THE RELATIONSHIP AMONG BLOOD PRESSURE, PERCENT BODY FAT, AND SELF-CONCEPT IN FIFTH-GRADE CHILDREN IN OKLAHOMA

By

LON HOWARD SEIGER

Bachelor of Science
Southeastern Oklahoma State University
Durant, Oklahoma
1978

Master of Education
East Central Oklahoma State University
Ada, Oklahoma
1979

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of the Oklahoma State University
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Thesis Approved:

Betty M. Edgley
Thesis Adviser

Betty Abercrombie

James K. Rogers

Thomas A. Edens

Norman N. Durham
Dean of the Graduate College

1238360

DEDICATION

To my parents, Rusty and Larry Seiger,

who taught me how to

"add life to my years and years to my life."

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The completion of this dissertation was certainly not the solitary effort of the author--many people contributed the motivation, support, and wisdom necessary to bring this document to its finale.

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CHAPTER I

INTRODUCTION

Introduction

There have been many studies that have identified coronary heart disease (CHD) risk factors in the childhood population (1-4). Health professionals believe that early identification of heart disease and modification of risk factors could prevent or control the atherosclerotic process (4). Recently, positive changes in lifestyle behaviors have come into focus as a key to the prevention or control of modifiable CHD risk factors. There is some evidence that the self-concept of an individual plays a significant role in the development of a desirable lifestyle--a lifestyle free from modifiable CHD risk factors. Thus the formation of a positive self-concept in childhood is vital if modifiable CHD risk factors are to be prevented or controlled.

For many years, efforts in controlling hypertension and obesity were mainly directed towards the adult. Finally, in the 1970's, efforts in the identification and management of hypertension and obesity were started in the childhood population (5). Presently, the growing interest in controlling these risk factors is being extended into pediatrics to alleviate future diseases (6). To illustrate the prevalence of hypertension and obesity, it is estimated that between 1 and 11 percent of Americans under 18 years of age have high blood pressure (7), while the incidence of childhood obesity has been estimated to range between 12 and 30 percent

for American school-age children (8). These alarming figures demonstrate the potentially large number of American children affected with at least one CHD risk factor.

To expose the seriousness of CHD, it is considered epidemic in the United States and the leading cause of death in the adult population (2, 9). This disease alone causes about 28 percent of all deaths in the U.S. each year (10). According to the American Heart Association (AHA), over 42 million Americans had one or more forms of heart and blood vessel disease during the year 1983 (11). In addition, approximately one-third of the men in the United States will have suffered from CHD by age 60; and there are over four and one-half million Americans alive today that have a history of heart attack or angina pectoris, or both (11). Economically, the costs are staggering. One of the largest businesses in the United States is open-heart surgery for coronary artery bypass. The American Heart Association estimated diseases of the heart and blood vessels cost 56.9 billion dollars in 1983 (11). This included physician and nursing services, medication costs, and lost output due to disability. Dr. Crittenden, assistant clinical professor at UCLA Medical Center, believes the great attention and costs now being directed to adults with symptomatic disease is in a sense "*after the fact*" (9). If Dr. Crittenden is accurate with this statement and if a serious encroachment is to be made into this staggering social problem, prevention at a young age must be given primary attention.

Recent trends in preventive medicine are indicating that heart disease begins early in life. Although the clinically overt symptoms of sudden death, myocardial infarction, or angina pectoris are rare in children, a hidden stage of arteriosclerosis may have its origin in childhood

(2). The beginning of the atherosclerotic lesion appears to begin at a young age. Glueck and others (12) noted the lesions seem to progress through a series of linked steps. These steps include the following: (1) development of arterial fatty streaks, (2) formation of fibrous plaques, (3) development of complicated fibrotic and calcific mature atherosclerotic lesions, and (4) clinical atherosclerotic cardiovascular disease. To support this finding, autopsy studies performed on children and young adults who died accidentally (13) or as a result of war injuries (14, 15) have shown that arterial atherosclerotic plaques are present in major arteries early in life, some to an advanced degree. Efforts to prevent or slow down this process should be directed at children since substantial and potentially irreversible damage may already exist by adolescence or early adulthood.

A modifiable CHD risk factor, hypertension is better known as high blood pressure, which is an elevation of the pressure that blood exerts against the inner walls of the blood vessels. It is a serious medical problem; an estimated 37 million adults are afflicted with this disease (11). High blood pressure is known as the silent killer since it does not have any noticeable symptoms that alert a person for medical care until major complications arise. It is estimated that one-half of hypertensive people know they have the condition, yet only 10 to 20 percent are receiving effective treatment (5). In the adult population, severe health problems can result if elevated blood pressure levels are left uncontrolled. This disease has been shown to accelerate the development of atherosclerosis, seriously damage the heart, brain, and kidneys while being a major contributor to heart attack, stroke, and kidney failure (16).

In children, high blood pressure had always been assumed to have an obvious symptomatic cause (5). That is, hypertension was widely believed to affect only adults and consequently, children were not examined with this possibility in mind. A pioneer study by Zinner and others (17) found elevated blood pressure can be detected in children as young as 2 years of age, disclaiming the belief that hypertension only affected adults. This study helped the medical profession to routinely measure the blood pressure of infants and children, thereby allowing better diagnosis of hypertensive children.

There is a gradual increase in systolic and diastolic blood pressures from birth through the adolescent years. Generally, researchers have found the blood-pressure levels of children tend to remain relatively fixed along the distribution curve for their age and sex (6). For example, if a child displays a blood-pressure level in a high percentile, there is a tendency for this child to remain in that percentile as they grow older. This process is known as tracking and may have significant predictive value, especially for children who show high levels of blood pressure at an early age. Studies by Zinner (17) and Paffenbarger (18) concluded that the higher the blood pressure during childhood and adolescence, the greater the likelihood of hypertension with aging. Therefore, it is reasonable to assume that the detection and control of elevated blood pressures in childhood may alter the course of the disease and reduce the serious complications found in the adult.

Obesity is the second modifiable CHD risk factor of focus in this study. The problems of excessive weight gain and obesity have increased to epidemic proportions as the weight of Americans has continued to increase (19). Researchers Katch and McArdle (20) claim Americans consume

more fat per capita than other nations in the world. Dr. Cooper (21), speaking recently at the American Alliance for Health, Physical Education, Recreation, and Dance Convention in Atlanta, Georgia, highlighted the fact that 50 million adults are estimated to be "overfat." There is little doubt that obesity presents a major health threat to society. Although it is still not clear the extent to which obesity causes specific medical problems, it is known that there are increased medical and health complications in obese individuals. The more serious complications include the following: hypertension and increased risk of stroke, renal and gallbladder disease, diabetes, pulmonary diseases, breast and endometrial cancer, abnormal plasma lipid and lipoprotein concentrations, impairment of cardiac function, osteoarthritis and gout, and menstrual irregularities and toxemia of pregnancy (20).

Obese individuals may also exhibit considerable psychological and social problems. Authorities in the field (22, 23) found a tendency for the obese to have greater body image distortions, poorer self-concepts, and more emotional disturbances. In addition, there are social problems that arise due to harassment, poor peer acceptance, and discrimination from significant others (24). Thus, obesity is a definite physical, psychological, and socioemotional liability.

Childhood obesity is presently a widespread condition in the United States. Moreover, the incidence of this serious health problem in the young is likely to increase due to advanced technology, a higher standard of living, and sedentary lifestyles. To illustrate, the Department of Health and Human Services funded a very recent survey entitled "The National Children and Youth Fitness Survey (NCYFS) (25). This study used a sample of highly representative American youngsters in grades 5 through

12 and found American children have become fatter since the 1960's. The skinfold data found in the NCYFS sample was compared to data obtained from a similar study entitled "The Health Related Physical Fitness Test" (HRPFT) conducted in 1960. For both boys and girls the NCYFS sample had median skinfold sums that were 2 to 3 millimeters thicker than in the HRPFT sample (26). The NCYFS demonstrates the increase in childhood obesity during the last 25 years among the American school-age population.

Of all the nutritional disorders in childhood, obesity is believed to be the most common (27). Excessive weight at a young age is accompanied by several physiological problems. Obesity in childhood appears to be related to such problems as a decrease in growth hormone release, increased insulin secretion, carbohydrate intolerance, hypertension, and atherogenic serum lipid disorders (28). In addition, children with severe cases of obesity may develop orthopedic problems, somnolence, and dyspnea (28).

Besides the physiological problems, childhood obesity may also have devastating psychological and social consequences previously mentioned in the adult population. Studies have found these consequences often carry over into adulthood and include a poor body image, an expectation of rejection, low self-esteem, a sense of failure and inferiority, and a passive external approach to life situations (29, 30). Often obese children encounter teasing and ridicule and are left out of social activities and athletics. This may in turn cause the child to be inactive, resulting in social withdrawal or cause the child to indulge in antisocial behavior. Neumann (30) believes a vicious cycle is set into motion within the child. The frustration and isolation felt by the child results in even greater withdrawal from society. Eating may be resorted to for gratification and

comfort. The child may look upon eating as a substitute for acceptance and activity. Sadly, if this cycle follows a child through adolescence, his/her chances of maintaining normal weight become less and less. The longer this vicious cycle continues, the less likely eating habits and activity patterns can be broken since conflicts with parents and other social adjustment problems complicate any effective treatment.

The variable of interest in this study is self-concept and its relationship with the modifiable CHD risk factors hypertension and obesity. Self-concept may be defined as a system of ideas, attitudes, values, and commitments that constitute a person's inner world (31). Researchers list the following as important dimensions of the self-concept: body self (or body image), social self, cognitive self, and self-esteem (32, 33).

How individuals feel about themselves can have a pervasive effect on their lives. In the adult population, the self-concept will influence an individual professionally, socially, emotionally, physically, etc., and be the main driving force for becoming self-actualized. Positive lifestyle changes (exercising, weight control, stress management, etc.) are more easily attainable with a healthy self-concept. As Keat (34, p. 47) states, a person's self-concept is considered by many to the "*the single most important variable in an individual's life.*"

In children, the self-concept is a crucial area of development and learning. Interaction with others, decision making, and personal growth and development are all based in a positive self-concept. The significance of a healthy self-concept can be seen in aiding a child to strive in a constructive manner throughout life. To illustrate, Kiester (35, p. 1) views self-concept as "*the foundation on which personality is built and the primary determinant of behavior.*" In addition, McDonald believes

a child's concept of himself potentially affect every thought, feeling, word, and behavior that he has (36).

Children with positive self-concepts feel capable, likeable, and valued, and they can successfully meet the demands of the world (37). Children fortunate enough to be treated with love, trust, respect, and understanding will realize their human worth and potential. They have dignity and are considered happy children. On the other hand, children with negative self-concepts believe they are bad, dumb, sick, unloveable, incompetent, and so on, depending on that particular issue or area in their life (38). Sadly, these children are often in trouble at home, in school, and have problems with relationships. A child with low self-worth may react to all these problems by displaying negative behavior. Swayze (37) believes the purpose behind this negative behavior may be to get revenge for the destruction of the positive self or to try to get a substitute for love.

Overeating can be considered a negative behavior a child may resort to when seeking revenge or striving to find some substitute for love. Excessive weight gain is often associated with overeating, thereby causing the child to become obese. Obesity in turn may result in a lowering of self-concept and a rise in blood pressure. The unfortunate child who displays a poor self-concept, who is considered obese, and who shows high blood-pressure levels may experience a broad range of psychological, social, and physiological problems. Often, these serious problems can carry over into adulthood. The formation of a positive self-concept in children will eliminate the tendency for negative behavior (overeating). In this context, the role parents, teachers, and significant others play in the formation of a healthy self-concept cannot be overestimated. Each

in their own way can help to develop a child's assets to the fullest in order to form a strong, positive self-concept, the most important attribute in an individual's development.

The literature reveals that very little research has been done to determine the importance of self-concept to modifiable CHD risk factors in children. With trends pointing toward more identification and modification of CHD risk factors in children, it is evident that more research is needed to determine the importance of self-concept in the prevention and control of modifiable CHD risk factors.

Hypertension and obesity were the two modifiable CHD risk factors chosen for investigation in this study since they are easily measured and have serious implications if left uncontrolled. The fifth-grade population in Oklahoma was chosen since 10 to 11-year-old children are sufficiently mature for modification of risk factors to take place. In addition, blood pressure, percent body fat, and self-concept norms have been established in 10 to 11-year-old children for comparison purposes and identifying children on track for high blood pressure, high percentage of body fat, and low self-concept.

In summary, the early recognition and modification of modifiable risk factors may prevent or slow down the development of CHD. Understanding, determining, and predicting the importance of a child's self-concept in CHD prevention may alleviate many of the health problems currently facing the adult population. A key in developing a desirable lifestyle free from CHD risk factors lies in the formation of a positive self-concept at a young age.

Statement of the Problem

The purpose of this study was to determine the relationships among blood pressure, percent body fat, and self-concept in fifth-grade children in Oklahoma. A subproblem was to generate prediction equations that would predict total percent body fat from the independent variables of systolic and diastolic blood pressure. Additionally, prediction equations were produced to predict self-concept from total percent body fat, triceps, and subscapular skinfolds. Also, the author investigated the number of subjects and percent of the sample who displayed any or all of the following characteristics: (1) high levels of blood pressure, (2) high percentage of body fat, and (3) a low self-concept.

Hypotheses

1. There is no significant relationship between (1) systolic blood pressure readings and triceps skinfold measurements or (2) systolic blood pressure readings and subscapular skinfold measurements in Oklahoma fifth-grade female or male children.

2. There is no significant relationship between systolic blood pressure readings and self-concept in Oklahoma fifth-grade female or male children.

3. There is no significant relationship between (1) diastolic blood pressure readings and triceps skinfold measurements or (2) diastolic blood pressure readings and subscapular skinfold measurements in Oklahoma fifth-grade female or male children.

4. There is no significant relationship between diastolic blood pressure readings and self-concept in Oklahoma fifth-grade female or male children.

5. There is no significant relationship between (1) total percent body fat and systolic blood pressure readings or (2) total percent body fat and diastolic blood pressure readings in Oklahoma fifth-grade female or male children.

6. There is no significant relationship between total percent body fat and self-concept in Oklahoma fifth-grade female or male children.

7. There is no significant relationship between triceps skinfold measurements and self-concept in Oklahoma fifth-grade female or male children.

8. There is no significant relationship between subscapular skinfold measurements and self-concept in Oklahoma fifth-grade female or male children.

Significance of the Study

Coronary heart disease (CHD) is the number-one killer among the adult population in the United States. Hypertension and obesity are two modifiable CHD risk factors that are known to influence the risk of this serious health problem. If preventive measures (screening, referral, and treatment) in childhood can be taken, this may prevent or control CHD from running rampant in our society. Another preventive measure of significance is the role of a child's positive self-concept. A feeling of self-worth at a young age may encourage a healthy lifestyle free from severe health concerns. It, therefore, seems logical to this researcher that the development of a positive self-concept in combination with early identification and modification of risk factors will help to alleviate future complications in the adult.

Delimitations

1. This study was limited to fifth-grade children from a selected representative random sample of 21 elementary schools in the state of Oklahoma.

2. The sample involved only fifth-grade students enrolled from September 1, 1984, to December 1, 1984, in Oklahoma schools.

3. This study focused only on the relationships among the following six variables: systolic blood pressure, diastolic blood pressure, triceps skinfold measurements, subscapular skinfold measurements, total percent body fat, and self-concept.

Limitations

1. The socioeconomic background, racial origin, family history, and diet of the subjects are uncontrolled variables.

2. The reliability of the self-concept data was dependent on the subjects willingness to give honest responses to the statements in the inventory.

Assumptions

1. It was assumed that the sample subject group would be representative of the larger, untested population of students enrolled in the fifth grade in Oklahoma schools.

2. It was assumed that the sample subject group's responses to the Piers-Harris Self-Concept Test is a valid interpretation of their own self-concept.

3. It was assumed that the assessment of tests will be consistently administered.

Definition of Terms

1. Coronary Heart Disease - A common name for coronary atherosclerosis, a condition in which blood flow is restricted through a coronary artery.

2. Atherosclerosis - The narrowing of the lumen (inside diameter) of arteries usually caused by fatty deposits on their walls.

3. Obesity - The excessive enlargement of the body's total quantity of fat.

4. Percentage Body Fat - The percentage of a person's total weight that is fat tissue.

5. Systolic Blood Pressure - The pressure of the blood against the walls of the arteries each time the heart beats.

6. Diastolic Blood Pressure - The pressure of the blood against the walls of the arteries each time the heart relaxes between beats.

7. Hypertension - The chronic elevation of blood pressure above normal levels.

8. Self-Concept - A system of ideas, attitudes, values, and commitments that constitute a person's inner world.

9. Body Image - How a person feels about the appearance and performance of his body.

10. Social Self - How a person feels about himself/herself in his/her relationships with others. Include the racial, ethnic, cultural, and religious selves.

11. Cognitive Self - What a person knows--their basic understanding of concepts and experiences, including their ability to problem solve and generalize across situations.

