these changes are also reviewed below.

Defining and Measuring Child Obesity

Americans are reaching epidemic proportions of obesity among children as well as adults (CDC, 2010). The CDC (2010) defines obesity as having an extreme amount of body fat as well as consuming more calories than one needs to maintain a healthy body for stature. Yaussi (2005) contends that when a person weighs in addition to 15% more than an average person of the same age and gender this person is deemed obese.

According to the Centers for Disease Control and Prevention (CDC, 2010), childhood obesity has more than tripled in the last thirty years, with one out of three American children today categorized as obese. These instances of obesity occur in children from every economic class as well as ethnicity. According to CDC figures
(2010), 17 percent of children and adolescents ages 2 to 19 years can be classified as being obese. According to Wechsler, McKenna, Lee, and Dietz (2004), the incidence of obesity is higher among Hispanic children, with overweight Hispanic children showing an increase of 120 percent from 1986 to 1998, and non-Hispanic children showing a 50 percent increase. Moreover, obesity rates are significantly higher in African American and Native American children and youth. Caucasian adolescents from lower socio-economic families display higher rates of obesity than Caucasian adolescents from upper or middle income families (Wechsler, et, al., 2004).

**Causes of Childhood Obesity**

Several factors are being studied as possible causes for this increase in obesity, including medical and genetic factors, changes in family eating habits, and changes in the types of foods children consume as well as in the ingredients and nutritional values of those foods. Since many children receive the majority of their daily nutrition through school lunch programs, it is important that these programs also be examined in order to fully understand the rise in child obesity.

Medical and genetic factors, such as family history or pre-existing medical conditions, may predispose a child to become obese. According to Whitaker, et al. (1993) obesity rates among children are greater if they have one or more parents who are obese. However, these factors account for only a minute percentage of obesity cases and in these
instances obesity can usually be treated with pharmaceuticals and close medical monitoring by an obesity specialist.

Increased levels of obesity in children and adolescents are closely linked to the family environment (Barlow, Trowbridge, Klish & Dietz, 2002). Whitaker et al. (1993) noted that children who are raised in families not educated about proper nutrition are likely to repeat the family’s food choices; these children are developing the disease of obesity in record numbers. Family eating patterns established early in life not only contribute to childhood obesity but also tend to be followed into adulthood. These patterns of unhealthy food choices have the potential to lead to a lifelong struggle with weight, health, and poor body image issues.

Another factor contributing to the rise in obesity is the growing absence of physical activity in children’s daily lives. Although the values of being physically active are many, for today’s youth being physically active has been replaced with time spent on indoor activities such as computer and/or television. Additionally, children’s physical activity in public schools has dwindled as schools cut back on physical education classes and recess time. Given the current state of our education system it will be interesting to monitor how if at all the physical education programs are further reduced and if any changes regarding physical activity is increased or decreased in the future. In the current study, physical activity did not vary greatly as the participating schools mandated physical education classes as well as daily recess activity minutes the students further reported being involved in sports or sports related classes.
**Consequences of Child Obesity**

Obesity itself can create many health problems for children and adolescents. However, there are other serious health consequences that must be considered when dealing with a disease as complex as obesity. For some individuals, childhood obesity may begin a lifelong struggle with food and weight and secondary detrimental effects as serious as death. Satcher (2005) found that between 70-80% of children and adolescents who are obese consequently become obese adults.

According to Barlow et al. (2002), the current obesity epidemic has the potential to lead to increased prevalence of secondary complications such as diabetes, hypertension and cardiovascular disease among the adolescent population. The U.S. Department of Health and Human Services (2008) has reported that children who are overweight can develop serious health problems such as elevated blood pressure and cholesterol, joint problems, type II diabetes, gall bladder disease, asthma, depression, and anxiety disorders.

Children who are experiencing the struggles of obesity also may face various adverse factors other than the diseases associated with being overweight. During the elementary school years, children are faced with increasing demands academically, socially, physically and emotionally. A disease like obesity that may become physically debilitating may not only manifest in a physical form but may also lead to social, emotional and psychological problems for some children. According to Mustillo, Worthman, Erkanli, Keeler, Angold, and Costello (2003), “overweight and obesity, or
perceptions thereof, may also affect self-esteem, body image, and social mobility” (p. 851). These social-emotional struggles associated with obesity generally unfold more frequently in adolescence but have surfaced in the early formative years as well.

Puhl and Latner (2007) have noted the fact that stigma often goes hand in hand with obesity. Children who face this disease must deal not only with peer pressure regarding being overweight but also with the fact that they are categorized negatively by their physical appearance. This stigma of obesity can lead to various social pressures. For instance, media influences and the current cultural emphasis on appearance and ideal body weight and type may influence teens to take drastic measures in weight loss. Moreover, Puhl and Latner (2007) state that the perils of obesity may hinder “social emotional and academic development and could exacerbate adverse medical outcomes” (p.557). Therefore it is critical to gain further understanding of childhood obesity and devise a plan of action between schools, families and children themselves to slow the spread and progression of this disease.

As children approach adolescence, the effects of obesity can be compounded and complicated by the onset of puberty. Tremblay and Frigon (2005) state that middle childhood for the most part encompasses children between the ages of 8-12 years of age; the body changes experienced during this time encompass pre-pubertal changes in boys as well as girls. During the later years of middle childhood (11-12 years) body awareness of self and others of the opposite sex is beginning to form. The changes that adolescents experience manifest themselves in various ways. These changes may also introduce a host of mental changes within some adolescents. It is through these changes that some
adolescents begin to take on various attributes regarding their bodies and physical appearance. During this time, adolescents are influenced by peer pressure, and some may be swayed generously by media influence. Obesity can be a complicating factor in the processes of puberty. Even for children who have not had a weight problem, there is typically an increase in growth and body fat in pre-pubescent teens (Tremblay & Frigon, 2005). Early onset of puberty can lead to other problems. For example, Tremblay and Frigon found that girls who matured early may experience increased instances of anxiety or depression due to the rapid body changes during this time.

