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ABSTRACT

This project compared the relative physical fitness levels of 30 visually handicapped/blind students (aged 7-18) at a residential school with that of non-handicapped peers, to develop a school-based fitness and nutrition intervention program and determine impact of the intervention. The compounding handicapping nature of fitness deficits and blindness is discussed, and previous programmatic fitness research is reviewed. The project involved assessing students' cardiovascular fitness, body composition, and nutritional status. Pre-intervention characteristics showed that the experimental group was heavier, had a larger value for the sum of skinfolds, and had smaller mid-arm circumference measures than the controls. Post-intervention measures indicated significant changes in heart rates during submaximal exercise and a decrease in sum of skinfolds for the experimental group. The only dietary intake variable to show a significant change for the experimental group between pre- and post-intervention was an increase in protein consumed. Appendices include screening tools for exercise testing; sample blood chemistry profile; National Center for Health Statistics growth charts; norms for tricep skinfold, mid-arm circumference, and mid-arm muscle circumference; food intake records; and nutrition intervention information. A 7-page bibliography is also included. (JDD)

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ALABAMA SCHOOL FOR THE BLIND

Fitness and Nutrition Project

G008500256

Douglas Patterson
Principal Investigator

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ALABAMA INSTITUTE FOR DEAF AND BLIND
TALLADEGA, ALABAMA

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The Alabama Institute for Deaf and Blind (AIDB) Fitness and Nutrition Project was conducted as a professional team effort including staff from the Alabama School for the Blind, AIDB Health Services, Sylacauga City Schools, the University of Alabama in Birmingham (UAB) Department of Nutrition Sciences and Department of Biostatistics and Biomathematics, Auburn University Department of Health, Physical Education, and Recreation, and the U.S. Department of Education, Office of Special Education Programs. Each contributing consultant added a unique perspective to the overall project and a warm appreciation is extended for these efforts.

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Preface

During the 1985-86 school year, the Alabama School for the Blind (ASB), a subunit of the Alabama Institute for Deaf and Blind (AIDB), was funded by The Office of Research in Education of the Handicapped, Special Education Programs, U.S. Department of Education to develop and test a research based program of fitness and nutrition for visually handicapped students. The project was supervised by Ronald Garrett and coordinated by Daniel M. McCrimmon and Jim A. Stovall. One of the objectives of the project was the development of a replication manual for dissemination t, appropriate schools and agencies. The training program presented in this manual has been developed to help professionals improve the physical fitness and nutritional status of visually handicapped students within their service agency and is intended to serve as a supplement to, not substitute for, current operational programs.

In the first chapter of the manual, the general problems of fitness and nutrition are described for both the general population and the visually handicapped. Relevant research that highlights the compounding handicapping nature of fitness deficits and blindness is presented to stress the importance of fitness for the visually handicapped student. Previous programmatic fitness research with the visually handicapped is also reviewed.

The project is presented in the next four chapters of the manual with the last chapter comprising a program summary and recommendations. The program includes a description of the original proposal and supporting hypothesis, assessment procedures for determining nutrition and fitness levels, intervention components and other variables which may affect intervention. Hopefully, this manual will serve as a replication guide for agencies and schools that would like to improve the fitness and nutrition levels of their children and youth.

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Contents

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CHAPTER I

INTRODUCTION

JIM A. STOVALL

DANIEL M. MCCRIMMON

Description of the Problem

The importance of good nutrition and exercise to the development and maintenance of a healthy body has received a tremendous amount of attention over the past two decades. Much of the knowledge that has emerged about fitness and nutrition has been widely disseminated by the popular press (Bailey, 1978; Cooper, 1982; Sheenan, 1986). The impact of obesity (Brownell & Kaye, 1982; Huse, Branes, Colligan, Nelson, & Palumbo, 1982) and poor physical fitness (Berenson, Frank, Hunter, Srinivosan, Voors, & Welber, 1982) on the educational and physical development of children is well documented. If left untreated, obese, out of shape children often come adults whose physical problems continue to compound themselves throughout life (Bailey, 1982). However, comprehensive school based programs have been found to yield long-term results (Brownell & Kaye, 1982).

The problems of poor physical fitness and inadequate nutrition are often more evident with visually handicapped students both in and out of residential settings than their non-handicapped peers (Snoy & Bentier, 1978). The literature generally suggests that visually handicapped children have less developed work capacities than their non-handicapped peers. Adelson and Fraiberg (1974) described the effects of delays in the development of motor skills and other researchers (Buell, 1973; Emes, 1985) have noted other psychomotor problems including gait, locomotion and poor balance. Scores of visually handicapped students on tests of cardiorespiratory fitness have generally been poor (Seelye, 1983; Short & Winnick, 1986; Stamford, 1975) with maximal oxygen intake being reported lower than in normally sighted children of similar age (Cumming, Goudling, & Baggley, 1971; Jankowski & Evans, 1981). However, Case, Dawson, Schartner, & Donoway (1973) found that visually handicapped students are not necessarily always less fit than their sighted peers. They concluded that deficiencies in cardiorespiratory fitness was not associated with blindness for students attending a school where an adequate physical education program compensates for the sedentary life often associated with the condition of blindness. This physical education program was found to utilize an indoor track for regular running with more time being allotted for planned physical activity than non-handicapped students received in their physical education program.

Buell (1983) attempted to disspell the myth that visually handicapped do not need to be as fit as their non-handicapped peers. Most people accept the idea that children with normal vision should be physically fit, however, few people stress the same need for visually handicapped children. Many parents and teachers overlook this basic concern of the visually handicapped child (Warren, 1976) and largely concentrate upon the more obvious problems of blindness such as mobility. In actuality, the visually handicapped may need to be more fit than their sighted peers since visually handicapped individuals often expend more energy to reach the same goals as their sighted peers. Therefore, it can be concluded that proper exercise and good nutrition can minimize the handicapping nature of the child's visual impairment.

Snoy and Benteir (1978) cited that the problem of obesity in visually handicapped adolescents is often due to the lack of exercise and an inadequate concept of personal body image. Visually handicapped adolescents frequently have little opportunity to learn to control food portions or types served to them or to model appropriate eating patterns. Additionally, gratification from food frequently serves as a substitute for many of the normal sources of gratification which are blocked by the visual handicaps. They found that a program of self-modification techniques could be successful for long-term weight maintenance in visually handicapped children.

Review of Previous Interventions

Physical educators and exercise researchers in schools for the blind and other agencies serving the visually handicapped have been refining new approaches for enhancing student fitness for over a decade. A review of these studies should acquaint the user of this manual with the state of the art as well as provide a chronological perspective on the development of programmatic interventions in the area of fitness training with the visually handicapped.

Cardiovascular endurance training and aerobic conditioning programs for visually handicapped can be traced to the pioneering efforts of Stamford (1975) and George, Patton, Purdy, & Pollack (1975). George et. al. (1975) found that a one hour cardiovascular and muscular workout three times weekly made significant gains in blind college students' cardiovascular and muscular fitness. After a medical screening including history, blood analysis, determination of pulmonary function and percent body fat, resting electrocardiogram and a maximal performance treadmill stress test, students were assigned to an individualized program of aerobic conditioning and skeletal muscle development. The workout regimen included use of a bicycle ergometer, treadmill, a universal gym and a trampoline.

Recognizing the prohibitive costs of gym equipment and the inherent difficulty involving blind persons in jogging and walking, Stamford (1975) advocated a chair stepping technique for building cardiovascular fitness in visually handicapped persons. His training regimen involved stepping up onto a chair approximately 17 inches high and returning to the floor to a four-count cadence. An initial duration of 15 to 20 complete cycles with one minute weekly incremental increases to a total of 10 minutes was recommended by Stamford as being an adequate prescription for achieving cardiovascular fitness.

Several other significant programs have been developed to enhance the fitness of visually handicapped students. Russo (1969) developed a corrective and recreational gym class for students at the California Orientation Center for the Blind consisting of one hour of daily activities as follows: 15 minutes general calisthenics for all joints and large muscle groups; 15 minute torso muscles; 15 minutes apparatus chinning bar, punching bag, wall pulleys, climbing rope, horizontal ladder and rope skipping; and 15 minutes for changing. Resnick (1973) originated creative movement classes for visually handicapped children with emphasis on motor skills, posture, orientation balance and self-concept. Cross country running over a rugged two mile course utilizing flags to indicate direction and sighted guides proved to be an effective vehicle for developing cardiovascular fitness with little equipment investment (Sonka, 1978).

In a recent study by Lee et.al. (1985), a curriculum containing four well designed exercise classes per week for visually handicapped students was found to be adequate for improving cardiovascular fitness. They found that the training response of three additional training sessions per week was limited and provided no significant impact upon overall cardiovascular fitness levels.

Definitions of Terminology

An adequate understanding of terminology employed in this manual is essential. The following definitions provide the reader with an overview of some of the concepts included in this project.

1. Cardiovascular Endurance Training (CVET) - continuous or uninterrupted whole body activity involving a major part of the total muscle mass, which results in marked elevation of heart rate (HR) for a minimum of several minutes (Stamford, 1975).
2. Visual Impairment - defined as a person who has a visual acuity of 20/200 or less in the better eye with correction, has a peripheral field so restricted that it affects a student's ability to learn, or has a progressive loss which will lead to blindness in later life (Alabama Institute for Deaf and Blind, Admission Criteria).

3. Overweight - an excess of 10% or more above the ideal weight for the person (Arnheim, Auxter, & Crowe, 1973).
4. Obesity - an excess of 20% or more above the ideal weight for the person (Arnheim et. al., 1973).

CHAPTER II

PROJECT DESCRIPTION

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Origin

The Alabama School for the Blind, a subunit of the Alabama Institute for Deaf and Blind, was awarded a grant during the 1985-86 school year from the U.S. Department of Education, Office of Research in Education of the Handicapped to develop a research based program for improving fitness and nutrition of the visually handicapped students. The purpose of the project was to:

1. compare the relative physical fitness levels of one handicapped population (visually handicapped/blind students of a residential school) with that of non-handicapped peers,
2. develop a school-based fitness and nutrition intervention program for an experimental group of visually handicapped children,
3. and, after a specified treatment period, assess relative gain of the experimental group to determine the impact of this type of intervention with the targeted population.

The study was conducted on the hypotheses that:

H-1 Due to mobility problems, visually handicapped children are, on the average, less physically fit than their normal counterparts as measured by:

a. stress tests (maximal oxygen consumption)

b. skinfold tests

c. vitamin screens

d. blc ? chemistry profile

H-2 With appropriate intervention, visually handicapped children can be brought to or above norm levels as measured by the above tests.

Method

To adequately assess these hypotheses, a quasi-experimental design involving an experimental group and control group, with pre test and post test measures was employed. The experimental group consisted of 30 randomly selected visually handicapped students from the residential program at the Alabama School for the Blind, Talladega, Alabama. The control group was composed of a matched sample (age, sex, race) of non-handicapped students selected from a randomly developed pool at the Sylacauga City School System. The two independent variables included presence or absence of visual impairment and individualized physical and nutritional programs. The dependent variables included stress test (Predicted max V 02), percentage of body fat, height, flexibility, weight and two variable sets represented by vitamin screening levels and blood chemistry profile. All of these are standardized measures of fitness.

Both experimental group (visually handicapped students) and control group (non-handicapped peers) were pre-tested using the standardized measures of fitness (dependent variables). Next, the experimental group was then exposed to the experimental treatment (individualized physical fitness and nutritional programs) over an experimental period of four and one half months; whereas, the control group was not exposed to treatments other than their customary P.E. programs. At the end of the treatment period both groups were reassessed using the same standardized measures. Hypothesis one was tested through the comparison of control and experimental groups in terms of mean scores on the pre- test. A comparison of control and experimental groups differences in mean scores on pre-test in mean scores on pre-test and post-test afforded an assessment of the second hypothesis.

Subjects

The sampling frame for the experimental group included approximately 130 visually handicapped students ranging in ages 7 through 18, who were enrolled at the Alabama School for the Blind, Talladega, Alabama. The technique of systematic random sampling was used to produce the sample of 30 subjects. The sampling frame for the control group included 1,100 non- handicapped students, ranging in ages 7 through 18, enrolled in the Sylacauga City School System. In order to control for the influences of sex, race and age the sample for the control group was matched with the experimental group in terms of these variables. This was accomplished in the following manner. First, the sample for the experimental group was randomly selected. Second, the percentages for race, sex, and age was derived for the experimental group. Next, the control group was catergorized to reflect the composition of the experimental group. For example, if there were 5 white, female, 10 year olds in the experimental group, a category defining this composition was created for the control group. Finally, the appropriate number of subjects was randomly selected for each category of the control group in order to match the experimental group.