12. Self-Esteem - The evaluative component of the self-concept that involves acceptance of and respect for the self. It is a feeling a person has about himself.

Descriptions of Instruments

1. Sphygmomanometer - The general name given a system for measuring blood pressure in the arteries (Stock No. 6753, PyMaH Corporation, P. O. Box 1114, Sumerville, N. J.).

2. Stethoscope - An instrument which allows one to listen to Korotkoff sounds within the brachial artery (PyMaH Corporation, P. O. Box 1114, Sumerville, N. J.).

3. Lange Skinfold Caliper - A standardized caliper to measure skinfold thicknesses. This instrument is spring loaded to a constant tension to insure a uniform compression of the tissue (Cambridge Scientific Industries, Inc., Cambridge, Maryland).

4. Piers-Harris Children's Self-Concept Inventory - An eighty-item, self-report questionnaire designed to assess how children feel about themselves (Authors Ellen V. Piers and Dale B. Harris; Published by Western Psychological Services, Publishers and Directors, 12031 Wilshire Boulevard, Los Angeles, California).

5. Scoring Key to the Piers-Harris Children's Self-Concept Inventory. An instrument used to score the self-concept questionnaire (Authors Ellen V. Piers and Dale B. Harris, Published by Western Psychological Services, 12031 Wilshire Boulevard, Los Angeles, California).

CHAPTER II

REVIEW OF LITERATURE

Introduction

The review of literature will be divided into four different phases: (1) hypertension in childhood, (2) childhood obesity, (3) self-concept in childhood, and (4) the relationships among hypertension, obesity, and self-concept in childhood.

Hypertension in Childhood

It was during the early 1970s that the seriousness of hypertension was recognized as a threat to health, and the adult population was encouraged to control the problem (5). Until this time, hypertension was believed to affect only adults, which is why attempts to combat this disease were not pursued in pediatrics. High blood pressure had been assumed to have an obvious symptomatic cause. However, research by Zinner and others (39) indicated this assumption may not be true, that essential elevated blood pressure can be detected in children as young as 2 years of age.

Gifford (40) in 1972 states that one of the reasons why so little was known about childhood hypertension was

> *. . . probably because children have not been included in the study populations. As a matter of fact, it may be necessary to*

> *start such a study with observations on the parents . . . and to record prenatal influences as well as data obtained at time of birth. When the study group on hypertension of the Inter-society of Heart Disease Resources considered the problem of primary prevention of hypertension, the gaps in our knowledge became increasingly apparent* (p. 152).

Recognizing these "gaps," researchers began work to conduct studies that explored blood pressure elevations in children. Their findings proved the frequent statement that essential hypertension is rare in children to be false.

In his first study involving school-age children, Londe (41), a pioneer in the field, took blood pressure readings for 894 boys and 911 girls from 4 through 15 years of age. The criteria used for elevated blood pressures were based on the normal ranges suggested by Master et al. (42): values of blood pressure levels between the 90th and 95th percentiles are suspicious and those above the 95th percentile are hypertensive. Londe discovered 111 boys (12.4 percent) and 106 girls (11.6 percent) with blood pressures above the 90th percentile. Thirty-five children, 14 boys and 21 girls, repeatedly had abnormally high blood pressures (above the 95th percentile). This study clearly indicated hypertension was not rare in children.

Five years later, Londe et al. (43) may have performed the single most important study on essential hypertension in children. Seventy-four children between the ages of 4 and 18 years were selected because each had blood pressure values repeatedly exceeding standards previously established for normal children (Master et al.), although they were otherwise asymptomatic. Londe's definition of hypertension included a systolic reading of 140 or higher and a distolic reading of 90 or higher during the course of at least one year.

The significant difference between Londe's studies and earlier studies of hypertension in children is that Londe studied healthy, asymptomatic children with moderately elevated blood pressures. The studies done previously were of hospitalized, severely hypertensive symptomatic children. Before his 1971 study, the values of 130/85 to 140/90 mm Hg were arbitrarily considered the upper limits for normal children. Through these studies, he demonstrated the values for the 90th percentile were all below 130/85 mm Hg for children under 10 years of age. As a result of this important discovery, Londe found previous studies missed moderately elevated blood pressures in children under 10 years of age.

Several studies have reported the link between childhood and adult hypertension (18, 39). In one study, Zinner and others (39) conducted a longitudinal study of blood pressures in children. Blood pressures were taken in 609 children, aged 6-18 years, 549 of whom had been studied four years earlier. There was a significant positive relationship between the follow-up and initial readings for systolic and diastolic blood pressures. Zinner's study clearly indicated a "significant tendency" for blood pressure scores to follow in the pattern shown earlier.

In summary, studies (18, 39, 41, 43) have indicated that high blood pressure does exist in children, it does have a tendency to increase with age, and the higher the blood pressure during childhood, the higher the blood pressure will likely be in adulthood. By identifying a tendency toward high blood pressure in the young, especially high-risk populations (Blacks, obese, family history), preventive measures can be taken to eliminate or control hypertension and its complications in the adult.

Childhood Obesity

The interest in childhood obesity has developed for several reasons: (1) adult obesity is considered a health hazard, (2) it is difficult to treat this condition successfully, and (3) there is suggestive evidence that obese children have a "strong tendency" to become obese adults. A number of studies have linked obesity in infancy and childhood to obesity in adulthood.

Eid (44) investigated whether excessive weight gain in the first 6 weeks, 3 months, or 6 months of age correlated with overweight and obesity at the ages of 6 to 8 years. His results showed the mean weight of children who had gained weight rapidly in infancy was significantly higher at 6 to 8 years (20 percent versus 7 percent) than those who had gained weight slowly. It was noted that 7.4 percent of the children were considered obese and 18.5 percent overweight of those infants who showed excessive weight gain by the sixth week of life. In infants who showed an excessive weight gain at 6 months of age, 16.7 percent were obese and 26.7 percent were overweight. Eid concluded that weight gain in infancy (as early as 6 weeks of age) is related to overweight and obesity in later childhood. Parallel results were also reported by Charney and associates (45). They determined the child's weight in the first 6 months has a definite relation to his weight status in the third decade of life.

Heald and Hollonder (46) studied the relationship between obesity in adolescence and early growth. The means between the experimental and control groups were found to be significantly different for current age and weight at 1 year of age and weight gained during the first year. The

average weight of the obese group at the time of the study was 174.7 pounds compared to 106.3 pounds for the control group (a difference of 68.4 pounds). Average weight at 1 year of age for the obese group (23.2 pounds) was significantly greater than that of the control group (21.9 pounds). Finally, the average weight gain from birth to 1 year is also significantly greater for the obese group (16.43 pounds) as compared to the control group (14.85 pounds). Datum indicate the weight gains from birth to 1 year and the weights at 1 year of age were significantly higher in the obese group as compared to the normal-weight group.

Other researchers report similar findings. Lloyd and Wolff (47) conducted a nine-year study on the weights of 98 overweight children. They concluded that 75 percent of obese children 9 to 11 years old were still obese eight years later. Abraham and Nordsieck (48) studied adults whose weights were taken in elementary schools. They reported overweight children 10 to 13 years of age were still overweight at 26 to 35 years of age. Finally, Stunkard (49) and Burt discovered the odds against an obese child (by age 12) becoming a normal-weight adult were more than 4 to 1. If the obese child's weight had not been reduced by the end of adolescence, the odds raised to 28 to 1. The findings of these studies suggest obesity in childhood is likely to persist into adult life.

There is a definite lack of unanimity regarding the etiology of obesity. A wide body of literature exists on the controversy of heredity versus environment as factors causing childhood obesity. Price and Genorilla (28) believe the genetic component most likely forms a foundation upon which environmental factors interact to develop obesity. There are studies to support both theories.

Supporters of the genetic theory point to the findings of Johnson and others (50) who interviewed 28 obese and nonobese girls of similar height, age, and grade to determine what percent of them had obese parents. They found that children of normal-weight parents had an obesity rate of 8 to 9 percent; when one parent is obese, the rate climbs to 40 percent and rises even higher (80 percent) when both parents are obese. In addition, Charney and others (45) concluded that when at least one parent is overweight and the infant's weight is above the 75th percentile, 51 percent of the infants will be overweight or obese as adults.

On the environmental side, Shenker and associates (51) conducted a study on the weight differences between 66 foster infants of overweight and nonoverweight foster mothers. The results demonstrated that infants placed with obese foster mothers tended to become more obese than infants placed with nonobese mothers. Strong family-line trends were also evident in the Ten State Nutrition Survey (52). The Survey showed the child of obese parents was three times as likely to be obese as the child of lean parents.

At this time, little can be done to alter the genetic components of obesity. Therefore, efforts should be channeled into the control of environmental factors, such as eating habits and activity levels, to help prevent childhood obesity from continuing into adult life.

Self-Concept in Childhood

A major focus point of self-concept research in the school-age child has been the relationship between self-concept and academic performance. Researchers in the course of investigating this relationship have

discovered differences in self-concept scores according to the sex, race, socioeconomic status, and age of their subjects (53). Although an ample amount of literature has been reported on each of these four variables, conflicting data has surfaced regarding the existence of systematic differences in self-concept.

In the matter of sex differences, researchers have found evidence to support the position that females perceive themselves less positively than males (54, 55). Other researchers have reported findings to support the opposite position, stating females do perceive themselves more positively than do their male counterparts (56, 57). The results of several other studies complicate the issue still further, demonstrating that no systematic sex differences occur in self-concept (58, 59, 60, 61).

Similar ambiguity has been discovered in the literature relating to race differences in self-perceptions. Osborne and LeGette (54) along with Stenner and others (62) found evidence to suggest that Blacks tend to have significantly lower self-concepts than do whites. On the other hand, other studies found that Blacks tend to perceive themselves more positively than their white classmates (63, 64, 65). Still other researchers have shown no significant race differences in studies related to self-concept (54, 66, 67).

Conflicting data has also been reported in studies dealing with social class differences. The evidence suggests a correlation does exist between socioeconomic status and self-concept, however, it is not clear whether this relationship is positive or negative. For example, Brookover et al. (68) and Wylie (69) reported less positive self-concepts for students from lower social classes; while Cicirelli (67), Soares and Soares (70), and Trowbridge (71) found evidence to suggest that the

self-concepts from lower social classes actually surpassed those of their more affluent classmates.

Finally, studies performed on the age differences appear to have inconsistent findings. Cicirelli (67), Morse (72), Piers and Harris (60), and Olsen and Carter (59) performed studies which have found age differences in self-concept. Yet, other researchers, including Trowbridge (71), Kokenes (73), and Nelson (74), have found evidence from their studies to suggest that level of self-esteem does not vary in regards to the child's age or grade level.

In summary, inconsistent findings have been found between self-concept and the variables sex, race, socioeconomic status, and age. Traditionally, according to Osborne and LeGette (58), the literature on self-concept has maintained that the self is comprised of many "selves." That is, the self-concept is a complicated construct made up of many components; therefore, it remains difficult to study because of its various dimensions.

Relationships Among Hypertension, Obesity, and Self-Concept in Childhood

An abundance of literature was found concerning the relationships between obesity and hypertension and obesity with self-concept. On the other hand a paucity of research exists involving the relationship between hypertension and self-concept, and only two studies were found dealing with the relationships among all of these variables.

It has been well established that overweight subjects are inclined to have high blood pressure when looking at the relationship between obesity and hypertension (75, 76, 77). Most of the population studies tend

to show a rise in blood pressure with an increase in body weight or body fat. Londe (41) reported systolic blood pressure was related to weight in both boys and girls, while diastolic pressure was related to weight in the girls but not the boys. In his second study Londe et al. (43) found 53 percent of the hypertensive children to be overweight, whereas only 14 percent of normotensive subjects were overweight. Using skinfold measurements, Lauer et al. (2) and Stine et al. (78) reported significant positive correlations between skinfold thickness and blood pressure (systolic and diastolic) in children. Marsh and others (79) reported similar findings with skinfold thickness and diastolic hypertension in ninth graders, however, no relationship was shown between skinfold thickness and systolic hypertension.

One of the most recent studies investigating the relationship of skinfold thickness with hypertension was completed by Edgley and Edwards (80). They found a significant positive correlation between percent body fat and systolic blood pressure in 10 to 11-year-old boys, while no significant relationship existed for percent body fat and diastolic blood pressure. In 10 to 11-year-old girls, no significant relationship was found between percent body fat and blood pressure. The authors speculated that blood pressure may be related to body composition in young males but not in females.

Finally, Seiger investigated this relationship in two additional studies (81, 82). A statistically moderate relationship was noted between percent body fat and blood pressure in the first study involving 10-year-old girls. The second study included 10 to 15-year-old boys and girls, and low positive correlations were discovered between the two

variables. In general, a positive relationship appears to exist between high blood pressure and obesity.

It is well documented that obese people tend to have a lower self-concept than normal-weight people (83, 84). Burch (85), Kalisch (86), Maddox et al. (87), Stunkard and Merdelson (88), and Werkman and Freenberg (89) have found evidence suggesting the negative effects of obesity on self-concept. According to Adams (90), a low self-concept may result in self-devaluation which can hinder psychological adjustment. That is, maladaptive psychological adjustment may take place in the obese, resulting in many psychological problems. Researchers, in the course of investigating this relationship, note the obese are seen as inadequate, having nonhealthy personalities, depressed, having higher anxiety levels, and being insecure (85, 87, 89, 91, 92).

Body image, social self, and self-esteem are three dimensions of the self-concept likely to be affected in the obese child. Each dimension plays an integral part in how a child perceives himself/herself. With respect to body image, it has generally been shown that feelings about the body are correlated with feelings of the self; although the strength of the correlation varies for different groups (93, 94). In adolescents, Clifford (95) found females to be more critical of their bodies than males. Although much has been done with adults and adolescents, Mendelson and White (96) found no empirical work had been done on body esteem (affective component of body image) of obese children. In their study, obese children were found to have lower opinions about their bodies and personal appearance than did normal-weight children. Additional studies are needed to further the understanding of self-concept (specifically body image) as it relates to obesity in children.

The social self, the way a child feels about himself in relationships with others (including racial, ethnic, cultural, and religious self) has serious implications in the obese child. Studies by Rodin (97) and Allon (98) have shown that obese people are devalued by society and by the obese themselves. One study by Richardson (99) involved the reactions of school children to drawings of six other school-age children. The findings showed the drawing of the normal child was consistently chosen as the most preferred, while the drawing of the obese child was shown to be the least preferred. The results of Richardson's study have deep implications for the social nonacceptance of the obese child. Kaplan (84) stated these findings were indicative of the fact that the cultural devaluation of obese children is transmitted to and incorporated by the obese at a young age. In other words, the personal devaluation of the obese begins early in life, as witnessed in studies by Carrera (93) and Werkman and Greenberg (89).

Self-esteem (the evaluative component of the self-concept) of obese children has been shown to be generally lower than that of normal-weight children by Felker and Kay (100) and Sallade (101), although this relation does not always hold true according to Sallade (101). A recent study by Mendelson and White (96) found self-esteem to be correlated for children over a wide range of weight. This finding is similar to findings with adults and adolescents that feelings about the body are associated with feelings about the self (101, 102).

With respect to hypertension and self-concept, Siegel and Leitch (103) note that the most neglected aspect of cardiovascular risk factors has been the behavioral variables. While much research has focused on the type A behavior pattern (competitive achievement striving), only a

scarcity of research has been directed towards the behavioral aspects of hypertension (104).

Buck and Stern (105) studied personality factors and blood pressures in children and found no relationship existed between blood pressure and the Coronary Prone Behavior Patterns (a rushed, aggressive, competitive, achievement-oriented style of life associated with developing coronary heart disease). These researchers concluded that personality abnormalities are more likely a consequence of being treated for hypertension rather than a cause of the disorder. However, this finding does not rule out the possibility that a pressor reaction to stress may be characteristic of hypertensive children.

Seigel and Leitch (103) conducted perhaps the most comprehensive examination of the behavioral correlates on blood pressure in the young. These researchers showed hypertensive subjects do differ from normotensive subjects on a cluster of behavioral characteristics. For example, subjects demonstrating high blood pressure were less satisfied with their lives and displayed more anger than subjects with low blood pressures. Also, hypertensives assessed as more Type A scored higher on the impatience content of the interview and expressed more hostility toward the interviewer than normotensives. Seigel and Leitch concluded that their study provided evidence for an association between certain behavioral factors and elevated blood pressure in the young.

On the other hand, Edgley and Edwards (80) and Seiger (82), when looking at the relationships among all three variables, reported no significant correlations existed between the variables hypertension and self-concept. In brief, very little research has examined the relationship

between self-concept and hypertension. In the few studies that have investigated this association, inconsistent findings have been reported.

Further research of young hypertensive subjects is necessary to determine if behavioral variables (such as self-concept and obesity) are significantly related with higher levels of blood pressure.