Weight problems in children and adolescents can also be a contributing factor in the development of eating disorders. Littleton and Ollendick (2003) assert that Western societies today are seeing increased occurrences of eating disorders along with poor body image issues among adolescent girls. Typically, the onset of eating disorders such as anorexia and bulimia does not occur in middle childhood but rather in the early teen to late teen years. However, Littleton and Ollendick have argued that these patterns and disorders begin to take shape in middle childhood, when the need to be thin can easily override the nutritional needs of a developing body. An obsession that starts out as the desire to lose a few pounds can snowball into a life long struggle with eating disorders that may ultimately lead to death (Davison, Markey, & Birch, 2003). Given the rise in child obesity, and the many negative impacts of weight related disorders for children and adolescents, it is critical that families and schools develop a better understanding of the nutritional needs of children and adolescents. This knowledge can aid in the
development of healthy family practices and healthy school lunch programs aimed at slowing the rise in obesity.

**Combating Obesity in Children**

**Importance of Physical Education**

In 2006, only 3.8% of elementary schools provided daily physical education programs for their students, and 22% of schools did not require students to take part in any physical education (CDC School Health Policies and Programs Study, 2006). In many schools, physical education and health are disregarded in the curriculum because they are not addressed within the parameters of the No Child Left Behind Act. Illinois is the only state that mandates daily physical education participation for their students. Currently, only 29% of US students grades K-12 attend and participate in daily physical education classes (CDC School Health Policies and Programs Study, 2006). Within this current study it was found that the students were required to participate in mandatory Physical Education classes two times per week. In addition the students daily recess minutes also counted towards physical activity minutes, as well as the self-reporting of each participant partaking in daily physical exercise in after school sports free play or organized sports.

This loss of physical activity within the school system is especially worrisome since, according to Cook (2005), one of the greatest contributors to obesity is leading a sedentary lifestyle. Given what is known about the relationship between this type of
lifestyle and childhood obesity, it is alarming that public schools are disregarding physical education programs in lieu of more academic instruction time. Parents and schools must partner together to increase physical education programs in public schools. Programs that encourage children to take an active role in their personal well-being and provide opportunities for them to engage in physical activity would help to reverse the current trend of increasing obesity levels among children.

**Healthy Child Nutrition**

One way to help prevent obesity is to educate adults and children about the principles of healthy child nutrition. One important principle is that children should consume appropriate portions of food from all of the major food groups (Young & Fors, 2001). A second principle is that the amounts of fruits and vegetables consumed by adolescents should ideally be increased to five servings per day. However, studies have shown that practicing healthy eating patterns is not viewed by many adolescents as important (Croll, Neumark-Sztainer, & Story, 2001). Many of today’s youth do not consume the suggested amount of fruits and vegetables as displayed in the national food guide pyramid (USDA.gov). One reason for this is that the dietary practices of many children and adolescents are modeled after the parents or caregivers within the household. A second reason is that food choices made by children and adolescents are often directed more towards meals that are easily obtained; these meals often turn out to be higher in fat and calories. Finally, families and children’s food choices and eating patterns are influenced by advertising. Briggs, et al. (2003) claim that advertising
campaigns which generate millions of dollars for fast food, beverages, and snack food companies heavily influence students’ food choices and preferences.

In addition family and cultural influences are not the only factors that can influence a child’s nutrition and eating patterns. Most children consume a substantial proportion of their food and nutrition at school, and, therefore, the school is in a unique position to provide an alternative, positive influence on children’s nutrition and on obesity prevention (Briggs et. al., 2003).

**The Role of Schools in Child Nutrition and Obesity**

While current statistics documenting the rise in childhood obesity are alarming, schools are in a unique position to help reverse this trend. Schools have several avenues for influencing children’s nutrition, eating practices and physical fitness regimes. One avenue is to increase the amount of physical education or activity children participate in during the school day. First Lady Michelle Obama has recently implemented a program titled “Let’s Move” (www.letsmove.gov). This program emphasizes the need for children and adolescents to become more physically active. Within her campaign she also encourages schools to take the lead in influencing our children to obtain some type of physical education on a daily basis. Schools have many opportunities to apply different physical fitness practices all related to developing an active well rounded student who takes an active role in their own personal fitness.

There is also a push to adapt the eating practices of our nation’s youth to include eating nutritionally balanced meals. Through informative health education, schools can
insure that children are provided with the basics of appropriate nutrition practices. Most importantly, schools can support children’s health and prevent obesity by maintaining healthy lunch programs. By implementing increased physical education programs along with revamped meal options within the schools, students may reap the benefits of such programs and realize that they are taking an active role in their personal health and well-being.

Moreover, by providing students with healthy well balanced meals, schools may be laying the groundwork for students to want to eat healthier and encourage good nutrition practices at home. By gaining a sense of physical awareness and being educated properly about elements that their growing bodies need, adolescents may begin to appreciate how their choices affect the internal changes that are occurring. Because families are the source of children’s first education about health and nutrition, a logical starting point would be to understand and respect parental influences in relation to food choices (Young & Fors, 2001). Given the fact that eating disorders manifest in the middle childhood through the early teen years, it is critical to combat the epidemic of obesity through partnership between families and schools working in conjunction to provide a supportive environment for children. With the support of families, schools may provide various opportunities to implement a nutritionally sound diet along with physical exercise thus providing a healthy alternative model for today’s youth. The partnership between families and schools is a critical aspect in the education of the whole child. Although school programs can do much to counteract and prevent unhealthy trends in children’s health, nutrition and fitness, recent trends in school such as the elimination of
health and physical education, as well as unhealthy food choices in many school lunch programs are disturbing. These changes raise concerns that, rather than serving as a positive influence on children’s health, schools have created a situation where they are a primary contributor to the rise in child obesity. In the current study, students were asked to report the source of their meals, whether they were from home or school.

School Lunch Programs

In 2009, the National School Lunch Program (NSLP) served lunches to 31 million children on a daily basis. The NSLP also served 2.5 billion lunches at a free or reduced price. There are specific criteria that families must meet in order to qualify for these free or reduced price meals. They are available to those children whose families fall within specific income brackets which are “at or below 130 percent of poverty for the free meal and 130 to 185 percent of poverty for reduced price meals” (USDA, 2010, p.1). Since the typical school schedule encompasses many of children’s waking hours, they consume much of their daily nutritional intake on school grounds. Although some children bring food from home, many families opt for their children to obtain lunch, and sometimes breakfast, through school based lunch programs. These programs have long been recognized as playing a critical role in providing the nutritional needs of America’s children, and they receive significant financial support through the National School Lunch Program. Given the fact that many students depend on the schools for their one well balanced meal of the day, it is critical to provide an adequate meal consisting of the appropriate servings of protein, vegetables, fruit, grains, and dairy to meet the daily
dietary guidelines from the USDA (2010). These guidelines state that children and adolescents should not consume more than thirty percent of their daily calories from fat and less than ten percent should be obtained from saturated fat. The regulations also require that one-third of the dietary allowances for protein, vitamin A, vitamin C, iron, calcium and calories must be incorporated within school meals (USDA, 2010). Although these guidelines are in place to establish minimal regulations, it is left up to individual school districts to determine how the lunches are prepared and what types of foods are served.