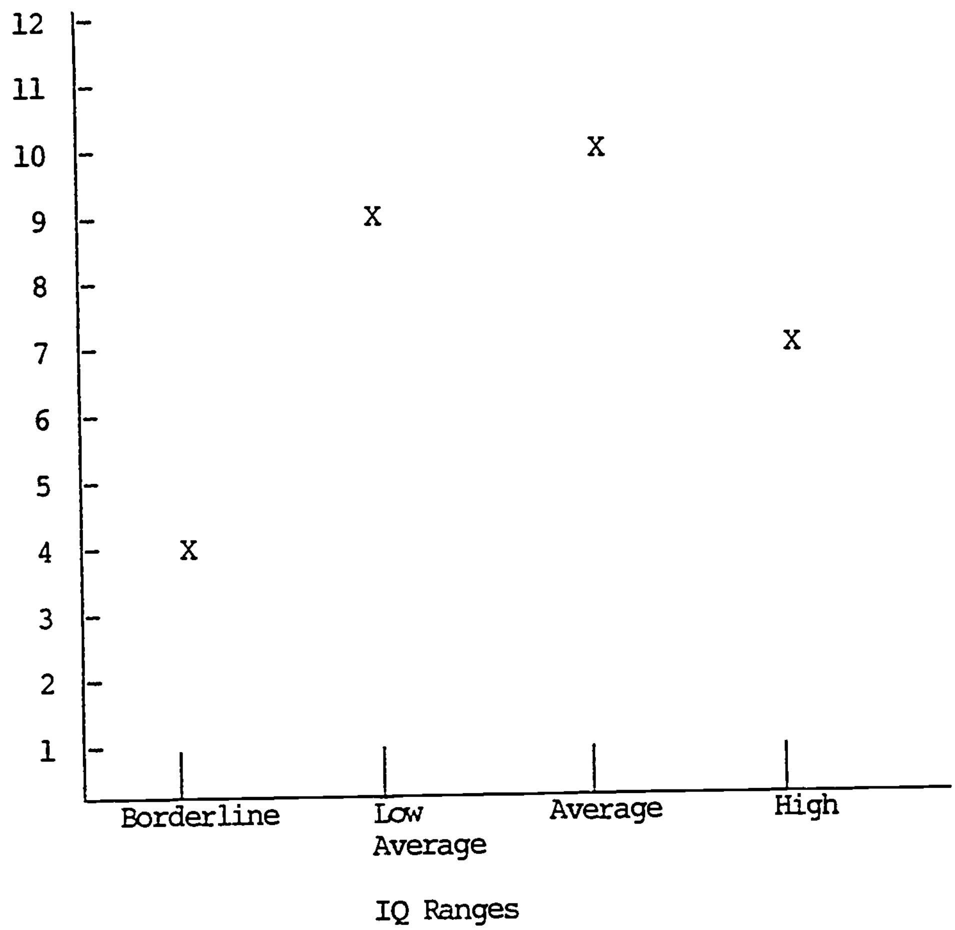
TABLE 2.1. Breakdown of Visual Disorders of Experimental Subjects.

EYE DISEASE	NO. AND PERCENT OF DISTRIBUTION IN EXPERIMENTAL GROUP		NO. AND PERCENT OF DISTRIBUTION IN UNITED STATES POPULATION
	NO. CASES	%	%
Retinal and Choroidal Diseases	4	13.4	3.6
Corneal Diseases	6	20.0	36.9
Cataracts	8	26.6	31.2
Glaucoma	2	6.7	7.8
Other/multiple Undetermined	10	33.3	20.5

1* Source: Welsh, R. L. (1983) Yearboc . of Association for Education and Rehabilitation of the Blind and Visually Impaired, Washington D.C.

The visual handicaps of the experimental subjects were confirmed through medical records. Disease prevalence rates are listed in Table 2.1 and were noted to be roughly comparable to national incidence figures (Welsh, 1983). In terms of measured visual acuity, 10 of the subjects were totally blind, 16 has visual acuities of 20/200 or worse in the better eye with correction and 4 had visual fields restricted to less than 20 degrees. Additionally, recent IQ measures of experimental subjects indicated that most of them were relatively normal in this respect. Figure 2.1 illustrates the frequency distribution of IQ ranges for this group.

FIGURE 2.1. Frequency distribution of IQ ranges for experimental subjects.



CHAPTER III

PROGRAM REPLICATION GUIDE

FITNESS ASSESSMENT AND INTERVENTION

DANIEL BLESSING

As the review of the literature has shown, there has been much recent interest in the study of cardiorespiratory response to exercise of healthy and diseased populations in a variety of settings. This interest includes the young and old in good health and also those with numerous medically related problems. Most of the available information suggests that many teachers have fears in allowing children to exercise at moderate to high intensity levels or to exercise at all. This has resulted in the curtailment of the already low levels of physical activity and thus encouraged sedentary living habits (Buell, 1973).

Therefore, the purpose of this chapter is to describe the procedure for screening, evaluating, and implementing a health-fitness program for visually handicapped students in order to combat the health related risks associated with sedentary lifestyles.

Need for Aerobic Programs

It is evident that children do not develop physical fitness on their own. Activity habits must be established at an early age or lifelong patterns of inactivity will develop. This is particularly true for visually handicapped students who receive little exercise and who frequently have a variety of mobility problems.

Cardiovascular disease "risk factors" are present in many young children and can be modified or prevented through properly designed diet and exercise programs. Gilliam (1977) found that 62 percent of children (age 7-12) had at least one coronary disease risk factor. Children are susceptible to high cholesterol levels, stressful living patterns, hypertension, and obesity. Approximately 11 to 15 percent of elementary school children are overweight by 20 percent or more of their recommended weight. The first signs of arteriosclerosis appear about age six and the disease process is reversible until approximately age 19.

Some would argue that a special aerobic training program is unnecessary since children are normally active and engage in high levels of activity at school recess and after school. However, Hovell, Bursick, Sharkey, & McClure (1978) developed a reliable measure of activity levels of children and showed that elementary students obtained relatively little exercise during recess periods. Further, Cumming et. al. (1975) reported that most childhood sports and recreational activities are not continuous and do not require high oxygen consumption, thus would not be expected to lead to improved cardiorespiratory fitness.

Research studies are gradually reducing the fear that children can be permanently harmed by aerobic exercise. Most studies have indicated that children as young as age six are capable of exercise oxygen uptake at comparable work loads of adults.

While earlier research had shown that aerobic exercises emphasizing running improved cardiorespiratory fitness and reduced risk factors in children, recent studies have compared the aerobic potential of children with adults. Freedson (1981) stated that children as young as seven had similar oxygen uptake response on a bicycle ergometer exercise as observed in adults. Another bicycle study by Sady and Katch (1981) concluded that children and adults had similar patterns for consistency of relative endurance performance. Using a motor drive treadmill, El Wahab (1982) suggested that exercise oxygen uptake is greater in trained children as compared to untrained children.

Finally, Lee, Ward, & Shephard (1985) reported that supervised exercise sessions three times per week in addition to an existing physical educational program for blind students failed to improve their fitness levels.

Guidelines for Exercise Testing and Prescription

Screening

A series of screening tools would be advisable when dealing with this particular population of students. This would include a signed informed consent by the parent or guardian which includes an explanation of the tests to be administered, a description of the risks, discomforts, and benefi associated with the tests. In addition, a health history form and a health risk profile questionnaire provide valuable information regarding a student's past and current health status (See Appendix A).

Resting heart rate and blood pressure measurements can also provide additional information. A resting EKG using a CM5 lead placement permits monitoring of the heart rate and electrical activity of the heart prior to and during the test. Screening measures of this nature assist in determining those students that should be omitted from certain tests and exercise activities.

Exercise Testing

Cardiovascular Fitness. The preliminary screening efforts will assist in defining those individuals for whom exercise testing is contraindicated. Following that process, a test battery can be implemented. Most schools with some improvising can measure cardiovascular fitness. The mobility problems, cost, and initial fears associated with treadmill walking usually prevent this instrument from being considered as a testing tool. The cycle ergometer is the tool of choice for testing as most students can adapt to cycling with verbal encouragement and practice sessions. In some instances, small children (<8 years) can not reach the pedals and others who have orthopedic and motor control problems can not maintain contact with the pedals. A modified step test should be used for a small number of these children. Both testing procedures involve a submaximal test to 85% of age predicted maximum heart rate. Three minute work intervals are used in a progressive manner until the target heart rate is achieved.

In addition, field test utilizing a 50-yard dash or long distance run can be used in assessing cardiovascular fitness.

Body Composition. Measurement of body composition (leanness and/or fatness) is not only helpful in designing physical fitness programs, but assists with dietary counseling. The amount of body fat is determined by using skinfold calipers. Measurements are of subcutaneous adipose (fat) tissue is made at two sites: triceps and subscapsular. Generally, skinfold measurements are made on the right side of the body for pre- and post- test measurements. The triceps and subscapular skinfolds are generally used. These two sites are

Thirdly, supervisory staff for testing need to take the appropriate time necessary to verbally communicate the specific task that is to be undertaken. Also, verbal encouragement is a high priority and assists with subject motivation.

Lastly, the issue of regular versus special norms must be addressed since much of the literature has shown th : visually handicapped youngsters cannot be equitably compared to standards established for normally sighted individuals (Short & Winnick, 1986). While this controversy will probably continue for quite some time, it is recommended that developers of fitness programs for visually handicapped youngsters use special norms (Short & Winnick, 1986) for program development and monitoring and regular norms (AAHPER, 1976) for comparisons with the normal population.

Exercise Prescription

The research indicates that physiologically, the cardiorespiratory systems of children are as competent to deliver oxygen to their muscles as adults. Children's heart rates can reach as high as 190-200 beats per minute during exercise. Upon rest, these vital signs return to resting levels. Teachers should not be concerned about the high heart rates, so long as the children are permitted to rest when they need to (Morris, 1980).

High level demands on the cardiorespiratory system should be included in the physical education curriculum. Thirty minute classes meeting once or twice a week will not increase the endurance capacity of children. Activities that involve "taking turns" are detrimental to improving cardiorespiratory endurance despite some teachers' illusions of involvement and feeling active. Special aerobic programs of adequate duration and intensity need to be provided.

A well designed exercise program needs to keep the four components of exercise prescription in mind if cardiovascular fitness and body composition are going to be favorably altered. These components of exercise prescription involve intensity, duration, frequency and mode. The intensity level of the tasks performed needs to be sufficient enough so that the child is exercising at 60% to 80% of maximum heart rate (220 minus age x 60-80%). The duration of exercise is dependent on the initial level of fitness. However, it is probably easiest to begin at a fixed time of 10 to 15 minutes and progress by 5 minutes per weel until 30 to 40 minutes is being achieved. This allows for adaptation for all students while building confidence in their ability to perform work, keeps motivation high, and offsets injuries.

The frequency of exercise may be dependent on physical education classes or after school exercise classes. Regardless, a minimum of three days per week needs to be the goal with an attendance rate of 80%. Supervisory staff play an important role concerning motivation and attendance as visually handicapped students (normally sighted also) lose interest as leadership and assistance with the program deteriorates. The mode of exercise needs to be aerobic in nature and may consist of the following activities: Stationary cycling, stationary rowing, treadmill walking, brisk walking with group or assistant, floor exercises, swimming or hydroaerobics in small controlled groups for non-swimmers. If exercise equipment is available, it can be arranged in a circuit fashion with students exercising for 5 to 10 minutes of each station. Circuits serve three primary functions: (1) allow for increased individual participation, (2) require a minimum of equipment (by featuring small group work), and (3) provide much enjoyment through the variety, challenge, and freedom provided. In order to receive full benefit from exercise on a treadmill or exercise bicycle, the visually handicapped child should be encouraged to maintain good coordination of arm and leg movements in typical walking and running patterns. Leaning and hanging on the arm of the treadmill should be discouraged. Music played during a circuit adds stimulation and may serve as an instructional cue for moving children around stations. A variety of other activities including calisthenics may be inserted into the program but must be performed in a fashion that will elicit heart rates in the training range. Lastly, the use of resistive exercise as a form of training could be implemented in many settings. Performing a number of weight training exercises with free weight or machines may enhance strength, muscular endurance and balance-coordination. Usually, light weights and high repetitions are suggested initially with a progressive increase in weight over time. The use of free weights or weight machines must be carefully structured to avoid the risk of injury.

Use of Test Results

The results of test items included in this manual can be a significant aid in the prescription of exercise for the development of physical fitness. Specific ways in which test results can aid in fitness development will vary depending upon the test situation, the teacher, and the students. Several ways in which test results can be effectively utilized are listed and briefly explained below:

1. Diagnosis: Attained scores on various items of the test can be used to identify strengths and weaknesses with individual students. Those who score below criterion standards are identified as needing special attention within an individualized program. These students will likely need counseling in regard to their fitness status along with guidance in selecting appropriate procedures for improvement. For example, distance run tests can be used to teach basic concepts in cardiovascular physiology and health, and with other students, students may become motivated toward improvement, or maintenance of a desired level already reached.

2. Achievement of Objectives: Every physical education program should have an established set of reasonable fitness objectives for the students. Test results can help determine the degree to which these objectives are being met.

3. Educational Purposes. The mere process of administering a fitness test to students communicates the nature of important components of health and fitness. The components measured are emphasized as being worthy of special consideration in a person's life style. Further, test results can be used to stimulate student interest on health related topics. For example, distance run tests can be used to teach basic concepts in cardiovascular physiology and health, and body composition determinations can be used to teach concepts in

weight control and nutrition. The testing process should be an integral part of the student's educational experiences in health and fitness. It should never be allowed to become a separate entity. In addition, students do talk to parents. Many of these parents are concerned about their own health and fitness status. Through discussion of fitness testing with their parents, the students often perform an indirect educational function in making the parents aware of the important components, tests, and criteria of health related fitness.

