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The effects of childhood obesity on elementary school absenteeism

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THE EFFECTS OF CHILDHOOD OBESITY ON ELEMENTARY SCHOOL ABSENTEEISM

A Thesis

Presented to the

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by

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ABSTRACT

Research on childhood overweight has elicited great concern about the increasing number of children and adolescents who are overweight. A multitude of research studies, using different methods and demographic variables, conclude that childhood and adolescent overweight is on the rise worldwide. The Center for Disease Control (CDC) has defined standards for overweight and risk for overweight in children and adolescents.

The purpose of this study was to determine if a relationship existed between body mass index and school absence. The research was a retrospective study of school nurse height and weight reports and attendance reports for 2nd grade Hispanic students at an elementary school in Riverside, California. The height and weight reports were used to determine body mass index (BMI) scores of the students using the CDC's BMI for age growth charts.

The sample was 60% (n=30) male and 40% (n=20) female. The data reflected that of the sample population 44% (n = 22) met the criteria for the 84th percentile of BMI and below (healthy range) and 56% (n = 28) met the criteria for the 85th percentile of BMI and above (overweight or risk for overweight range). Absences ranged from zero to 31 absences over the course of one year,

November 2003 to November 2004. The mean number of absences for the students in the 84th percentile and below were 5.27 (SD = 4.47) and mean absences for students in the 85th percentile and above were 7.46 (SD = 7.89). A t-test revealed no significant difference in absences ($p = .251$) between students with BMI's in the 84th percentile or less and students with BMI's in the 85th percentile or more.

Although no statistical significance was found between the absence rate for students with BMI in the 85th percentile and above and students in the 84th percentile and below the data did show that the students in the higher BMI category were absent approximately two more days per year. The data also showed that male students in the 85th percentile and above were absent three more days per year than female students in the same category.

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CHAPTER ONE

INTRODUCTION

Background

Childhood overweight is rapidly becoming one of the most discussed preventable health issues in today's society. The incidence of childhood overweight has more than doubled since the 1970's and the Center for Disease Control (CDC) estimates that 15% of children and adolescents are overweight (Ogden et al., 2002). The Healthy People 2010 goals reflect a need to reduce the number of children and adolescents who are overweight from 11 percent to 5 percent in children six to 19 years of age (Healthy People 2010, n.d.).

Obesity is defined as an excessively high amount of body fat or adipose tissue in relation to lean body mass (Stunkard & Wadden, 1999). Body mass index (BMI), which is defined as weight in kilograms divided by height in meters squared, has been established as a useful standard measure of overweight and obesity (Hoppin, 2004). The CDC avoids using the term obesity to refer to children and adolescents and instead uses the 95^{th} percentile of BMI as the overweight category, and the 85^{th}-95^{th} percentile as the risk for overweight category (CDC, 2004).

children due to the increase in overweight among children. According to a study done in a New York Head Start Preschool, obese preschoolers had approximately three times the risk of having high systolic blood pressure and twice the risk of low high-density lipoprotein cholesterol level compared with non-obese children (Williams et al., 2004). Other studies suggest an increased risk of type II diabetes, metabolic syndrome, heart disease, cancer and asthma.

Psychological issues that may be associated with childhood obesity are being scrutinized both here and abroad. Recent research studies that explore a relationship between childhood obesity and the development of psychopathology include a 2003 study by Mustillo which found that obesity was linked with psychological developmental trajectories. Another study published in 2004 by Rieder and Friedman explored obesity among inner-city primarily black youth, though they found that there was no increase in psychological pathology among obese students, nor were academics or absenteeism affected. A third study published by Xie (2003) examined weight perception and psychological factors in Chinese adolescents, and found more depression and reported peer isolation among those students that were obese. A fourth a

population-based case-control study by Renman (1999) noted a correlation between depression and oppositional defiant disorder in obese adolescents. A fifth study that examined middle-class African American eight to ten year old girls who were at risk of becoming obese, conducted by Thompson (2003), did not find a strong relationship to psychological or academic problems. These studies suggest that depression, oppositional defiant disorder, and poor self-esteem issues related to peer isolation may be related to childhood overweight; though, Hispanic youth were not specifically studied.

New studies are targeting the fiscal impact of overweight adults. Currently 300,000 deaths a year are related to obesity, and the costs to the United States related to obesity were about $117 billion in 2000 (Overweight and Obesity, 2001). A few research studies are also targeting the increase in school and workplace absence. A 2002 Tasmanian study concluded that between 17% and 25% of students are absent at least one day a week from school (At School, On Time, Ready for Work, 2002).

Most school districts in the United States employ school nurses to safeguard the health of their students. School nurses, who often are advanced practice nurses, are responsible for health education and prevention programs.

Advanced practice nurses in the school setting are witnessing the increase in student obesity during classroom observations, as well as, nursing assessments of injured and well children in the school health offices. Statistics gathered previously in the school district used as the setting for this study reflected an upward trend in obesity and school absences. If a student is absent from school they miss valuable education time, therefore, it is clearly within the scope of the school nurse to investigate possible linkages between student health problems and school attendance.

This raises a number of questions for the advanced practice school nurse to consider which directly impact student health and the school district's economic wellbeing. The school district setting for this study receives funding from the State of California calculated upon the average daily attendance (ADA). Since overweight and health problems are interrelated, it is important to investigate the affect on absence rates. The literature shows that a greater number of Hispanic children are overweight than their non-Hispanic White and African American peers, therefore Hispanic children may be at greater risk for developing more health problems (CDC, 2004). If Hispanic children are at risk for developing

health problems which may lead to illness that affects their ability to attend school, it is sagacious to look for a relationship between childhood overweight and school absence. Due to the high incidence of Hispanic students in the district reviewed for this study coupled with the knowledge that a greater number of Hispanic children are overweight, the school district may be loosing funding due to this health problem. The loss of funding negatively impacts a districts ability to combat the rising numbers of overweight children with needed nutrition and activity programs. Schools with improved funding, through increased school attendance, may be able to offer more services to their students.

Statement of the Problem

It is now, more than ever, the responsibility of the school nurse to make sure children are in school and healthy. School districts are paid by the state and federal government according to how many students are present each day, the term used to describe this occurrence is average daily attendance. In states that use average daily attendance, a single absence could cost the school between $9 and $40 dollars. The school district site for this study loses approximately $36 dollars per

child per day. If the 19,000 children in this district miss 5 days of school per year it would cost the district roughly $3,420,000 each year in state funds. If the school district nurse is able to determine a way to engage the school administration through direct statements of funding loss, the nurse may be able to increase funding for nutrition and activity programs. Through height and weight assessments and the subsequent BMI and absence calculations the school nurse has the necessary tools to state a case for a relationship between childhood obesity and school absence.

Aim of the Study

The aim of this study was to describe the relationship between childhood obesity and school absence in 2nd grade Hispanic students in an urban school district in Riverside, California. It is hypothesized that children with body mass index (BMI) at or above the 85th percentile (in the overweight category) will have a greater number of absences than children with BMI's at or below the 84th percentile (healthy BMI range).

Theoretical Framework

The framework used to guide this study was the Population Health Approach (Huff & Kline, 1999). The aim

of the Population Health Approach framework is to maintain and improve the health status of the entire population and to reduce inequalities in health status between groups and/or subgroups (A Population Health Approach, n.d.). This framework uses "determinants of health" or the factors that affect and impact health which include, culture, socioeconomic status, social support networks, education, work setting, physical setting, environment, genetics, personal health behaviors, health services, including child development. Population Health is a framework that targets a community to comprehensively address health issues in order to have an impact at the population or group level. Height and weight screening in the elementary school are measured to assess for evidence of the health concern of overweight in the student population. Height and weight measurements are used to calculate the student's BMI percentile and compared to CDC guidelines for BMI percentile for age. This data provides evidence that a problem exists in the school population in this study.

The Population Health Approach framework focuses on decisions about planning, investment and policy based on evidentiary research. The results from BMI calculations when compared with school absence provides meaningful data

to prioritize the decision making process. Population Health Approach principles state that quantitative data, estimating size and scope of the health problem can identify health outcomes in vulnerable populations. For the purpose of this study the vulnerable population is the Hispanic student population who may not have access to health exams, including height and weight screening.

This framework emphasizes a multidisciplinary and flexible approach to problem solving. It requires collaboration between multiple sectors including health services, school administration, community members and public and private organizations. Providing data to these sectors that outline the problem of childhood overweight as it relates to school attendance is one of action strategies discussed in the Population Health Approach framework.

Theory Application

This study focused on a vulnerable sub-population of second grade Hispanic boys and girls at an elementary school in Riverside, California. The BMI percentile calculated from height and weight screening provided data used to classify levels of normal and at-risk/overweight status. Due to the low socioeconomic status of the school

for this study, children may not be seen for routine physical exams where BMI percentiles are evaluated. The action strategy is to provide BMI percentile information, coupled with absence data to school administration in order to collaboratively plan a comprehensive school health program.

The theory of Population Health Approach can be applied to a cyclical process that describes how increased BMI can lead to physiological and psychological health problems which can further lead to increased absence which can in turn result in increased BMI. In addition physiological and psychological health problems can each affect the severity of the other and are therefore addressed in Figure 1.

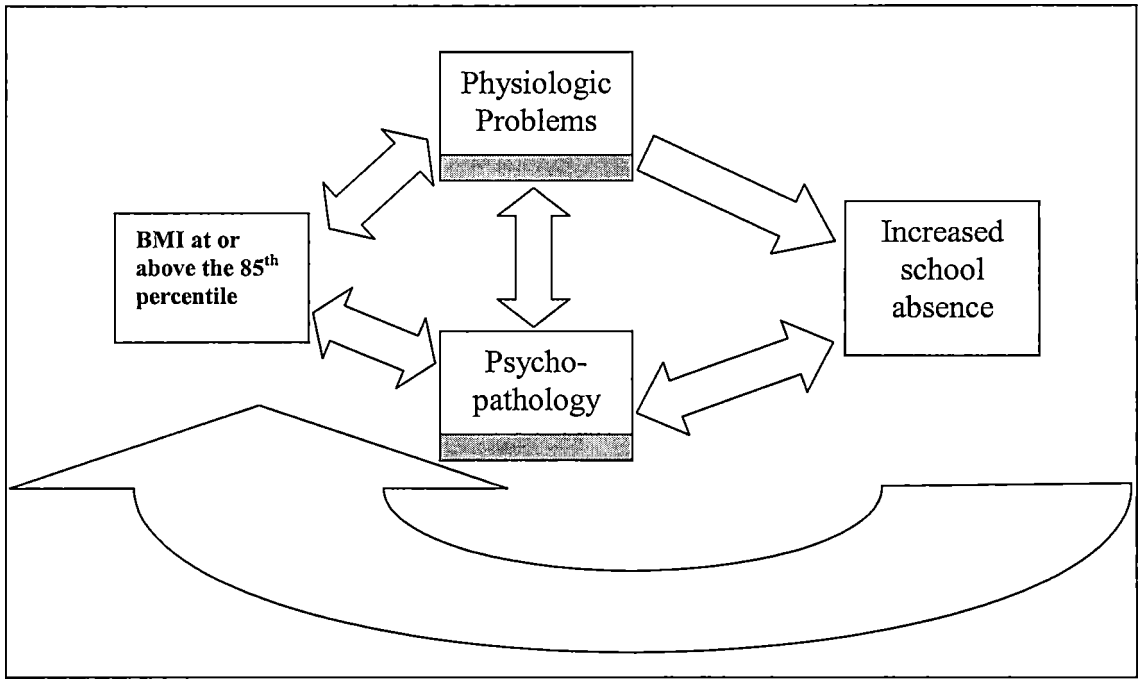


Figure 1. Cycle of Overweight and School Absenteeism

Limitations of the Study

This study has four major limitations. The first limitation of this study is that the sample population came from only one school in Riverside County. A convenience sample was used, which limits the ability to generalize this study to other populations.