The meals and snacks that are served at school have the potential to establish either healthy or poor eating habits among American’s children and adolescents. Whitaker, et al. (1993) state that although children in the United States are greatly influenced by school lunch programs, nutrition does not typically play a role in the food choices that children/adolescents make. The students actual reporting of what is eaten was not recorded and would provide insight into the nutrition they are gaining from these choices. However, school lunch programs may be able to aid in the formation of healthier food choices by providing children with balanced low fat meal options. Furthermore, schools can offer alternative meal options such as salad bars and vegetarian meals. However, these options are not guaranteed to become the child’s first choice of consumption.

The national school lunch programs are intended to provide healthy well balanced meals for the student population. USDA guidelines require that, within the daily school lunch menus, a fruit and vegetable are always served, along with low fat milk. But many
of the current food choices available to school aged children replicate those of the fast food variety thus potentially contributing to the development of childhood obesity. Some schools provide an alternative vegetarian lunch and/or salad bar option. However, many students are so used to consuming fast food type meals that choosing the latter become second nature. The three identified lunch choices in the current study, school lunch, school vegetarian lunch, or lunch brought from home were reported by each participant did not allow a test of the link between lunch choice and instances of obesity from specific food choices, but by types of meals.

Beyond the school lunch program, schools can take a proactive role in providing nutrition education programs focusing on what a growing body needs to develop properly (Wechsler, McKenna, Lee, & Dietz, 2004). According to the USDA (2010), public schools are beginning to make changes in the food types that are readily available to our students. In addition, schools are taking a more active role in promoting more nutritious choices as well as implementing additional nutritional education to staff and students regarding diet and exercise practices for the students. There has also been an increase in consumption of the vegetarian alternative meals provided to many students. These proactive programs administered by the schools can play an important role in counteracting the current surge in childhood obesity rates. The aim of the current study was to identify what lunch option was chosen by the participants most frequently and to provide a link between a single lunch choice to instances of obesity.
Summary

In summary, research has attempted to address several elements that may be factors in the current epidemic of childhood obesity. The current literature states that one in four adolescents between the ages of 2-19 can be classified as obese (CDC 2010). Given this alarming fact the underlying causes of this disease are of great importance. The measurement of obesity is a vital piece of information that gives parents as well as pediatricians the data that they need in order to identify the occurrences of the disease. The causes of obesity are a combination of several components, including hereditary traits and the genetic make-up of the family’s physical attributes as well as lifestyle choices. The current study focused on the combination of what children are eating along with children’s physical activity at home and at school as predictors of obesity.
Chapter 3
METHOD

Research Design

The study employed a quasi-experimental design to examine the links between students’ activity levels and food choices and their levels of obesity. The data were collected from a questionnaire completed by 40 fifth grade students at two suburban elementary schools in the Sacramento area. The information regarding the food choices and physical activity practices of the students was compared to the students’ BMI index-for-age percentile score calculated from their height and weight. Comparisons were tested incorporating the participants BMI percentile-for-age and their individual lunch option selected for significance using an ANOVA analyses.

Research Questions

The primary research focus in the study was: Are school lunch programs a factor contributing to the increase of childhood obesity? Specifically, the following questions guided the data collection and analysis:
1. What are the obesity levels of elementary school aged children, as defined by the participants’ Body Mass Index (BMI) and BMI index–for- age percentile scores?
2. What are the food choices of elementary school aged children?

3. What are the physical activity levels of elementary school aged children?

4. Are there gender differences in obesity levels of elementary school aged children?

5. Is there a relationship between elementary students’ BMI index-for-age percentile scores and their school lunch choices?

**Participants and Setting**

The participants in this study were 40 students recruited from two public elementary schools in the Sacramento area. There were 15 males and 25 females, and the participants’ ages ranged from 9 to 12 years, with a mean age of 10 years. The ethnic diversity among the students was similar within the two schools, and consisted of the following groups: African American (2 males, 1 female), Asian (3 males, 3 females), Caucasian (4 males, 6 females), Hispanic (2 males, 2 females), Laotian (2 females), Native American (1 female), Filipino (2 males, 3 females), Russian (2 females), and other (2 males, 5 females). The two participating schools were located in a newly developed upper middle class community in an outlying suburban area of Sacramento, California. School number one had been in operation for close to six years, and school number two had been open for four years. Neither of the two participating schools were a Title 1 school. The researcher had no affiliation with the schools where the data were collected nor had any prior contact with school personnel or students. To recruit participants, the
researcher visited with principals at the two selected schools to secure their permission to conduct the study.

**Procedures**

Six hundred and twenty packets with questionnaires, assent and consent forms were sent home with all fifth grade students at three different schools. A total of 40 packets with consent and assent signed by both student and parent were returned and used in the current study (Appendix C). Then each student completed the student based questionnaire instrument, which elicited information about food choices, physical activity and family demographics. The researcher also gathered information about students’ obesity by computing a Body Mass Index (BMI) score for each student using height and weight information obtained by the physical education teacher. The researcher used this BMI score to compute a BMI index-for-age percentile score for each student. In addition, a lunch menu was collected from each of the two schools to provide the researcher an idea of the types of foods being served (Appendix E.). The following data was collected from the 40 participants within this study and are parallel with national statistics. Thirteen students (33%) fell into the lower percentiles (0-30th) for BMI index-for-age. Another seven students (18%) clustered in the middle range of the 50th-69th percentiles. Three students (7%) were categorized as at risk of being overweight; these were students who fell into the 85th-89th percentiles. Two participants (5%) who fell into the 90th-94th percentiles would be categorized as overweight. Finally, five of the
students (12%) would be categorized as obese by virtue of their falling into the 95th or higher percentile. Among the 40 total students, 25% of the students (n=10) fell into the at-risk, overweight or obese percentile categories.