4. Program Evaluation. Test results can be used to determine if a physical education program is achieving desired goals. With program evaluation, the score of the group rather than the individual is considered. In this context, the average of a group can be compared to the norm. This would reflect the level of fitness of the average student.

5. Motivation. Children and youth are inherently curious about their physical abilities and development and the way in which their results compare to those of others. Most are also quite competitive. By becoming aware of how they compare with criterion standards and with other students, students may become motivated toward improvement, or maintenance of a desired level already reached.

6. Improvement of Public Relations. The focus in a health related fitness program is on each individual student. A testing and follow-up program organized around health related fitness is tangible evidence that the school, and specifically

the physical education department, are doing something toward trying to solve one of our major societal problems -- low fitness. The very nature of the program (individualized) is an indication that the school <u>is</u> concerned with the individual.

CHAPTER IV

PROGRAM REPLICATION GUIDE

NUTRITION ASSESSMENT AND INTERVENTION

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PATRICIA L. SHULTZ

Appropriate nutrition is necessary for optimal growth and development, physical activity, and other stress periods as well as for maintenance of health throughout the life cycle. A variety of health problems can occur when persons have either deficits of essential nutrients or inappropriate or excessive consumption of some nutrients. Although the role of nutrition is not fully understood, much is known about appropriate food choices for attaining or maintaining health (Public Health Report, 1983).

Surveys of the nutritional status of school age children have usually included a normal population. Surveys of the handicapped child have included children with cerebral palsy, mental retardation, Down's Syndrome, and other handicapping conditions (Brown, Davis, & Fleming, 1979; Cronk, 1978). These surveys were conducted largely to assess nutritional status of various population groups in an effort to determine appropriate intervention programs.

Traditionally, a threefold approach is necessary in assessing nutritional status: anthropometric, biochemical, and dietary. Selection of the most reliable and sensitive procedure coupled with acceptable standards for interpreting the information collected is imperative for group surveys.

General considerations which should be noted in any survey of group nutritional status are that one's nutritional status is determined over time and involves the level of nutrients consumed and absorbed versus those utilized and excreted (Jensen, Englert, & Dudrick, 1983).

The average daily sodium intake is substantially higher for the U.S. population than generally recommended intake levels, although some decrease has been seen in the last decade. Studies have shown people beginning to consume less total fat, saturated fat, and cholesterol. People are more interested in nutrition, are more aware of the actions they can take to maintain health, and are changing nutritional practices (Sauberlich, 1984).

In a study of effects of weight loss on fitness in obese children, 113 obese preadolescents in a six-month behavioral weight control program showed significant improvements for both weight and fitness. Program success was strongly related to changes in exercise heart rate. The greatest fitness changes occurred in children who were only moderately overweight but who had effective weight loss. Children who entered treatment more than moderately overweight achieved comparable fitness improvements only if their weight loss was dramatic (Esptein, Koeske, Zidansek, & Wang, 1983).

In another study of 63 children, ages 5 to 12 years, participating in a 10 week school-based program of behavior modification, nutrition education, and physical activity, the children showed weight loss as well as reversed the steady weight gain that occurred before the program, suggesting that a comprehensive program in the schools can produce significant weight losses and that untreated children tend to increse their degree of obesity.

To establish the value of screening children for hypercholesterolemia in terms of identifying future adults with hypercholesterolemia, a large study of 12 year old children was conducted for nine years. Forty-nine percent of the children in the highest cholesterol groups at baseline were similarly placed at follow-up. Children who had improved were less likely to be smokers and tended to be more active than those who had moved into the high cholesterol risk group as adults (Orchard, Donahue, Kuller, Hodge, & Drash, 1983).

Athletes are often poorly informed about nutrition. Many follow potentially harmful practices including disproportionately high intake of proteins (especially by weight lifters), vitamins and minerals in excess of the RDA (Recommended Dietary Allowances), poorly designed weight gain or loss programs, and various food fads (Marjarrez & Birrer, 1983).

Screening for nutritional problems in children plays a vital role in preventing illness and promoting normal growth and development, especially in handicapped populations. Some of the most common nutritional problems encountered in children include overweight, underweight, delayed or slowed growth, and iron deficiency anemia. Successful screening depends upon using accurate methods for measuring and testing.

Determination of biochemical indices in nutritional assessment for the handicapped child should include assessment of the hemoglobin and hematocrit as a minimum measure. Determination of all vitamin levels along with serum protein, albumin, cholesterol, and triglycerides has been recommended by many surveys but have often been omitted because of their cost (Jensen, Englert, & Dudrick, 1983).

Dietary information provides the third element of the nutrition assessment survey and has been examined in a number of studies (Brown, Davis, & Fleming, 1979; Jensen, Englert, & Dudrick, 1983). The results of the analysis of many studies have found kilocalories, vitamin A, and vitamin C most frequently consumed in low amounts although when looked at individually many children had high protein intakes. Positive associations have been found between protein, kilocalories, and growth status. Activity level and feeding problems have also been found to affect kilocalorie intake.

Many handicapped children have speech, hearing, motor, and visual problems. As many as two million U.S. citizens may suffer from visual impairment, an inclusive term of both partial and total blindness. Incidence for the 0-19 age group is estimated at 0.1 percent (Wicham & Black, 1985). The relationship of visual impairment to a compromised nutritional and physical fitness status is assumed, but poorly documented, although visual impairments are found in multiply handicapped children with a higher incidence than among normal children (Caldwell, 1982).

Intervention related to nutrition education has been reported in educational programs for teaching food preparation skills with other programs focusing on independence in feeding. Children with visual handicaps are often delayed in feeding development, rely on caregivers for the selection and provision of food and subsequently may be limited in acceptance of food varied in flavor and texture.

Other programs involved in nutrition education for the handicapped child have included parent workshops, modification of meals and snacks served during school to more nearly match the Recommended Dietary Allowances, and workshops for the caregivers related to nutrition and behavioral management (Dufton-Gross, 1979).

All of these considerations entered into the planning of the AIDB project to assess the nutritional and fitness status of a group of visually handicapped children and to provide an intervention program for fitness and nutritional intakes followed by a reassessment of the nutritional and fitness status. The nutrition assessment tools used included biochemical assays, anthropometric measurements and food intake records, all of which will be later described.

This manual has been designed to help health providers and educators in institutions for the visually handicapped monitor the nutritional status of their students. The preferred or appropriate assessment tools and instructions for their use are provided. If the procedures and equipment available in your institution are somewhat different from those described, you should still be able to use much of the information provided.

Biochemical Analysis

Methods

Two laboratories were utilized for the biochemical analysis of students' blood samples utilizing whole blood and plasma chemistry analysis. Two tubes for each subject were labeled and transported on ice in an insulated container (4 degrees Celsius) to the Vitamin Assay

Laboratory at The University of Alabama At Birmingham (U.A.B.), and one to Medical Lababoratory Associates in Birmingham. Vitamin C analyses were performed within 6 hours at U.A.B., while hemoglobin, hematocrit and other vitamin assays were completed at a later date, following storage at -70 degrees Celsius. The blood chemistry profile was performed at Medical Laboratory Associates in Birmingham, Alabama (see Appendix B).

Fasting blood samples were drawn in the a.m. on the first day of the study by a medical laboratory technician. For each student approximately 5 ml. of blood were drawn into each of the 3 lavendar-stopper tubes with a draw capacity of 7 ml. These tubes each contained 10.5 mg. EDTA (Na)2 as a preservative.

The following tests were performed: 1) chemistry profile including total protein, albumin, calcium, cholesterol, triglycerides, sodium, potassium, creatinine and glucose, complete blood count including hemoglobin and hematocrit; 2) a vitamin screen including serum and red cell folate, vitamin B12, and vitamin B6, vitamin A, carotene, vitamin C, thiamine, and riboflavin, hematocrit, and hemoglobin. Normal values will vary for individual laboratories. Those used in this study were established in respective laboratories.

If access to facilities or funds to perform biochemical screens on each student are not available, they may be indicated in selected cases if a deficiency or nutritional problem is suspected.

A less comprehensive but lower cost alternative screening program would include anthropometric measurements, food intake records, and the only inexpensive, readily available biochemical assay, which is hemoglobin determination.

Hematocrit and hemoglobin are used to determine iron deficiency anemia. Hematocrit is a measurement of the perce age of red blood cells in the blood. The hemoglobin test measures concentration of hemoglobin in the blood. Lowered hemoglobin and/or hematocrit indicate iron deficiency anemia, the most common form of anemia in children. Children at risk include:

*premature and low birth weight infants

*children between the ages of 6 months and 3 years

*multiple birth infants

*teenage boys and girls

*children from low income families who may not be getting an adequate diet.

The values below are normal values for hemoglobin and hematocrit for the indicated ages and sexes. Values below these levels indicate iron deficiency anemia:

Age (years)	Sex	Hemoglobin	Hematocrit
1/2-10	Both	(gm/100 ml)	34
10-14	Both	12.0	37
14+	Male	13	41
14+	Female	12.0	37

If screening results are normal, the schedule recommended by the American Academy of Pediatrics for repeat screening of hematocrit or hemoglobin is at the following ages: 6-7 months, 36-37 months, 5-6 years, and 11-12 years.

If iron deficiency is present, appropriate treatment should be given and the child checked one month later. Children whose hematocrit and/or hemoglobin levels have increased, but are not yet normal, should be monitored regularly.

Anthropometric Measurements

Anthropometric measures are a simplified means of evaluating body composition as one measure of nutritional status. The usual anthropometric measurements include weight, length, head circumference, arm circumferences and fatfold thicknesses. Comparison to reference populations is generally based on National Center for Health Statistics data; however, the usefulness of the data collected is increased when measurements are taken at two different time intervals (Jensen, Englert, & Dudrick, 1983). Cronk, et.al. (1978) completed a longitudinal study of anthropometric measures of a handicapped population, Down's Syndrome, finding this group shorter than a group of normal children. Similar results to both height and weight were found by surveys of handicapped in North Carolina and Minnesota including multiply handicapped individuals (Brown, Davis, & Flemming, 1979).

A report describing the anthropometric analysis component of the National Evaluation of School Nutrition programs addressed the relationship between participation in the school nutrition program and students' height, weight, and triceps fatfold. The anthropometric analyses suggested that long-term participation in the School Lunch Program has no relationship to height but does have a small relationship to weight of school-aged children, partly due to increase in body fat. Income and ethnic characteristics did not make a difference, although older children were affected more than younger children (Vormeesch, Hanes, & Gale, 1984).

Methods for Height-Weight

Measurements of height and weight provide important clues regarding health and nutritional well-being. These measurements can indicate when a child is overweight or underweight. When measured serially (repeated over time), you can get a picture of the pattern of growth. Since height and weight measurements are important in identifying children who may be at risk, or already have a nutritional problem, it is essential that correct measuring procedures are followed to assure accurate results. These tools for nutritional assessment are quick and inexpensive and should be performed at every school and institution for handicapped and non-handicapped students alike. A registered dietitian or other health professional well-trained in performing anthropometric measurements should perform these procedures.

The following sections outline the procedures for obtaining an accurate height and weight and interpreting the results. It is helpful to fully explain all procedures to the visually handicapped children and to allow them to feel the measuring tools so that they are comfortable with what is being done.

Height. Children over 3 years of age should be measured while standing. Measurement of stature requires a measuring stick or a non-stretchable tape attached to a vertical, flat surface like a wall with no baseboard or molding. A right-angle headboard is also needed. Cloth or plastic tapes can stretch and cause inaccurate readings. Movable measuring rods attached to platform scales are also unreliable and should not be used.

Ideally, the child should wear only underclothes so that stance can be seen clearly. This is not always feasible in school settings and can be accomplished when wearing indoor clothing through careful observation and positioning of the legs by the measurer. The child should stand with bare heels close together, but not touching, legs straight, arms at the sides, and shoulders relaxed. The knees should be straight, with heels on the floor, and with head, shoulder blades, buttocks, and heels touching the wall. Slowly lower the headboard until it touches the crown of the head firmly. Make sure the headboard is not just resting on the hair but is actually touching the top of the head and is level. The measurer's eyes should be level with the headboard. Read the height measurement to the nearest 1/8 inch (1 mm) out loud and jot it down immediately.

Weight. To obtain an accurage weight, the standard platform beam scale, sensitive to within 1/4 pound (100 gm) is suitable. The same scale or type of scale should be used pre and post-intervention. Spring- type scales should not be used since they may not maintain the necessary degree of accuracy.

Before you weigh the child, balance the scale. This adjustment is accomplished by placing the main and fractional sliding weights at their respective zeros and moving the zeroing weight until the beam is in balance. The accuracy of scales should be checked with a set of standard weights at least 2-3 times per year.

If possible, children should be weighed in their underclothes or light clothing and without shoes. It is also best to weigh in the morning before the child has eaten. The child should stand over the center of the platform or the scale with heels together. The reading should be made when the child is standing still, and not touching anything. This is often difficult to achieve with the visually handicapped child who has a poor sense of balance. Constant movement on the scale makes measurements difficult. Much patience is needed in these cases to get an accurate reading. Measurements should be repeated until you obtain two readings that agree with 1/4 pound (100 gm). Record the second reading that agrees within 1/4 lb Return the upper and lower beam weights to zero after each child is weighed.