The second limitation in this study was that students had to be able to stand and support their weight for height and weight measurements. This excluded children with physical disabilities.

The third limitation of the study was the exclusion of special education students due to the wide variation in ages among the special education classes.

Lastly, because of the high transient population in this particular school, students who were overweight may have moved out of the district before end-of-year measurements could be obtained.

Definition of Terms

Absenteeism/absence - For the purposes of this study an absence would mean a day that the student is not at school, and absenteeism would mean that the student has a habitual failure to attend school.

Body Mass Index - Body Mass Index is defined as a ratio of weight to height. Body Mass Index is calculated by measuring weight in kilograms and height in meters and performing the calculation of weight divided by height squared.

Childhood Overweight - Childhood overweight is defined by the Center for Disease Control as BMI at or above the 95th percentile

Pathophysiological Problems - The pathophysiological problems is defined as the medical problems related to obesity, including hypertension, type II diabetes,

insulin resistance, metabolic syndrome, heart disease, cancer, and asthma.

Psychopathology - Depression, oppositional defiant disorder, and self-esteem issues related to peer isolation are the psychological problems included in this study.

Risk for Overweight - Risk for overweight is defined by the Centers for Disease Control as BMI from the 85th to 95th percentile.

Second Grader - This study considered a second grader to be 7 or 8 years of age and enrolled in the second grade at a Riverside County elementary school.

CHAPTER TWO

REVIEW OF LITERATURE

The number of overweight and obese children in the World has reached epidemic proportions. Obesity occurs when there is an imbalance between caloric intake, metabolism and energy expenditure. Obesity can occur from a myriad of factors including genetic, hormonal, neural, behavioral and societal; although it is believed that behavioral and societal have the greatest impact (Robinson, 2001). Cultural factors also play a role in childhood obesity; many cultures feel that being "chubby" is a sign of health in infants and children (Frost, 2003).

Genetic causes can explain the wide variation of body weight within a given population (Hoppin, 2004). Linkage studies in large populations show that many chromosomal loci have associations to a variety of obesity-related phenotypes, including BMI, leptin levels, fat distribution, and hyperlipidemia (Hoppin, 2004). The biologic mechanisms for the apparent linkage with obesity are still unclear.

Risk factors associated with childhood overweight and obesity include high birth weight, maternal diabetes, and family history of obesity (Holcomb, 2004). It is estimated

that if one parent is obese a child has a three-fold increase for obesity in adulthood. If both parents are obese the child's risk is ten times greater for obesity in adulthood. Before age three, parental weight is more of a risk factor for developing obesity than the child's actual weight (Holcomb, 2004). Low income, low education, absence of family meals, and sedentary behavior are all examples of environmental and societal causes of obesity.

Worldwide Childhood Obesity Research

Worldwide awareness of childhood overweight is demonstrated by the steady rise in research being conducted in many nations besides the United States. Australia, Beirut, Britain, China, Japan, and United Arab Emirates among others have found an increased incidence of childhood overweight and obesity. This prevalence shows that overweight and obesity is a worldwide epidemic.

Almost one-fourth of Australian children ages two to seventeen are overweight (Deakin Research Report, 2004). It is estimated that over the past decade the prevalence of overweight children almost doubled and the prevalence of obese children almost tripled. A higher incidence of overweight and obesity is found in children of particular backgrounds, and maternal education level is the strongest

social determinant of overweight and obesity in childhood (Waters & Baur, 2003). A study done by O'Dea (2000) examined height and weight among 4441 children from 38 schools randomly selected from lists of all state and territory schools in Australia. Schools were categorized as low to middle/high socioeconomic status based on parental income. Overweight and obesity, as defined by an international standard definition, were identified in 17.3% and 6.4% of participants. This study showed that students in low-socioeconomic households had a greater incidence of overweight and obesity.

In a Lebanon, Beirut study done by Jabre, Sikias, Khater-Menassa, Baddoura, and Awada (2005) 234 children, 131 boys and 103 girls, ages 6-8 years were examined for prevalence of obesity. A cross-sectional study with a home interview including measurements of weight and height and a structured questionnaire was administered. Overweight and obesity calculations were based on the international cut-off points for body mass index by age and gender proposed by the International Obesity Task Force. The characteristics of overweight examined in the study were age, gender, household and family size, single vs. two-parent family, parents' level of education and profession, physical activity and dietary intake of

children. The results of the data analysis showed the prevalence of overweight and obesity was 26% and 7% in boys and 25% and 6% in girls. Overweight was found to be significantly associated with low physical activity and mother's BMI.

The United Kingdom is also experiencing increasing levels of childhood overweight and obesity. A 2001 estimate for England showed that 8.5% of 6-year-olds and 15% of 15 year-olds are obese (Parliamentary Office of Science and Technology, 2003). A study by Chinn and Rona (2001) examined 10,414 boys and 9737 girls in England and 5385 boys and 5219 girls in Scotland aged 4 to 11 years to report trends in overweight and obesity. Overweight and obesity results were tabulated using the International Obesity Task Force standards. The researchers found from 1984 to 1994 overweight increased from 5.4% to 9.0% in English boys and from 6.4% to 10.0% in Scottish boys. Values for girls were 9.3% to 13.5% in English girls and 10.4% to 15.8% in Scottish girls. These results show overweight is an increasing problem, and Scottish children appear more overweight than British children.

From 1976 to 2000 Matsushita et al. (2004) studied 29,052 boys and 27,552 girls between 6 and 14 years of age to describe the 25-year changes in BMI and the prevalence

of obesity in Japanese children with special reference to urban-rural differences. The researchers used a cross-sectional annual nationwide survey with trend analyses of data on sex and age groups and on residential areas according to the size of the municipality (metropolitan areas, cities, and small towns). The data was analyzed by BMI results (kg/m2). The results illustrate the prevalence of obese boys and girls increased from 6.1% and 7.1%, respectively, in the time-period 1976 to 1980, to 11.1% and 10.2% in 1996 to 2000. The increasing trend was most evident in 9- to 11-year-old children of both sexes living in small towns, whereas no changes were observed in girls in metropolitan areas (Matsushita et al., 2004). The results of this study show an increase in childhood obesity in Japanese children from 1976-2000.

Al-Haddad, Bertis, Ghafoor, and Ghafar (2005) studied a sample of 16,391 children in the United Arab Emirates (UAE). Height and weight were measured by physicians and trained nurses and body mass index was computed. The results were compared to recently published international standards and revealed that UAE children were at increased risk for overweight and obesity. A ten-year-old male UAE child had 1.7 times the rate of overweight compared to

international standards and 1.9 times at 18 years. Female UAE children have 1.8 times the rate of overweight compared to international standards at 10 and 18 years of age. Obesity was 2.3 times higher in 14 year old UAE males and increased to 3.6 times at 18 years which is 2.3 times higher than the international standard. UAE female and male children had no difference in obesity levels at 14 years, but at 18 years of age female obesity was 1.9 times higher than the international standard, nearly one-half the rate of obesity among UAE males of the same age. This research shows that obesity is a definite problem in United Arab Emirates and is more of an issue in male children than female.

Research conducted in China by Xie (2003) found a statistically significant correlation between obesity and depression, as the overweight Chinese adolescents had more reported depression and peer isolation.

United States Childhood Obesity Research

According to the American Dietetic Association (ADA) 4.7 million youths between the ages of 6-17 are overweight or obese; the number of overweight youths (11%) has more than doubled in the past 30 years (Position of the ADA, 2003). Overweight children are said to have a BMI (Body

Mass Index) above the 95th percentile. Children with a BMI between the 85th and 95th percentile are said to be at risk for being overweight (CDC, 2004).

Obesity is rapidly becoming one of the most important health problems facing us as a nation. Government agencies, such as the National Institute of Health have warned that obesity is one of the most serious preventable causes of health problems in the United States. Currently 300,000 deaths occur a year related to obesity, and costs to the United States related to obesity were about $117 billion in 2000 (Overweight and Obesity: A Vision for the Future, 2001).

In 2003 Arkansas legislature passed Act 1220 which mandated annual body mass index for age (BMI-for-age) to be performed and reported to parents. To comply with this new law Arkansas school nurses measured the heights and weights of more than 400,000 school students during the 2003-2004 school year. Results from their assessments showed that 21% of the students met the CDC criteria for overweight, and 17% were at risk for overweight (Gance-Cleveland & Bushmiar, 2004). The data also showed that a higher percentage of minority youth were classified as overweight or at risk for overweight with 46% of Hispanic youth and 41% of African American youth being

placed in these categories compared to 37% of Caucasian youth (Gance-Cleveland & Bushmiar, 2005).

A research study by Datar, Sturm, and Magnabosco (2004) examined 11,192 first-time kindergartners from the Early Childhood Longitudinal Study (ECLS-K) a nationally representative sample of Kindergartners in the United States in 1998. The researchers studied the association of a child's overweight status in kindergarten and their academic achievement in kindergarten and 1st grade. The children surveyed were individually administered math and reading assessments at four data points from kindergarten to 1st grade. The researchers controlled for socioeconomic status, parent-child interaction, birth weight, physical activity and television viewing. The data showed that 1 in 10 kindergartners were overweight upon kindergarten entry in 1998. Overweight children were more likely to be Hispanic and poor with an uneducated mother compared with non-overweight children. Overweight children had significantly lower math and reading test scores compared with non-overweight children in kindergarten. Both groups were gaining similarly on math and reading test scores, resulting in significantly lower test scores among overweight children at the end of grade 1. These scores became insignificant when compared with socioeconmic and

behavior variables. It was shown that race/ethnicity and mothers education level were bigger predictors of test score levels/gains than overweight status.