**Measures**

In order to examine the links between children’s food choices, physical activity and levels of obesity, the researcher used two primary data sources for the study. First, students completed a questionnaire about their food choices, physical activity and family demographics. Second, the researcher derived a BMI score for each of the 40 students, and then plotted this score on the BMI index-for-age percentile chart. This information was then used to produce a measure of obesity.

**Body Mass Index Scores**

The Body Mass Index (BMI) is a nationally recognized measure used to determine if an individual is underweight, overweight, obese, or at an appropriate weight range for the person’s height and body stature (CDC, 2010). There are two different BMI scales; one is used for males ages 2-20 years and the other for females ages 2-20 years (Appendix D). An individual’s height and weight is used to compute a BMI score. This score is then plotted on the gender appropriate BMI index-for-age percentile chart in order to derive a percentile score which is used as a measure of the individual’s obesity. According to the CDC (2010), using the index-for-age percentile score is a better
indicator of a child’s risk of obesity, since the base BMI score that reflects a healthy weight in a 9 year old may reflect a serious health risk for an 11 or 12 year old.

In the current study, the researcher obtained height and weight data for each participating student from the schools’ Physical Education teachers. The height and weight data were entered into the BMI calculator on the CDC website to obtain a BMI score. This score was plotted on the BMI index-for–age chart to produce an index-for-age percentile score for each child. These percentile scores were used to identify instances of obesity among the participants. The BMI index-for-age percentile scores were used in the ANOVA analyses examining food choices and occurrences of obesity. The identified categories are further explained within the Histogram located in Figure 2.

**Student Questionnaire**

Data related to the students’ family demographics, food choices and physical activity were collected through a student completed questionnaire (Appendix C). This questionnaire inquired about each student’s eating choices and physical activity practices and included general questions regarding age, gender, and ethnicity. For each question, participants were asked to fill in one answer only from among several choices (1 to 2 days a week, 3 to 4 days a week, 5 days a week, or not at all). The following are sample questions from the questionnaire:

1. How often do you eat lunch provided by the school? (The school lunch that is not the vegetarian alternative choice).
2. How often do you eat the vegetarian alternative school lunch?
3. How often do you bring your lunch from home?

**Data Analysis**

Data analysis in the study was conducted in three steps. First, descriptive statistics were computed to summarize students’ family demographic data and BMI scores. Next, an ANOVA was conducted to determine if there were differences in students’ BMI index-for-age percentile scores related to their food choices. The independent variable for analysis was the BMI category determined by the height and weight data: normal, overweight, or obese. The dependent variables included the students’ ratings of food choices in the following categories: (a) the frequency with which children ate lunch provided by the school, (b) the frequency with which children ate the alternative vegetarian lunch and (c) the frequency with which children brought their lunch from home.
Chapter 4

RESULTS

This chapter presents the results of the analyses, beginning with the descriptive data related to the students’ BMI scores, including both base and index-for-age percentile scores. This is followed by a summary of the students’ physical education practices, food choices and preferences from the questionnaire. Finally, results of the ANOVA analyses are presented.

**Students’ BMI Scores**

In order to determine levels of obesity, the researcher computed two scores for each student. The first score was a base BMI score computed using height and weight. Figure 1 presents a pictorial description of these raw scores. This information was calculated by entering each student’s height and weight into the BMI calculator located on the Centers for Disease Controls (CDC) website. As shown in Figure 1, the lowest BMI score recorded among the participants was 8 and the highest score was 29. Only two students had a BMI under 10, and only four students had a BMI above 25. The majority of the students had a BMI score between 15 and 20. A breakdown of instances of overweight, underweight, or levels of obesity is further identified in table 2.
Figure 1.

Students’ BMI Scores
Next, each student’s base BMI score was converted into a BMI index-for-age percentile score using the CDC’s index-for-age chart (Appendix D). Figure 2 presents a pictorial representation of these data. Thirteen students (33%) fell into the lower percentiles (0-30th) for BMI index-for-age. Another seven students (18%) clustered in the middle range of the 50th-69th percentiles. Three students (7%) were categorized as at risk of being overweight; these were students who fell into the 85th-89th percentiles. Two participants (5%) who fell into the 90th-94th percentiles would be categorized as overweight. Finally, five of the students (12%) would be categorized as obese by virtue of their falling into the 95th or higher percentile. Among the 40 total students, 25% of the students (n=10) fell into the at-risk, overweight or obese percentile categories. The given data is closely comparable to national averages in relation to the statistical accounts of the various levels of obesity and approaching obesity rates among children of the same age and weight and height.

Figure 2.

Students’ BMI Index-for-Age Percentile Distribution.
Students’ Food Choices and Physical Activity

Students’ food and physical activity choices were determined through responses to items on the questionnaire (Appendix C). The following summarizes student responses to the questionnaire.

Lunch Choices

Items 1-3 of the questionnaire asked students to record their lunch food choices, including their frequency of selection of the school lunch, vegetarian school alternative or lunch brought from home.

Table 1

Students’ Reported Lunch Choices

<table>
<thead>
<tr>
<th>Students’ Lunch Choices</th>
<th>1-2 days</th>
<th>3-4 days</th>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>School lunch</td>
<td>9</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Vegetarian option</td>
<td>14</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>Lunch from home</td>
<td>7</td>
<td>31</td>
<td>0</td>
</tr>
</tbody>
</table>
There was some confusion among the students as to how to record their answers to these items on the questionnaire. This confusion was a result of the wording of the items. The answer choices provided to the students asked them to choose from 1-2 days per week, 3-4 days per week and 5 days per week. Some students chose 3-4 days per week for each lunch option, resulting in a total number of lunch selections exceeding a five day school week. The participants’ reported food choices consisted of both the school and vegetarian lunch option, as well as lunch from home throughout a week’s course. This was the pattern for each of the lunch choices. For example, many students reported that they consumed the school lunch 3-4 days per week, the vegetarian lunch 1-2 days per week and also brought their lunch from home. Given the fact that there is only a five day school week this made it difficult to report the actual days per week each lunch choice was chosen by the participants.

The majority of students chose each of the three lunch choices on a frequent basis (3-4 times week). In addition, students reported eating the school lunch about as frequently as they reported bringing lunch from home. Finally, the vegetarian option appeared to be popular with a majority of students, though the frequency of students who reported eating this choice 3-4 times a week was slightly less than that reported for the other two choices.