Recording and Plotting Height and Weight

Growth charts developed by the National Center for Health Statistics (NCHS) are valuable tools to show how a child's height and weight compare with those of other children in the United States. They help differentiate children who are within the average range of weight and height for age and sex from those who may be at high risk for overweight, underweight, or delayed growth. Changes in the pattern of growth can be readily determined from serial measurements.

The NCHS has available 4 sets of growth charts. There are charts for both boys and girls to 36 months and 2-18 years of age. For schoolage children, the 2-18 years of age charts are used (Appendix C).

The date on which measurements are taken, the child's age to the nearest year and month (e.g. 10 years, 2 months) and the height and weight measurements all should be recorded in the boxes provided in the upper left hand corner of the chart. The recorded numerical data make it possible to check later if doubt arises as to whether measurements are plotted on the growth charts. The following measurements for 2-18 years are plotted on the growth charts as follows: height for age; weight for age; weight for height.

Each measurement that is plotted on the growth chart is placed at a point where the horizontal lines and vertical lines meet. Measurements are plotted in standard measurements (inches, pounds) or in metric measurements (centimeters, kilograms). Be careful to use the correct line when plotting or measurements will be grossly inaccurate. It is best to use a pencil for plotting, so errors can be easily corrected.

Each chart has a set of curves or lines with the numbers 5,10,25,75,90, and 95 printed along the right-hand side. These are called percentile curves. Each one indicates the percentages of boys or girls in the U.S. population who are below that measurement. For example, if a 10 year old girl weighs 72 pounds, her weight for age is at the 50th percentile. This means that 50 percent of girls her age weigh less than she. For children 2-18 years, age should be plotted to the nearest quarter year. Remember, age errors are as serious as measurement errors when interpreting growth data.

For all children, weight and height for age should be plotted. The plotting of weight against height, independent of age, is appropriate between birth and the beginning of pubescence. During puberty, weight for height varies with age. Consequently, these charts should not be used in assessment. These charts cannot be used if a boy is taller than 145 cm (4'9") or if a girl is taller than 137 cm (4'6") since most children taller than this will have entered pubescence.

Interpretation of Height and Weight

Accurate recording and plotting of growth data are important because children who are extreme in their growth (below the 5th or above the 95th percentile) are more likely to have a nutritional disorder or disease than children closer to the 50th percentile. Measurements between the 25th - 95th percentile are likely to represent normal growth.

If a child's weight for height or age is at the 95th percentile or above, or if weight for height or age has moved upward over time crossing into higher percentiles, the child may be at risk for overweight. If a child's weight for height or age is at the 5th percentile or below or if the present weight for height or age is at a lower percentile than previous measurements, the child may be at risk for underweight.

If a child's height for age is at or below the 5th percentile, or if the present height is at a lower percentile than previous measurements, the child's growth may be delayed.

In any one of these cases, monitoring the child's height and weight should be done regularly. A medical history and exam, as well as dietary history, should be evaluated to ascertain the cause. Appropriate counseling and treatment should be provided.

Methods - Skinfold

The amount of fat in the body is an important indicator of nutritional status. Body weight alone does estimate accurately the percentage of body fat, but can be determined indirectly from triceps skinfold thickness (TSF). TSF is a measurement of a double layer of skin and subcutaneous fat on the back of the arm. There is wide agreement that the triceps (back of the upper arm) and subscapular (below the shoulder blades) sites are the best. The triceps site is universally accessible in both males and females so was used for this project. A reliable skinfold caliper is needed.

The following are skinfold calipers that meet the specifications for accuracy:

1. Lange Skinfold Calipers. Cambridge Scientific Industries, Inc., 101 Virginia Avenue, Cambridge, Maryland 21613.*
2. Harpenden Skinfold Calipers. British Indicators, Ltd., St. Albans, Hertfordshire, England.
3. Aidpometer Skinfold Calipers. Ross Laboratories, Columbus, Ohio 43216.

*Used in this project.

The method of determination of the triceps skinfold method includes the following steps.

1. Select subject's bare right arm for measurement.
2. Have the subject bend the arm at a right angle with the hand across the stomach.

3. Locate the midpoint of the upper arm by placing the middle finger of one hand on the tip of the acromial process of the scapula (shoulder) and the middle finger of the other on the olecranon process of the ulna (elbow). Then estimate the midpoint by extending the thumbs towards each other until they touch. Mark the midpoint with a marking pen. The mark should be on the back of the arm directly in line with the elbow.
4. Then, with the subject's arm hanging relaxed at the side, pick up a lengthwise double fold of skin and fat with the thumb and forefinger of the left hand about one centimeter above the mark. This insures that the pressure at the midpoint is exerted by the calipers and not the fingers. Pinch up firmly and cleanly from the underlying muscle. (If in doubt, have the subject contract and relax the arm muscles to insure that no muscle is included in the pinch).
5. Place the calipers over the fatfold at the marked midpoint at a depth about equal to the thickness of the fold and release the calipers but not the pinch. Take a reading three seconds after release. Record readings to the nearest 0.5 millimeter.
6. Remove the calipers and reapply to obtain a total of three readings. Average the results.

Mid-Arm Circumference (MAC)

MAC is also used in assessment of caloric and protein stores. It is most useful when used to calculate the arm muscle circumference, a more sensitive index of muscle or protein stores. A flexible measuring tape made of metal, fiberglass or other non-stretchable material should be used. The Ross Insertape (R) was used for our project.

The following steps should be completed:

1. Select the subject's bare right arm for measurement (either arm is acceptable as long as procedure is consistent).
2. Locate the midpoint in the same manner as for triceps skinfold measurement.
3. With the subject's arm hanging relaxed at the side, place a flexible steel or non-stretch fiberglass tape around the arm at the midpoint. Hold the tape firmly but gently to avoid compression of the soft tissue.
4. Record circumference to the nearest 0.1 centimeter.

Calculation of Mid-Arm Muscle Circumference (MAMC)

Mid-arm muscle circumference (MAMC) is accepted as a sensitive index of body protein reserves. This measure is calculated from triceps skinfold (TSF) and mid-arm circumference (MAC) measurements.

$$\text{MAMC (cm)} = \text{MAC (cm)} - [3.14 \times \text{TSF (cm)}]$$

Located in Appendix D are the norms and percentiles for males and females for triceps skinfold, mid-arm circumference and mid-arm muscle circumference. Each child should be compared against these standards to aid in assessment of nutritional status and physical fitness. Exercise and weight reduction (if overweight is present) will decrease the TSF. Exercise will increase the MAMC reflecting increased muscle protein.

Ideally, serial measurements should be obtained to assess changes due to changes in nutrition and/or physical activity. To insure the most accurate measurements, all initial and serial measurements performed on an individual should be performed by the same person when possible.

Food Intake Records

To adequately assess an individual's nutritional status, it is important to know what they are and are not eating. Numerous methods exist to determine dietary intake such as observation, food frequency questionnaires, food diaries, and a 24-hour recall. In this project, a 3 consecutive day food record was completed during the initial assessment and after the 4 month intervention period to assess its effects (Appendix E).

Each child and others responsible for care of the child, i.e. houseparents and parents, were instructed in how to keep a detailed food record. Forms with instruction for use were provided (Appendix E). The intake records were kept on Sunday through Tuesday to attempt to acquire both weekend and weekday intake information. Nutritionists monitored the intake record keeping in the school cafeteria.

The forms were collected on the 4th day, the food items coded and each child's diet entered into the computer using a nutrient analysis software package (The Short Report, HDI Services, Columbus, Ohio). The computer analysis was reviewed by the nutritionists. An example of one section of the printout is shown in Appendix E.

In addition to each individual diet evaluated, the school cafeteria menu was evaluated by a computer based nutritional analysis (The Short Report).

Nutrition Intervention

Changes in the cafeteria menu, snack bar selections and other food service changes were made as indicated. Most recommendations were made based on the U.S. dietary guidelines, i.e. reduce total fat to 30% of calories, and reduce sugar and salt consumption. Salt shakers were taken off the tables at meals and fruits and diet soft drinks were added as snack choices. Recommendations were also made if the overall menu was low in any nutrient, i.e. provided less than 2/3 the RDA for that nutrient.

The students completed a nutrition intervention program simultaneously with the physical fitness program. A flow chart for the intervention phase of the project is shown in Appendix F.

A nutrition assessment summary (Appendix F) was developed for each child, based on laboratory, dietary, and anthropometric data. Recommendations were made according to the following criteria.

1. Vitamin or mineral levels in the blood below normal standards for our laboratories;
2. elevated serum cholesterol or triglycerides;
3. dietary fat exceeding 40% total calories or cholesterol; intake exceeding 400 mg/day;
4. weight or height for age reflecting overweight or underweight.

Individual nutrition counseling sessions were carried out with each student based on nutrition care plans. For example, if a child's plamsa vitamin C was low, he was instructed to increase vitamin C intake. An example is shown in Appendix H. Children who were overweight, i.e. > ≐ 95 percentile, were counseled once every two weeks for weight control. Individual meal plans were developed specifying the number of daily servings from each food group. All other students received counseling every fourth week. Each session was approximately 15 minutes in length. At each visit, weight was recorded in a file kept for each student. Prior to the initial counseling session, an invitation was sent to each student's parents or guardians; however, a very small number attended.

In addition to individual diet counseling, four group classes were held presenting general nutrition information. The topics for the classes were chosen after evaluation of the food intake records. Based on the needs which were identified in this manner, the following were included: the basic food groups, nutritious snacks, healthy breakfast foods, and calcium needs and sources. Food tasting and food models were used. Each class was 15-20 minutes in length. Class participation was encouraged. Others class topics based on the initial assessment of group needs could be added in future programs.

Written goals for the children were provided to houseparents and parents to help improve compliance. Nutrition and health educators are making significant use of programs that analyze dietary intake, and in some cases activity levels. Nutritionists have identified problem areas related to nutrition education by computer as the client's inability to correctly interpret data without assistance from a health-care provider. The advisability of releasing technical data, such as computer summaries with comparison to RDA's, without counseling by a qualified person is questionable; therefore, an edited version was prepared and sent to parents at both the beginning and end of the study. The children also received copies of their nutritional goals in large print or Braille, as indicated for each student. To reinforce the intervention program and to provide continuity, detailed computerized dietary analysis and recommendations were provided the AIDB staff to be used for follow-up with students returning the following school term.

To achieve good dietary compliance, it is recommended that a registered dietitian (R.D.) be the key person to organize and carry out the nutrition component of any nutrition assessment and intervention program. Six R.D.'s (faculty and nutrition graduate students) participated in the AIDB Project. Because AIDB only had a part-time dietitian, there was no nutrition professional to reinforce the nutrition intervention, although there was strong support by the consulting dietitian including follow up on recommendations on menu planning and food preparation.

CHAPTER V

SUMMARY AND RECOMMENDATIONS

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The literature has clearly shown a need for the development of aerobic fitness and nutritional programs for the visually handicapped. Such programs have demonstrated that visually handicapped children and adults can achieve cardiorespiratory fitness levels similar to their sighted peers. Failure to program for these needs only reinforces poor fitness and nutrition levels and therefore encourages a sedentary lifestyle. Parents of visually handicapped children, educators, service providers, and the general public must become aware of the importance of regular vigorous exercise and proper dietary intake for the visually handicapped child if we are to impact upon the additional handicapping problem of inadequate physical fitness in the visually handicapped population.

The AIDB Fitness and Nutrition research based project demonstrated that an intervention program could impact upon the health status of visually handicapped students in a residential school.

Table 5.1 shows pre-intervention characteristics for the experimental and control group. In the control group, anthropometric values were only available on 29 of the 30 subjects. There were no significant differences between the two populations with respect to age, sex, height (actual or percentile), weight (actual or percentile) or mid-arm circumference (actual or percentile). The values of the sum of skinfolds was significantly larger in the experimental group (P<0.001) while mid-arm circumference was significantly smaller (actual P<0.01 and percentile P<0.001).

TABLE 5.1 PRE-INTERVENTION POPULATION CHARACTERISTICS

MEAN + S.D.

VARIABLE		EXPERIMENTAL (N=30)	CONTROL (N=29)
Age		12.5 ± 3.14	12.4 ± 3.18
Height (cm)	Actual	153.3 ± 17.4	154.9 ± 18.1
	Percentile	48.3 ± 32.1	61.0 ± 26.2
Weight (kg)	Actual	51.3 ± 16.3	48.9 ± 19.3
	Percentile	60.5 ± 35.9	59.2 ± 26.7
Mid Arm Circum (Cm)	Actual	25.9 ± 4.4	24.6 ± 4.5
	Percentile	65.1 ± 30.7	61.1 ± 27.4
Mid Arm Muscle Circum (Cm)	Actual	19.4 ± 3.6	21.4 ± 4.2
		50.1 ± 29.8	73.4 ± 24.3
SSD4 (MM)		55.6 ± 32.8	35.0 ± 17.9*

*Difference significant P<0.05

The means, standard deviations and pre-to-post intervention mean differences are presented in Table 5.2. Based on paired t-tests, significant differences (P.05) were found between the experimental group (N=30) and control group (N=30) in their pre-intervention body weight and skinfold (E4) measurements. Thus, the experimental (visually handicapped) group were approximately 5.2 kg heavier and had a total of 20 mm more fat than the control group.