A study done by O'brien, Holubov, and Reis (2004) targeted identification, evaluation and management of obesity in children in the academic primary care center. They did a retrospective review of all health supervision for children aged 3 months to 16 years over a 3-month period. A total of 2515 visits were reviewed and data reviewed included child's age, gender, height, and weight. Each chart was read to determine adequate dietary intake, activity history, notation of obesity included in physical exam, and diagnosis of obesity noted in assessment. A total of 244 children met the study definition of obesity which was defined in children aged </ = 5 years as > 120% of the 50^{th} percentile of weight and height and, for children aged >/ = 5 years, a body mass index (BMI) of > 95^{th} percentile for age and gender. Results showed that only half of the obese children were identified by providers and the lowest rates of identification occurred in the children < 5 years old. In the children identified as obese 81% had adequate dietary histories obtained and 71% had dietary changes recommended. Unfortunately only 27% of these children had an activity assessment noted.

The results in the children who were obese and not identified as obese revealed that a diet history was only obtained in half of these children and only two percent had activity history taken. Six percent received dietary counseling and none were advised to increase activity or decrease television viewing. This study is limited by its reliance on provider documentation (O'Brien & Holubkov, 2004). The study does reveal that provider intervention is not being performed at the most crucial time for obesity intervention, the < 5 year age group.

The research by Mustillo (2003) utilized a longitudinal approach in their study design, taking advantage of data being collected in large ongoing studies. Mustillo's group capitalized on the information collected in the Great Smoky Mountains Study (GSMS), where a representative sample, from a total population of 20,000 children, were interviewed by trained professionals annually from 1993-2000. The GSMS studies had large sample sizes, very precise measurements of height and weight, set the standard for obesity by use of BMI > 85^{th} percentile as the standard of overweight, and mentioned that they had obtained approval of their study protocols through their institutions' formal review boards. The population under study consisted of rural white youth who are chronically

obese. Their findings indicated that obese students had more depression and oppositional defiant disorder.

Not all research found a correlation between obesity and psychopathology. Rieder and Friedman (2004) found that despite the alarming trend towards increasing obesity in the inner-city high school population sampled, there was a perceived *decrease* in stress reported by "overweight" students when compared to the self-reported stress perceived by the "non-overweight" or "at-risk for overweight" students (p. 2). This result supported the findings of the Renman (1999) study which found a higher rate of severe obesity than originally anticipated, with little or no decrease in self-esteem, and no increase in psychopathology. Rieder and Friedman (2004) also reported that there was no difference in the number of tardy notifications, absences, or the mean GPA among the categories of students studied.

Thompson (2003) reported discrepancies between parental responses and the daughters' responses, as the parents were more likely to state that nutritious snacks and meals were being eaten by their daughters, while the daughters reported eating chips and fast food. Modeling of physical activity by the parents, restriction of television viewing during meals, and limitation of high

calorie foods available in the home were successful interventions.

Health Problems Related to Childhood Obesity

The effects of obesity on health have been well documented (CDC, 2004). Diseases such as diabetes, hypertension, metabolic syndrome, CVD, and others have been rising along with the prevalence of obesity (CDC, 2004). These diseases are manifesting at an earlier age. Cardiovascular disease is now the number 3 cause of death among children younger than 15 years of age (American Heart Association, Heart Disease and Stroke Statistics, 2004). Disturbing epidemiological evidence gathered by the CDC and other agencies documents the growth of obesity in school children. These obese children are at risk for the development of diabetes, metabolic syndrome, and psychological problems related to self-esteem (Xie et al., 2003). One of the consequences of obesity that is receiving close scrutiny is the development of psychological pathology in overweight children (Mustillo et al., 2003). Although a review of the literature was not conclusive that obesity is correlated with a high incidence of psychopathology, some studies suggest a link with obesity and depression (Xie, 2003, p. 202)

Williams, Strobino, Bollella, and Brotanek (2004) studied the effects of body size and cardiovascular risk factors in the preschool population. A sample of 1215 children entering New York Head Start from 1995-1997 was obtained. The population included 43% African American, 30% Hispanic, 25% white, and 2% were of other ethnicities. Children of mixed or other ethnicities were excluded from all analyses because of the small numbers. Boys and girls were equally represented at 51% boys, 49% girls. The age of the children ranged from 2-5 years. Measurements obtained on each child included: height, weight, and triceps, subscapular, and suprailiac skinfold thickness, waist and hip circumference, blood pressure, and resting heart rate. Blood lipids were measured by a nonfasting capillary blood sample obtained by fingerstick and immediately analyzed for total and high-density lipoprotein (HDL) cholesterol and triglycerides using the Cholestech L*D*X Analyzer system (Wliiams et al., 2004). The results of analysis showed that 17% of the children were overweight and 15% were obese; the risk was greatest in Hispanic children. Overall, 13% of the children had high blood pressure, with increased risk of elevated blood pressure in African-American children. African American children had a more favorable lipid profile (high

high-density lipoprotein cholesterol level and low triglycerides level) than white or Hispanic children. Body size was a significant predictor of elevated blood pressure, low high-density lipoprotein cholesterol, and increased triglycerides. There was association between obesity and blood pressure evident in white and Hispanic children only; neither ethnicity nor obesity was associated with total cholesterol level. According to the researchers, obese preschoolers had approximately three times the risk of having high systolic blood pressure and twice the risk of low high-density lipoprotein cholesterol level compared with nonobese children, indicating that at-risk populations can be identified and primary prevention begun at a young age.

Another study performed by Sorof et al. (2004) examined 5000 Houston students aged 10-19 years for high blood pressure. They found that 4.5% of the 5102 students and 11% of the overweight students had high blood pressure, which was confirmed on three separate occasions. The researchers found that as BMI rose, so did blood pressure levels. Twenty percent of the study participants were deemed overweight (BMI>/ = 95th percentile), and Hispanic children had a higher rate of excessive weight and high blood pressure. Thirty-one percent of the

Hispanic children were overweight compared with 20% of the African American students, 15% of the white children and 11% of the Asian children. The researcher also found that 41% of 129 children with high blood pressure had left ventricular hypertrophy which is believed to increase the risk of cardiovascular complications later in life. They also found a correlation between the degree of enlargement of left ventricular mass and the child body mass index (BMI). It was found that the risk of LVH was higher in Hispanic children in this study.

Schwimmer (2004) conducted a study involving 100 children (35 girls and 65 boys) aged two to 18 years who had nonalcoholic fatty liver disease (Harby, 2004). The diagnosis was demonstrated by a liver biopsy. Of the sample children one was underweight, one was healthy weight, six were overweight and 92 were obese, with a mean body mass index of 31.6 kg.m2. The population consisted of 78 whites, 11 Asians, five Native Americans, four African Americans and two unclassified children. The study concluded that fatty liver disease causes a particular pattern in children, with the most severe injury in children who were nonwhite, boys, or those who were especially obese. The long-term impacts of this study's

participants are hypothesized to be complications of liver disease and/or be candidates for a liver transplant.

Obesity is increasingly becoming prevalent in asthmatic children. According to Dr. Krzystof Nowak, of the department of the pediatric residency group practice at Presbyterian Hospital-Cornell Campus in New York, nationwide the prevalence of asthma and obesity is increasing, and evidence exists that obesity is more common among asthmatic children and adolescents than in the general population (Goldman, 2000). Dr. Nowak based his observation in part on a study of 89 consecutive asthmatic children, aged 2-18 years, seen at a pediatric group practice between January 1998 and February 1999. The population sample was primarily African American and Hispanic, poor and urban. For the purpose of the study obesity was defined as the 95th percentile and above for age-adjusted body mass index and defined high risk for obesity as the 85th percentile or greater. The study compared the prevalence of obesity and high-risk body mass index in the asthmatic cohort with the prevalence in a cohort of 93 healthy age-and gender-matched peers. The results showed that 35% of the asthmatic children were obese, compared with 28% of the nonasthmatic cohort. Twenty-four percent of the asthma patients and 18% of the

nonasthmatic cohort were at high risk for obesity. In all, 59% of the asthmatic children and 46% of the nonasthmatic children were either obese or at risk for obesity.

Jeffreys et al. (2004) of Massey University, Wellington, New Zealand, and colleagues examined the association between childhood body mass index (BMI) and the risk of cancer in adulthood. They used a historical cohort study based on the Boyd Orr Study of Diet and Health in Pre-War Britain (1937-1939). The sample included 2347 subjects between the ages of two and 14 years that were identified through the National Health Service Central Register. Children had their height and weight measured in England and Scotland. The researchers estimated the risk of cancer in relation to age and gender specific BMI standard deviation scores. Data analysis showed that 188 men and 192 women developed cancer during the 50 years of follow-up. The research showed that the risk of adulthood cancer per standard deviation increase in childhood BMI was increased 9%. The researchers report that no evidence showed that confounding variables of adult or childhood socioeconomic status, other anthropometric measures, energy intake in childhood, or birth order was observed. A 30% increase in the risk of

smoking related cancer per standard deviation increase in childhood BMI was found (Jeffreys et al., 2004).

Childhood Obesity in Hispanics

The CDC reports that approximately 23% of Hispanic children are overweight compared to 14% of their non-Hispanic White peers (2004). Recent data from a national study of U.S. children reported that within a 12-year period the prevalence of overweight children in the age 4-12 year age group increased to 21.5% among African-Americans, 21.8% among Hispanics, and 12.3% among non-Hispanic whites (Strauss & Pollack, 2001). Other studies show that in childhood African Americans and Hispanics are more likely to be overweight than whites, but by adolescents Hispanic and Asian/Pacific Islanders had higher rates of overweight (Hass, Lee, & Kaplan, 2003). Studies suggest that Hispanic children are at greater risk for diabetes and cardiovascular disease due to their increased obesity and risk factors (Delameter, 2000).

Robert Trevino and associates (1999) performed a study in San Antonio Texas that revealed that low income Mexican-American children have modifiable and genetic risk factors of developing type II diabetes. The study looked

at 173 Mexican-American children from welfare-receiving families. The results found that the children ate high calories from fat, had higher percentages of energy from saturated fat, had decreased fruit and vegetable intake, poor physical fitness scores and had higher body fat than non-Hispanic white children of the same age (Trevino, 1999).

Another health problem being addressed in the Hispanic population is sleep apnea. Goodwin (2003) studied 1214 Hispanic and white children ages 4-11 years of age to assess the severity of sleep related symptoms associated with sleep-disordered breathing. Findings revealed that Hispanic children in the population-based TuCASA (Tucson Children's Assessment of Sleep Apnea) study experienced more frequent symptoms associated with SDB, such as snoring, excessive daytime sleepiness, witnessed apnea, and learning problems than did white children (Goodwin, 2003). Unfortunately the aforementioned problems associated with sleep apnea and diabetes can also affect a child's ability to focus and even attend school.