**Physical Activity**

Two items in the questionnaire asked students to report their levels of physical activity at school and at home. A third item asked them to describe the types of physical
activities in which they engaged. Table 2 represents the minutes and days that each participant reported being involved with physical activity at home or at school. Since Physical Education classes are held twice a week for all students at both schools, all 40 students reported engaging in P.E. two days per week. Each school also has three 15-minute recess blocks daily that are also counted as activity minutes. Thus, all 40 participants reported engaging in recess three to four times per week. Finally, all 40 students reported that they either play daily after school actively or are involved with organized sports activities or classes.

Table 2

*Students’ Reported Frequency of Physical Activity*

<table>
<thead>
<tr>
<th>Students’ Place of Physical Activity</th>
<th>1-2 days</th>
<th>3-4 days</th>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.E. at school</td>
<td>40</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>School recess</td>
<td>0</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>After school sports or sports classes</td>
<td>40</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Other Food Choices**

The final three items in the survey asked students to record their favorite food choices for meals other than lunch. These responses were summarized into two
categories: carbohydrates and protein. Because of frequency of response, cereal was recorded as a separate category for the question related to breakfast. The other choices that were recorded for breakfast were categorized as carbohydrates; examples were pancakes, waffles, toast, and bagels.

Table 3

*Frequencies of Participants’ Favorite Food Choices for Breakfast and Dinner*

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breakfast</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cereal</td>
<td>8</td>
<td>13</td>
<td>53%</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>5</td>
<td>3</td>
<td>20%</td>
</tr>
<tr>
<td>Protein</td>
<td>5</td>
<td>6</td>
<td>28%</td>
</tr>
<tr>
<td><strong>Dinner</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>9</td>
<td>14</td>
<td>58%</td>
</tr>
<tr>
<td>Protein</td>
<td>9</td>
<td>8</td>
<td>43%</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>8</td>
<td>15</td>
<td>58%</td>
</tr>
<tr>
<td>Protein</td>
<td>10</td>
<td>7</td>
<td>43%</td>
</tr>
</tbody>
</table>

Carbohydrates reported for breakfast foods included toast, muffins, pop-tarts, and waffles. For the dinner question, carbohydrates reported included pasta, pizza, burritos, and noodles. Protein choices reported for dinner included steak, chicken, shrimp and fish. The favorite type of food choices were listed as protein; steak, chicken, hamburgers,
hotdogs, shrimp, and seafood. The carbohydrates recorded within the dinner choices were listed as pizza, pasta, and noodles.

A majority of students (n=29) reported eating some form of carbohydrate for breakfast, with over half (53%) of the students consuming cereal. Slightly more than a quarter (28%) of the students reported eating protein for breakfast. Students did report consuming more protein (48%) at dinner, but the number of students consuming carbohydrates at dinner (n=23) was only slightly lower than for breakfast. A similar pattern was found in students’ reporting of their favorite food choices, with 58% choosing carbohydrates and 43% choosing protein.

**Gender and School Lunch Choice Differences in BMI Scores**

A t-test analysis was conducted to determine if there were differences in students’ BMI scores related to gender. The results of this t-test were not statistically significant, suggesting that in this sample, BMI scores for girls and boys were not different. In order to examine the relationship between students’ mean level of obesity and their lunch food choices, a one way ANOVA was computed. The BMI index-for-age percentile score was used in this analysis along with three categories of student choice related to lunch: regular school lunch; school vegetarian option; and lunch from home. Results did not indicate any significant mean differences (see Table 4).
Table 4

*Means and Standard Deviations for BMI Percentile Scores by Lunch Choices*

<table>
<thead>
<tr>
<th>Lunch Option</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School Lunch</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No school lunch</td>
<td>5</td>
<td>70.60</td>
<td>25.39</td>
</tr>
<tr>
<td>0-2 days</td>
<td>4</td>
<td>42.75</td>
<td>30.35</td>
</tr>
<tr>
<td>3-5 days</td>
<td>5</td>
<td>60.20</td>
<td>32.66</td>
</tr>
<tr>
<td>5 days</td>
<td>26</td>
<td>55.12</td>
<td>36.10</td>
</tr>
<tr>
<td><strong>Vegetarian Lunch</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Vegetarian lunch</td>
<td>25</td>
<td>58.08</td>
<td>34.68</td>
</tr>
<tr>
<td>1-2 days</td>
<td>9</td>
<td>51.00</td>
<td>28.65</td>
</tr>
<tr>
<td>3-4 days</td>
<td>5</td>
<td>49.80</td>
<td>39.82</td>
</tr>
<tr>
<td><strong>Lunch from home</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No home lunch</td>
<td>28</td>
<td>56.46</td>
<td>34.49</td>
</tr>
<tr>
<td>1-2 days</td>
<td>6</td>
<td>50.33</td>
<td>37.27</td>
</tr>
<tr>
<td>5 days</td>
<td>5</td>
<td>58.40</td>
<td>31.79</td>
</tr>
</tbody>
</table>
Chapter 5

DISCUSSION

The following discussion of the results of this research is organized around the questions framed in Chapter One: Do National School Lunch Programs that serve 31 million students daily in the United States of America contribute to the current rise of childhood obesity rates? Addition research questions included (a) What are the obesity levels of elementary school aged children? (b) What are the food choices of elementary school-aged children? (c) What are the physical activity levels of elementary school-aged children? (d) Are there gender differences in obesity levels of elementary school-aged children? (e) Is there a relationship between elementary students BMI-for-age percentile scores and their school lunch choices? This study addressed these questions by examining the relationship between children’s lunch choices, including those provided by school lunch programs, and students’ levels of obesity. Results of the study are discussed below, including limitations of the research.

Major Findings

There were three sets of analyses in the current study. First, descriptive analyses revealed that the participants’ BMI scores were consistent with national data. This means that within current reported data children and adolescents who are of specific ethnicities such as Mexican –American and African American report higher BMI scores as well as
higher numbers in weight recordings. This was evident within this study. However given the fact that this studies sample size was so small there was not a measurable account among the various groups. There were differences reported within these groups within the ANOVA. These numbers were further influenced by the food choices that were made by the students as well as the activity levels reported by the individuals.