TABLE 5.2 MEAN AND STANDARD DEVIATIONS OF FITNESS OF VARIABLES BEFORE AND AFTER INTERVENTION

VARIABLE	GROUP	PRE INTERVENTION	POST INTERVENTION	MEAN DIFF (POST-PRE)
WT (KG)	E	51.3 ± 16.3	53.2 ± 16.4	5.1*
	C	48.9 ± 19.3	53.1 ± 19.5	9.2
Skinfold (E4mm)	E	55.6 ± 32.8+	51.5 ± 28.2+	4.1*
	C	35.5 ± 17.9	33.4 ± 21.1	2.1
HR (bpm)	E	77.6 ± 16.3	73.1 ± 9.3	4.5*
	C	75.5 ± 9.1	72.7 ± 10.6	2.8
Submax HR 3 (bpm)	E	135.0 ± 15.6	125.0 ± 15.3	-9.9*
	C	135.7 ± 18.9	132.2 ± 20.4	-3.5
Submax HR 6 (bpm)	E	150.8 ± 17.8	138.9 ± 15.4	-11.9*
	C	149.3 ± 21.7	144.9 ± 23.7	-4.4
Submax HR 9 (bpm)	E	165.5 ± 17.3	151.6 ± 18.0	-13.9*
	C	161.5 ± 23.1	157.6 ± 25.1	-3.9

NOTE: E = Experimental Group (N = 30)
C = Control Group (N= 30)

*Pre-intevention to post-intervention change significant at $P < .05$

+Experiment to control significant at $P < .05$.

Post intervention measurements indicated that changes in heart rates during submaximal exercise at minutes 3, 6, and 9 of the cycle ergometer test were significantly greater in the experimental group (-14, -12, and -10 beats per minute, respectively) than in the control group (-3, -5, and -4 beats per minute, respectively).

A. significant (7.3%) decrease in sum of skinfolds (SSF4) was observed after training in the experimental group. Both sexes tended to lose fat, and there was an associated small increase of total mass, implying an accumulation of lean tissue. No significant differences were noted for any of the variables in the control group.

The dropout rate for the subjects in this study was lower than expected. There was one dropout from the experimental group, while no subjects from the control group dropped out. The adherence rate for the final 29 subjects was greater than 90% of the total exercise sessions for the experimental group.

Table 5.3 shows a comparison of selected nutrients in dietary intake between the experimental and control groups. The only variable to show an increase between pre and post intervention was the amount of protein consumed ($P<0.05$) which was accompanied by corresponding, but not significant, increases in calories, fat and calcium. While the increase in calcium in the experimental group was not significant at the completion of the study, the amount of calcium consumed by the experimental group was significantly higher than the control group ($P<0.05$). There were a non-significant trend toward a decrease in sodium intake from pre to post intervention, although in both pre and post intervention, the mean levels for the experimental group were higher than for the control group. There was no significant differences in vitamin A or vitamin C, pre and post intervention, in the experimental group, while in the control group there were non-significant increases in both vitamins.

TABLE 5.3 MEAN AND STANDARD DEVIATIONS OF DIETARY INTAKE BEFORE AND AFTER INTERVENTION

VARIABLE	GROUP	PRE INTERVENTION	POST INTERVENTION	MEAN DIFF (PRE-POST)
Calories	E	2051.8 ± 660.2	2282.9 ± 734.6	-231.06
	C	2081.9 ± 833.5	2074.2 ± 601.3	18.93
Protein	E	69.6 ± 22.5	81.0 ± 24.3	-11.36
	C	79.0 ± 25.1	76.6 ± 25.4	.40*
Fat	E	84.1 ± 26.9	91.9 ± 27.7	7.85
	C	83.9 ± 35.5	85.3 ± 29.9	-2.68
Vitamin A	E	3737.9 ± [illegible]78.0	3733.4 ± 2037.7	-467.69
	C	3900.6 ± 2184.5	4728.1 ± 3807.1	-1436.71
Vitamin C	E	88.06 ± 52.1	85.34 ± 56.0	-4.62
	C	79.8 ± 59.9	96.50 ± 68.7	-24.85
Sodium	E	3231.4 ± 1314.7	3040.3 ± 985.4	191.14
	C	2819.9 ± 1276.4	2860.0 ± 1029.1	54.77
Calcium	E	897.4 ± 468.3	1048.7 ± 463.7+	-154.58
	C	831.9 ± 433.5	797.1 ± 2439+	47.89

*Pre-intervention to post-intervention change significant at $P < 0.05$

+Experiment to control significant at $P < 0.05$.

Previous attempts at working to change meal patterns and food intake with parents of handicapped children have had initial success followed by a return to old habits (Dufton-Gross, 1979). In this study, the positive results included menu improvements in the school, change in types of food for snacks, reducing sodium and fat, and increasing availability of fruits and fruit juices. A major result was an increased awareness of the importance of nutrition and physical fitness on the part of caregivers and parents.

While it is generally hypothesized that visually handicapped students have lower physical working capabilities than sighted students, the present study showed no difference between sighted public school students and visually handicapped students prior to the training program. This is demonstrative of the previously noted finding that visually handicapped students can be comparable to sighted students if they were involved in a physical education program.

In the present study, the mean training heart rate was 150 bpm (70% of APMHR). This was slightly lower than the 160 bpm suggested for non- handicapped children. However, the decreases in resting heart rate by 4.5 bpm (5.87%) and in heart rate at three submaximal stages of the cycle test indicate that cardiovascular function was altered by the endurance training program. These changes are similar to those of George et. al. (1975), who trained 10 legally blind college-age students (18-26 years) 3 days a week for 14 weeks and found a significant reduction in resting heart rate and a significant increase in treadmill endurance time. These findings are also in agreement with Savage, Petratis, Thomson, Berg, Smith & Sady, (1986), who studied 14 normally sighted prepubescent males (ages 7-10 years) and reported significant increases in cardiorespiratory endurance following 11 weeks of walking/jogging. Alternatively, Lee et. al. (1986) conducted the only other study utilizing visually handicapped students and found no change in cardiovascular fitness levels following 4 months of endurance training. The author attributed the lack of change to the well- designed existing exercise program and the already high fitness levels of their subjects. In the present study, the lower heart rate at rest and during submaximal exercise is a desirable adaptation because it reflects a reduced myocardial oxygen demand and increased myocardial efficiency (Kitamura, Jorgensen, Goebel, Taylor, & Wang, 1972). This would have important implications for the visually handicapped in that both the mechanical and physiological efficiencies would improve along with the performance of daily activities without excessive fatigue.

The preliminary statistical analyses indicated that the experimental and control group differed initially in body composition (skinfolds 4). However, after 16 weeks of training, the experimental group realized a significant (7.3%) decrease in skinfold thickness, while the control group remained unchanged. This is in agreement with Lee et al. (1986), who reported a 10% reduction in skinfolds in visually handicapped students following 4 months of endurance training. In addition, body mass increases in the present study for the experimental (3.7%) and control group (8.5%) both increased significantly ($P<.05$).

Since the total duration of the study was over five months (including holidays) it is likely that maturation changes may account for some of the weight gain. According to the dimensional theory (Von Dobeln, 1966), body mass might increase by 1 to 2 percent during this time. Regardless, the reduction in fat in the experimental group suggests that the weight gain was primarily an accumulation of lean tissue was a result of the physical training.

Recommendations

The following recommendations are intended to serve as a set of general guidelines for professionals and parents who are designing and implementing a program of fitness and nutrition for visually handicapped students.

1. Any program of nutrition and fitness must be individualized to meet the student's needs as determined by pre-intervention assessments.
2. Normative controversies in assessments make the dual use of specialized norms for the visually handicapped and the general population norms highly desirable. Additionally, this approach will provide two very useful "yardsticks" for comparing individual student fitness levels.
3. Plan menus to meet the U.S. Guidelines for Healthy Eating which emphasizes reducing calories, fat, and salt in the diet while increasing intake of fiber. Specifically, this involves the elimination of high calorie and salty snacks and the substitution of fruits and other low calorie snacks.
4. In general, visually handicapped children need longer mealtimes due to their needs for instruction in eating skills.
5. An individualized aerobic fitness program of three to four sessions per week should be implemented in addition to the visually handicapped student's regular physical education program.

6. Careful medical screening prior to the implementation of a fitness program as well as ongoing program monitoring will minimize the potential for injury to the student.
7. Supportive counseling should be provided as an adjunct to fitness and nutrition programming with the visually handicapped student due to the impact of obesity upon self-concept, the tendency of the visually handicapped to withdraw, and as a motivation inducement.

APPENDIX A

SCREENING TOOLS FOR EXERCISE TESTING

APPENDIX A.1

INFORMED CONSENT FOR EXERCISE TEST

In order to estimate how well my heart, lungs, and blood vessels perform, I hereby consent to perform a special exercise test at the Department of Health, Physical and Recreation Education, Auburn University, Auburn University, Alabama. During the test, I will cycle or walk at a constant speed with the workload increasing every few minutes. I may stop the test whenever I decide I should. The operator may stop the test sooner on the basis of his observations if he thinks it is unnecessary or unwise to continue. During the test my blood pressure and electrocardiogram will be taken.

This test carries no known risk for the patient with normal circulation. Persons who have heart disease are at some slight risk all the time, and this test briefly increases their risk of heart disease complications.

Benefits from taking this test include the possibility of finding evidence that the heart, lungs, and circulation are performing normally rather than limited by disease. In the event of recognizable abnormality, the operator will refer me for medical observation or testing.

I give informed consent for the performance of an exercise test in the Department of Health, Physical and Recreation at Auburn University.

Signature __________________________

Witness ____________________________

Date ______________________________

____
(Supervising the test)

APPENDIX A.2

HEALTH AND ACTIVITY

NAME____________________ DATE____________ BIRTHDATE____________

ADDRESS__________________________________ PHONE________________

I. Activity

A. How do you rank yourself with other people of the same sex and age to the amount of physical activity you get at work and outside of work together?

B. List primary leisure time physical activities

Activity	Times per week	Minutes per time

II. Health

A. General
1. List any present medical problems
2. List any medications currently taken
3. If hospitalized in the past year, why?
4. Smoking
   a. Past   If so, how much?
   b. Now?   If so, how much?
5. Family history of
   a. lung problems?
   b. heart disease?
   c. diabetes?

B. Cardiorespiratory history
1. specify known cardiovascular problems
2. murmurs?
3. chest pains?   If so, at exercise?   at rest?
4. fainting?
5. high blood pressure
6. chronic cough?
7. any known respiratory problem?

C. Muscle, bone, or joint problems?   Specify.

D. Weight and Diet
1. Weight at 20____30____40____50____now____
2. Family tendency: overweight? average? lean?
3. Number of eggs eaten each week_______
4. Meat consumption: light? moderate? heavy?
5. Cholestrol and/or triglycerides: high? normal? low?

APPENDIX A.3.1

RISK ANALYSIS

NAME ______________________________

							SCORE 1	SCORE 2
AGE	10 - 20 yrs. 1	21 - 30 yrs. 2	31 - 40 yrs. 3	41 - 50 yrs. 4	51 - 60 yrs. 6	61 + yrs. 8		
HEREDITY: PARENTS AND SIBLINGS	No Family History of CVD 1	One with CVD over 60 yrs. 2	Two with CVD over 60 yrs. 3	One Death from CVD Under 60 yrs. 4	Two Deaths from CVD Under 60 yrs. 6	Three Deaths from CVD Under 60 yrs. 7		
WEIGHT	More than 5 lbs. below standard weight 0	−5 to +5 lbs. of standard weight 1	5 to 20 lbs. overweight 2	21 to 35 lbs. overweight 3	36 - 50 lbs. overweight 5	51 - 65 lbs. overweight 7		
TOBACCO SMOKING	Nonuser 0	Occasional Cigar/or Pipe 1	10 Cigarettes or less/day 2	11 - 20 Cigarettes per/day 4	21 - 30 Cigarettes per/day 6	Over 31 Cigarettes per/day 10		
EXERCISE	Intensive Occupational and Recreational Exertion 0	Moderate Occupational and Recreational Exertion 1	Sedentary Occupation and Intensive Recreation 2	Sedentary Occupation and Moderate Recreation 4	Sedentary Occupation and Light Recreation 6	Sedentary Occupation No Special Exercise or Recreation 8		
CHOLESTEROL	Below 180 mg % 1	181 - 205 mg % 2	206 - 230 mg % 3	231 - 255 mg % 4	256 - 280 mg % 5	281 - 300 mg % 7		
SYSTOLIC BLOOD PRESSURE	Below 110 mm Hg 0	111 - 130 mm Hg 1	131 - 140 mm Hg 2	141 - 160 mm Hg 3	161 - 180 mm Hg 5	Above 180 mm Hg 7		
DIASTOLIC BLOOD PRESSURE	Below 80 mm Hg 0	80 - 85 mm Hg 1	86 - 90 mm Hg 2	91 - 95 mm Hg 4	96 - 100 mm Hg 7	101 and above 9		
GENDER	Female 1	Female over 45 yrs. 2	Male 4	Bald Male 5	Bald Short Male 6	Bald Short Stocky Male 7		

Fig. 2 - New York State Education Department Physical Fitness/Heart Disease Intervention Program cardiovascular disease risk factor estimate

RESTING EKG	Normal 0	Borderline 2	Frequent PVC's 3	Conduction Defect 4	Ischemia 7	Infarction 10		
STRESS	No Stress Type B 1	Occasional Mild Stress 2	Frequent Mild Stress 3	Frequent Moderate Stress 4	Frequent High Stress Type A 5	Constant High Stress Type A 7		
PRESENT CVD SYMPTOMS	None 0	Occasional Tachicardia and/or Irregular Rhythm 2	Frequent Tachicardia and/or Irregular Rhythm 4	Dyspnnea on Exertion 6	Occasional Angina 8	Frequent Angina 10		
PAST PERSONAL HISTORY CVD	Completely Benign 0	CVD Symptoms Not M.D. Confirmed 2	History of CVD Symptoms Examined by M.D. 4	Mild CVD No Present R_x 6	CVD Under R_x 8	Hospitalized for CVD 10		
DIABETES	No Symptoms: Negative Family History 0	Latent: Positive Family History 1	Chemical 3	Mild: Dietary Control 5	Moderate: Oral R_x Control 7	Severe: Insulin Control 9		
GOUT	No Symptoms Negative Family History 0	Family History 1	Elevated Uric Acid (8mg % +) No Symptoms 2	New Onset Gout: Early Detected 3	Repeated Chronic Gouty Attacks 5	Gout With Renals and Ostea Complications 8		

TOTAL SCORE

If you score:

- 6 - 14 = Risk well below average.
- 15 - 19 = Risk below average.
- 20 - 25 = Risk generally average.
- 26 - 32 = Risk moderate.
- 33 - 40 = Risk dangerous; you must reduce your score.
- 41 - 55 = Risk very dangerous; you must reduce your score immediately.
- 56 - = Risk extreme; urgent medical treatment recommended.