A study done by Dr. Rifai and colleagues at Children's Hospital in Boston studied 1960 children aged 12 to 19 years old for metabolic syndrome (Reuters Health Information, 2004). The children had previously

participated in the Third National Health and Nutritional Survey during the period 1988-1994. The criterion for diagnosis was based on the Adult Treatment Panel III. The subjects were diagnosed if they were positive for at least three heart disease risk factors: elevated triglycerides, low HDL, hyperglycemia, increased waist circumference and high blood pressure. According to the researchers, 9.2% met the criteria for metabolic syndrome, and 63.4% had at least one metabolic abnormality. Subjects with BMI in the 85^{th} percentile or higher for age and gender had a 31.2% rate of metabolic syndrome. Mexican-American children had the highest rates with 12.9% meeting the criteria for metabolic syndrome. Non-Hispanic whites had a 10.9% rate and non-Hispanic blacks at 2.5%. The results of this study show that there is an increase in metabolic abnormalities found in children, with the highest rates found in Mexican-American children.

Absenteeism

A worldwide push has been initiated to solve the problem of school absenteeism. Many factors have been studied and assessed to determine the reasoning's behind the large number of students missing school each day. A 2002 study done in Tasmanian schools showed that on

average 8% of students are absent from school each day and that on any given week between 17% and 25% of students are absent for at least one day (At School, On Time, Ready for Work, 2002). Listed as common reasons for school absence were feelings of inadequacy, social incompetence, chaotic family life, poverty, unemployment, boredom, fear of being bullied and not fitting in. The above reasons were not studied to see if there was a correlation with childhood obesity. Another study done in 2004 found a strong association between being overweight in Kindergarten and behavior problems such as anxiety, loneliness, low self-esteem, sadness, anger, arguing and fighting (NIHCM Foundation, 2004). The above psychological problems may have an association with the increase in school absence being recognized. This thesis hypothesizes that a direct correlation exists.

Summary of Literature Review

An overwhelming trend shows an increase in childhood obesity in many countries other than the United States. Literature review also shows that Hispanic and Mexican American children are at greatest risk for overweight and obesity and the subsequent health problems associated with overweight and obesity. Although very few studies have

been performed on school absenteeism, the literature shows that psychosocial issues can impact a child's willingness to attend school. Psychological issues stemming from childhood overweight can, in some populations, cause low self-esteem, anger, loneliness and increased fighting which can in-turn make a student less likely to want to attend school.

Hypothesis

This study examined Body Mass Index (BMI) data and school absences of Hispanic children to evaluate if a correlation exists between BMI and school absence in this population. It is hypothesized that Hispanic children with body mass index (BMI) at or above the 85th percentile (in the overweight category) will have a greater number of absences than Hispanic children with BMI's at or below the 84th percentile (healthy BMI range).

CHAPTER THREE

METHODOLOGY

Introduction

This study is a descriptive secondary analysis of existing data, utilizing public school records for body mass index and absenteeism. The source of the data for this study was school nurse height and weight reports and attendance reports for 2nd grade Hispanic students at an elementary school in Riverside County. These students had weights and heights obtained in the California mandated vision and hearing screenings of Kindergarten, 2nd and 5th graders, during their 2nd grade school year (2003). The measurements were repeated in the 3rd grade, approximately one year later, in the course of this districts routine school nursing follow-up. The data for each student was collected by a trained school nurse from this district that has access to all student records as part of her job, recorded in a database without any information that could identify any individual student and provided to the researchers.

The data collected included gender, ethnicity, body mass index (a calculated ratio of weight to height (BMI), calculation of BMI percentiles (a percentile of body mass

calculated according to age), and the number of school absences during the November 2003-2004 school year.

Participants

No participants were recruited for this research. Only school district records were used. The subjects studied were a convenience sample of the children in one elementary school located in Riverside, California which was selected due to its population similarities with other elementary schools within the district.

All Hispanic students in the second grade who were measured by district nurses during California mandated screening were included. Both male and female students were included. Students, who enrolled late in the school year, after screening was conducted, were excluded. Any child who left the school before the end of study (one year later) measurements could be collected was excluded. Students in special education classes, due to wide variation in ages and students who were unable to stand for weight and height measurements on a calibrated scale were excluded. Students who were "retained" in second grade were included, as long as they were screened with their classmates (retained students are children who are "retained" in the same grade, though their classmates move

on). This district uses a year round school approach which permits students to be in classrooms throughout the year, decreasing the need to build more schools. Students are assigned to a track system where one-quarter of the student population is not attending school during any given month. Tracks are color coded as blue, green, orange and red. Students on red track were omitted due to absence during data collection for this study.

Study Variables

Data collected included gender, age, ethnicity designated as Hispanic, height in inches, weight in pounds, body mass index (BMI) according to age and number of school absences from November 2003 to November 2004.

Data Collection Procedure

After obtaining written approval from the Alvord Unified School District (see Appendix A), and approval from the California State University, San Bernardino Institutional Review Board (see Appendix B), data was collected by a district school nurse and given to the researchers in an anonymous database with all identifiers removed (see Appendices C & D).

School records were reviewed by the school district nurse and included the computer records on attendance and

health, as a component of the Aeries software program, as well as the hard copies of their cumulative (CUM) education and health files.

The BMI of the second grade students was calculated using the CDC growth charts for children in these age groups. Weights were taken, using a calibrated scale, which is standardized to zero. Students were weighed with clothes and shoes on, and with jackets or sweatshirts removed; per district policy. No allowances for weight of the clothes were made in the weights recorded. Weight was calculated to the nearest quarter of a pound. Height was measured with shoes on, standing with feet parallel. Height was obtained by the use of the weight scales' measuring system. Height was measured to .25 of an inch. The height and weight measurements were extracted from the Aeries database and body mass index (BMI) was calculated. Body mass index is measured by measuring the body weight in pounds and the height in inches and performing the calculation of weight divided by height squared times 703.

Absences were analyzed from the Aeries database and included the time period of November 2003 to November 2004. All absences were included whether excused or unexcused. Absences were not screened for reason absent

and were included for any reason. Tardies were not included.

CHAPTER FOUR

RESULTS

Data Analysis

This study was a quantitative descriptive study that used data from school district nurse height and weight reports and district attendance reports. The extracted data included gender, ethnicity, height, weight, and absence information. The height and weight measurements were used to calculate the Body Mass Index (BMI). The BMI for each student was calculated according to Center for Disease Control (CDC) standards for height and weight for age (see Appendix E). The students were classified into two groups according to BMI score; the 85th percentile of BMI and above (the at-risk for overweight or overweight category) and the 84th percentile of BMI and below (the healthy range category of BMI). For the purpose of this study the third grade year or end of study BMI score was used to classify the student into the proper category of BMI.

The convenience sample for this study was composed of Hispanic boys (n = 30) and Hispanic girls (n = 20) from second grade classes at an elementary school in Riverside,

California. Data was entered and analyzed using computer software SPSS 11.5 for Windows SPSS Inc., Chicago, IL.

The district used in this study has requested to remain anonymous. The student populations at the school setting used for this study are Hispanic (82.2 %), Caucasian (13.00%), Black (2.70%), Asian American (1.50%), Pacific Islander (0.2%), American Indian (0.3%), and multi/undecided (0.3%)(SARC, 2004). Economic data was not available individually, however, over 57% of this school's population of students qualifies for the free or reduced school lunch and breakfast programs intended for financially disadvantaged families. This would indicate that most children are from families with limited incomes.

Presentation Findings

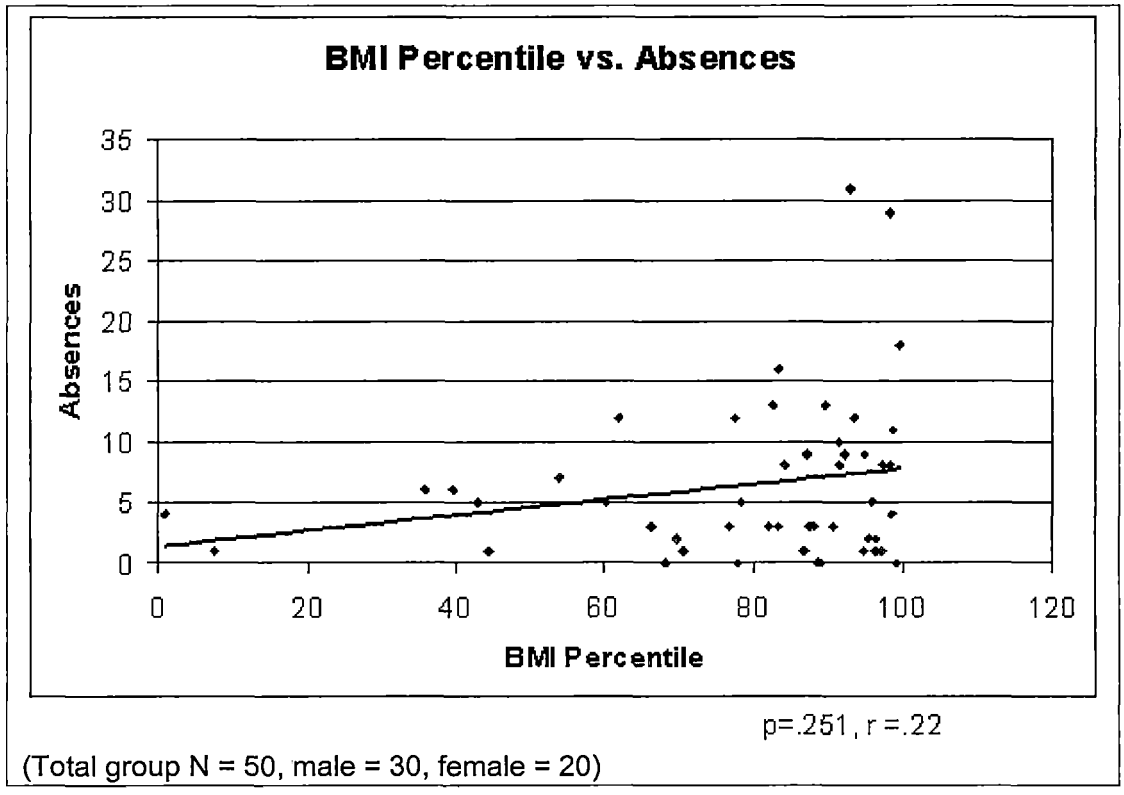
Though not statistically significant, this study found that children with a BMI above the 85th percentile were absent approximately two days more per year than the children with BMI below the 85th percentile. Fifty students (64%) out of an initial 78-second graders met the inclusion criteria at the conclusion of the study. Sixty percent of the samples were Hispanic boys (n = 30) and 40% were Hispanic girls (n = 20). Of the sample population 44% (n = 22) met the criteria for the 84th percentile of BMI

and below and 56% (n = 28) met the criteria for the 85th percentile of BMI and above. Body mass percentile scores for the 84th percentile and below ranged from 1.01% to 84.19% with a mean of 61.33% (SD = 23.95). Body mass percentile scores for the 85th percentile and above ranged from 86.89% to 99.49% with a mean percentile of 93.84% (SD = 4.12).