CHAPTER III

METHODS AND PROCEDURES

The purpose of this study was to determine the relationships among percent body fat, blood pressure, and self-concept in fifth-grade children in Oklahoma. A subproblem was to generate prediction equations that would predict total percent body fat from the independent variables of systolic and diastolic blood pressure. Additionally, prediction equations were produced to predict self-concept from total percent body fat, triceps, and subscapular skinfolds. Also, the author investigated the number of subjects and percent of the sample who displayed any or all of the following characteristics: (1) high levels of blood pressure, (2) high percentage of body fat, and (3) a low self-concept.

Selection of Subjects

The sample for this study consisted of fifth-grade children selected from a stratified random-order listing of Oklahoma School Districts as published by the Oklahoma Board of Education (106). Seven small (0-249 students), seven medium (250-999 students), and seven large (1,000 plus students) school districts were selected from the following seven regions taken from the random-order listing: Metropolitan, Central, Southwest, Southeast, South Central, Northwest, and Northeast. Within each of the twenty-one school districts, one elementary school was chosen. All

subjects came from the entire fifth-grade population of that particular elementary school.

Upon being selected for the study, the principals of each elementary school were contacted by phone to determine if their school would like to be involved in this study. Often permission from superintendents was necessary before principals would agree to participate. Afterward, follow-up letters were sent clarifying the purposes of the study and explaining the various testing procedures to be used in the collecting of data (Appendix A). Additionally, parent-permission forms were sent to each elementary school (Appendix A). For a child to become a subject, parental permission was required. A total of 619 fifth-grade children (286 females and 333 males) from 21 elementary schools obtained parental permission to be subjects in this study.

Table I presents the seven regions, the names of the participating elementary schools, their locations, the size of the school districts, and number of participants from each elementary school. In addition, Figure 1 graphically displays the location of each elementary school selected. To show representation, there were 10 elementary schools located south of Interstate 40 and 11 elementary schools located north of Interstate 40, the highway which divides the state in half horizontally. There were 9 elementary schools to the west, and 12 schools to the east of Interstate 35, the highway that divides the state in half vertically.

Test Procedures

Each of the 21 elementary schools selected for the study was visited by the researcher. Three measurements were taken from each subject: blood pressure, percent body fat, and self-concept. Before the tests

TABLE I

ELEMENTARY SCHOOLS SELECTED FOR TESTING

Region	Elementary School	Location	Size of School District	Number of Participants
Metropolitan	Leonard Elementary	Leonard, Oklahoma	Small	3
	Bethany Elementary	Bethany, Oklahoma	Medium	39
	Washington Elementary	Collinsville, Oklahoma	Large	34
Central	Bradley Elementary	Bradley, Oklahoma	Small	6
	East Side Elementary	Chandler, Oklahoma	Medium	46
	Will Rogers Elementary	Stillwater, Oklahoma	Large	30
Southwest	Lone Wolf Elementary	Lone Wolf, Oklahoma	Small	13
	West Elementary	Carnegie, Oklahoma	Medium	41
	Fifth Grade Center	Anadarko, Oklahoma	Large	73
Southeast	Canadian Elementary	Canadian, Oklahoma	Small	19
	Indianola Elementary	Indianola, Oklahoma	Medium	22
	Will Rogers Elementary	McAlester, Oklahoma	Large	52
South Central	White Bead Elementary	White Bead, Oklahoma	Small	26
	Allen Elementary	Allen, Oklahoma	Medium	30
	Hayes Elementary	Ada, Oklahoma	Large	35
Northwest	Lahoma Elementary	Lahoma, Oklahoma	Small	15
	Waynoka Elementary	Waynoka, Oklahoma	Medium	12
	Lincoln Elementary	Alva, Oklahoma	Large	15
Northeast	Wynona Elementary	Wynona, Oklahoma	Small	14
	Adair Elementary	Adair, Oklahoma	Medium	45
	Nowata Elementary	Nowata, Oklahoma	Large	49

Figure 1. Location of Participating Schools

were given, the subjects were briefed about the purposes of the study and the techniques to be used in testing. The following procedures were used in the collection of data:

Blood Pressure

The ausculatory method (listening) was the technique used to measure blood pressure. Blood pressures were mainly taken by health professionals (school or county health nurses). When a health professional was not available, the author performed the readings. Training for the author was performed by Lorraine Garner, the State Hypertension Nurse for Oklahoma. Additionally, the author had prior training from two graduate coures taught by Dr. Aix B. Harrison, Oklahoma State University. Guidelines set up by the Oklahoma State Department of Health (16) were followed for greater accuracy of blood pressure readings.

Each subject was asked to sit down at a desk or in a chair and relax. The subjects were asked to roll up the sleeve covering their right arm and lay their slightly flexed arm on the desk top or table with palm of the hand upward. After checking to ensure the upper arm was at heart level, the proper size (adult or child) sphygmomanometer was selected. The deflated compression cuff was applied evenly and snugly around the upper arm with the center of the inflatable rubber bladder directly over the brachial artery. The lower edge of the cuff was placed one inch above the natural crease across the inner aspect of the elbow. The stethoscope was then placed over the pulse pressure point of the brachial artery and the cuff inflated 20-30 mm Hg higher than the point when blood flow within the artery was halted. Immediately, the control valve was opened and a constant deflation rate of 2 to 3 mm Hg per second was maintained.

The systolic blood pressure was recorded as the point on the mercury column at which at least two beats were heard (Phase I of the Korotkoff sounds) in order to eliminate recording a single erroneous sound. Phase V of the Korotkoff sounds (when all sounds disappear) was used to record the diastolic reading. When a high reading was heard, a second measurement was taken with the lowest of two readings being recorded for the subject's blood pressure.

Percent Body Fat

Skinfold measurements were taken for the estimation of percent body fat. Lohman (107) indicates this is the most valid approach for body composition using field methods. The triceps and subscapular skinfold sites were chosen because they are easily measured and are highly correlated with total body fat.

The NCYFS has produced current norms with the triceps and subscapular skinfold sites using a nationally representative sample (25). The skinfold norms from this survey are generally considered to be superior to the previously developed norms established in the 1960's by the National Center for Health Statistics. Through the use of the NCYFS norms, an educator/researcher can compare the subject's skinfold data with the norms for that age and assess the subject's current percent body fat status.

The Lange Skinfold Caliper was the instrument used to measure skinfold thickness at the triceps and subscapular regions. This device is spring loaded at a constant tension of 10 grams per millimeter to ensure a uniform compression of tissue. Research into the reliability and validity is well documented; and when compared to the Harpenden Skinfold Caliper, comparable results were reported (108, 109).

In training for the skinfold measurements, past research has indicated that training and practice of skinfold measurements are essential for reliable and valid measurements (110). Prior to this study, this author had received training from Dr. Betty Edgley, a Professor from Oklahoma State University well versed in the technique of measuring skinfold thickness. Coupled with this training, the author had used the Lange Skinfold Caliper in two other studies, measuring the skinfold thickness of over 150 children.

Recommendations by Hockey (19) were followed for accurate, consistent measurement. The fold of the skin was firmly grasped between the left thumb and forefinger and lifted. The contact surfaces of the calipers were placed approximately ½ inch from the tips of the fingers. The skinfold measurement was read to the nearest 0.5 mm once the needle became relatively stable. At least two measurements were taken at each site. If measurements were not equal, additional readings were made until consistency was obtained. Finally, all measurements were made by the author on the right side of the body.

The following are descriptions (19) of the two locations for skinfold measurements:

1. Triceps - A vertical fold at the back of the right arm, running parallel to the length of the arm, midway between the shoulder and elbow joints. The arm is hanging naturally at the side in a relaxed position.

2. Subscapular - A diagonal fold immediately below the interior angle of the scapula. The natural fold is away from the midline of the body and downward.

Lastly, a nomogram prepared by Parizkova (111) was used for the determination of total percent body fat from the values of the triceps and subscapular skinfold measurements (see Appendix B).

Self-Concept

Each subject was asked to take the Piers-Harris Children's Self-Concept Scale entitled "The Way I Feel About Myself" (112). With respect to the reliability and validity of this instrument, the test-retest reliability coefficients ranged from 0.42 to 0.96, and internal consistency estimates for the total score ranged from 0.88 to 0.93 (113). For validity purposes the correlations between the Piers-Harris total score and other measures of self-concept have been reported as high as 0.85 (113). Thus the Piers-Harris self-concept scale appeared to be a reliable and valid instrument for measuring a child's self-concept and, therefore, the main reason for using it in this study.

This scale is intended for use with children and adolescents grades 4 through 12 (ages 8 to 18 years). The scale was administered at one time to the entire group of fifth-grade subjects participating from each elementary school. A cafeteria or classroom was chosen as the setting for completing the questionnaire. A rapport was established between the author and subjects so that the subjects would respond in a manner that accurately reflected the way they feel about themselves. Before distribution, the author spoke about the purposes of the questionnaire and how the results were to be used. To enhance the usefulness of the results, the subjects were encouraged to respond as honestly as possible, rather than how they think others (parents, teachers, friends) would want them to be or how they would ideally like to be. The subjects were then told

to read each of the 80 statements concerning their self-concept and indicate whether each statement applied to them using dichotomous yes or no responses.

Upon completion, a scoring key developed by Piers and Harris (114) was placed over the answer sheet to determine the number of responses marked in a positive direction. The total raw score is the number of responses out of a possible 80 that are marked positively. A high score on the scale of 80 items is a score of 66 and above and indicates a positive self-evaluation. On the other hand, a low mark of 37 and below suggests a negative self-evaluation.

Measurements as a Screening Device

Results of all the measurements (blood pressure, percent body fat, and self-concept) for each subject were sent to each of the elementary school principals participating in the study. It was hoped that the results would be used as a screening device to identify children with elevated blood pressure levels, a high percentage of body fat, or low self-concepts. Subjects with any of the above mentioned concerns were identified by circling their scores in the results. In the letter accompanying the results (Appendix A), measures in the prevention and control of these health problems were suggested.

Statistical Analysis

Statistical analysis was carried out on the IBM 3081D Computer at the Oklahoma State University Computer Center utilizing the SPSS^{X} Program (115). Three statistical procedures were used to evaluate the data collected in this investigation. The Pearson Product-moment correlation

was run to determine the interrelationships among the variables triceps and subscapular skinfold measurements, total percent body fat, systolic and diastolic blood pressures, and self-concept. Second, stepwise multiple regression analysis was used to develop a prediction equation for total percent body fat (dependent variable) from systolic blood pressures, and diastolic blood pressures (independent variables). Additional regression analysis was used to develop a second prediction equation for self-concept (dependent variable) from total percent body fat, triceps skinfold measurements, and subscapular skinfold measurements (independent variables). Third, t-tests were run to discover whether significant differences existed between the means for females and males involving systolic blood pressure, diastolic blood pressure, triceps skinfold, subscapular skinfold, total percent body fat, and self-concept.

CHAPTER IV

ANALYSIS OF DATA AND DISCUSSION OF RESULTS

Analysis of Data

A total of 619 Oklahoma fifth-grade children (286 females, 333 males) participated in this study. Subjects were tested using the auscultatory method for systolic blood pressure (SBP) and diastolic blood pressure (DBP), skinfold measurements at the triceps skinfold (TS) and subscapular skinfold (SS) regions for total percent body fat (TPBF), and were administered the Piers-Harris Children's Self-Concept Scale for self-concept (SC). Pearson Product-Moment Correlations and Multiple Regression were the statistical techniques used to discover whether significant correlations existed among the variables and to produce prediction equations to predict total percent body fat (TPBF) self-concept (SC). To discover whether significant differences existed between the means for females and males in SBP, DBP, TS, SS, TPBF, and SC, t-tests were run. In addition, the author investigated the number of subjects and percent of the sample who displayed one or more of the following characteristics: (1) high levels of blood pressure, (2) a high percentage of body fat, and (3) a low self-concept (SC).

The normative data including the mean, standard deviation, and range among all variables is presented in Table II. The means for SBP and DBP for females (98.7-62.5 mm Hg) and males (98.7-63.0 mm Hg) were identical and were found to be within the normal ranges according to Blood Pressure

TABLE II

NORMATIVE DATA FOR OKLAHOMA FIFTH-GRADE CHILDREN

Variables	Females (n = 286) Mean S.D.	Range	Males (n = 333) Mean S.D.	Range	Total Group (n = 619) Mean S.D.	Range
Systolic Blood Pressure (mm Hg)	98.7 ± 11.68	72 - 130	98.7 ± 11.35	76 - 128	98.7 ± 11.50	72 - 130
Diastolic Blood Pressure (mm Hg)	63.5 ± 10.41	32 - 94	63.0 ± 10.83	30 - 90	62.2 ± 10.63	30 - 94
Triceps Skinfold (mm)	19.3 ± 7.46	7.0 - 42.5	17.3 ± 7.34	5.5 - 49.0	18.2 ± 7.48	5.5 - 49
Subscapular Skinfold (mm)	14.5 ± 9.40	4.0 - 47.0	11.9 ± 9.01	4.0 - 59.0	13.1 ± 9.27	4.0 - 59.0
Total Percentage Body Fat (mm)	25.6 ± 4.58	11.9 - 38.0	23.33 ± 5.75	13.5 - 46	24.4 ± 5.35	11.9 - 46
Self-Concept (0-80 points)	59.4 ± 11.63	22 - 80	59.5 ± 12.00	20 - 79	59.4 ± 11.83	20 - 80

Percentile Charts for age and sex (116). (See Figures 2 and 3.) The charts indicate blood pressure readings above the 95th percentile are considered high while readings above the 75th percentile are considered suspicious.

While blood pressure means were found to be normal, percent body fat measurements were high when compared to the normal population (see Figure 4). For example, the TS mean for females (19.3 mm) and males (17.3 mm) is high when compared to the National Children's Youth Fitness Survey (NCYFS) norms of 12 and 11 mm, respectively (see Figure 5). Norms have not been produced for the SS or for total percent body fat, although the means (14.5 mm for females/11.9 mm for males, 25.6 mm for females/23.33 mm for males) also seem to be high. In addition to the TS norms, the NCYFS has generated new norms for the sum of TS plus SS. When adding both skinfold measurements for the females in this study, a sum of 33.8 mm is reached. This sum is 13.8 mm higher than the population norm of 20 for this age and sex. The fifth-grade males demonstrated a 29.2 mm reading for the sum of TS plus SS, a difference of 12.2 when compared to the population norm of 17 mm.

The mean for SC was found to be similar in females and males, with scores of 59.4 and 59.5 (see Figure 6). The population norm for this age is 53, a difference of over 6 points. This relatively high mean may be attributed to "faking good," the tendency to distort answers in a positive direction.