Precautions and/or limitations:

Fig. 2 - Continued

APPENDIX A.4

Table 1. Fitness Norms For Visually Impaired Students

	Females			Males		
	10–12	*13–14*	*15–17*	*10–12*	*13–14*	*15–17*
Skinfolds (mm)						
NS	21.02	28.76	24.75	22.00	22.92	23.29
	(10.41)	(12.33)	(10.73)	(10.04)	(11.09)	(8.45)
PS	24.86	32.82	32.36	24.51	25.99	26.94
	(12.00)	(16.02)	(17.39)	(13.30)	(17.66)	(14.87)
BL	27.96	26.11	34.85	21.88	18.69	23.24
	(13.51)	(11.51)	(13.66)	(6.86)	(5.53)	(12.14)
Grip Strength (kg)						
NS	30.47	42.62	52.15	35.02	55.49	82.86
	(11.99)	(12.86)	(11.81)	(9.34)	(21.46)	(17.49)
PS	27.00	34.29	40.02	28.13	42.73	61.86
	(11.76)	(12.60)	(16.98)	(14.45)	(17.91)	(21.43)
BL	26.79	25.85	32.77	20.27	36.53	64.39
	(13.97)	(10.02)	(14.14)	(10.19)	(19.42)	(20.47)
Sit-ups (no. in 60 sec.)						
NS	30.26	35.79	36.48	34.86	43.97	45.72
	(7.86)	(9.00)	(11.22)	(8.23)	(7.25)	(10.33)
PS	27.05	30.54	31.38	30.68	34.42	37.01
	(9.97)	(8.95)	(9.38)	(10.68)	(10.69)	(11.45)
BL	27.68	23.39	28.69	28.00	36.84	36.54
	(9.55)	(8.90)	(9.64)	(9.95)	(9.62)	(10.66)
Sit and Reach (cm)						
NS	28.02	32.51	33.50	23.77	25.43	27.70
	(7.16)	(7.37)	(8.23)	(6.68)	(6.85)	(8.71)
PS	26.31	29.20	27.47	24.27	23.18	23.88
	(7.58)	(7.34)	(10.76)	(8.32)	(9.02)	(9.10)
BL	23.53	21.23	28.85	20.36	25.68	26.46
	(7.86)	(10.83)	(8.42)	(8.90)	(9.17)	(10.49)
50-yard Dash (sec.)						
NS	9.02	8.34	8.25	8.42	7.63	6.79
	(1.12)	(.89)	(1.40)	(.82)	(.82)	(.73)
PS	9.90	9.14	8.79	9.67	8.48	7.98
	(1.66)	(1.55)	(1.60)	(1.89)	(1.73)	(2.43)
BL	12.01	11.29	10.19	14.20	10.29	8.65
	(2.35)	(2.70)	(2.32)	(7.38)	(2.97)	(2.03)
Long Distance Run (yds./min.)						
NS	156.29	158.75	169.41	179.77	197.46	224.55
	(37.18)	(31.72)	(44.10)	(31.73)	(38.00)	(45.65)
PS	154.11	144.88	148.35	157.37	174.55	188.76
	(46.21)	(44.71)	(37.82)	(36.16)	(53.23)	(44.94)
BL	139.48	117.68	145.71	149.96	145.01	165.36
	(40.17)	(16.43)	(40.55)	(42.42)	(31.83)	(45.75)

Short & Winnick, 1986

APPENDIX B

SAMPLE BLOOD CHEMISTRY PROFILE

APPENDIX B

Medical Laboratory Associates
1025 South 18th Street - Birmingham, Alabama 35256
Telephone (205) 939-6200 Client Services (205) 939-6300
Medlab

Joseph B. Beard, Jr., M.D.
Medical Director

PAGE 1

PATIENT

REFERRED BY
ALA SCHOOL FOR DEAF & BLIND
CAROL CRAIG
DEPT OF NUTRITIONAL SCIENCES
UNIVERSITY STATION, AL 35294

1530-99-1-9025-C

Age	Sex	Date & Time Collected	Date Received	Date & Time Reported	Specimen No.	Report Status
		4/23/86	4/23/86	4/24/86 2:57 PM	01-631045R	FINAL

TEST ORDERED: SPECIMEN COLLECTION/1, CBC W/O DIFF, CHEMISTRY PROFILE/S, COLLECTION SUPPLIES/1

TEST	RESULTS (ABNORMAL)	RESULTS	REFERENCE RANGE	UNITS	SITE
CBC W/O DIFF					01
WBC		6.5	(4.8-10.8)	TH/CUMM	
RBC	4.02 L		(4.6-6.2)	MIL/CUMM	
HGB	12.0 L		(14-18)	GM%	
HCT	34.9 L		(42-52)	%	
MCV		86.7	(82-98)	U3	
MCH		29.9	(27-31)	UUGM	
MCHC		34.4	(32-36)	%	
RDW		13.0	(11.5-14.5)	%	
PLATELET COUNT		304	(140-440)	TH/CUMM	
MPV		9.8	(7.4-10.4)		
CHEMISTRY PROFILE/S					01
PROTEIN, TOTAL		7.6	(6.0-8.0)	G/DL	
ALBUMIN		4.9	(3.5-5.0)	G/DL	
GLOBULINS		2.7	(1.9-3.1)	G/DL	
CALCIUM		9.6	(8.5-10.5)	MG/DL	
INORGANIC PHOSPHORUS	4.8 H		(2.5-4.5)	MG/DL	
BILIRUBIN, TOTAL		0.2	(0.2-1.4)	MG/DL	
ALKALINE PHOSPHATASE		108	(40-136)	U/L	
LDH		133	(100-205)	U/L	
SGOT		21	(11-55)	U/L	
SGPT		3	(2-50)	U/L	
GGT		12	(7-42)	U/L	
SODIUM		140	(135-145)	MEQ/L	
POTASSIUM		4.0	(3.8-5.1)	MEQ/L	
CHLORIDE		108	(99-111)	MEQ/L	
CO2		29	(24-32)	MEQ/L	
BUN		18	(10-20)	MG/DL	
CREATININE		0.6	(0.5-1.2)	MG/DL	
GLUCOSE		85	(70-115)	MG/DL	
URIC ACID	3.7 L		(3.9-8.3)	MG/DL	
BUN/CREATININE RATIO		30.0			
A/G RATIO		1.8	(1.1-2.2)		
CHOLESTEROL	280 H		(144-250)	MG/DL	
TRIGLYCERIDES		41	(40-170)	MG/DL	