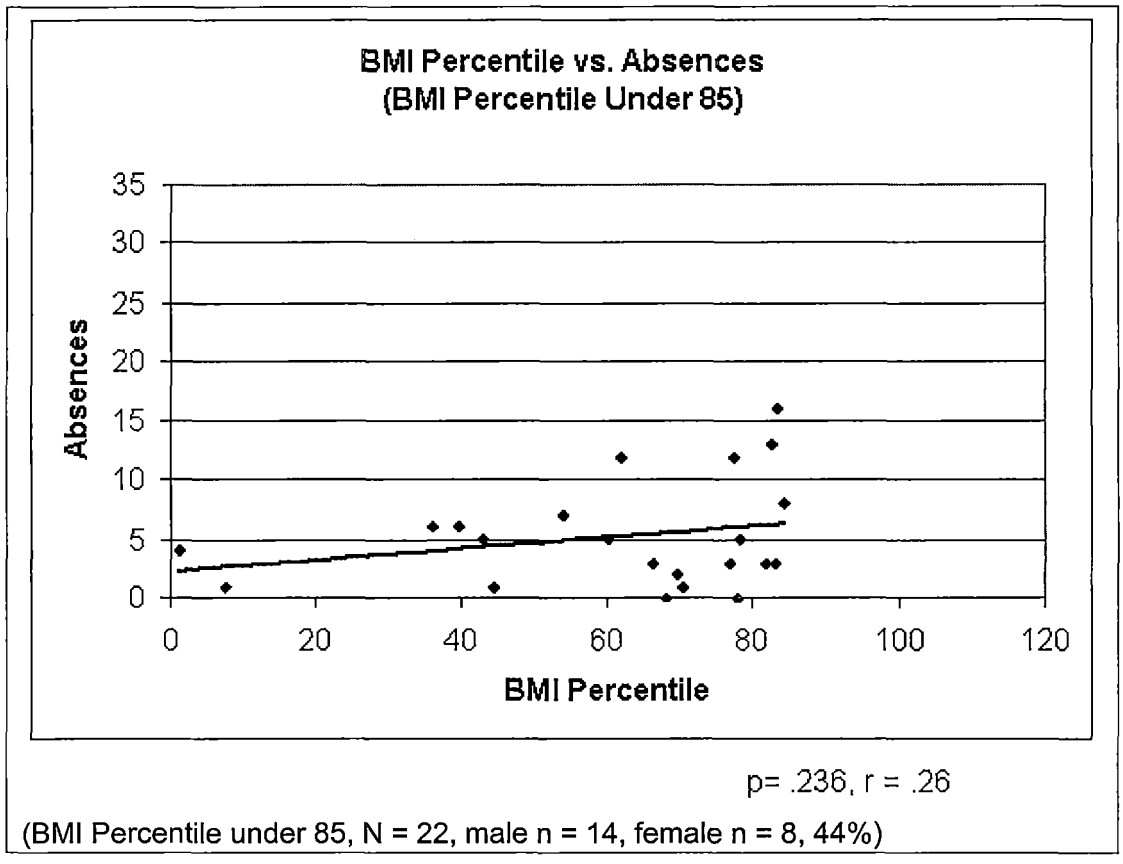
Absences ranged from zero to 31 absences over the course of one year, November 2003 to November 2004. The mean number of absences for the students in the 84th percentile and below were 5.27 (SD = 4.47) and mean absences for students in the 85th percentile and above were 7.46 (SD = 7.89). A t-test revealed no significant difference in absences (p = .251) between students with BMI's in the 84th percentile or less and students with BMI's in the 85th percentile or more.

A subgroup analysis was performed to compare absences of male versus female students at and above the 85th percentile and those below the 85th percentile. A mean of 6.14 (SD = 4.53) was found in males (n = 14) who were below the 85th percentile, while a mean of 3.75 (SD = 4.2) was found in the females (n = 8). This result was not significant with a t-test finding of p = .236. In the males (n = 16) who were above the 85th percentile there

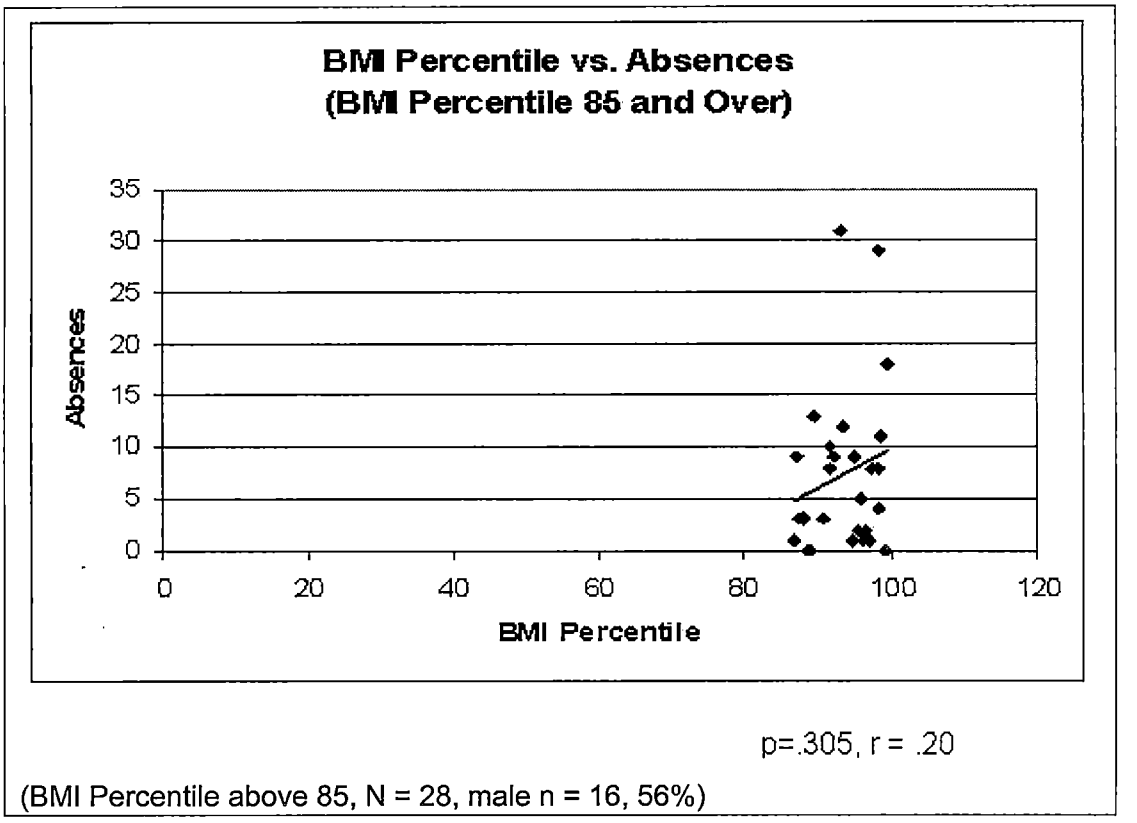
was a mean of 8.81 (SD = 9.752), while the females (n = 12) had a mean of 5.67 (SD = 4.097). A t-test revealed no significant differences in absences were found with a p = .305.



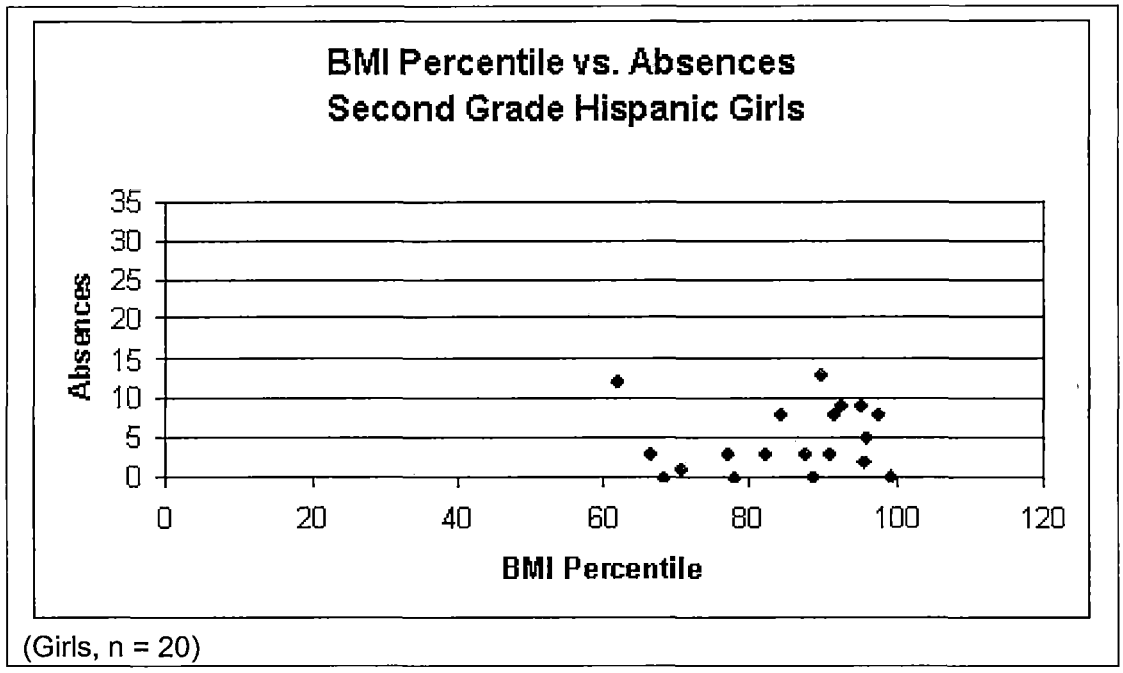
Graph 1. Body Mass Index Percentile Versus Absences