The standard deviation and range are measures of variability which simply indicate the degree of dispersion among the set of scores. When looking at the standard deviation and range among the variables (blood

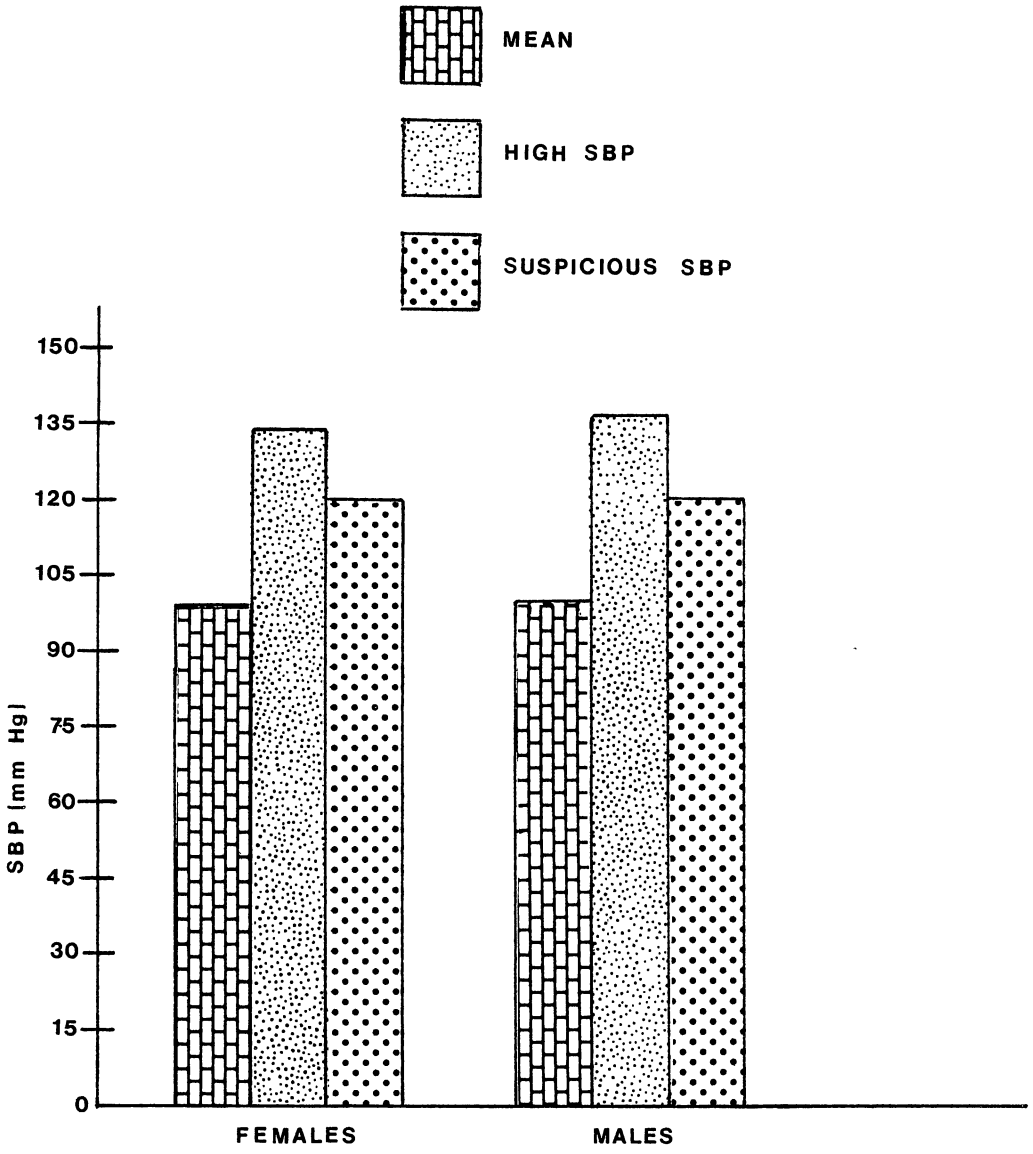

Figure 2. The Means and Values of High/Suspicious Systolic Blood Pressures (SBP) for Fifth-Grade Children

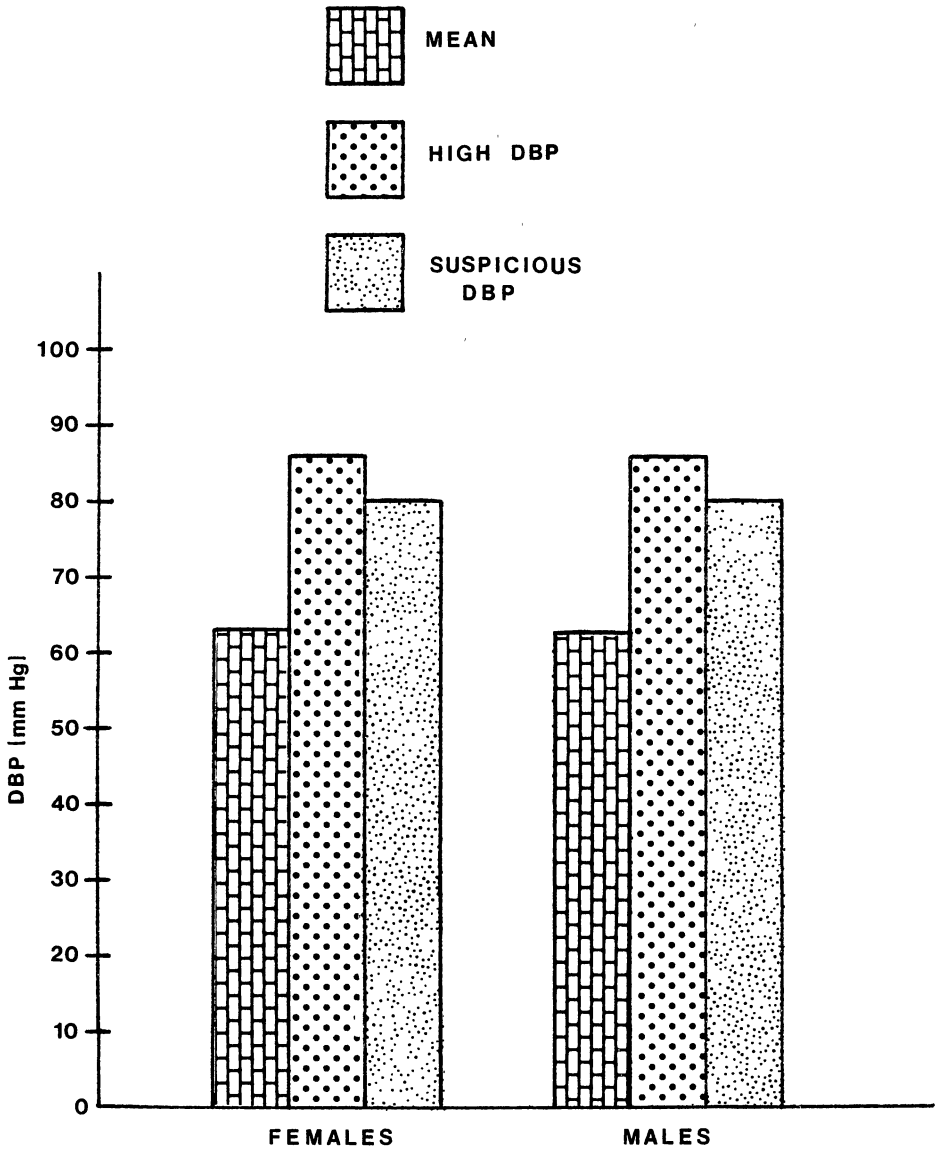

Figure 3. The Means and Values of High/Suspicious Diastolic Blood Pressures (DBP) for Fifth-Grade Children

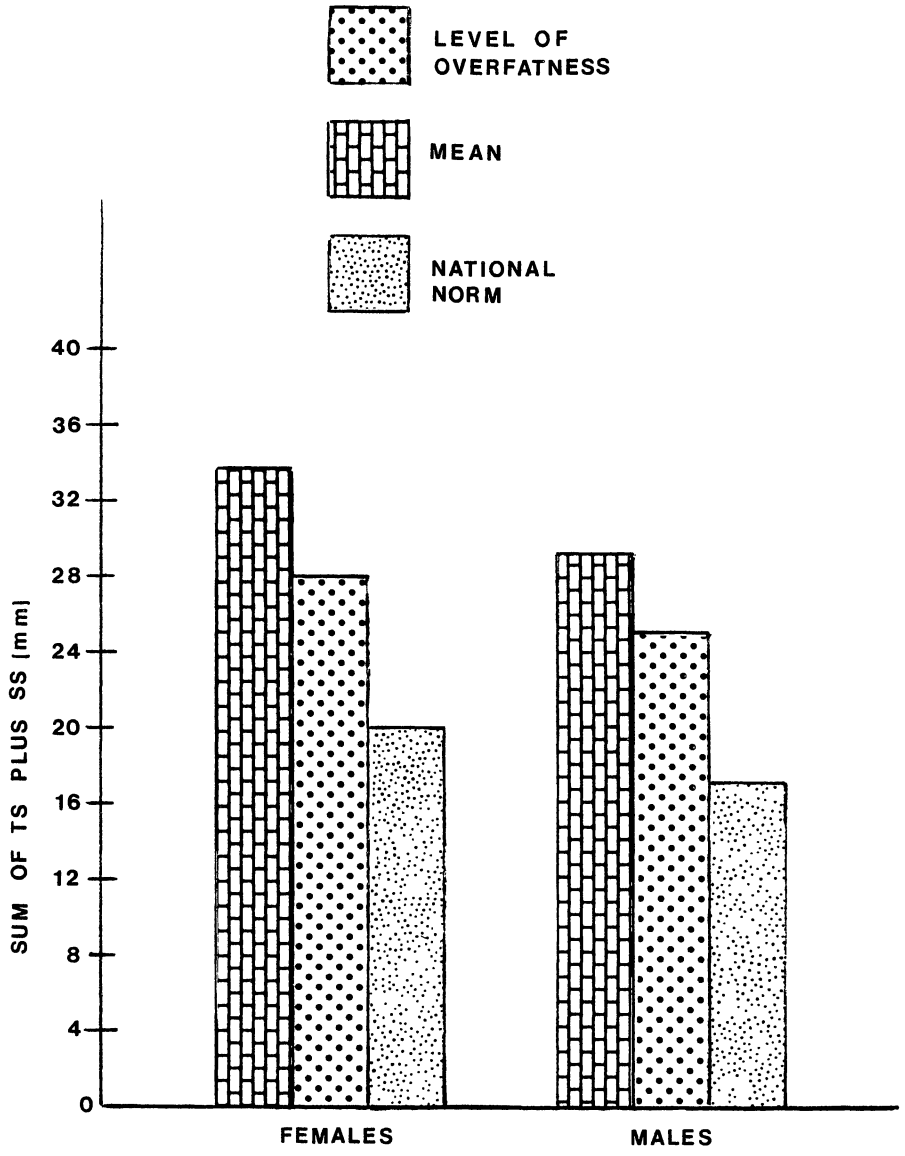

Figure 4. Comparisons of the Means, Levels of Overfatness, and National Norms for the Sum of Triceps Skinfold (TS) Plus Subscapular Skinfold (SS) in Fifth-Grade Children

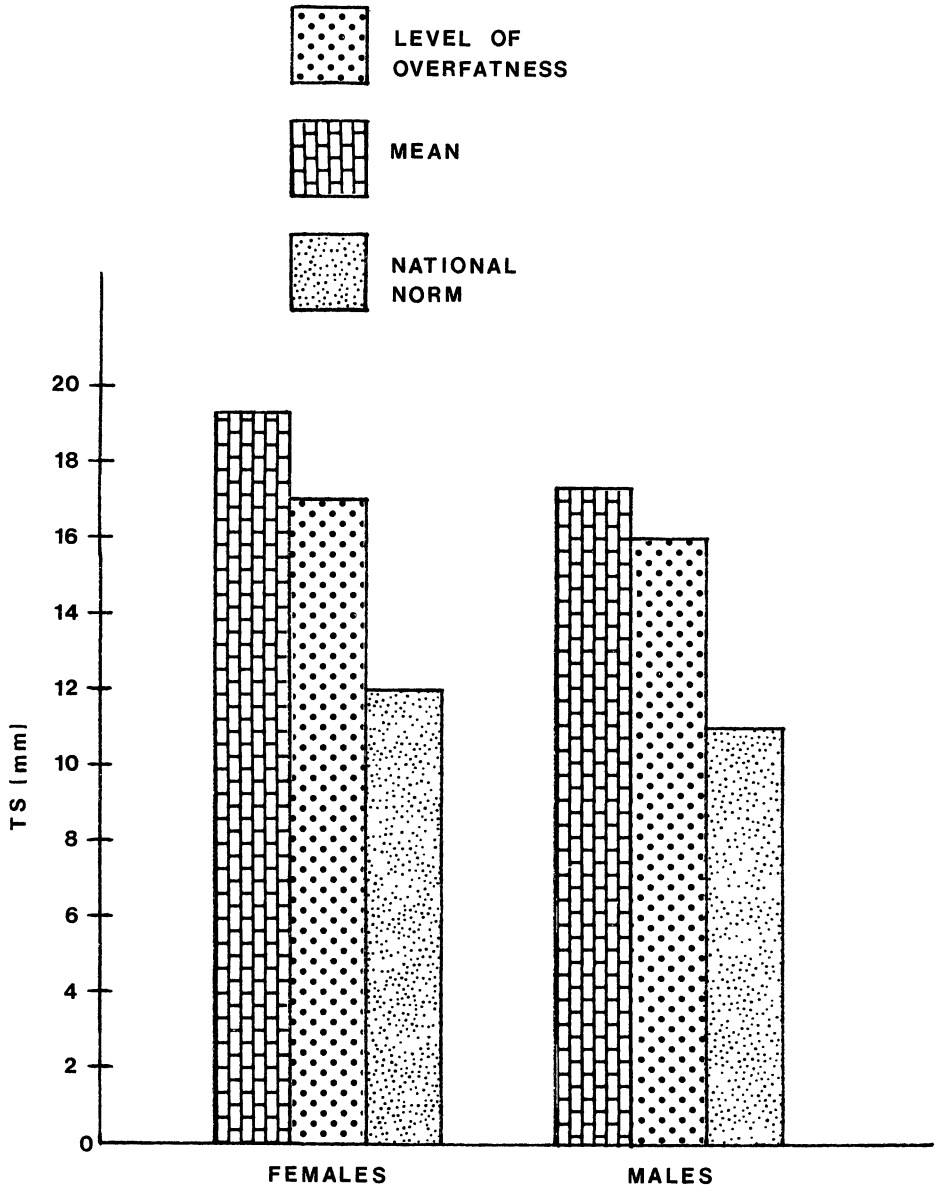

Figure 5. Comparisons of the Means, Levels of Overfatness, and National Norms for Triceps Skinfold (TS) in Fifth-Grade Females and Males

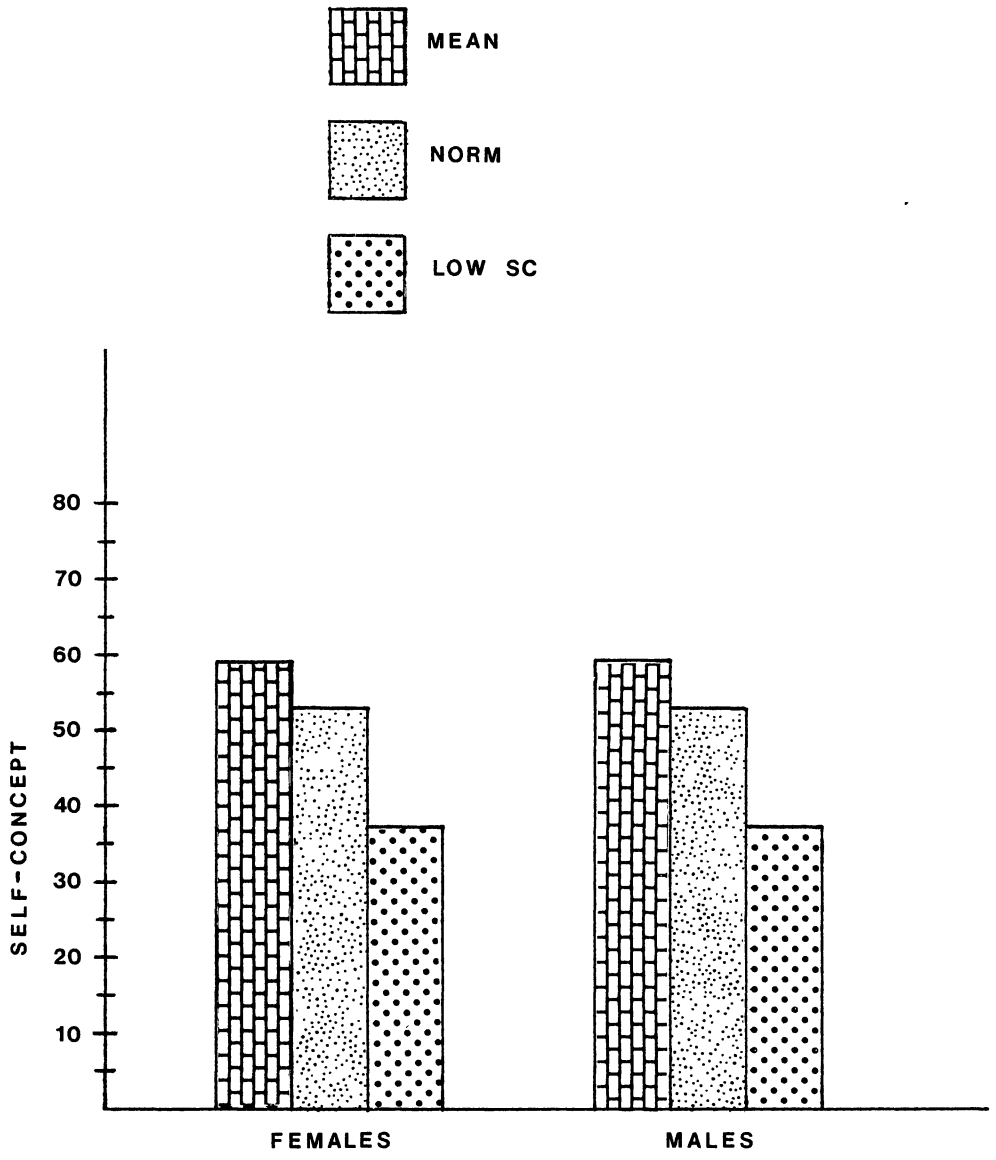

Figure 6. The Means, Norms, and Low Self-Concept Scores for the Piers-Harris Children's Self-Concept Scale

pressure, percent body fat, and self-concept), it is obvious that the scores are heterogeneous.

t-tests were run to discover whether significant differences existed between the means for females and males involving the following six variables: systolic blood pressure (SBP), diastolic blood pressure (DBP), triceps skinfold (TS), subscapular skinfold (SS), total percent body fat (TPBF), and self-concept (SC). Significant differences were found in TS, SS and TPBF, suggesting differences between females and males in this study. On the other hand, significant differences were not found for females and males in SBP, DBP, and SC, indicating no differences between the sexes.