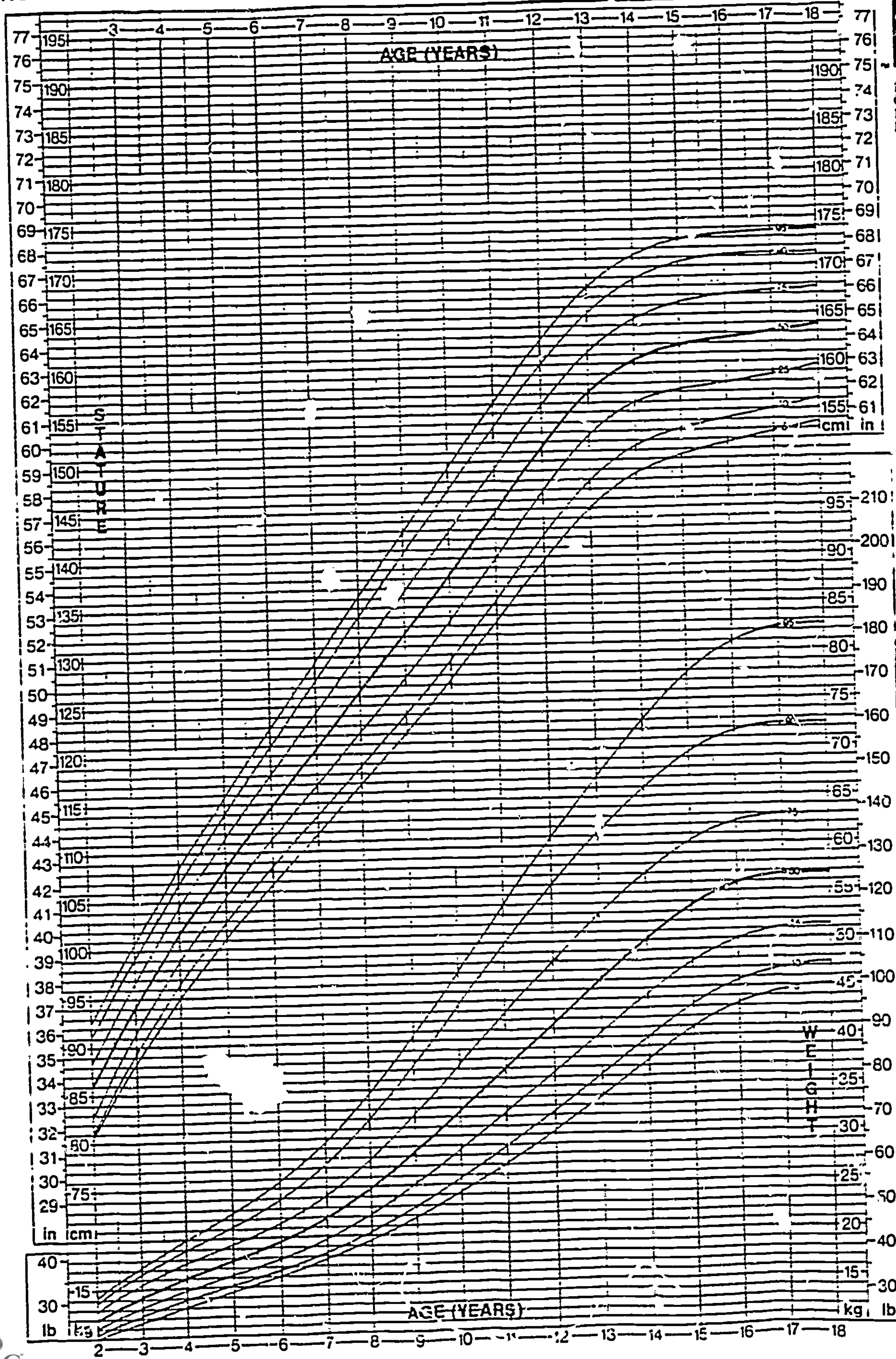
LABORATORY REPORT

APPENDIX C

NATIONAL CENTER FOR HEALTH STATISTICS
GROWTH CHARTS

GIRLS: 2 TO 18 YEARS
PHYSICAL GROWTH
NCHS PERCENTILES*

NAME ________________ RECORD # ________

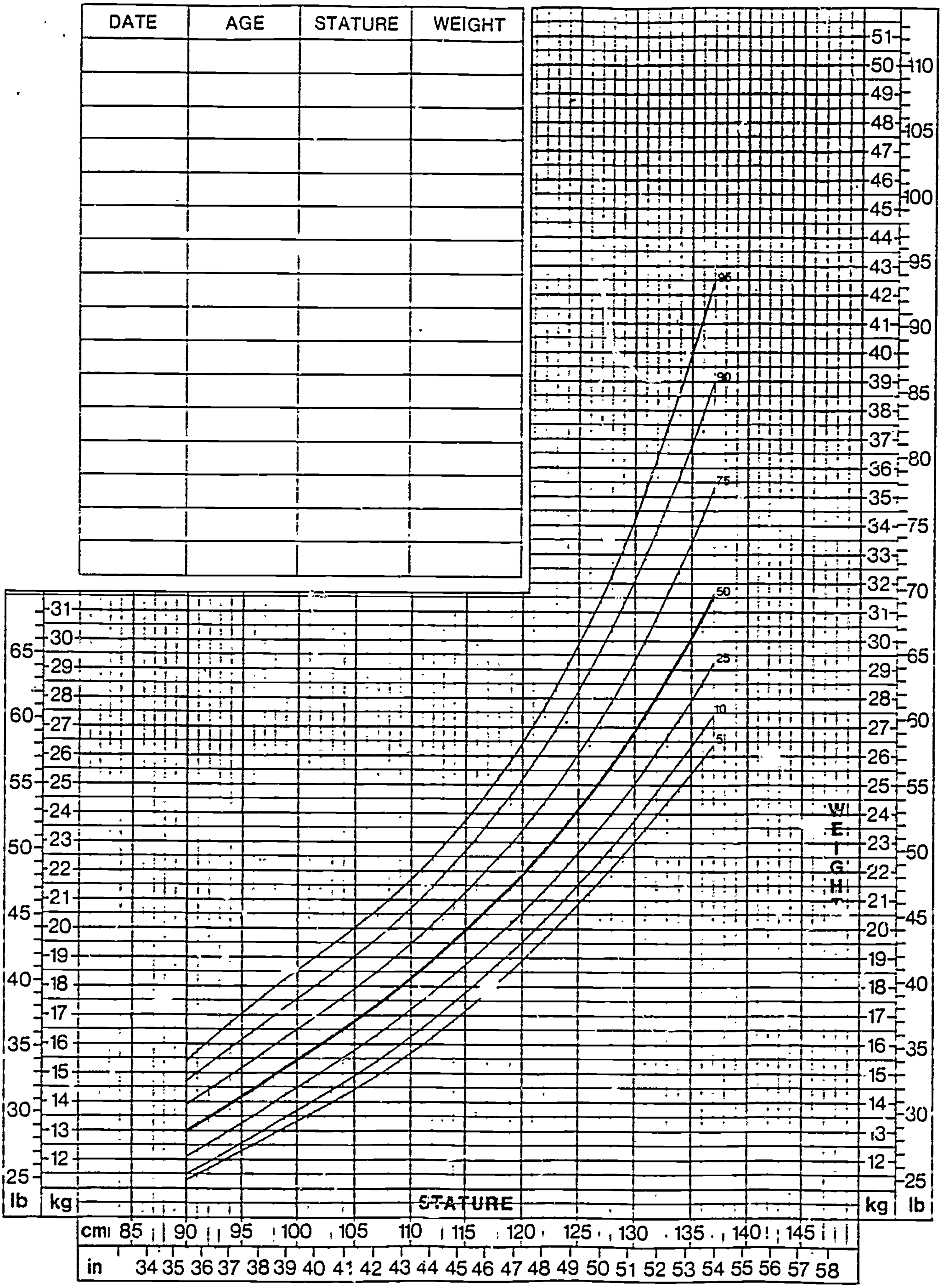


Ross Growth & Development Program

GIRLS: PREPUBESCENT PHYSICAL GROWTH NCHS PERCENTILES*

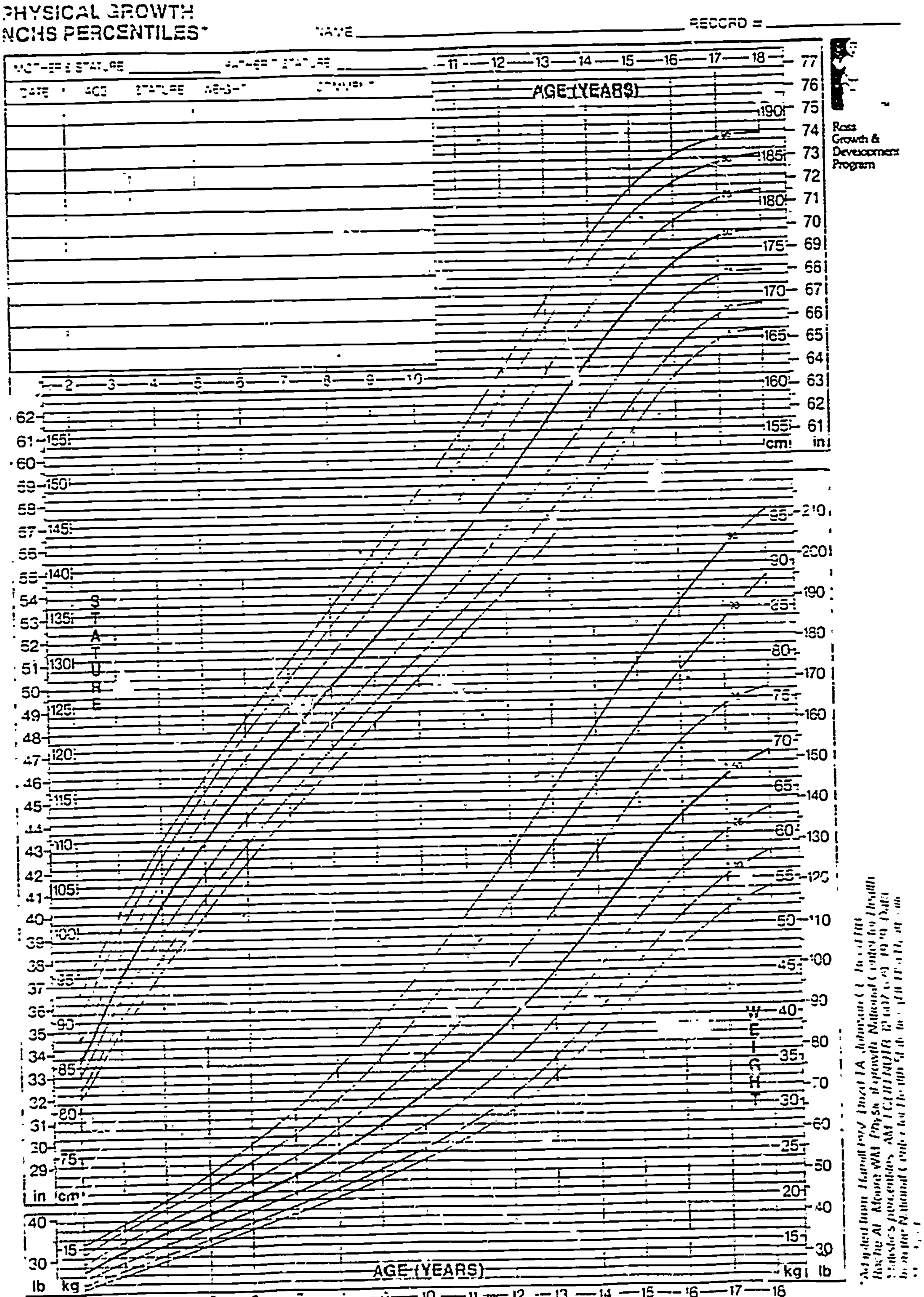
NAME ____________________ RECORD # ____________

DATE	AGE	STATURE	WEIGHT



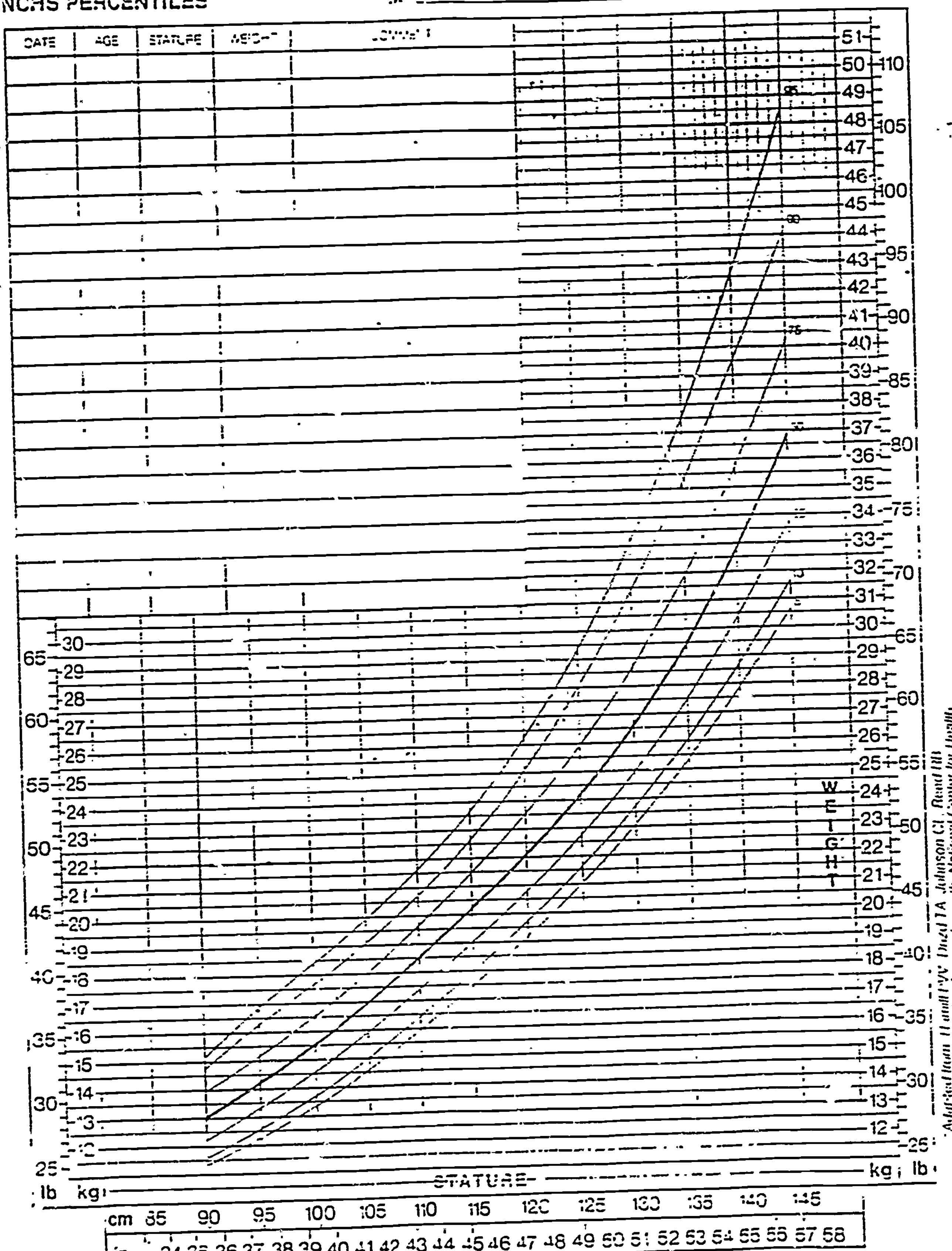
*Adapted from: Hamill PVV, Drizd TA, Johnson CL, Reed RB, Roche AF, Moore WM: Physical growth: National Center for Health Statistics percentiles. AM J CLIN NUTR 32:607-629, 1979. Data from the National Center for Health Statistics (NCHS), Hyattsville, Maryland.

BOYS: 2 TO 18 YEARS
PHYSICAL GROWTH
NCHS PERCENTILES*



BOYS: PREPUBESCENT PHYSICAL GROWTH NCHS PERCENTILES*

NAME ____________________ RECORD # ____________



*Adapted from: Hamill PVV, Drizd TA, Johnson CL, Reed RB, Roche AF, Moore WM: Physical growth: National Center for Health Statistics percentiles. AM J CLIN NUTR 32:607-629, 1979. Data from the National Center for Health Statistics (NCHS) Hyattsville, Maryland.