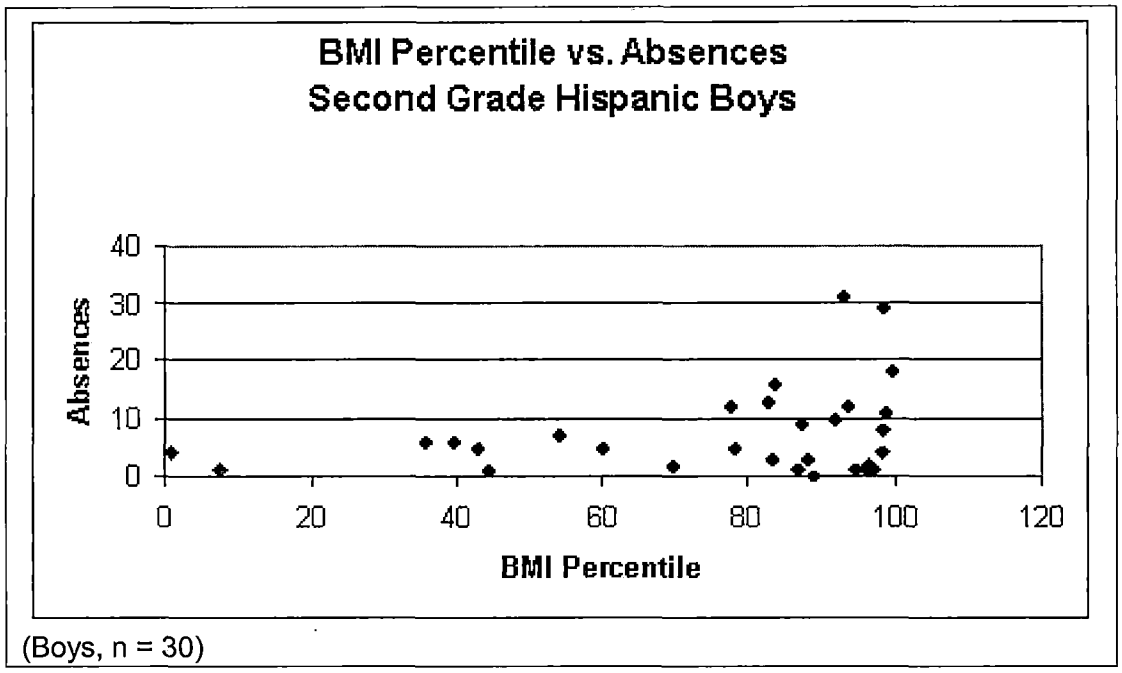
Graph 2. Body Mass Index Percentile (Below 85) Versus Absences



Graph 3. Body Mass Index Percentile (Above 85) Versus Absences



Graph 4. Body Mass Index Percentile Versus Absences Second Grade Hispanic Girls



Graph 5. Body Mass Index Percentile Versus Absences Second Grade Hispanic Boys

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The sharp increase in obesity within the United States and abroad raises fear of short term and long-term health concerns. The Population Health Approach encourages researchers to identify the determinants that influence health so that they may be analyzed with regard to their relative importance to health (A Population Health Approach, n.d.). Researchers concerned with the affects of obesity on the public health have focused efforts on the health consequences of obesity as it affects the longevity of the next generation of our citizens. USDA spokesmen have announced that this alarming trend may, for the first time, cause today's young people to have a shorter life span than their parents (USDA, 2005). New nutrition and activity guidelines were developed with the goal to assist people to individualize their health plans with the development of the new food pyramids published by the USDA (USDA, 2005).

Obesity rates among our nation's youth has caused many researchers to investigate causality in the hopes of modifying this trend. Research nationally and

internationally has linked obesity with health and psychological problems. Some of this research indicates a link between obesity and absenteeism (Mustillo, 2003; Xie, 2003), while other research has found no correlation (Rieder & Friedman, 2004; Renman et al., 1999).

This study found that no statistical significance existed between 2nd grade Hispanic children with BMI above the 85th percentile and those with BMI at or below the 84th percentile and school absence. However, data revealed that students with BMI at or above the 85th percentile were absent approximately two more days per year than students at or below the 84th percentile. Male students at or above the 85th percentile had three more absences a year than female students in the same category. In the 84th percentile and below male students were absent 2.4 days per year more than female students in the same category.

This study follows the Population Health Approach conceptual framework by contributing to the collection of evidence necessary to analyze and assess the significance of the affect of obesity in school children as it relates to absenteeism. The results of this study support the nul-hypothesis that second grade Hispanic children with body mass index (BMI) at or above the 85th percentile (in the overweight category) will not have a greater number of

absences than Hispanic children with BMI's at or below the 84th percentile (healthy BMI range). The large SDs (4.474 and 7.886) along with similar mean absence rates (5.27, 7.46) in the two groups compared may have contributed to a non-significant finding. However, the study may have been underpowered and a larger sample size may be needed to achieve significance. Another factor affecting the outcome of this study may be the cultural perception that overweight status is healthy (Frost, 2003). There may not be psychological affects of obesity in the Hispanic student due to it's acceptance in their culture.

When scatter-plot graphs are evaluated, it appears that the trend in absences climbs as weight increases ($r = .22$, $p = .251$), (Graph 1. BMI Percentile vs. Absences). This difference is especially apparent when evaluating the at or above the 85th percentile group ($r = .26$, $p = .305$), (Graph 3. BMI Percentile vs. Absences, BMI Percentile 85 and Over).

This study did not find any statistical differences in absences between Hispanic males and Hispanic females, though the trend toward obesity was increased in males. The male students had a mean of 7.57 compared with the female student mean of 4.90. Again, the trend is apparent,

though a t-test failed to demonstrate significance ($p = 1.66$).

Limitations

Limitations of this study that affected the findings are a small sample size with all participant data retrieved from one elementary school in Riverside California. The ethnic group studied was Hispanic, since that made up most of that school's population of second graders. This limits the external validity of the results making it difficult to generalize the findings and conclusions to other groups.

The second grade Hispanic students were relatively young, and therefore may be less likely to be affected by peer isolation due to obesity. Self-esteem may be less of an issue in second graders than older students in higher grades. It is also possible that cultural differences within the Hispanic population may make obesity more desirable than a slender frame, if poverty within the population plays a role.

The Population Health Approach stresses that all factors should be considered when assessing and planning an approach to problem resolution within a community; therefore, future studies with a qualitative research

design are recommended to address the impact of Hispanic culture, and the culture of poverty, on younger obese students.

Though there are more absences seen in the overweight group, the findings were not significant statistically. Scatter plot graphing revealed the trend toward increased absence with greater weights. Future research should be conducted on students in older age groups and other ethnicities to determine if trends achieve a level of statistical significance.

Recommendations

This study found that 56% of the Hispanic 2nd grade students met the criteria for overweight or at-risk for overweight. The study also found that 60% of the female students and 53% of the male students studied were overweight or at-risk for overweight. Hispanic males had a tendency to be absent more often than Hispanic females in both the 85th percentile and above and 84th percentile and below categories. The findings for overweight in this school setting were higher than the national average of 23% (CDC, 2004). Literature has shown that low-income children and Hispanic children are more at risk for overweight than their non-Hispanic, middle-income peers.

The fact that this district has 57% of its students on free or reduced lunches coupled with the high Hispanic population may be contributing to the dramatic increase in overweight among its students.

Although school absences were not statistically significant in this study, absences among students in the 85th percentile and above were higher than those in the 84th percentile and below. This information should be shared with district administrative personnel in order to design policy that will address the possible trend of overweight causing increased school absences and therefore the loss of revenue to the school district.

The current school district practice of eliminating physical education, utilizing vending machine income despite the relatively poor nutrition choices that they offer students, and the lack of a district wide policy guiding activities at individual campuses, are contributing to the problem of childhood overweight. Since Hispanic students are at-risk for overweight, a district-wide program for reducing the problem is recommended. Working with other departments and administrative personnel to design a comprehensive school health program is an area where the advanced practice school nurse can be of great benefit to the district, and

is consistent with the multisectoral analysis and decision-making process described in the Population Health Approach.

Each state should mandate that height and weight, with BMI calculation, be included with vision and hearing screening, as this would be more economical than performing the screenings separately. The school nurse, to avoid health related problems or illness may refer students at risk-of-overweight, or overweight to health services. This is a critical factor, especially important in the underserved vulnerable populations within this school district, as the Population Health Approach encourages (A Population Health Approach, n.d.). Overweight students who show signs of poor self-esteem, peer isolation, or depression should be referred for counseling as needed. Advanced practice school nurses should develop, or coordinate programs which address nutrition and activity in order to decrease the incidence of childhood overweight. Multidisciplinary teams should be created to approach this epidemic at many levels within the school system, as is occurring nationally and internationally as the evidence about obesity is collected (A Population Health Approach, n.d.).

APPENDIX A

APPROVAL FROM THE ALVORD UNIFIED SCHOOL DISTRICT

ALVORD UNIFIED SCHOOL DISTRICT

10365 KELLER AVENUE, RIVERSIDE, CA 92505 (909) 509-5000 FAX: (909) 351-9306

ARLANZA ELEMENTARY
5891 RUTLAND

COLLETT ELEMENTARY
10850 COLLETT

FOOTHILL ELEMENTARY
8230 WELLS

LA GRANADA ELEMENTARY
10346 KELLER

MCAULIFFE ELEMENTARY
4100 GOLDEN

MYRA LINN ELEMENTARY
10435 BRANIGAN

ORRENMAA ELEMENTARY
3350 FILLMORE

PROMENADE ELEMENTARY
550 HAMILTON, CORONA

ROSEMARY KENNEDY ELEMENTARY
6411 MITCHELL

TERRACE ELEMENTARY
6601 RUTLAND

TWINHILL ELEMENTARY
11000 CAMPBELL

VALLEY VIEW ELEMENTARY
11750 GRAMERCY

ARIZONA MIDDLE SCHOOL
11045 ARIZONA

LOMA VISTA MIDDLE SCHOOL
11050 ARLINGTON

WELLS MIDDLE SCHOOL
10000 WELLS

YSMAEL VILLEGAS MIDDLE SCHOOL
3754 HARVILLE LANE

ALVORD HIGH
3606 PIERCE

LA SIERRA HIGH
4145 LA SIERRA

NORTE VISTA HIGH
6585 CREST

California State University, San Bernardino
Internal Review Board
5500 University Parkway
San Bernardino, CA 92407

Alvord Unified School District gives permission for Wyona Lagomarsino, RN, BSN, and Sarah Schoonover, RN, BSN, to conduct research for their master's degree program thesis requirement in our district, providing all information remain confidential. The school district name and the name of any school, or student, shall remain anonymous. Confidential information shall be used for statistical information only. Mrs. Lagomarsino and Mrs. Schoonover may share the anonymous results of the findings in their thesis, and with school district administration.