The correlations among blood pressure, percent body fat, and self-concept are presented in Table III. A correlation describes the index of relationship between two variables. In order for a relationship between two variables to be significant, two criteria had to be met: (1) the correlation coefficient must be significant at the 0.05 level, and (2) the size of the coefficient must be above $r = 0.20$. If a correlation coefficient between any two variables did not meet both criteria, the relationship was deemed nonsignificant. As was previously expected, high positive correlation coefficients were found to exist between the following variables: TS and SS for females, $r = 0.812$ ($p < 0.05$) and males, $r = 0.851$ ($p < 0.05$); TS and TPBF for females, $r = 0.879$ ($p < 0.05$) and males, $r = 0.932$ ($p < 0.05$), and SS and TPBF for females, $r = 0.926$ ($p < 0.05$) and males, $r = 0.918$ ($p < 0.05$). Although a moderately high correlation coefficient was found to exist between SBP and DBP for females, $r = 0.594$ ($p < 0.05$), a low correlation was found for males, $r = 0.139$ ($p < 0.05$).

TABLE III

PEARSON CORRELATION COEFFICIENTS FOR OKLAHOMA FIFTH-GRADE FEMALES (n = 286) AND MALES (n = 333)

Variable		Diastolic Blood Pressure		Triceps Skinfold		Subscapular Skinfold		Total Percent Body Fat		Self-Concept
Systolic Blood Pressure (mm Hg)	F	0.594*	F	0.339*	F	0.369*	F	0.359*	F	0.026
	M	0.139*	M	0.047	M	0.023	M	0.053	M	0.022
Diastolic Blood Pressure (mm Hg)			F	0.216*	F	0.280*	F	0.271*	F	0.088
			M	0.133*	M	0.167*	M	0.158*	M	0.019
Triceps Skinfold (mm)					F	0.812*	F	0.879*	F	0.216*
					M	0.851*	M	0.932*	M	0.100*
Subscapular Skinfold (mm)							F	0.926*	F	0.286*
							M	0.918*	M	0.125*
Total Percent Body Fat									F	0.268*
									M	0.112*

* Significant at 0.05 level.

With respect to the variables blood pressure and percent body fat, low positive correlations were found between SBP and SS, $r = 0.369$ ($p < 0.05$); SBP and TPBF, $r = 0.359$ ($p < 0.05$), and SBP and TS, $r = 0.339$ ($p < 0.05$) in females only. On the other hand, no systematic relationship was found to exist among males when looking at the relationship between blood pressure and percent body fat.

When looking at the variables self-concept, blood pressure, and percent body fat, low positive correlation coefficients were also found between SC and SS, $r = 0.286$ ($p < 0.05$); SC and TPBF ($r = 0.268$); and SC and TS, $r = 0.216$ ($p < 0.05$) in females. Since the size of the relationship was not above $r = 0.20$, no significant correlation coefficients were found for males between SC and SS, $r = 0.125$ ($p < 0.05$); SC and TPBF, $r = 0.112$ ($p < 0.05$); and SC and TS, $r = 0.100$ ($p < 0.05$). Finally, no systematic relationship was found to exist between self-concept and blood pressure in fifth-grade females or males.

Total percent body fat and self-concept were the dependent variables selected for prediction in this study. Through stepwise multiple regression analysis, the independent variables were regressed against the dependent variables separately. The independent variable added at each step was the one that accounted for the greatest amount of common variance.

The statistics R (correlation), R^2 (correlation squared), SEE (standard error of estimate), and the F-test describe the accuracy of the multiple regression equation. For example, the R is the coefficient of multiple correlation for every step of the prediction scheme and provides an index of the accuracy of the prediction equation. R^2 shows how much of the variability in the dependent variable is explained by the

independent variable(s). In other words, the higher the R^2, the stronger the relationship is between the dependent and independent variable(s). The SEE helps to report the accuracy of the prediction equation once the dependent variable has been predicted. The smaller the SEE, the more accuracy there is in predicting the dependent variable. Finally, the F-test is an overall test that determines whether the prediction equation is significant in explaining the dependent variable.

Equation 1 in Table IV presents the prediction equation for TPBF in females. The regression coefficients in the equation show a one-unit change in DBP and a one-unit change in SBP would lead to a 0.04 and a 0.12 unit change in TPBF, respectively. The R value of 0.37 and the R^2 of 0.13 are both low and thus weaken the prediction model. The SEE value is 4.3, and the F value for Equation 1 is 21.93, which is significant at the 0.05 level.

Table IV also displays Equation 2 for the prediction of TPBF in males. The regression coefficients for this equation show a one-unit change in DBP and a one-unit change in SBP would lead to a 0.03 and 0.20 change in TPBF, respectively. The R value of 0.36 and the R^2 of 0.13 in Equation 2 are similar to the values found in Equation 1 for females. The SEE is 5.4, which is slightly higher when compared to the females, and the F-value of 24.52 for Equation 2 is significant at the 0.05 level.

Multiple regression Equations 3 through 6 for the prediction of the dependent variable self-concept (SC) are presented in Table V. In Equation 3 for females, TPBF is the only independent variable figured into the equation. The regression coefficient shows a one-unit change in TPBF would lead to a 0.68 unit change in SC. The R-value of 0.27 and the R^2 of 0.07 are again low for this equation. The SEE is 11.2, and the

TABLE IV

MULTIPLE REGRESSION EQUATIONS BY SEX FOR THE PREDICTION OF PERCENTAGE BODY FAT OBTAINED FROM SYSTOLIC BLOOD PRESSURE AND DIASTOLIC BLOOD PRESSURE

Equation	R	R^2	SEE	F
Females				
(1) Total Percent Body Fat = 11.23 + (0.04 × Diastolic Blood Pressure) + (0.12 × Systolic Blood Pressure)	0.366	0.134	4.3	21.93*
Males				
(2) Total Percent Body Fat = 5.87 + (0.033 × Diastolic Blood Pressure) + (0.198 × Systolic Blood Pressure)	0.360	0.130	5.4	24.52*

* Significant at 0.05 level.

TABLE V

MULTIPLE REGRESSION EQUATIONS BY SEX FOR THE PREDICTION OF SELF-CONCEPT OBTAINED FROM PERCENTAGE BODY FAT, TRICEPS SKINFOLD, AND SUBSCAPULAR SKINFOLD

Equation	R	R^2	SEE	F
Females				
(3) Self-Concept = 76.78 - 0.68 × Total Body Fat	0.268	0.07	11.2	21.96*
(4) Self-Concept = 63.96 - 0.36 × Subscapular Skinfold	0.275	0.07	11.2	11.54*
Males				
(5) Self-Concept = 64.92 - 0.23 × Total Body Fat	0.111	0.01	11.9	4.181*
(6) Self-Concept = 61.14 - (0.19 × Subscapular Skinfold) + (0.04 × Triceps Skinfold)	0.125	0.02	11.9	2.625

* Significant at 0.05 level.

F-value for this equation is 21.96 and was found to be significant at the 0.05 level.

Equation 4 in Table V finds SS being the only independent variable entering the equation. The regression coefficient of 0.36 means a one-unit change in SS would lead to a 0.36 unit change in SC. The R for Equation 4 in females is 0.18, while the R^2 is equal to 0.07. The SEE of 11.2 is identical to the value found in Equation 3, and the F-value of 11.54 was significant at the 0.05 level. Equations 5 and 6 for males in Table V follow the same pattern with respect to the weak statistics that describe the accuracy of the prediction schemes. TPBF is the prediction variable for SC in Equation 5 and shows a one-unit change in TPBF would lead to a 0.23 unit change in SC. The R and R^2 are the lowest of all six equations at 0.11 and 0.01, respectively. The standard error is high at 11.9, and the F-value of 4.181 was significant at the 0.05 level.

Equation 6 for males is the last of the six prediction equations, and it is a multiple regression equation since two independent variables, SS and TS, entered into the equation. The regression coefficients show a one-unit change in SS and a one-unit change in TS would lead to a 0.19 and 0.04 unit change in SC, respectively. The R and R^2 of 0.13 and 0.02 are very low and weaken the prediction equation. The SEE is also high at 11.9, and the F-value for Equation 6 in males was found not to be significant at the 0.05 level.

The number of subjects and percent of the sample displaying high/suspicious SBP and DBP, a high percentage of body fat, and a low self-concept were identified and are presented in Table VI.

As indicated in Table VI, there were no subjects who displayed a high SBP. The National Heart, Lung, and Blood Institute (NHLBI) Task

TABLE VI

NUMBER AND PERCENT OF SAMPLE DISPLAYING HIGH/SUSPICIOUS BLOOD PRESSURE, HIGH PERCENT BODY FAT, AND A LOW SELF-CONCEPT

Variable	Female Subjects		Male Subjects		Group Totals	
	Number	Percent	Number	Percent	Number	Percent
High Systolic Blood Pressure	0	0	0	0	0	0
Suspicious Systolic Blood Pressure	21	7.3	18	5.4	39	6.3
High Diastolic Blood Pressure	6	2.1	3	1.0	9	1.5
Suspicious Diastolic Blood Pressure	22	7.7	34	10.2	56	9.0
High Sum of Triceps Plus Subscapular Skinfolds (Body Fat)	147	51.3	167	50.1	314	50.7
Low Self-Concept	12	4.2	17	5.1	29	4.7

Force on Blood Pressure Control in Children (116) has defined high SBP as a reading above the 95th percentile for age and sex. SBP readings of 134 mm Hg for fifth-grade females and 136 mm Hg for fifth-grade males constitute values above the 95th percentile. In addition, Doctors Segal, Weber, and Drayer (6) have labeled blood pressure values above the 75th percentile as suspicious. In this study, a total of 39 subjects, making up 6.3 percent of the total group, displayed a suspicious SBP reading of 120 and above (see Figure 7). By sex, there were 21 females or 7.3 percent and 18 males or 5.4 percent who exhibited suspicious SBP values above the 75th percentile.

High DBP was exhibited by 9 subjects or 1.5 percent of the total group as shown in Figure 8. For a fifth-grade female or male to have high DBP, a reading of 86 (above the 95th percentile for age and sex) had to be observed. The 9 subjects were comprised of 6 females (2.1 percent) and 3 males (1.0 percent). A total of 56 subjects, comprising 9 percent of the total group demonstrated suspicious DBP readings above the 75th percentile (a reading of 80 and above). The breakdown by sex included 22 females (7.7 percent) and 34 males (10.2 percent) who displayed SBP values above the 75th percentile (see Figure 9).

To identify those subjects displaying a high percentage of body fat, the sum of TS plus SS was used. The criteria used in this study to identify subjects with a high percentage of body fat comes from the classification system previously adopted by the American Alliance for Health, Physical Education, Recreation, and Dance (117). According to the classification system, scores below the 25th percentile are unacceptable (poor). A fifth-grade student with a combined skinfold measurement below this percentile exhibited a high percentage of body fat. The sum of TS

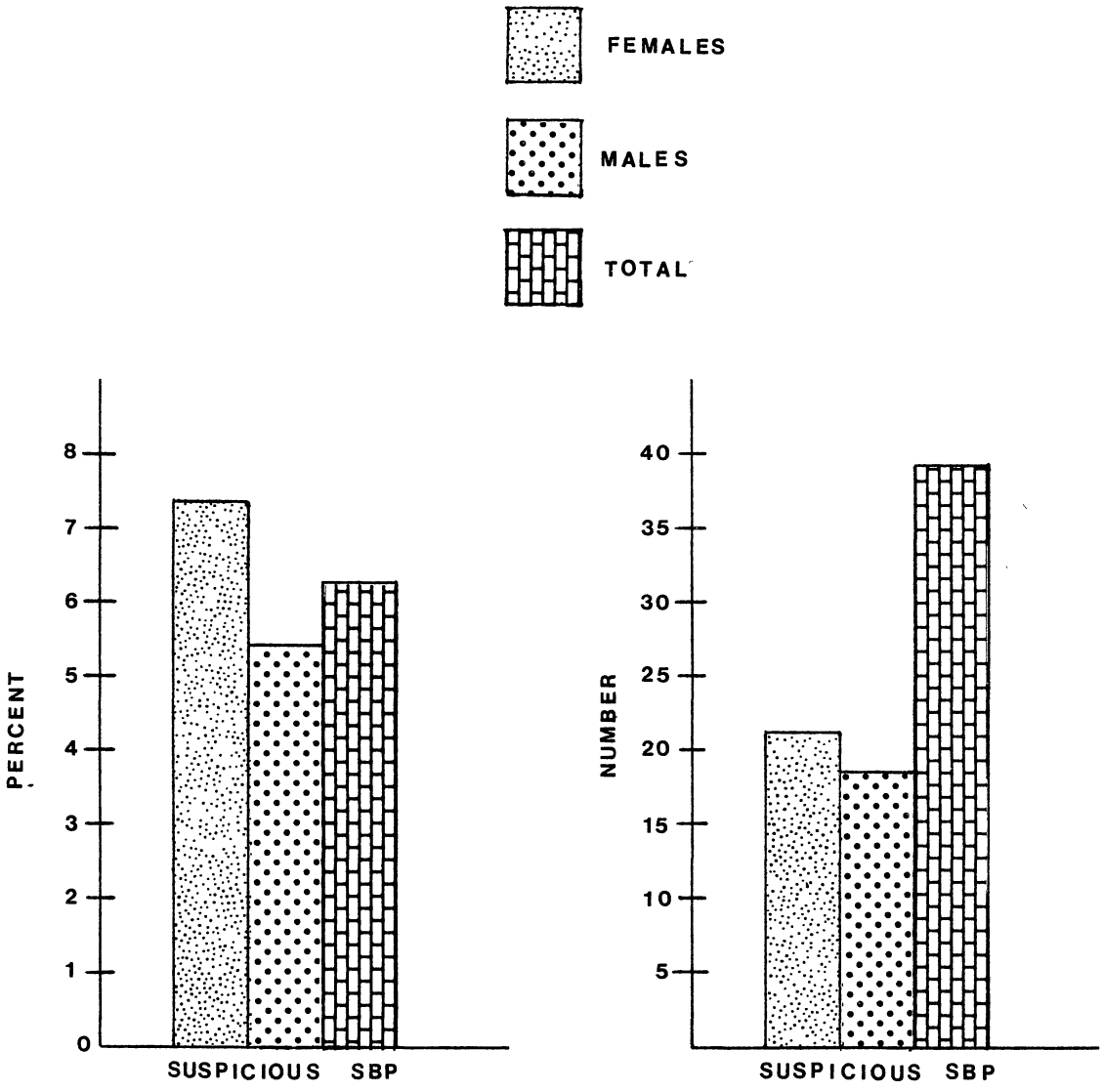

Figure 7. Percent of Sample and Number of Subjects Displaying Suspicious Systolic Blood Pressure (SBP)

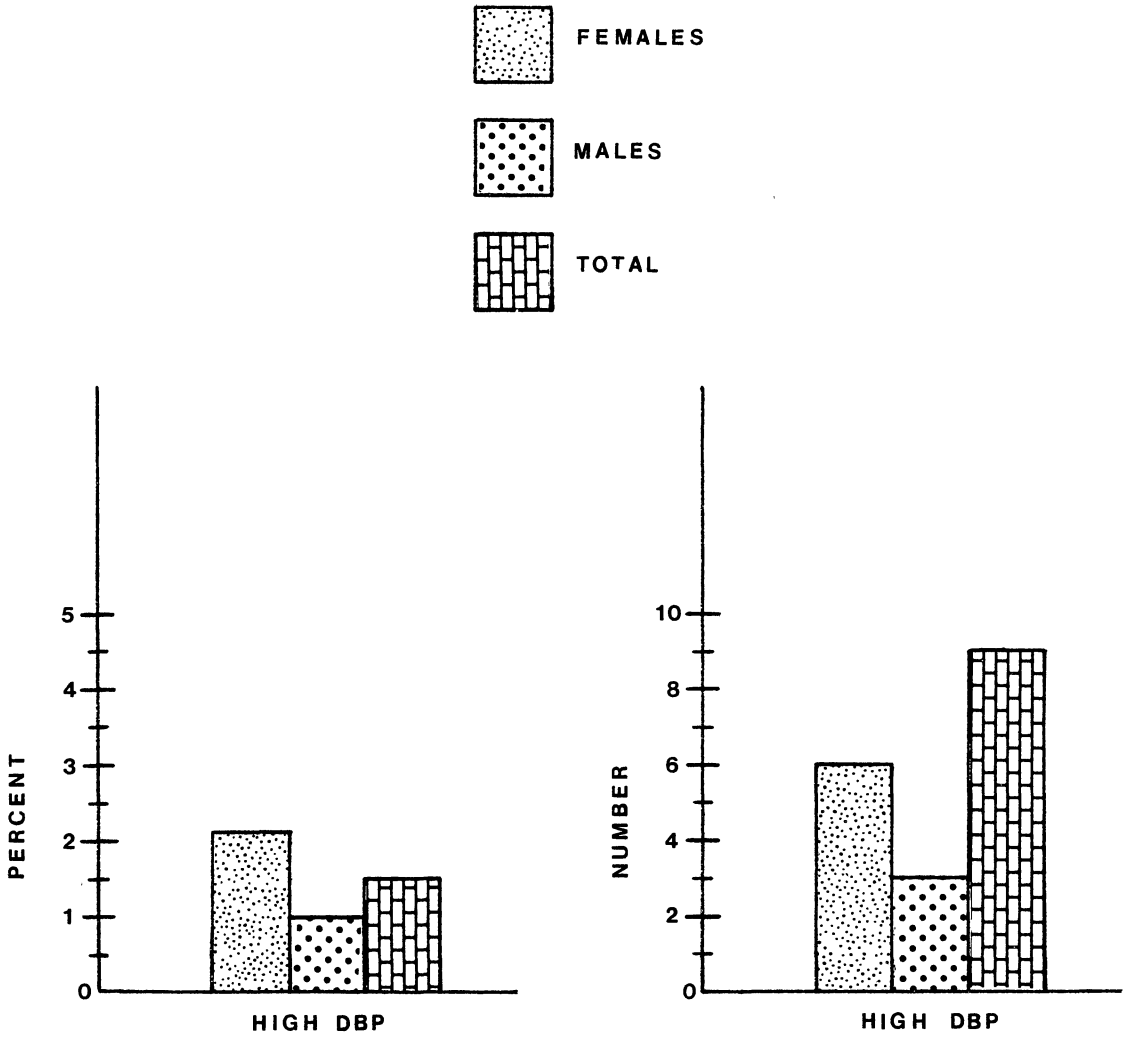

Figure 8. Percent of Sample and Number of Subjects Displaying High Diastolic Blood Pressure (DBP)