APPENDIX D

NORMS FOR TRICEP SKINFOLD, MID-ARM CIRCUMFERENCE AND MID-ARM MUSCLE CIRCUMFERENCE

Percentiles for upper arm circumference and triceps skin folds for whites of the Ten-State Nutrition Survey of 1968-1970

Age group	Age Midpoint, years	No.	Arm circumference percentiles, mm: 5th	15th	50th	85th	95th	Triceps skin fold percentiles, mm: 5th	15th	50th	85th	95th
					Males							
4.5-5.4	5	262	146	155	169	185	199	5	6	8	12	16
5.5-6.4	6	264	151	159	172	188	198	5	6	8	11	15
6.5-7.4	7	309	154	162	176	194	212	4	6	8	11	14
7.5-8.4	8	301	161	168	185	205	233	5	6	8	12	17
8.5-9.4	9	287	165	174	190	217	262	5	6	9	14	19
9.5-10.4	10	315	170	180	200	228	255	5	6	10	16	22
10.5-11.4	11	294	177	186	208	240	276	6	7	10	17	25
11.5-12.4	12	294	184	194	216	253	291	5	7	11	19	26
12.5-13.4	13	266	186	198	230	270	297	5	6	10	18	25
13.5-14.4	14	207	198	211	243	279	321	5	6	10	17	22
14.5-15.4	15	179	202	220	253	302	320	4	6	9	19	26
15.5-16.4	16	166	217	232	262	300	335	4	5	9	20	27
16.5-17.4	17	142	230	238	275	306	326	4	5	8	14	20
17.5-24.4	21	545	250	264	292	330	354	4	5	10	18	25
					Females							
4.5-5.4	5	233	149	155	169	185	195	6	7	10	13	16
5.5-6.4	6	259	148	158	170	187	202	6	7	10	12	15
6.5-7.4	7	273	153	162	178	199	216		7	10	13	17
7.5-8.4	8	270	158	166	183	207	231	6	7	10	15	19
8.5-9.4	9	284	166	175	192	222	255	6	7	11	17	24
9.5-10.4	10	276	170	181	203	236	263	6	8	12	19	24
10.5-11.4	11	268	173	186	210	251	280	7	8	12	20	29
11.5-12.4	12	267	185	196	220	256	275	6	9	13	20	25
12.5-13.4	13	229	186	204	230	270	294	7	9	14	[illegible]	30
13.5-14.4	14	184	201	214	240	284	306	8	10	15	22	28
14.5-15.4	15	197	[illegible]	216	245	281	310	8	11	16	24	30
15.5-16.4	16	187	[illegible]	224	249	286	322	8	10	15	[illegible]	27
16.5-17.4	17	[illegible]	[illegible]	224	250	291	328	9	12	16	26	31
17.5-24.4	21	836	215	233	260	297	329	9	12	17	25	31

Percentiles for upper arm diameter and upper arm circumference for whites of the Ten-State Nutrition Survey of 1968-1970

	Arm muscle									
	diameter, percentiles, mm					circumference percentiles, mm				
Age midpoint, years	5th	15th	50th	85th	95th	5th	15th	50th	85th	95th
Males										
5	39	41	45	50	53	121	130	141	156	166
6	40	43	47	51	53	127	134	146	159	167
7	41	43	48	52	55	130	137	151	164	173
8	44	46	50	55	59	138	144	158	174	185
9	44	46	51	58	64	138	143	161	182	200
10	45	48	53	59	64	142	152	168	186	202
11	48	50	55	62	67	150	158	174	194	211
12	49	52	58	66	70	153	163	181	207	221
13	51	54	62	71	77	159	169	195	224	242
14	53	58	67	74	84	167	182	211	234	265
15	[illegible]5	59	70	80	86	173	185	220	252	271
16	59	65	73	83	89	186	205	229	260	281
17	66	69	78	86	92	206	217	245	271	290
21	69	74	82	91	97	217	232	258	286	305
Females										
5	38	40	44	48	51	119	124	138	151	160
6	38	41	45	49	53	121	129	140	155	165
7	39	42	47	52	56	123	132	146	162	175
8	41	44	48	53	59	12[illegible]	138	151	168	186
9	43	45	50	56	62	1[illegible]	143	157	176	193
10	44	47	5[illegible]	58	62	139	147	163	182	196
11	44	48	55	62	67	140	152	171	195	209
12	48	51	57	64	68	150	161	179	200	212
13	49	53	59	66	71	155	165	185	206	225
14	53	56	61	70	74	166	175	193	221	234
15	52	55	62	70	74	163	173	195	220	232
16	54	57	64	72	83	171	178	200	227	260
17	54	56	62	71	77	171	177	196	223	241
21	54	58	65	73	80	170	183	205	229	253

APPENDIX E

FOOD INTAKE RECORDS

APPENDIX E.1

SAMPLE

(office use only)

FOOD OR BEVERAGE CONSUMED	AMOUNT EATEN (Don't include what's left on the plate!)	CODE NO.
Frozen orange juice	2/3 cup	
Kellogg's raisin bran	1/2 cup	
2% milk	4 oz.	
sugar	1 t.	
Campbell's tomato soup	1 cup	
with 2% milk	4 oz.	
Hi-C fruit punch	1 cup	
Waverly Wafers	2 whole crackers	
White enriched bread	1 slice	
Tuna packed in oil	1 oz.	
Miracle Whip	1 T.	
Delmonte Apricot Dessert Cup	1/2 cup	
Pot Roast (lean only)	4 oz.	
Brown rice, cooked	1/2 cup	
Canned cream-style corn	1/4 cup	
Coca-Cola	12 oz.	
Borden's vanilla ice cream with frozen	1/2 cup	
strawberries	1/4 cup	
Dannon raspberry yogart	1/2 cup	
Chipsters potato chips	10	
Water (all day)		

ARE VITAMINS TAKEN? YES______ NO______
IF SO, HOW OFTEN?__________________________
BRAND NAME:________________________________
DO THEY CONTAIN IRON?______FLOURIDE______
(COPY OR SEND LABEL)

APPENDIX E.2.1

PLEASE READ THESE INSTRUCTIONS CAREFULLY! WE NEED YOUR HELP IN ORDER TO ASSESS YOUR CHILD'S NUTRITIONAL STATUS ACCURATELY AND WE'RE DEPENDING ON YOUR HONESTY!

--To keep error at a bare minimum, record all food items immediately after they are eaten (meals and snacks).

--We need to know:

1. Portion sizes...cups, teaspoons, tablespoons, ounces, slices of bread, etc.
2. Method of preparation...fried, steamed, baked.
3. BRAND names.
4. ALL those little extras...gravies, cream sauces, salad dressing, relishes, butter, jams, honey, etc.
5. ALL the ingredients used in homemade recipes.
6. ALL drinks consumed...including an approximation of water intake.

--Be sure to mention which meals are eaten away from home in restaurants, school lunch, nursery school snacks, neighbor's home, etc.

--Our hope is that these three days reflect your child's typical food intake. If anything unusual has occurred during these days (illness, lack of appetite, unusual exercise or excitement, etc.), please make a note of it.

How to estimate meat portions?

OUR SAMPLE FOOD RECORD ILLUSTRATES THESE INSTRUCTIONS...........
PLEASE DO NOT FILL IN COLUMNS LABELED "AMOUNT AND CODE NUMBER".

THREE DAY FOOD RECORD

NAME: ____________________

ADDRESS: ____________________

____

TELEPHONE NUMBER: ____________________

DATE: __________ __________ TO __________

APPENDIX E.2.3

(Day 1)

DATE: ____________________

WAS VITAMIN TAKEN________ NAME____________________

(office use only)

FOOD OR BEVERAGE CONSUMED	AMOUNT EATEN (Don't include what's left on the plate!)	ƆE NO.

APPENDIX E.2.4

(Day 2)

DATE: ____________________

WAS VITAMIN TAKEN________ NAME____________________

(office use only)

FOOD OR BEVERAGE CONSUMED	AMOUNT EATEN (Don't include what's left on the plate!)	CODE NO.

APPENDIX E.2.5

(Day 3)

DATE:____________________ ____________________ ________

WAS VITAMIN TAKEN_______ NAME________________________

FOOD OR BEVERAGE CONSUMED	AMOUNT EATEN (Don't include what's left on the plate!)	CODE NO. (office use only)

A.I.D.B. FITNESS AND NUTRITION ASSESSMENT AND INTERVENTION PROJECT

Nutrition Assessment Report

NAME: ____________________ D.O.E.: ____________

B.D.: ____________________ CHART #: ____________

ADDRESS: ____________________ AGE: ____________

____________________ PHONE #: ____________

HEIGHT: _____ in. _____ cm. % standard _____

WEIGHT: _____ kg. _____ # % standard _____

TRICEPS SKINFOLD: _____ % title

ARM CIRCUMFERENCE: _____ % title

MID ARM MUSCLE CIRCUM. _____ % title

3-DAY INTAKE RESULTS

Kcalories _____

Pro % _____

Fat % _____

Cho % _____

Vitamins (list those low when compared with RDA) ____________________

____

Minerals (list those low when compared with RDA) ____________________

____

Vitamin Supplement ____

Mineral Supplement ____

School Lunch ____ ____ Pack Lunch

RECOMMENDATIONS

____

____

Page 6
Date: 05/01/86
Name:
Work#:

UAB Nutrition Sciences Dept
The Short Report-F

TOTAL DAILY AVERAGE NUTRIENT SUMMARY
COMPARISON TO SUGGESTED VALUES

NUTRIENT	SUGG VALUES	TOTAL NUTRIENT	****** % OF SUGGESTED VALUES ****** (0% : 67% : 100% : 200% : 300% :)
Energy (kcal)	2800.0	1556.8	*******
Protein (g)	56.0	73.7	**************
Carbohydrate (g)	---	179.3	
Fat (g)	---	60.8	
Saturated (g)	---	20.9	
Monounsaturated (g)	---	20.1	
Polyunsaturated (g)	---	11.1	
Cholesterol (mg)	300.0	278.4	**********
P/S Ratio	1.0	0.5	
% kilocalories			
Protein (%)	12.0	18.9	
Carbohydrate (%)	58.0	46.1	
Fat (%)	30.0	35.2	
Fiber (g)	5.0	1.4	****
Vitamins			
Fat Soluble			
A (IU)	5000.0	1360.5	****
E (IU)	15.0	3.6	***
Water Soluble			
C (mg)	60.0	44.4	********
B1 Thiamin (mg)	1.4	0.8	*******
B2 Riboflavin (mg)	1.7	1.0	*******
B6 (mg)	2.0	0.6	****
B12 (mcg)	3.0	0.3	**
Niacin (mg)	18.0	21.2	************
Folacin (mcg)	400.0	57.7	**
Minerals			
Calcium (mg)	1200.0	433.8	*****
Phosphorous (mg)	1200.0	818.7	********
Ca/P Ratio	1.0	0.5	
Iron (mg)	18.0	8.3	******
Sodium (mg)	1800.0	1999.3	*************
Potassium (mg)	3050.0	1354.0	*****
Zinc (mg)	15.0	3.1	***
Copper (mg)	2.5	1.7	********
Magnesium (mg)	400.0	61.0	**

APPENDIX F

NUTRITION INTERVENTION

DEPARTMENT OF NUTRITION SCIENCES, U.A.B.
Talladega Nutrition & Fitness Project
Intervention Phase

1986

January	February	March	April	May	June	July
Individual counseling sessions with school for blind students bi-weekly	-->					
	Send nutrition assessment to Sylacauga parents --------------->					
Monthly nutrition classes for School for Blind participating students -->						
Meet with or send nutrition assessment reports to parents		--------->		---------->	Final report sent to parents	
Meet with Jan O'Brien & Dan McCrimmon & houseparents as needed -->						
	--------------> Initial Statistical Evaluation of baseline data			---------> Re-assess Nutrition Status - Complete by May 15th (anthropometric, blood work & 3 day intake)	-----------------> Final statistical evaluation of data and report draft	

APPENDIX F.1

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A.I.D.B. FITNESS AND NUTRITION ASSESSMENT AND INTERVENTION PROJECT

Nutrition Assessment Report

NAME: ______________________ D.O.E.: ______________

B.D.: ______________________ CHART #: ______________

ADDRESS: ______________________ AGE: ______________

______________________ PHONE #: ______________

HEIGHT: _____ in. _____ cm. % standard _____

WEIGHT: _____ kg. _____ # % standard _____

TRICEPS SKINFOLD: _____ % title

ARM CIRCUMFERENCE: _____ % title

MID ARM MUSCLE CIRCUM. _____ % title

3-DAY INTAKE RESULTS

Kcalories _____ Vitamins (list those low when compared with RDA) ______________________

Pro % _____

Fat % _____ ______________________

Cho % _____ Minerals (list those low when compared with RDA) ______________________

____

Vitamin Supplement ___

Mineral Supplement ___

School Lunch ___ ___ Pack Lunch

RECOMMENDATIONS

____

____

The University of Alabama at Birmingham
Department of Nutrition Sciences

A.I.D.B. FITNESS & NUTRITION PROJECT

NUTRITION ASSESSMENT SUMMARY

Name: ______________________________

Address: ____________________________________

Birthdate: ________________ Age: ________________

	Assessment (1)	(2)
Height	________	________
Weight	________	________

Abnormal Blood Chemistry Values (H) High (L) Low

	(1)	(2)
(1)	________	________
(2)	________	________
(3)	________	________
(4)	________	________

Dietary Findings - see attached sheet

Recommendations

(1)

(2)

(3)

(4)

University Station / Birmingham, Alabama 35294

A.I.D.E. Fitness And Nutrition
Assessment and Intervention Project

Name:

Vitamin Status: Folic acid low in blood and diet

Mineral Status: Dietary calcium intake low

Other Comments: Total fat in diet high, fiber low

Component of Diet or Blood	High or Low	Recommendations
1) Calcium	Low	-Calcium is needed for strong bones and teeth. -Good sources: milk, cheese, yogurt, ice cream, dried beans and peas, dark green leafy vegetables -Include 4 servings each day from these foods.
2) Total Fat (as a percentage of calories)	High	-A high fat diet has been linked to heart disease. Therefore, it is recommended to lower fat in the diet. -Ways to reduce fat content of diet: 1. Use less fried foods. 2. Limit added fats such as butter, margarine, mayonnaise and salad dressing. 3. Use less packaged meats. 4. Use more fruits, vegetables, breads and cereals.
3) Fiber	Low	-Increasing fiber may help to regulate bowel habits and prevent some types of cancer. -Ways to increase fiber: 1. Eat more fruits and vegetables 2. Use whole grain breads and cereals.
4) Folic Acid	Low	Folic acid is needed by the body for proper development of tissues and red blood cells. Food high in folic acid include: liver, meat, green leafy vegetables, and oranges.

APPENDIX F.F

PROGRESS REPORT

NAME: ______________________________

DAY STUDENT: YES: __________ NO: __________

DATE	

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