Second, a t-test comparison of BMI scores and gender resulted in non-significant findings. These results are inconclusive due to the fact that there were not substantial differences in what each participant ate for lunch and the multiple reporting of physical activity practices. Another component that may have led to these findings was the participants’ responses within their questionnaire. All participants consumed all three lunch choices during a week’s time. They also responded that they participated in P.E. classes two times per week as mandated by the schools, as well as were active at recess (daily) and after school activities or sports programs and/or sports related classes. Such lack of variability in the scores made it difficult to find differences.

Third, an ANOVA comparing BMI groupings as a function of lunch choices also resulted in no significant findings. This in turn can be due to the fact that all participants consumed all three lunch choices within one school week. It should be noted that this analysis did not take into account the ages of the participants, which ranged from 9-12 years. This could be an important factor to be considered, since a BMI score for a 9 year old female would likely be very different from that of a 12 year old male.

One factor that may have complicated the ANOVA analysis was the wording of the questions in the questionnaire, which asked students to indicate their lunch selections
using several options that described a frequency range. For example, students were to indicate whether they chose the school lunch 1-2 days per week, 3-4 days per week, or 5 days a week. This was the pattern for each lunch choice (vegetarian lunch option, school lunch, and lunch brought from home). As noted above, many students reported that they consumed the school lunch 3-4 days per week and the vegetarian lunch 1-2 days per week and also brought their lunch from home. Given the fact that there is only a five day school week this made it difficult to determine the actual days per week each lunch choice was eaten by the participants. This information was taken directly from the self-report questionnaire where the students were asked to record the lunch option they ate provided by the school. A factor in these data was that the questions within the questionnaire were answered using a range, for example the students responded they chose the school lunch 1-2 days per week, 3-4 days per week, or 5 days a week. This was the pattern for each lunch choice, vegetarian lunch option, school lunch, and lunch brought from home. This recording of data reflected additional lunch choices consumed within a five day school week. Many students reported that they consumed the school lunch 3-4 days per week and the vegetarian lunch 1-2 days per week and also brought their lunch from home. Given the fact that there is only a five day school week this made it difficult to report the actual days per week each lunch choice was chosen by the participants. Thus, the data may reflect an inaccurate count of the lunch choices consumed in a five day school week and this inaccuracy may have contributed to the inconclusive result in the ANOVA.
**Body Mass Index Controversy**

Given the fact that the Body Mass Index is a measurement of a person’s height and weight and does not take into account genetics or contribution of muscle mass to a person’s body weight, there is controversy that surrounds the Body Mass Index as a valid measure of health by itself. For example, an athlete whose BMI is above the 95th percentile among adolescents of the same age would be categorized as obese or overweight. However, this individual’s greater body weight could be due to a much larger muscle mass compared to other non-athletes of the same age. The percent of body fat that is associated with health risks of elevated body weight while in abundance of muscle mass is associated with better health. In the case of this athlete it is misleading to classify this as obese based on BMI alone. To obtain a more accurate measure of obesity, all of these elements – fat, muscle mass, height, and weight - would have to take into consideration.

For the purposes of this particular research study the participants’ height and weight were the only measurements used in the determining the BMI percentile, thus in turn recording instances of over-weight and or obesity rates. Given the fact that the researcher had no record of each students muscle mass, or genetic history these could not be taken into consideration in the determining their influence on BMI percentile.

Furthermore, in closely examining the participants’ ethnic identity and recorded height and weight it was determined to be in line with current literature which suggests that instances of childhood obesity rates are higher in the African American and Mexican
ethnicity realms. A true account of specific obesity rates would need to record instances of body type, genetic make-up in order to gain a more authentic account of obesity rates.

**Limitations**

In addressing the results of this study there were many factors that lead to an outcome of non-significant results. The following description addresses these attributes that support the study’s results.

As previously mentioned, confusion and lack of precision on the questionnaire may have produced error variance in the comparison analyses. This researcher therefore recommends that future surveys provide more precise choices for students’ responses. A response question should have been written as how many days per week do you eat the school lunch? The choices provide should have been more specific; where the answer would have stated: one day per week, two days per week, three days per week four days per week or five days per week. By changing the word choices within the questionnaire this would have eliminated much of the confusion with the incorrect reporting of the results of the food choices made.

Another weakness of this particular study would be the sample size. Initially 620 questionnaires were distributed to three schools. The fact that only 40 surveys were collected is a substantial weakness to the study. Another weakness to the study’s findings were that all of the participants were mandated by the schools to participate in Physical Education courses two days per week for 45 minute sessions and that all recess activity a
total of 45 minutes per day was counted as additional physical activity minutes. All participants reported participating in daily physical activity at home the minimum being two days per week the maximum being 5-7 days per week. Thus, there was no variability to the responses to the physical exercise question.

An additional factor that influenced the accurate recordings of the lunch choices that were consumed was the self-report nature of the questionnaire. The participants recorded the information according to the questions asked on the student based questionnaire. It is not known if some or all of the questions were completely understood by the participants before they were answered, if they answered the questions truthfully providing authentic data to be used in conjunction within this research study. All of these factors in conjunction contributed to the limitations to this particular research studies finding. One final limitation would be to have had a controlled experiment within this research study. By providing this aspect to the study the end results would have had a very different outcome.

Conclusions and Recommendations

The complications of obesity are many and according to the CDC (2010); approximately nine million children and adolescents between the ages of 6-19 years are classified as overweight. Furthermore, many of these children and adolescents are meeting the criteria for being classified as obese. The U.S. Department of Health and Human Services (2010), state that children who are overweight can develop serious
health problems, such as elevated blood pressure and cholesterol, joint problems, type II diabetes, gall bladder disease, asthma, depression, and anxiety disorders. Satcher (2005) contends that between 70-80% of children and adolescents who are obese consequently become obese adults. As children are growing into young adults the importance of proper nutrition is a key factor in setting the stage for a healthy lifestyle. Taking an active role in one’s health and physical fitness can ultimately combat the instances in obesity rates.