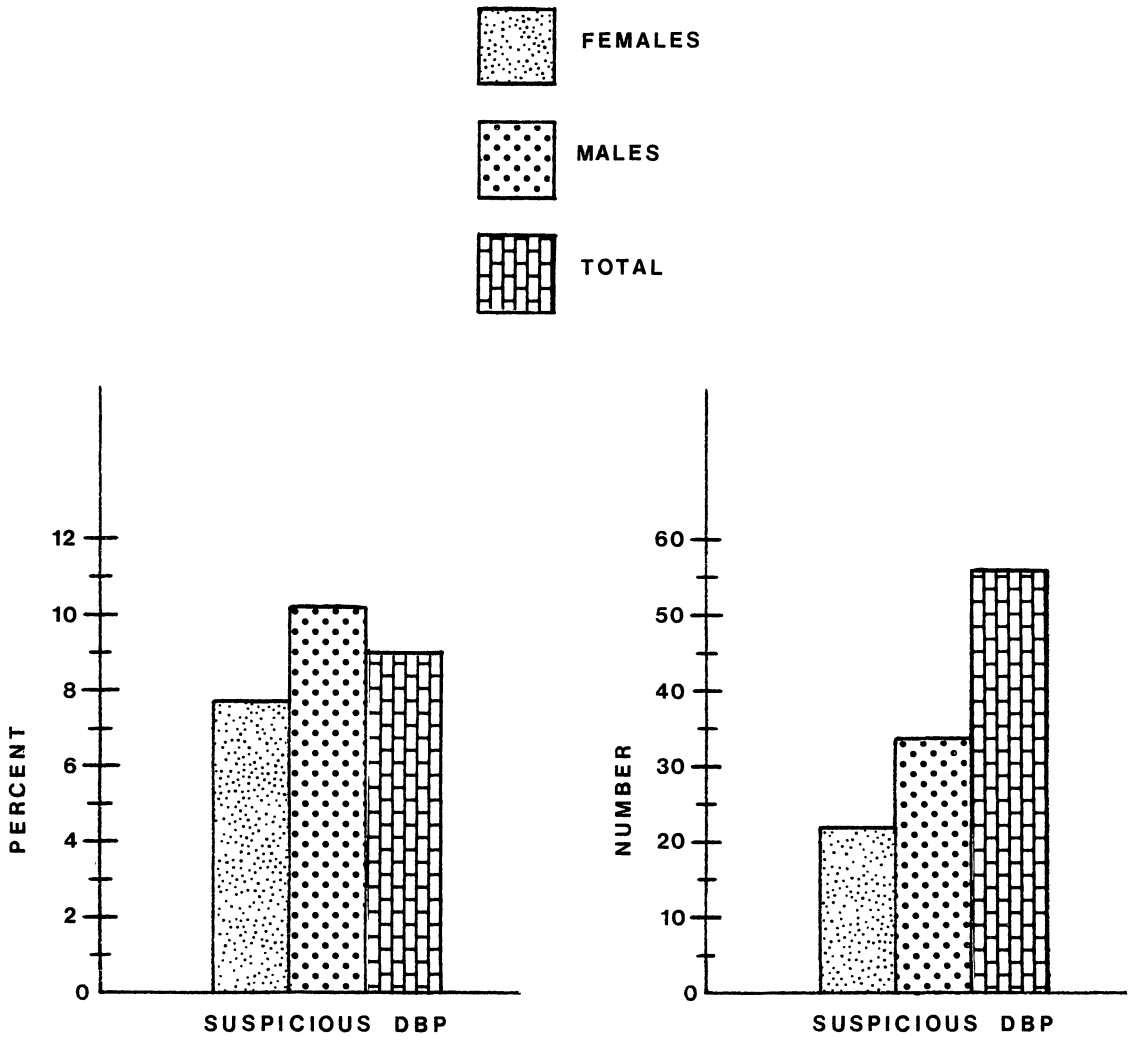

Figure 9. Percent of Sample and Number of Subjects Displaying Suspicious Diastolic Blood Pressure (DBP)

plus SS below the 25th percentile translates into a combined skinfold measurement of 28 and above for females and 25 and above for males.

Over 50 percent (314 subjects) of the participants in this study exhibited a sum of TS plus SS below the 25th percentile, indicating overfatness. A total of 147 females (51.3 percent) and 167 males (50.1 percent) were considered to have a high percentage of body fat and were classified as "overfat" (see Figure 10).

Lastly, the number of subjects and percent of the sample demonstrating a low SC or low negative self-evaluation was computed. A score of 37 or below (at or below the 16th percentile) on the Piers-Harris Children's Self-Concept Questionnaire signified a low SC/negative self-evaluation. For this study, a total of 29 subjects or 4.7 percent of the total group displayed a score of 37 or below. The breakdown by sex included 12 females or 4.2 percent and 17 males or 5.1 percent who reported a low SC/negative self-evaluation (see Figure 11).

Discussion of Results

Examination of the means in Table III yielded some facts worth noting. Means for SBP and DBP for both sexes were identical, indicating equal central tendency within females and males. In addition, the norms for TS and TS plus SS in both sexes were very high compared to the newly published NCYFS norms. It appears that Oklahoma fifth-grade children, on the average, are fatter when matched against the national sample of highly representative American fifth-grade children used in the NCYFS. This may be due to factors such as elementary physical education not being required in Oklahoma, lack of elementary health education, poor dietary habits, environment, etc. Finally, the higher SC mean found among the

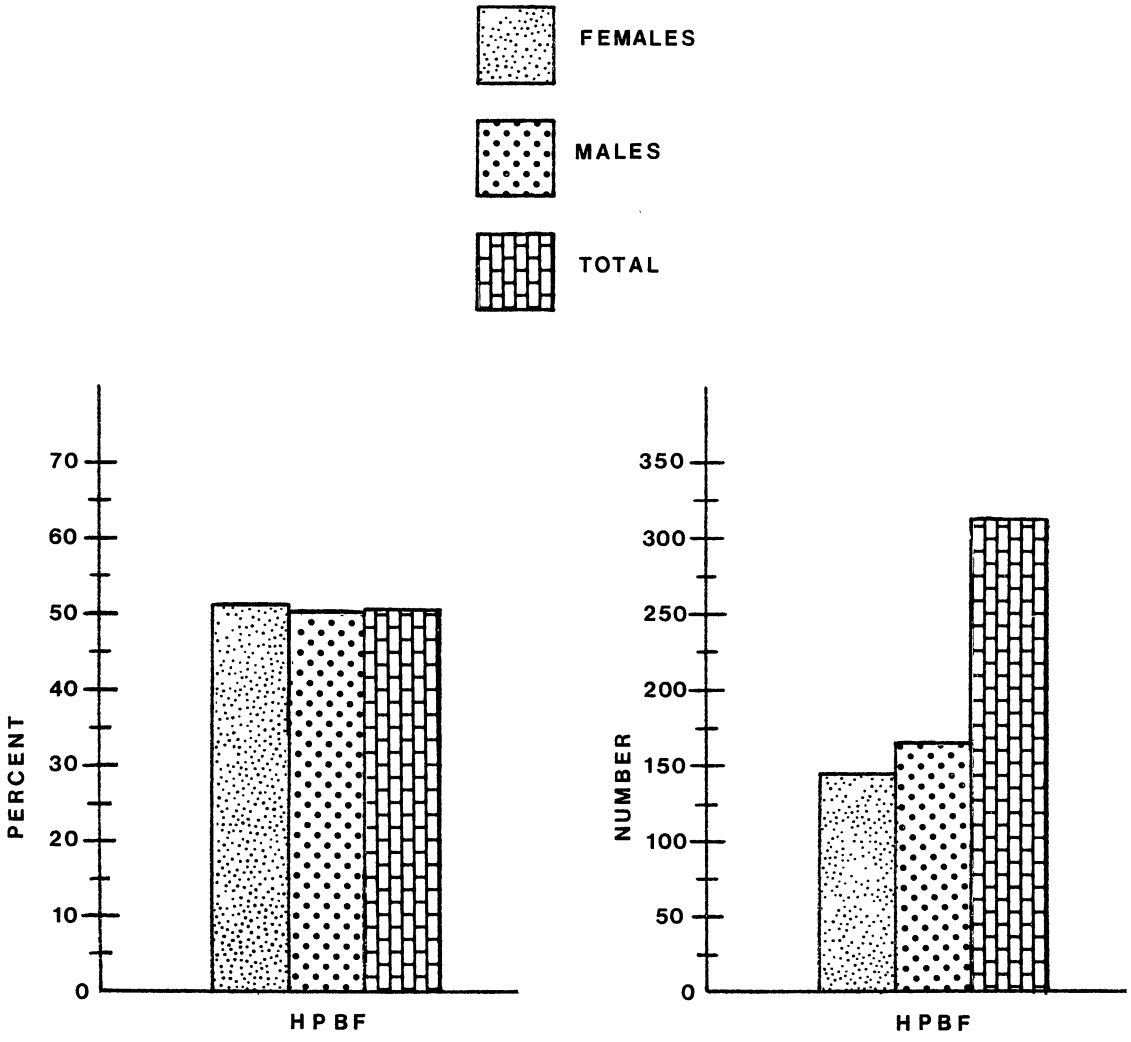

Figure 10. Percent of Sample and Number of Subjects Exhibiting a High Percentage of Body Fat (HPBF)

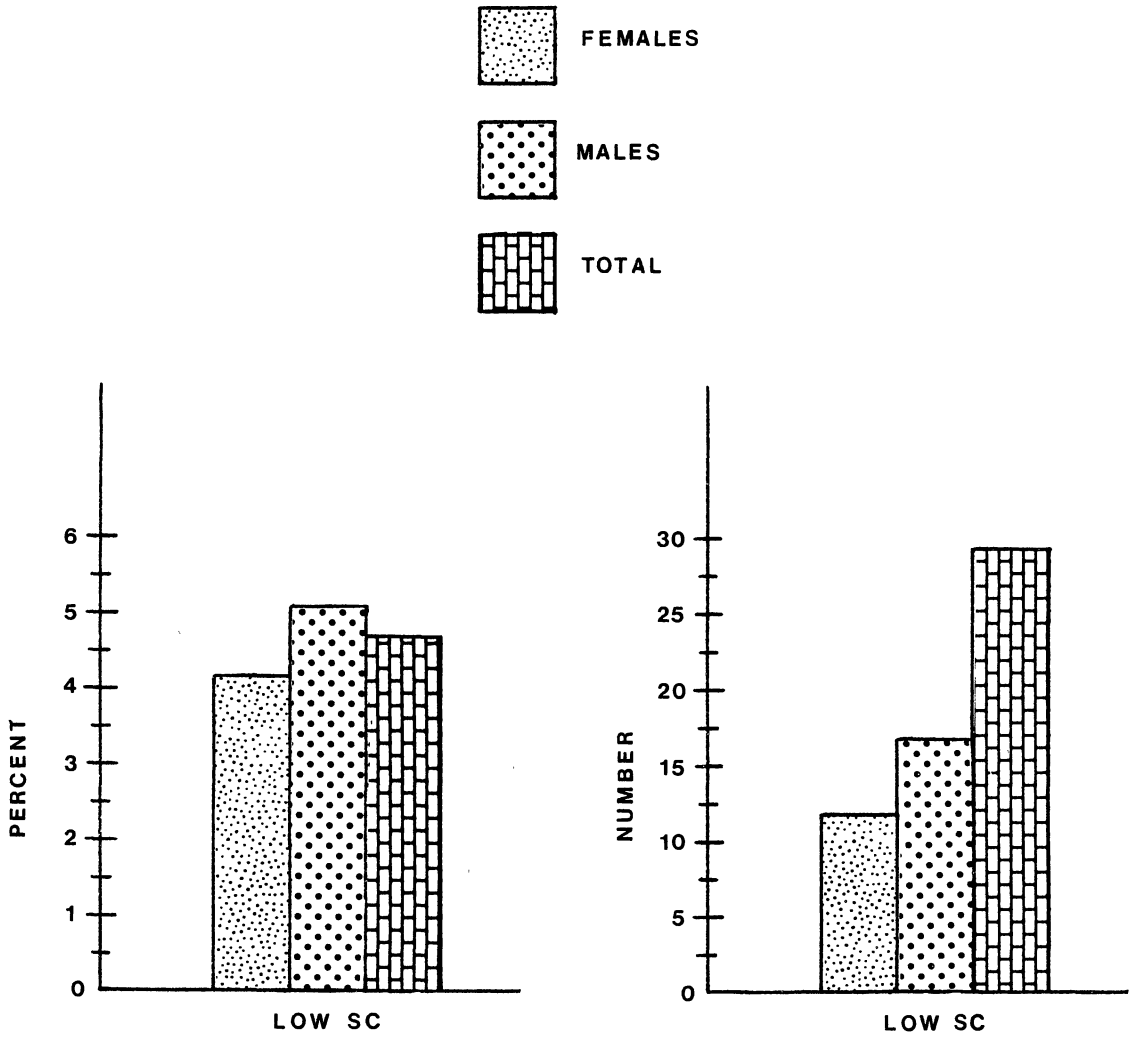

Figure 11. Percent of Sample and Number of Subjects Demonstrating Low Self-Concepts (SC)

619 subjects when compared to the population norm may be attributed to "faking good"--the tendency to distort answers in a positive direction. The term "faking good" is frequently associated with the idea of social desirability. Piers and Harris, authors of the questionnaire used in this study, believe that, in part, a child's socially desirable responses may reflect a confusion between how the child really feels or acts and how they have been told to feel or act (113). The desire to "look good" and to say mostly positive things about oneself is common to most children and may be the reason for the higher mean found in the study.

Contrasting correlation coefficients were found for females and males between blood pressure with percent body fat and percent body fat with self-concept. Both sexes reported no significant relationships between blood pressure and self-concept, suggesting there is no direct relationship between these two variables.

In fifth-grade females, there seemed to be a consistent pattern of significant relationships between blood pressure with percent body fat and percent body fat with self-concept. To illustrate, when blood pressure rises, there is a tendency for percent body fat to increase also. In other words, there exists a positive direct relationship between blood pressure and percent body fat. In addition, a significant negative correlation reflecting an inverse relationship was found to exist between percent body fat and self-concept in females. That is, as percent body fat decreases, self-concept increases. In this case, the lower the values for percent body fat, the higher the values for self-concept.

Inspection of the correlation coefficients in males among blood pressure, percent body fat, and self-concept revealed a consistent pattern of nonsignificant relationships. Not a single coefficient between

the variables met the criteria of being above the r = 0.20 level. It is difficult to make assumptions about this finding in this particular situation. Perhaps socioeconomic background, racial origin, family history, and diet may account for the inconsistencies found in the relationship between blood pressure and percent body fat. For percent body fat and self-concept, one reason given for the nonsignificant relationship might be that overfat males may have a normal or high self-evaluation, resulting in a positive self-concept. It appears to this author that many "chubby" males may have several friends due to their personalities. This may also hold true for chubby females. If this is accurate, the overfat female and male may have a normal-to-high self-esteem due to the positive way their friends view them. Additionally, it seems that males are not so apt to judge themselves physically as females do. If this is accurate, males would not put much emphasis into their physical appearance when evaluating their self-concept. Further studies are needed to determine the variables which may have accounted for the inconsistencies between blood pressure with percent body fat and percent body fat with self-concept.