Katherine A. Wright 10/29/04

Katherine A. Wright, Ed.D. Date
Deputy Superintendent
Alvord Unified School District

APPENDIX B

CALIFORNIA STATE UNIVERSITY, SAN BERNARDINO

INSTITUTIONAL REVIEW BOARD

Institutional Review Board (IRB)
California State University, San Bernardino
Ph: (909) 880-5027 Fax: (909) 880-7028

CSUSB
INSTITUTIONAL
REVIEW BOARD
Exempt Review
IRB# 04086
Status
APPROVED

April 11, 2005

Ms. Wyona Lagomarsino
Sarah Schoonover
C/O Dr. Ellen Daroszewski
Department of Nursing
California State University San Bernardino
5500 University Parkway
San Bernardino, California 92407

Dear Ms. Lagomarisino & Ms. Schoonover:

Your application to use human subjects, titled "The Relationship of Childhood Obesity on Elementary School Absenteeism" has been reviewed and approved by the Institutional Review Board (IRB). All subsequent copies used must be this officially approved version. A change in your informed consent requires resubmission of your protocol as amended.

You are required to notify the IRB if any substantive changes are made in your research prospectus/protocol, if any unanticipated adverse events are experienced by subjects during your research, and when your project has ended. If your project lasts longer than one year, you (the investigator/researcher) are required to notify the IRB by email or correspondence of *Notice of Project Ending* or *Request for Continuation* at the end of each year. Failure to notify the IRB of the above may result in disciplinary action. You are required to keep copies of the informed consent forms and data for at least three years.

If you have any questions regarding the IRB decision, please contact Carmen Jones, (Interim) IRB Secretary. Mrs. Jones can be reached by phone at (909) 880-5027, by fax at (909) 880-7028, or by email at ccjones@csusb.edu. Please include your application identification number (above) in all correspondence.

Best of luck with your research

Sincerely,

Joseph Lovett, Chair
Institutional Review Board

JL/ccj

APPENDIX C

CONFIDENTIALITY STATEMENT

Institutional Review Board
California State University San Bernardino
Application to Use Human Participants in Research

Wyona Lagomarsino, RN, BSN, MSNc
And
Sarah Schoonover, RN, BSN, MSNc

The Relationship of Childhood Obesity on Elementary School Absenteeism

Consent to assist with data gathering for this study

I, **Kim Strebel, RN, BSN**, school nurse for Alvord Unified School District do hereby agree to gather and tabulate existing data from the Alvord Unified School District Aeries Database for the purposes of the research study listed above. I will keep this information strictly confidential; all originals will be placed in a locked file drawer in my office, for which I will have the only key. The records that I will release to the researchers will have all identifying characteristics, such as name, student number and teacher, removed prior to surrender. The data I will release will include age, gender, BMI, absences, height, weight, and dates measurements were obtained.

Kim Strebel, RN, BSN, PHN
Alvord Unified School District Nurse

APPENDIX D

STUDENT DATA COLLECTED

Gender	BMI 1	Percen. 1	BMI 2	Percen. 2	Ethnicity	Absences
m	17.6	84	20.65	94.7	500	1
m	17.42	79.75	20.46	93.07	500	31
m	28.03	99.75	28.49	99.49	500	18
f	27.24	99.19	29.92	99.25	500	0
m	15.68	49.94	16.3	53.99	500	7
m	17.72	86.71	18.51	86.89	500	1
m	17.3	82.12	18.77	88.11	500	3
m	17.51	86.04	17.36	77.7	500	12
f	17.3	73.93	19	82.1	500	3
m	15.6	53.26	17.81	83.36	500	3
m	16.31	70.26	16.27	60.22	500	5
m	17.52	84.95	18.61	87.2	500	9
m	21.06	98.01	23.47	98.34	500	8
f	21.84	96.63	22.61	95.51	500	2
m	22.1	98.75	23.53	98.41	500	4
m	12.44	1	13.26	1.01	500	4
f	16.31	69.16	18.42	84.19	500	8
m	13.78	5.34	14.14	7.41	500	1
f	21.88	97.9	22.9	97.32	500	8
m	16.4	66.66	19.22	89.09	500	0
f	20.8	96.27	23.35	97.38	500	8
f	16.11	62.89	19.48	89.57	500	13
f	15.62	55.52	16.74	66.38	500	3
m	14.35	14.57	15.58	35.83	500	6
m	18.92	91.72	22.02	96.3	500	1
f	17.52	72.36	18.88	76.94	500	3
m	21.94	98.17	20.32	93.47	500	12
m	16.59	69.4	15.73	39.63	500	6
m	16.76	74.57	19.58	91.59	500	10
m	17.09	80.03	18.14	83.53	500	16
f	16.98	74.63	20.48	92.19	500	9
m	21.09	98.39	23.43	98.58	500	11
m	19.5	96.12	21.02	96.42	500	2
m	14.34	17	15.51	42.91	500	5
f	20.25	95.96	21.65	95.89	500	5
m	20.45	97.11	23.68	98.32	500	29
m	20.26	94.94	23.28	97.15	500	1
f	18.08	86.66	19.45	88.65	500	0
f	19.13	92.91	21.14	94.89	500	9
f	15.28	46.74	16.5	62.08	500	12
m	18	83.34	18.3	78.33	500	5
f	18.84	91.46	20.02	91.56	500	8
f	16.9	65.83	19.57	87.47	500	3
f	14.34	19.27	17.16	70.69	500	1
m	11.95	1	17.05	69.7	500	2
f	21.94	97.04	20.45	90.7	500	3
m	18.65	90.02	18.51	82.78	500	13
f	16.02	42.9	18.36	78	500	0
f	16.22	50.97	17.24	68.2	500	0

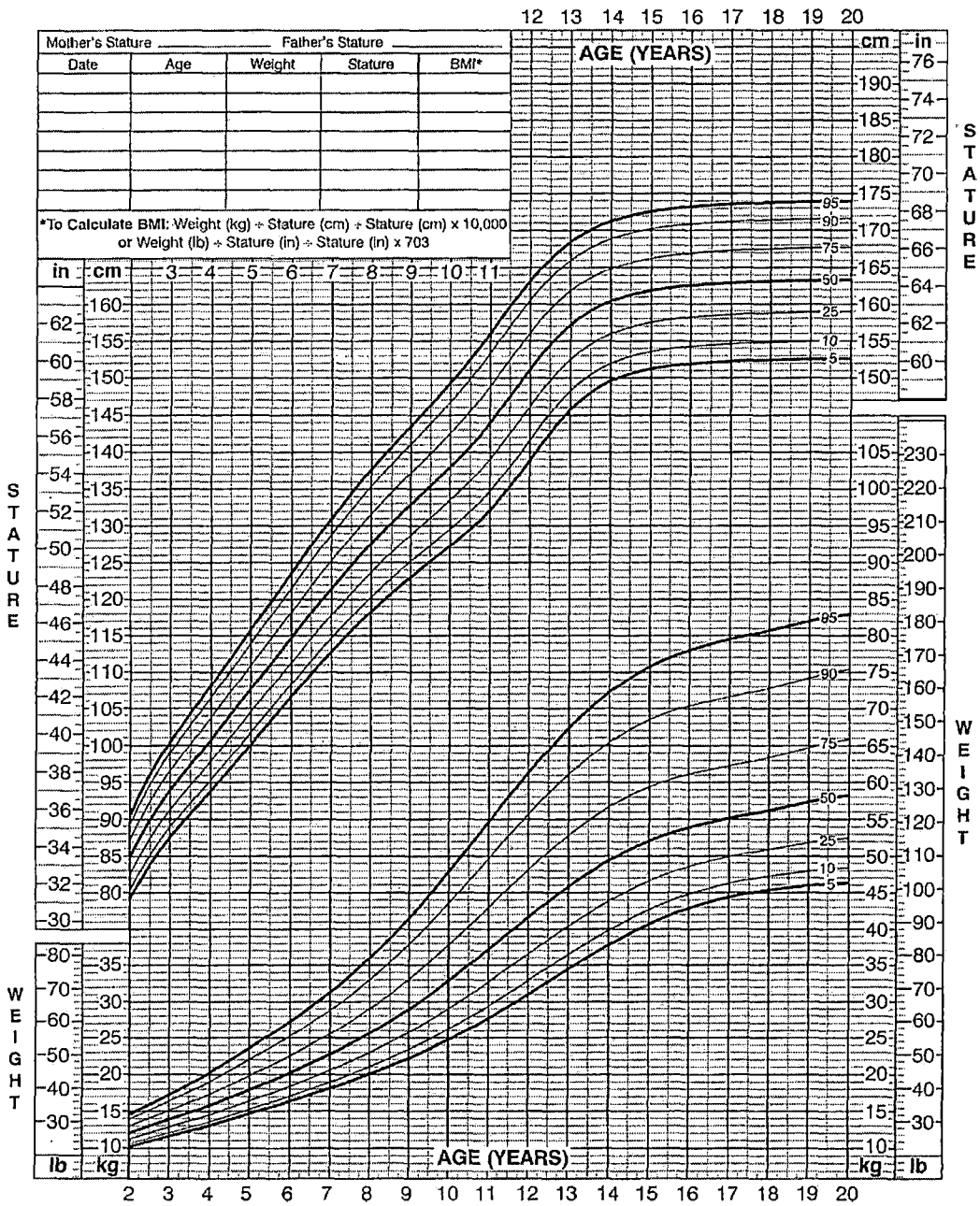
APPENDIX E

CENTER FOR DISEASE CONTROL BODY MASS INDEX FOR AGE GROWTH CHARTS

2 to 20 years: Girls
Stature-for-age and Weight-for-age percentiles

NAME _____

RECORD # _____



Published May 30, 2000 (modified 11/21/00).