Puhl and Latner (2007) further state that instances of obesity in adolescents may develop into serious social and emotional problems in the mid to late adolescent years. In addition instances of depression coincide closely with those who suffer from obesity and obesity related issues. All of these elements in conjunction have the potential to lead one into a spiraling effect of negative self-perception and worthlessness. The physical depiction of an obese person plays a role in others perceptions of them as individuals and may hinder others from forming meaningful relationships with those who are in need of compassion and support especially if they are experiencing instances of situational depression due to the current stages of their life situation

A component that was researched within this study was the involvement of physical activity among the participating students. Participating students were mandated by the schools to participate in physical education classes for one 45 minute period two times per week. The students’ daily recess times of three 15 minute blocks also counted towards physical activity minutes throughout the school week. Furthermore the 40 participants also reported that they all participated in physical activity outside of school. These activities consisted of organized sports, martial arts, soccer, baseball, swimming,
and gymnastics, as well as free play choices at the park or after school games with peers. This is good news given the documented importance of physical activity in staving off obesity (citation).

According to Pyle and Poston (2006) children and adolescents who are overweight tend to be more inclined to become obese adults this in turn can lead to a lifelong struggle with obesity and the diseases associated with it. By becoming aware of the attributes that lead to obesity one can take an active role in the prevention of this disease before serious health concerns or risks have been experienced. The USDA (2010) suggests following nutrition guidelines where fat and calories are adequate to properly nourish a growing adolescent’s body. By following these guidelines a growing adolescent will develop properly through gaining nutrients from various foods within the food groups. This regimen will allow one to develop a healthy body and mind and establish a pattern of proper nutrition that will aide in the maintenance of a healthy body image.

Future research should take into consideration of what our public schools are providing to our students from physical education practices to the types of meals that are provided for their consumption. An additional element that must be considered are the drastic budget cuts that public schools are currently facing, as well as recognizing that not all programs even though necessary for our children’s health benefits will not be able to be met within the parameters of the current education system. Future research must also consider that instances of obesity are not a primary concern for some families and through providing specific facts related to the disease may provide them with
opportunities to make educated choices that may aide in the physical development of their children and families.

The researcher recommends on the basis of the information collected from the related literature and the analysis of information obtained from the ANOVA, and descriptive statistics, as well as the student based questionnaire that parents should be aware of the increased occurrences of childhood obesity and how the link between modeling and providing appropriate nutrition practices at home may aid in the sound nutrition practices that their children make while they are at school. The increase of daily physical activity contributes to the physical need of a growing body where activity aids in the development of muscles coordination, and agility. The increase of a well-balanced diet along with daily physical activity practices all contribute to a properly nourished healthy active child. All of these attributes in conjunction have the ability to shape the way that one decides to manage and maintain a healthy body. It is critical to understand that obesity and the many stigmas and complication thereof can be changed with the influence and guidance of those who are able to provide a sound support system with knowledge regarding proper food and exercise choices that are needed to maintain a healthy active lifestyle.
Dear Students,

My name is Melissa Stroben; I am currently working on my Masters Degree at California State University Sacramento, where I am researching childhood health patterns and school lunch programs. I would like to ask you about your food preferences and physical activities as well as ask about your gender and ethnicity. If you choose to participate in my study you will be asked to fill out the attached questionnaire. Furthermore your height and weight will be taken from the physical fitness gram test recordings that are administered at your school. This information will help child development researchers understand the ways in which students’ food choices and amount of physical activity play a part in their physical development. If you choose to participate in this study, I want to assure you that your participation is completely voluntary and that all information you give me is confidential.

For the protection of your identity, your name will be kept out of the research study; it will only be used to match the parental consent form that your parents or guardians must sign in order for you to participate, as well as match with school records. Instead of using your name, I will give you a number to match your questionnaire and your school records throughout the study. Your participation with this questionnaire is voluntary. You do not have to answer the questions if you do not want to.

The CSUS Child Development Department phone number is 278-3788 if there are any questions that you may have regarding this study. I can be reached at (916) 419-8094 if you have any further questions regarding this questionnaire.

Thank You, Melissa Stroben

Please print your name here ____________________________________
Dear parents and/or guardians,

My name is Melissa Stroben. I am currently a graduate student at California State University Sacramento, where I am working on my Masters degree in Early Childhood Education. I am researching childhood health patterns and school lunch programs. I am writing to obtain your written consent for your child to fill out a questionnaire on their typical school lunch choice and physical activities. Upon your consent, I also plan on obtaining your child’s height and weight from the physical fitness gram test that is administered by the Physical Education teacher. I want to assure you that this study does not evaluate individual student’s eating and physical fitness habits but instead examines more general group patterns such as those related to gender and age level. Your child’s name will not be included in the research. To further protect your child’s identity, each participant will be given an identifying number that will be used within the study. The questionnaires will be stored in a separate place that the consent letters and will be destroyed after the answers are compiled and analyzed. I have attached a questionnaire for you to view the questions being asked of your child. Please have your child fill in the answers to the questionnaire and return it to his or her teacher.

I do not anticipate any risks related to filling out the questionnaire. Your child’s participation is greatly appreciated because it will help child development researchers understand links among what children eat, how much they exercise, and typical physical development of adolescents.

I would like to thank you for this opportunity to obtain your child’s input and for participating in my research collection. If you have further questions I can be reached at (916) 419-8094. Your child’s participation is completely voluntary and he or she does not need to participate in this questionnaire if he or she so chooses. The CSUS Child Development Department phone number is 278-3788 if you have further questions regarding this study or questionnaire.

Thank you again for your consideration,
Melissa Stroben

Please return this page with your signature, your child’s name and the attached questionnaire to your child’s teacher.

I give my consent for my child to participate in the attached questionnaire provided.

Signature_____________________________________________________

Child’s name__________________________________________________
APPENDIX C
Student Questionnaire

Please fill in only one bubble for each question.

Name ____________________________

1) How often do you eat lunch provided by the school? (The school lunch that is not the vegetarian alternative choice)
   ○ 1 to 2 days a week
   ○ 3 to 4 days a week
   ○ 5 days a week
   ○ not at all

2) How often do you eat the vegetarian alternative school lunch?
   ○ 1 to 2 days a week
   ○ 3 to 4 days a week
   ○ 5 days a week
   ○ not at all

3) How often do you bring your lunch from home?
   ○ 1 to 2 days a week
   ○ 3 to 4 days a week
   ○ 5 days a week
   ○ not at all

4) How often do you participate in Physical Education (P.E.) classes at school?
   ○ 1 to 2 days a week
   ○ 3 to 4 days a week
   ○ 5 days a week
   ○ not at all
5) How often do you engage in physical activity at home?
   - 1 to 2 days a week
   - 3 to 4 days a week
   - 5 to 7 days a week
   - not at all
   - What kinds of physical activity do you engage in? Please write a response here.