The six multiple regression equations reported in this study have been found to be weak via the statistics that describe the equations' accuracy. In addressing Equations 1 and 2 in Table IV, the prediction equations for total percent body fat are weak for the following three reasons: (1) the regression coefficients are low, indicating a unit change in DBP and SBP would account for a small change in TPBF, (2) the R-value of 0.37 squared in Equation 1 and the R-value of 0.36 squared in Equation 2 suggest only 13 percent of the change in TPBF is caused by DBP and SBP, leaving 87 percent of the variability in TPBF unexplained,

and (3) the SEE's of 4.3 in females and 5.4 in males mean that the subject's predicted TPBF can be off by 4.3 or 5.4 either way.

For Equations 3 and 5 in Table V, TPBF is the predictor variable for the dependent variable SC. Although the regression coefficient of 0.68 for TPBF in Equation 3 accounts for more of a unit change in SC compared to the regression coefficient of 0.23 in Equation 5, the other statistics (R, R^2, and SEE) weaken the prediction scheme. To illustrate, the R-value of 0.27 squared in Equation 3 is equal to 0.07, while the R-value squared of 0.11 is equal to 0.01. This indicates that only 7 percent for females and 1 percent for males of the change in SC is caused by TPBF, leaving 93 percent and 99 percent of the variability in SC unaccounted for. Lastly, the SEE's of 11.2 in Equation 3 and 11.9 in Equation 5 suggest that the subject's predicted SC score may be off 11.2 and 11.9 either way. A fact worth noting is that in Equations 3 and 5, an inverse relationship exists between TPBF and SC, indicating as TPBF decreases, SC will increase.

Table V also displays prediction Equations 4 and 6 with SS and TS being the predictor variables for SC. The regression coefficients found in both equations are low, suggesting unit changes in both predictor variables would account for only a small change in SC. In addition, the low R-value of 0.275 squared (0.07) in Equation 4 implies that only 7 percent of the change in SC is caused by SS. In Equation 6, the low R-value of 0.125 squared (0.02) reveals that only 2 percent of the change in SC is accounted for by SS and TS. The SEE's in Equations 4 and 6 are 11.2 and 11.9, indicating the predicted SC once the equation has been figured may be off by 11.2 and 11.9 either way. There also exists an

inverse relationship in Equations 4 and 6 between SC and SS and SC and TS, indicating that as SS and TS decrease, SC will increase.

In summary, the prediction equations for TPBF and SC were found to be weak due to the statistics which describe their accuracy. Stronger statistics would have allowed the author to predict changes in the dependent variable were accounted for by changes in the predictor variables. Since this was not the case, the prediction equations in this study are unreliable for use in the predicting of the dependent variables TPBF and SC.

As shown in Table VI, there were no subjects out of the 619 who participated in this study who displayed a high SBP value above the 95th percentile. Additionally, only 9 subjects displayed a high DBP value above the 95th percentile (Figure 8). By grouping both values together, only 1.5 percent of the sample displayed a high blood pressure reading, which falls at the bottom of the estimated prevalence of Americans under 18 years of age who have high blood pressure (range 1 to 11 percent) (7). It appears that the NHLBI's Blood Percentile Charts for age and sex are high. This belief is supported by Loggie and others (118) who state that there are reservations by doctors about the percentiles, particularly because the values at the 95th are relatively high, even by adult standards. If this is true, perhaps many of the 39 subjects displaying suspicious SBP (Figure 7) and the 56 subjects displaying suspicious DBP above the 75th percentiles (Figure 9) are in actuality hypertensive. Loggie and others suggest the idea of unified measurement standards being the answer. This might be accomplished by establishing reference percentiles using pooled data.

It was surprising to find the high number of subjects and percentage of the total group who exhibited a combined TS plus SS measurement below the 25th percentile for age and sex (Figure 10). Over 50 percent of the total group demonstrated a sum of TS plus SS below the 25th percentile, indicating overfatness. This percentage goes beyond the incidence of between 12 and 30 percent of all American school-age children estimated to be obese (8). There were a total of 314 subjects, 147 females and 167 males, who were identified as being overfat in this study. The implications of this finding are several: (1) since this was a representative sample of 619 subjects from small, medium, and large schools all over the state, one might infer that one-half of Oklahoma fifth-grade children are overfat; (2) since researchers Ross and Gilbert (26) noted an individual's degree of body fatness, as shown by skinfold thickness, helps to predict vulnerability to a wide range of degenerative diseases (hypertension, heart disease, diabetes, psychological disorders, and impaired tolerance for heat), half of the Oklahoma fifth-grade children may be prone to any or all of these diseases; (3) perhaps half of the Oklahoma fifth-grade children are either taking in excess calories, not exercising regularly, or both; and (4) since a recent study by Dr. William H. Dietz, Jr. found heavy doses of TV watching could make children fat (119), perhaps half of Oklahoma's fifth-grade children spend excessive hours viewing television.

Finally, Figure 11 shows 29 subjects, 12 females and 17 males, comprising 4.7 percent of the total group, demonstrating a low self-concept. Authors Piers and Harris (114) of the Piers-Harris Children's Self-Concept Scale reveal that children are less knowledgeable about any benefits that might come as a result of presenting an unfavorable picture of

themselves. That is, a low score on the questionnaire generally reflects a truly low self-esteem. The authors mentioned this does not mean that negative distortions never occur, only that they are relatively rare. In summary, although high scores on the Piers-Harris questionnaire may or may not reflect truly positive self-attitudes, low scores generally reflect negative self-attitudes.

A point worth noting in this study involves the large number of subjects exhibiting a high percentage of body fat and the small number of subjects displaying a low self-concept. Two reasons may be given for this finding: (1) perhaps the overfat children do not think of their overweight as a weakness of their personality and (2) because of the dichotomous yes/no responses on the Piers-Harris Children's Self-Concept Scale, an overweight subject not sure of the answer could have easily distorted his/her response in a positive direction.

Hypothesis Testing

The first hypothesis stated that there is no significant relationship between (1) systolic blood pressure readings and triceps skinfold measurements or (2) systolic blood pressure readings and subscapular skinfold measurements in Oklahoma fifth-grade female or male children. In order to test this null hypothesis, a Pearson Product-Moment Correlation was computed between SBP and TS and SBP and SS. A significant correlation coefficient at the 0.05 level coupled with the size of the correlation coefficient being above $r = 0.20$ constituted grounds for the rejection of the null hypothesis. The results showed a significant correlation coefficient of 0.339 and 0.359 for SBP and TS and SBP and SS in females, respectively. Therefore, the null hypothesis for females was

rejected. On the other hand, no significant correlation coefficients were found between SBP and TS (0.047) and SBP and SS (0.023) in males. Based on this finding, the null hypothesis for males could not be rejected.

The second hypothesis stated that there is no significant relationship between systolic blood pressure readings and self-concept in Oklahoma fifth-grade female or male children. The testing of this null hypothesis was accomplished by a Pearson Product-Moment Correlation. The grounds for rejection of the null hypothesis consisted of a significant correlation coefficient at the 0.05 level coupled with the size of the correlation being above $r = 0.20$. The results showed nonsignificant correlation coefficients of 0.026 for females and 0.022 for males between SBP and SC. Based on this finding, the null hypothesis could not be rejected for either sex.

The third hypothesis of this study stated that there is no significant relationship between (1) diastolic blood pressure readings and triceps skinfold measurements or (2) diastolic blood pressure readings and subscapular skinfold measurements in Oklahoma fifth-grade female or male children. The testing of this null hypothesis was accomplished by a Pearson Product-Moment Correlation. The grounds for rejection of the null hypothesis consisted of a significant correlation at the 0.05 level coupled with the size of the correlation being above $r = 0.20$. The results showed significant correlation coefficients of 0.216 and 0.280 between DBP and TS and DBP and SS in females, respectively. Since the correlation coefficients were found to be significant in females, the null hypothesis was rejected. In contrast, although the correlation coefficients between DBP and TS (0.133) and DBP and SS (0.167) were

significant at the 0.05 level in males, the size of the coefficients were below r = 0.20. Therefore, the null hypothesis for males could not be rejected.

The fourth hypothesis stated that there is no significant relationship between diastolic blood pressure and self-concept in Oklahoma fifth-grade female or male children. A Pearson Product-Moment correlation was computed between DBP and SC to test the null hypothesis. The grounds for rejection of the null hypothesis consisted of a significant correlation coefficient at the 0.05 level coupled with the size of the correlation being above r = 0.20. The results showed nonsignificant correlation coefficients of 0.088 for females and 0.019 for males between DBP and SC. Based on this finding, the null hypothesis could not be rejected for either sex.

Hypothesis five stated that there is no significant relationship between (1) total percent body fat and systolic blood pressure readings or (2) total percent body fat and diastolic blood pressure readings in Oklahoma fifth-grade female or male children. In order to test this null hypothesis, a Pearson Product-Moment Correlation was computed between TPBF and SBP and TPBF and DBP. A significant correlation coefficient at the 0.05 level coupled with the size of the correlation coefficient being above r = 0.20 constituted grounds for the rejection of the null hypothesis. The results showed a significant correlation coefficient of 0.359 and 0.271 in females for TPBF and SBP and TPBF and DBP, respectively. Since the coefficients met the criteria for being significant in females, the null hypothesis was rejected. On the other hand, no significant correlation coefficient was found between TPBF and SBP in males (0.053), and although the correlation coefficient (0.158) between TPBF and DBP was

significant at the 0.05 level, the size of the coefficient was smaller than r = 0.20. Based on this finding, the null hypothesis for males could not be rejected.

The sixth hypothesis stated there is no significant relationship between total percent body fat and self-concept in Oklahoma fifth-grade female or male children. The testing of this hypothesis was accomplished by a Pearson Product-Moment Correlation. The grounds for rejection of the null hypothesis consisted of a significant correlation coefficient at the 0.05 level coupled with the size of the correlation being above r = 0.20. The results between TPBF and SC showed a significant correlation coefficient of 0.268 in females. Therefore, the null hypothesis was rejected for this sex. In males, a correlation coefficient of 0.112 was significant at the 0.05 level, yet the size was below r = 0.20. Based on this finding, the null hypothesis could not be rejected for males.

Hypothesis seven stated that there is no significant relationship between triceps skinfold measurements and self-concept in Oklahoma fifth-grade female or male children. Again, the Pearson Product-Moment correlation was used in the testing of this hypothesis. The grounds for rejection of the null hypothesis once again consisted of a significant correlation coefficient at the 0.05 level coupled with the size of the correlation being above r = 0.20. The results showed contrasting coefficients were found between females and males. The correlation coefficient of 0.216 was found between TS and SC in females. Therefore the null hypothesis for this sex was rejected. On the other hand, males showed a correlation coefficient of 0.100 which was significant at the 0.05 level, yet the size was below r = 0.20. Consequently, the null hypothesis for males could not be rejected.

Finally, the eighth hypothesis stated that there is no significant relationship between subscapular skinfold measurements and self-concept in Oklahoma fifth-grade female or male children. As with the other hypotheses, the testing of this null hypothesis was accomplished by a Pearson Product-Moment Correlation. In addition, the same grounds for rejection (a significant correlation at the 0.05 level coupled with the size of the correlation coefficient being above $r = 0.20$) was used for this null hypothesis. Similarly, the results showed contrasting correlation coefficients were found between the sexes. The correlation coefficient of 0.268 was found for females between SS and SC. Since this coefficient met both criteria for being significant, the null hypothesis was rejected for females. Males reported a correlation coefficient of 0.112 between SS and SC. Although this coefficient was found to be significant at the 0.05 level, the size was below $r = 0.20$. Based on this finding, the null hypothesis for males could not be rejected.

From the testing of the hypotheses, it can be seen that the females were the only sex to have significant correlation coefficients existing between several of the variables. In females, the significant relationships were among the following variables: (1) SBP and TS, (2) SBP and SS, (3) DBP and TS, (4) DBP and SS, (5) TPBF and SBP, (6) TPBF and DBP, (7) TPBF and SC, (8) TS and SC, and (9) SS and SC. No significant correlation coefficients were reported for females and males between SBP and SC and between DBP and SC. In males, not a single correlation coefficient met the criteria for being significant, suggesting no direct relationships existed among the variables. From this discussion, we can conclude that the females were the only sex to have significant relationships existing among the majority of the variables.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

For many years the primary focus in the prevention and control of coronary heart disease (the leading cause of death in the United States) was directed at the adult. Recently, trends in preventive medicine are indicating that heart disease begins early in life. Efforts are now being directed at identifying and modifying CHD risk factors in children since substantial damage may already exist by adolescence or early adulthood.

Health professionals agree that the early identification and modification of CHD risk factors could prevent or slow down the atherosclerotic process. Positive changes in lifestyle behaviors (regular exercising, weight control, well-balanced diet with less salt, cessation of smoking, etc.) have come into focus as a key to the prevention and control of modifiable CHD risk factors.

There is some evidence that the self-concept of an individual plays a significant role in the development of a desirable lifestyle--a lifestyle free from modifiable CHD risk factors. If this is true, the formation of a positive self-concept in childhood is vital if modifiable CHD risk factors are to be prevented or controlled.

The literature revealed very little research has been done to determine the importance of self-concept to modifiable CHD risk factors in children, such as hypertension and obesity. With trends pointing toward

more identification and modification of CHD risk factors in children, it is evident that more research is needed to determine the importance of self-concept in the prevention and control of risk factors such as hypertension and obesity.

The purpose of this study was to determine the relationships among blood pressure, percent body fat, and self-concept in fifth-grade children in Oklahoma. A subproblem was to generate prediction equations that would predict total percent body fat from the independent variables of systolic and diastolic blood pressures. In addition, prediction equations were produced to predict self-concept from total percent body fat, triceps, and subscapular skinfolds. Additionally, the author investigated the percentage of fifth-grade children who displayed any or all of the following characteristics: (1) high levels of blood pressure, (2) a high percentage of body fat, and (3) a low self-concept.

Conclusions

In order for a null hypothesis to be rejected, two criteria had to be met: (1) the correlation coefficient between any two variables must be significant at the 0.05 level, and (2) the size of this coefficient must be above $r = 0.20$. This holds true for all eight hypotheses. If the correlation coefficient did meet both criteria, the relationship between both variables was deemed significant and the null hypothesis was rejected.

Taking into consideration the delimitations, limitations, and assumptions of the study and based on the hypotheses stated in Chapter I, the following conclusions were made:

1. *There is no significant relationship between (1) systolic blood pressure readings and triceps skinfold measurements or (2) systolic blood pressure readings and subscapular skinfold measurements in Oklahoma fifth-grade female or male children.* In females, this null hypothesis was rejected since correlation coefficients of 0.339 for SBP and TS and 0.369 for SBP and SS were found to be significant. In males, this hypothesis could not be rejected since correlation coefficients of 0.047 and 0.023 were found not to be significant for SBP and TS and SBP and SS, respectively.

2. *There is no significant relationship between systolic blood pressure readings and self-concept in Oklahoma fifth-grade female or male children.* Since correlation coefficients of 0.026 in females and 0.022 in males for SBP and SC were found not to be significant, this null hypothesis could not be rejected for either sex.

3. *There is no significant relationship between (1) diastolic blood pressure readings and triceps skinfold measurements or (2) diastolic blood pressure readings and subscapular skinfold measurements in Oklahoma fifth-grade female or male children.* This null hypothesis was rejected in females since correlation coefficients of 0.216 for DBP and TS and 0.280 for DBP and SS were found to be significant. On the other hand, this null hypothesis could not be rejected in males since correlation coefficients of 0.133 and 0.167 were found not to be significant for DBP and TS and DBP and SS, respectively.

4. *There is no significant relationship between diastolic blood pressure readings and self-concept in Oklahoma fifth-grade female or male children.* Since correlation coefficients of 0.088 in females and 0.019

in males for DBP and SC were found not to be significant, this null hypothesis could not be rejected for either sex.

5. *There is no significant relationship between (1) total percent body fat and systolic blood pressure readings or (2) total percent body fat and diastolic blood pressure readings in Oklahoma fifth-grade female or male children.* In females, this null hypothesis was rejected since correlation coefficients of 0.359 for TPBF and SBP and 0.271 for TPBF and DBP were found to be significant. In males, this hypothesis could not be rejected since correlation coefficients of 0.053 and 0.158 were found not to be significant for TPBF and SBP and TPBF and DBP, respectively.

6. *There is no significant relationship between total percent body fat and self-concept in Oklahoma fifth-grade female or male children.* This null hypothesis was rejected in females since a correlation coefficient of 0.268 between TPBF and SC was found to be significant. In males, since a correlation coefficient of 0.112 between TPBF and SC was found not to be significant, this null hypothesis could not be rejected.

7. *There is no significant relationship between triceps skinfold measurements and self-concept in Oklahoma fifth-grade female or male children.* Since a correlation coefficient of 0.216 was found between TS and SC, this null hypothesis was rejected in females. On the other hand, since a correlation coefficient of 0.100 was found between TS and SC in males, this null hypothesis could not be rejected.

8. *There is no significant relationship between subscapular skinfold measurements and self-concept in Oklahoma fifth-grade female or male children.* This null hypothesis was rejected in females since a correlation coefficient of 0.286 between SS and SC was found to be significant.