SOURCE: *Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000). http://www.cdc.gov/growthcharts*

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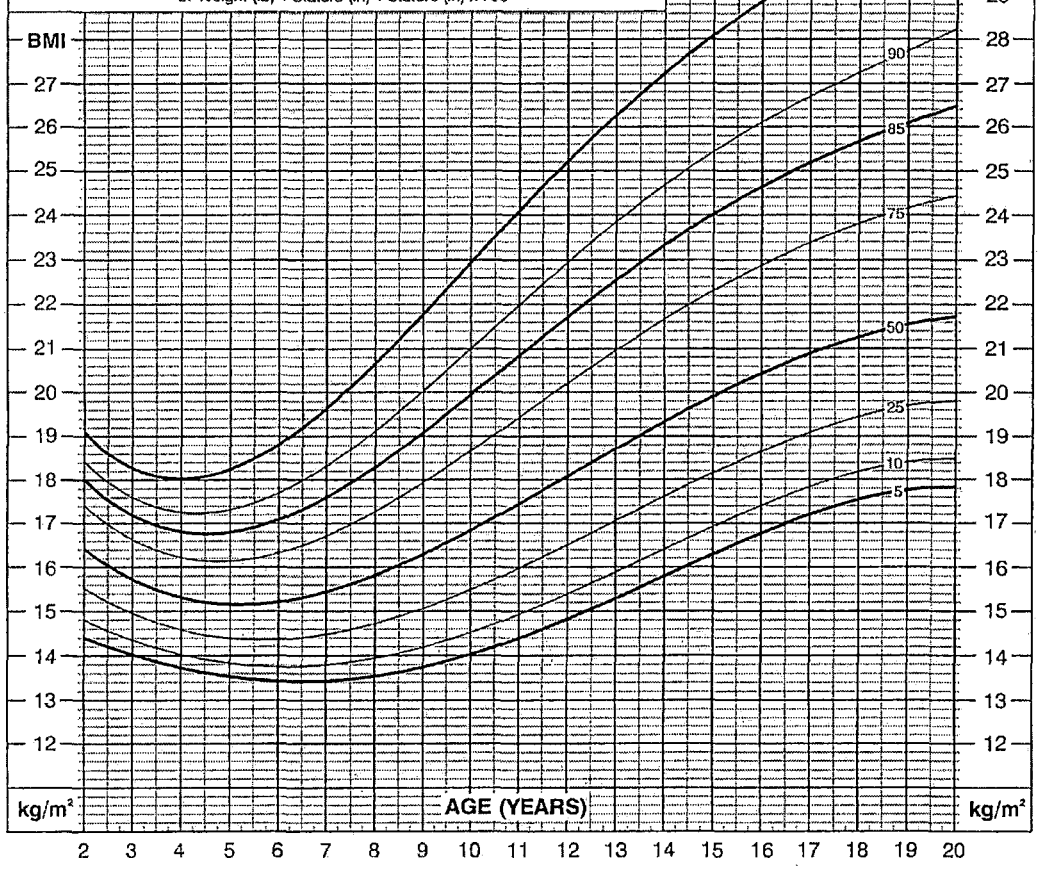
2 to 20 years: Girls
Body mass index-for-age percentiles

NAME _____

RECORD # _____

Date	Age	Weight	Stature	BMI*	Comments

*To Calculate BMI: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 10/16/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

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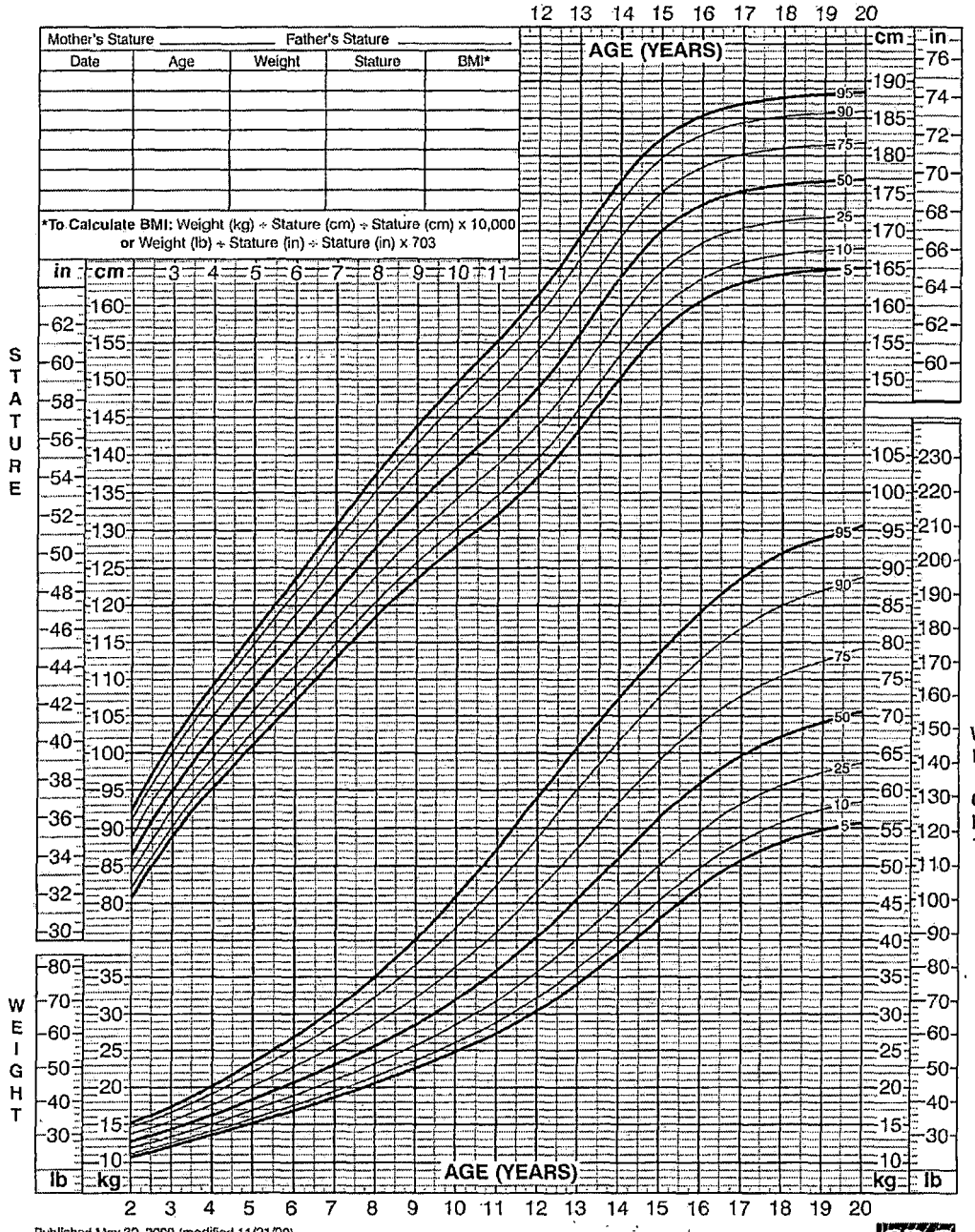
2 to 20 years: Boys
Stature-for-age and Weight-for-age percentiles

NAME _____

RECORD # _____



Published May 30, 2000 (modified 11/21/00).

SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000). http://www.cdc.gov/growthcharts

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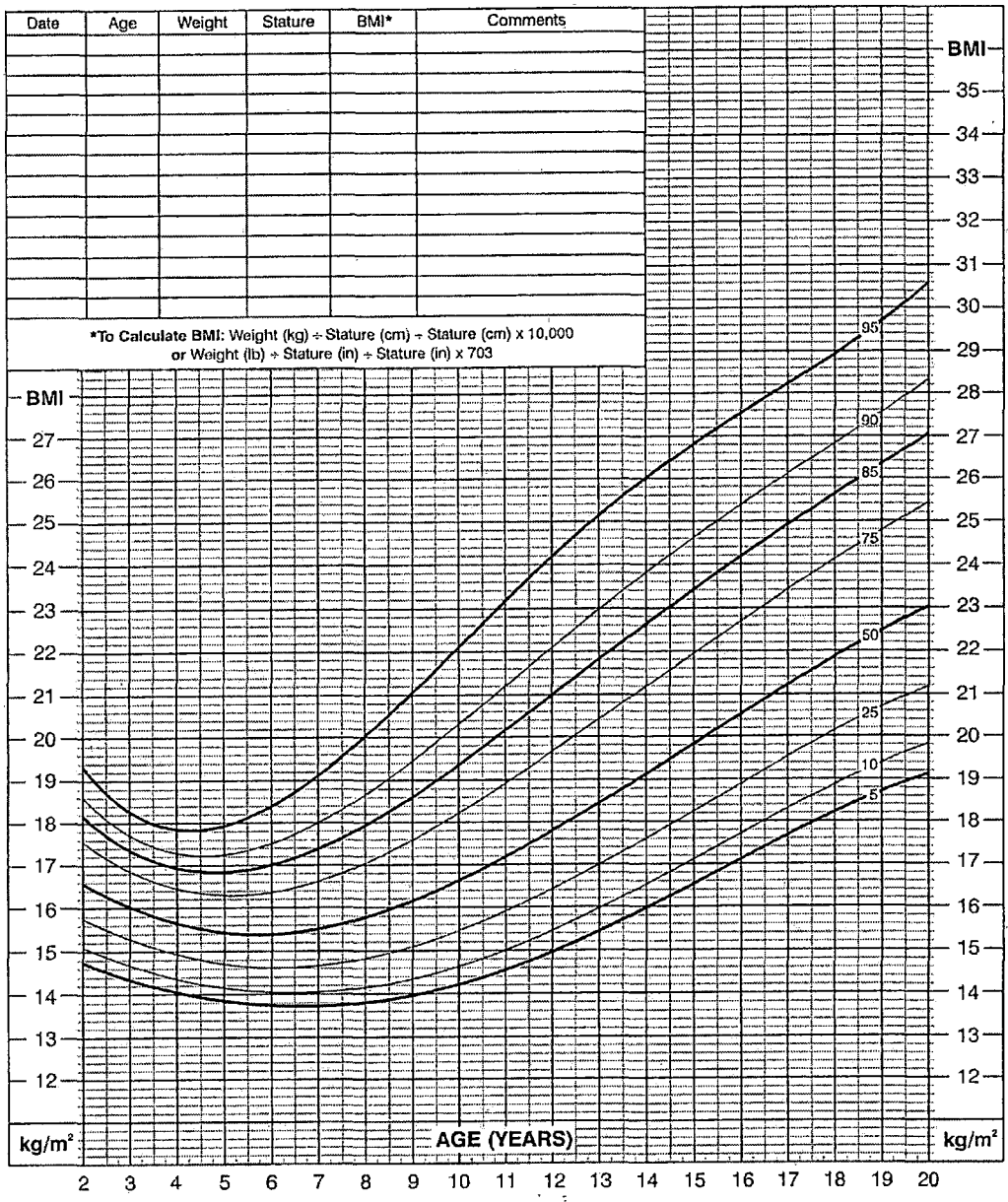
2 to 20 years: Boys
Body mass index-for-age percentiles

NAME _____

RECORD # _____

Date	Age	Weight	Stature	BMI*	Comments

*To Calculate BMI: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 10/16/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

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ASSIGNED RESPONSIBILITIES PAGE

This was a two-person project where authors collaborated throughout. However, for each phase of the project, certain authors took primary responsibility. These responsibilities were assigned in the manner listed below.

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   Team Effort: Sarah Schoonover & Wyona Lagomarsino

2. Data Entry and Analysis:

   Team Effort: Sarah Schoonover & Wyona Lagomarsino

3. Writing Report and Presentation of Findings:

   a. Introduction and Literature

      Assigned Leader: Sarah Schoonover

      Assisted By: Wyona Lagomarsino

   b. Methods

      Assigned Leader: Wyona Lagomarsino

      Assisted By: Sarah Schoonover

   c. Results

      Team Effort: Sarah Schoonover & Wyona Lagomarsino

   d. Discussion

      Team Effort: Sarah Schoonover & Wyona Lagomarsino