6) How old are you?
   - 9 years old
   - 10 years old
   - 11 years old
   - 12 years old

7) What is your gender?
   - I am a male (a boy)
   - I am a female (a girl)

8) What race/ethnicity do you consider yourself to be?
   - African American
   - Asian
   - Caucasian
   - Filipino
   - Hispanic
   - Hmong
   - Laotian
   - Native American
   - Russian
   - Other

9) What is your favorite food to eat for breakfast?

10) What is your favorite food to eat for dinner?

11) What is your favorite type of food?
APPENDIX D
BMI for Age Percentile Charts

2 to 20 years: Girls
Body mass index-for-age percentiles

<table>
<thead>
<tr>
<th>Date</th>
<th>Age</th>
<th>Weight</th>
<th>Stature</th>
<th>BMI*</th>
<th>Comments</th>
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*To Calculate BMI: Weight (kg) + Stature (cm) + Stature (cm) x 10,000 or Weight (lb) + Stature (in) - Stature (in) x 0.105

Published May 30, 2000 (modified 10/1/99).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (1999).
http://www.cdc.gov/growthcharts
APPENDIX E
Sample School District Lunch Menu

Elementary Lunch Menu

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>American Favorite</strong> Sloppy Joe On Whole Wheat Bun Seasoned Corn Milk</td>
<td><strong>Kid's favorite</strong> Turkey Corn Dog Mustard Season Oven Fries Peach Cup Milk</td>
<td><strong>OLE!</strong> Cheese Enchilada Salsa Broccoli Bites Ranch Dressing Apples Milk</td>
<td><strong>Southern Favorite</strong> Roast Chicken Potato Wedges Buttermilk Biscuit Kiwi Fruit Milk</td>
<td></td>
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<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td><strong>Flexible Day</strong> Waffles &amp; Eggs Maple Syrup Banana Milk</td>
<td><strong>South Border</strong> Beef Soft Taco Flour Tortilla Corn Cobbette Blueberry Cup Milk</td>
<td><strong>Home Favorite</strong> Tuna Salad with Crackers Celery Sticks Cherry Ice Milk</td>
<td><strong>Kid's Favorite</strong> Crispy Chicken Sandwich Seasoned Oven Fries Spiced Apples Milk</td>
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</tr>
<tr>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td><strong>OLE!</strong> Chicken Fajita Flour Tortilla Salsa &amp; Sour Cream Baked Apples Fruit Milk</td>
<td><strong>Italian Classic!</strong> Pasta &amp; Meat Sauce Caesar Salad Italian Orange Ice Milk</td>
<td><strong>MANAGERS CHOICE</strong> Milk</td>
<td><strong>NO SCHOOL</strong></td>
<td><strong>NO SCHOOL</strong></td>
</tr>
</tbody>
</table>

Vegetarian Entrees Options or Vegetarian Salad Available Daily. Must Pre-order Vegetarian Entrees!

Low-fat Milk Choices Daily
You may qualify for free lunch or reduced price meals Applications are available at all schools and the district office Lunch price $2.50 paid $.40 reduce
Elementary Lunch Menu

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>American Favorite</strong>&lt;br&gt; Turkey Corn Dog Mustard&lt;br&gt; Seasoned Corn Millet&lt;br&gt; Broccoli Bites&lt;br&gt; Ranch Dressing&lt;br&gt; Apples&lt;br&gt; Milk</td>
<td><strong>Kid’s favorite</strong>&lt;br&gt; Turkey Corn Dog Mustard&lt;br&gt; Seasoned Corn Millet&lt;br&gt; Broccoli Bites&lt;br&gt; Ranch Dressing&lt;br&gt; Apples&lt;br&gt; Milk</td>
<td><strong>OLE!</strong>&lt;br&gt; Cheese Enchilada Salsa&lt;br&gt; Broccoli Bites&lt;br&gt; Ranch Dressing&lt;br&gt; Apples&lt;br&gt; Milk</td>
<td><strong>Southern Favorite</strong>&lt;br&gt; Roast Chicken&lt;br&gt; Potatoes Wedges&lt;br&gt; Buttermilk Biscuit&lt;br&gt; Kiwi Fruit&lt;br&gt; Milk</td>
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<td>7</td>
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<td>10</td>
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<tr>
<td><strong>Wok</strong>&lt;br&gt; Chicken Teriyaki&lt;br&gt; Steamed Broccoli&lt;br&gt; Steamed Rice&lt;br&gt; Fortune Cookie&lt;br&gt; Orange&lt;br&gt; Milk</td>
<td><strong>Flexitarian Day</strong>&lt;br&gt; Waffles &amp; Eggs Maple Syrup&lt;br&gt; Bannana&lt;br&gt; Milk</td>
<td><strong>South Border</strong>&lt;br&gt; Beef Soft Taco&lt;br&gt; Flour Tortilla&lt;br&gt; Corn Cobbette&lt;br&gt; Blueberry Cup&lt;br&gt; Milk</td>
<td><strong>Home Favorite</strong>&lt;br&gt; Tuna Salad with Crackers&lt;br&gt; Celery Sticks&lt;br&gt; Cherry Ice&lt;br&gt; Milk</td>
<td></td>
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<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td><strong>OLE!</strong>&lt;br&gt; Chicken Fajita&lt;br&gt; Flour Tortilla&lt;br&gt; Salsa &amp; Sour Cream&lt;br&gt; Baked Apples&lt;br&gt; Fruit&lt;br&gt; Milk</td>
<td><strong>Italian Classic!</strong>&lt;br&gt; Pasta &amp; Meat Sauce&lt;br&gt; Caesar Salad&lt;br&gt; Italian Orange Ice&lt;br&gt; Milk</td>
<td><strong>MANAGERS CHOICE</strong>&lt;br&gt; Milk</td>
<td><strong>NO SCHOOL</strong></td>
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<td>18</td>
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<td>18</td>
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<tr>
<td><strong>NO SCHOOL</strong></td>
<td><strong>NO SCHOOL</strong></td>
<td><strong>MANAGERS CHOICE</strong>&lt;br&gt; Milk</td>
<td><strong>NO SCHOOL</strong></td>
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