Since a correlation coefficient of 0.125 between TPBF and SC was found not to be significant in males, this null hypothesis could not be rejected.

A subproblem of this study was to determine multiple linear regression equations for the prediction of the dependent variables total percent body fat and self-concept.

The prediction equations for TPBF and SC were found to be weak due to the statistics which describe their accuracy. Stronger statistics would have allowed the author to predict that changes in the dependent variable were accounted for by changes in the predictor variable. Since the statistics were weak, the prediction equations in this study are unreliable for use in the predicting of the dependent variables TPBF and SC.

Additional results indicated there were no subjects out of the 619 who participated in this study who displayed high systolic blood pressure values, and only 9 subjects displayed a high diastolic blood pressure value. The 9 subjects displaying high DBP accounted for only 1.5 percent of the total group. There were a total of 29 subjects (6.3 percent of the total group) who displayed suspicious SBP, while 56 subjects (9 percent of the total group) demonstrated suspicious DBP.

The number of subjects and percent of the sample was also computed for subjects exhibiting a high percentage of body fat. The results showed a surprising 50.7 percent of the total group displaying levels of "overfatness." With respect to the number of subjects, a total of 314 subjects, 147 females and 167 males, were identified as having a high percentage of body fat in this study.

Last, 4.7 percent of the total group, 12 females and 17 males, demonstrated scores of 37 or below on the Piers-Harris Children's

Self-Concept Scale. According to the authors, low scores generally reflect negative self-attitudes. Thus, 29 subjects in this study registered low self-concepts as represented by their low scores.

Recommendations

As a supplement to the Piers-Harris Self-Concept Scale, an interview with each student might help to document their score on the questionnaire. In addition, a second administration of the Piers-Harris Scale might give the researcher an "average" self-concept score as opposed to a one-time reading where the subject might be feeling especially positive/negative that day. Also, additional questionnaires over the self-concept of each subject could be filled out by teachers and parents. This perhaps would give the researcher a more valid and reliable assessment of the student's true self-concept.

Other suggestions for studies similar to this study are to determine the relationships among blood pressure, percent body fat, and self-concept in small, medium, and large school districts in Oklahoma. With the results, one might discover if significant relationships were more likely in one size school district as compared to another size. Another study suggested would be to conduct a longitudinal investigation involving the 619 subjects used in this study and test over the same variables every two years until graduation. With this study one might determine whether a subject with hypertension, obesity, or displaying low self-concept would maintain this condition until graduation. An interesting study would be to compare other grades of Oklahoma school-age children over blood pressure, percent body fat, and self-concept. One might go as far

as comparing children from other countries on these variables. Discovering if minority school-age children (Indians, Blacks, Hispanics, etc.) have higher correlations among blood pressure, percent body fat, and self-concept as compared to their white counterparts might be of interest.

Other recommendations for further study include determining the effects of an exercise program on children with hypertension and obesity, determining if a nutrition education program would have an influence on the incidence of hypertension and obesity among school-age children, and finding ways to better control external influences (diet, exercise levels, environmental influences) when studying the relationship among blood pressure, percent body fat, and self-concept. Finally, more indepth investigations of the importance of a positive self-concept in the prevention and control of modifiable CHD risk factors would be valuable, along with determining if significant relationships exist among a child's exercise patterns and blood pressure, percent body fat, and self-concept.

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APPENDIXES

APPENDIX A

LETTERS TO PARTICIPATING SCHOOLS WITH PARENT PERMISSION FORMS

Dear Principal/Administrator:

I am an OSU graduate student working on a doctorate degree in Health Education. Currently, I am involved in a cardiovascular research project for my doctoral dissertation. The research project will involve fifth-grade students in 21 elementary schools around the state of Oklahoma.

Your elementary school has been selected to participate in this important cardiovascular research. The project will involve three screening tests:

1. Blood Pressure
2. Skinfold measurements for body fat content
3. Pier-Harris children's self-concept questionnaire

Cardiovascular disease is the leading cause of death in the United States. Sadly, there has been very little research to determine the effectiveness of early intervention and positive lifestyle choices in decreasing cardiovascular disease. The project's goal is to determine if there is any correlation among elevated blood pressure, percentage of body fat, and self-concept.

With respect to the administration of the screening tests, if a school nurse is not available to take the blood-pressure readings, I have been trained to take the student's blood pressures. The skinfold measurements would be done by me, and the self-concept questionnaire would be administered and scored by either your elementary counselor or physical education teacher. All three screening tests will be administered with parent consent only.

All information will be kept confidential but will be made available to individual parents about their child upon request. If any significant deviation from normal is found, the parent will be notified through school personnel.

I'm hoping that your elementary school will be represented in this cardiovascular research project. I will call you in a few days to answer any questions you might have and determine your interest in this project. Thank you for your attention to this matter.

Sincerely,

Lon H. Seiger
OSU Doctoral Student

September, 1984

Dear Parent:

_____ _____ _____ is pleased to announce that our school has been selected as one of only twenty-one elementary schools to participate in a cardiovascular research project. Lon H. Seiger, a doctoral student at Oklahoma State University, will be conducting the research with our fifth grade students. The project's goal is to determine if there is any relationship among elevated blood pressure, percentage of body fat, and self-concept. Three screening tests will be administered:

1. Blood Pressure
2. Skinfold Measurements for Body Fat Content
3. Piers-Harris Children's Self-Concept Questionnaire

All information will be kept confidential but will be made available to individual parents about their child upon request. If any significant deviation from normal is found, you will be notified through school personnel.

The leading cause of death in our country is cardiovascular disease. Sadly, there has been very little research to determine the effectiveness of early intervention and positive lifestyle choices in decreasing cardiovascular disease. Our school is pleased to offer the opportunity to be a part of this cardiovascular research project. If you would like your child to participate in this project, please sign this note and return it with your child to your child's teacher.

Sincerely,

_____
Child's Name

_____
Parent's Signature

103 Colvin Center
Oklahoma State University
Stillwater, Oklahoma 74078
January 18, 1985

Dear Administrator/Teacher:

I would like to thank you again for assisting me with my cardiovascular research project. I was able to collect data on 619 fifth-grade students from 21 elementary schools in Oklahoma. The measurements for blood pressure and percent body fat plus the self-concept scores for the students who participated from your school are enclosed. Each measurement will be discussed so that you may know what is considered a normal or abnormal score.

Blood Pressure

Lorraine Gardner, State Hypertension Nurse in Oklahoma, suggests that any fifth grader with a systolic blood pressure reading of 110 and above and a diastolic reading of 70 and above be recommended for additional follow-ups. However, it should be noted that during the actual measuring of blood pressure, the student may have been excited, stressed, or scared. These mood states may cause a higher reading. Also, the possibility exists that the student with a higher reading does have high blood pressure. In either case, follow-ups are needed to determine whether or not the student does have high levels of blood pressure. Scores circled in the systolic and diastolic blood pressure columns indicate scores of 110 and above and 70 and above. Research shows that high blood pressure can be controlled by using the following approaches: (1) weight control (loss), (2) regular exercise, (3) diet (less salt), (4) relaxation, and (5) medication.

Percent Body Fat

National Percentile Norms have been set up for children ages 10 and 11. Normal scores for the sum of triceps plus subscapular skinfolds for boys range from 12 to 19; the range for girls is from 14 to 23. According to the norms, if a male fifth grader displays a combined reading of 22 or more for triceps plus subscapular skinfolds, he is considered to be overfat; a female fifth grader with a combined reading of 25 or more is considered to be overfat. Scores circled in the triceps and subscapular columns indicate students with a combined reading of 22 or more (males) and 25 or more (females). Three methods (used in combination) are recommended for weight loss programs: (1) caloric restriction, (2) regular physical exercise, and (3) behavior modification (smaller food portions, records of what is eaten and when, etc.).

Self-Concept

According to Piers and Harris (developers of the Piers and Harris Self-Concept Inventory given to the students), normal self-concept scores range from 45 to 61 (total range is 0 to 80). Scores of 66 and above indicate a high self-concept, although the possibility of "faking good" (the tendency for students to distort answers in a positive direction) exists with these high scores. Scores of 37 and below indicate a low self-concept. Usually a low score on this inventory is a reliable indicator of a student who does not feel good about himself. Scores circled in the self-concept column represent students with scores of 37 and below. To help promote a positive self-concept in children, teachers and parents can (1) create an open and caring environment, (2) maintain a "you can do" attitude, (3) listen, (4) be a friend, (5) build an environment of positive support.

If you have any questions over any of the results for the students who participated in the project, please feel free to call or write me at (405) 624-5493, 103 Colvin Center, Oklahoma State University, Stillwater, Oklahoma 74078. Thank you again for your assistance.

Sincerely,

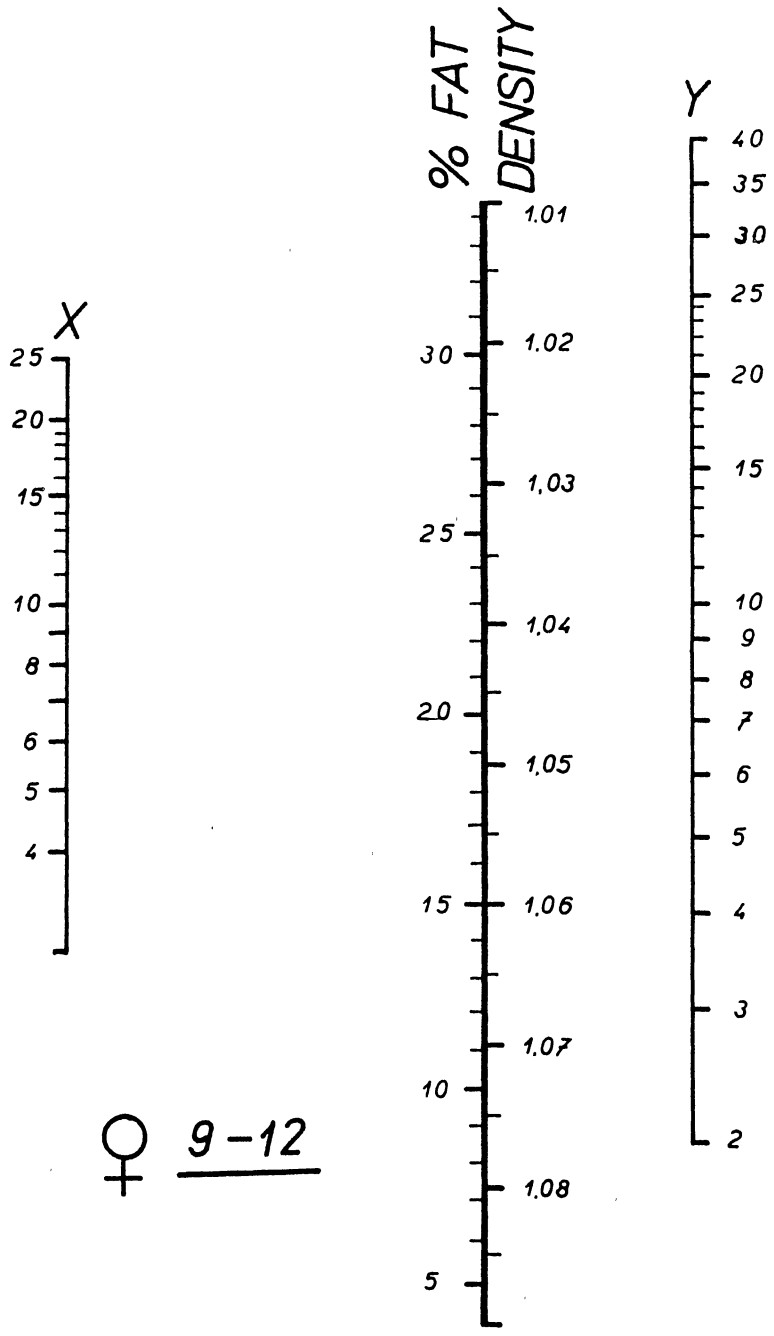
Lon H. Seiger

LHS/ba

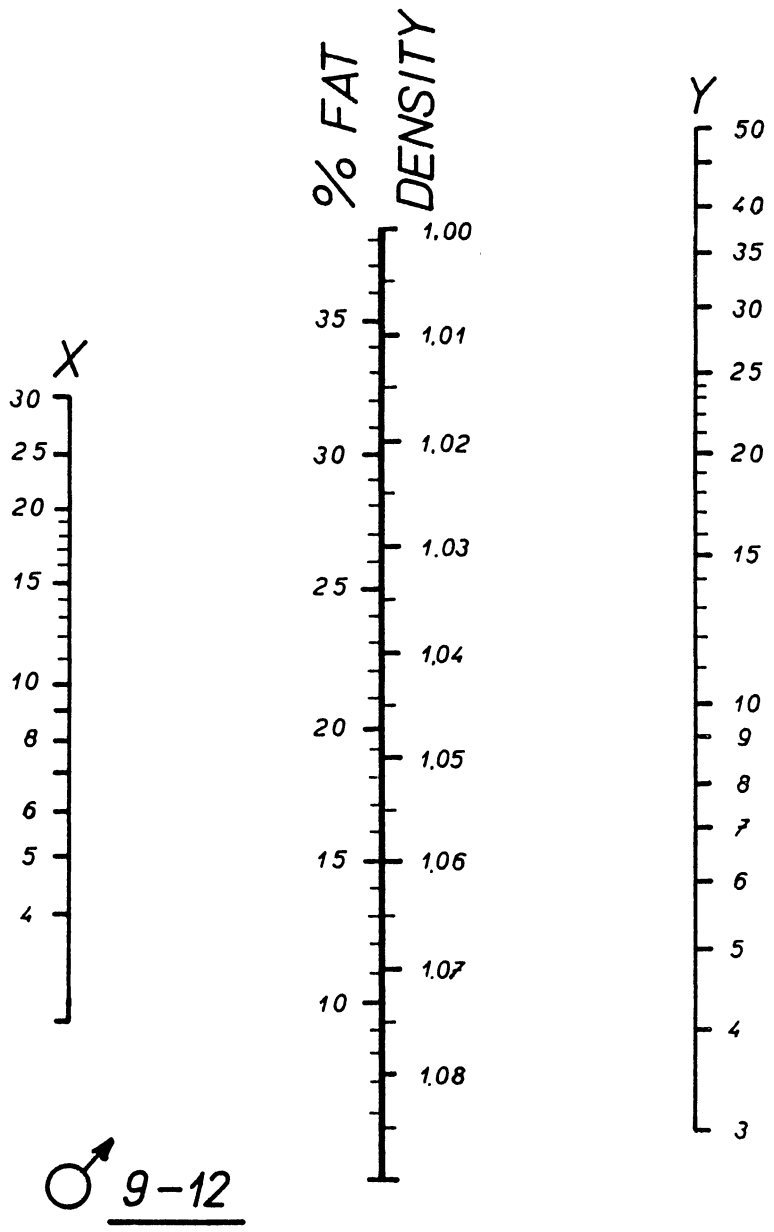
Enclosures

APPENDIX B

NOMOGRAMS FOR THE ESTIMATION OF TOTAL PERCENT BODY FAT



Nomogram for Prediction of Total Percent Body Fat From Triceps and Subscapular Skinfolds in Girls 9-12 Years Old



Nomogram for Prediction of Total Percent Body Fat From Triceps and Subscapular Skinfolds in Boys 9-12 Years Old

VITA

Lon Howard Seiger

Candidate for the Degree of

Doctor of Education

Thesis: THE RELATIONSHIP AMONG BLOOD PRESSURE, PERCENT BODY FAT, AND SELF-CONCEPT IN FIFTH-GRADE CHILDREN IN OKLAHOMA

Major Field: Higher Education

Minor Field: Health Education

Biographical:

Personal Data: Born in Pensacola, Florida, January 29, 1956, the son of Mr. and Mrs. Lawrence Seiger. Married Melissa S. Kelly, January 1, 1985.

Education: Attended elementary and junior high school in Honolulu, Hawaii; graduated from Torrejon American High School, Madrid, Spain, in May, 1974; received the Bachelor of Science degree from Southeastern Oklahoma State University, Durant, Oklahoma, in May of 1978; received the Master of Education degree from East Central Oklahoma State University, Ada, Oklahoma, in May of 1979; and completed requirements for the Doctor of Education degree at Oklahoma State University in July, 1985.

Professional Experience: Head Men's Tennis Coach and Instructor of tennis at East Central University, Ada, Oklahoma, 1978-79; Seventh Grade Teacher, Basketball and Track Coach at White Bead Elementary School, Pauls Valley, Oklahoma, 1979-80; Elementary Physical Education and Health and Drug Education Teacher, Junior High Boys and Girls Tennis Coach, Washington Elementary School, Ada, Oklahoma, 1980-81; Elementary Physical Education and Secondary Special Education Teacher, Head High School Girls Tennis Coach, Will Rogers Elementary and Shawnee High School, Shawnee, Oklahoma, 1981-82; Graduate Teaching Assistant at Oklahoma State University, Stillwater, Oklahoma, 1982-present.