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ABSTRACT

The booklet discusses the aerobic fitness capacities of severely/profoundly retarded students and discusses approaches for improving their fitness. An initial section describes a method for determining the student's present fitness level on the basis of computations of height, weight, blood pressure, resting pulse, and Barach Index and Crampton Blood Ptosis tests (measures of energy expended by the heart). Additional screening devices and their modifications are covered. Planning considerations are noted in terms of length and intensity of exercise. The remainder of the book presents activity ideas for improving cardiorespiratory endurance and tolerance to exercises. Suggestions are offered for walking, running for distance (including ideas for interval training), roller skating, obstacle course work, bike riding, air flow mat (a safe form of trampoline), relays, and aerobic activities for the nonambulatory. (CL)

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AEROBIC FITNESS FOR THE SEVERELY AND PROFOUNDLY MENTALLY RETARDED

Dan Bauer

IN THIS ISSUE

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ACKNOWLEDGEMENTS

Physical fitness and aerobic conditioning are quickly becoming the major emphases in physical education instruction. Concentration on sport skills in physical education classes is shifting to the philosophy of total body awareness.

In the first of two issues of Practical Pointers, Dan Bauer illustrates a conditioning program for the severely/profoundly retarded. Through his work at San Bernardino Unified School District, he was able to develop and test this program. Designed for use by teachers, administrators, and parents, this information will be a great benefit to the mentally retarded population. The American Alliance Unit on Programs for the Handicapped is pleased to take part in the dissemination of such a worthwhile program.

INTRODUCTION

Individuals who fall below the range of 35 on standard intelligence tests are labeled "severely retarded"; individuals who fall below 20 are labeled "profoundly retarded". These severely and profoundly retarded individuals vary tremendously in terms of the physical and behavioral handicaps which they manifest.

The severely retarded label covers a wide range of abilities since the term is based on measured I.Q. which decreases as the chronological age increases. Most individuals within the severely retarded range can be trained in self-help skills, simple household and maintenance tasks, and simple social, recreational, and gross motor activities. Most will need continued training and guidance throughout their lives to maintain their highest functioning level.

The profoundly retarded range includes individuals with extremely limited cognitive ability, who will require a high level of skilled care throughout their lifetime. They show limited physical development. The major teaching emphasis is on self-help skills and acceptable social behaviors. Skills gained can be lost quickly without daily use.

Some of the severely and profoundly retarded may be aggressive, some withdrawn, and others hyperactive; many are multiply handicapped. In addition, some are wheelchair bound, while others are so-called "crib cases." Most individuals within the severe and profound range of retardation will need a sheltered situation throughout their lifetime.

Because of the passage of Public Law 94-142, Education for All Handicapped Children, Act of 1975, many severely and profoundly retarded are entering physical education and recreation programs. These children have a great need for vigorous activity. In many cases the students lack of response to other phases of the organized program may be due to their great need for exercise, movement, and activity.

The purpose of this book is two-fold: to present methods of determining and measuring the aerobic fitness capacities of the severely and profoundly retarded; to detail activities and programs for building and improving aerobic fitness among these students.

AEROBIC FITNESS

There are many types of fitness, but this book will hold that the most important aspect of physical fitness is one's aerobic working capacity, the amount of energy one can release over long periods of continuous work (a reflection of the health and functional capacity of the heart and circulatory system). Running, walking, cycling, and roller skating, are typical aerobic exercises. There are many others. A good aerobic condition depends upon efficient lungs, a powerful heart, and a good vascular system. Because it reflects the conditions of these vital organs, the aerobic capacity is the best index of overall physical fitness.

In a study[1] conducted in the public schools of e than 5,000 children between the ages of 6 and 18 were examined c r period. Seventy percent of the children had some symptons of cor rt disease. Seven Percent had extremely high cholesterol levels; a lar entage had developed high blood pressure; at least 12 percent were ove t by at least 20 percent.

The same factors that contribute to the alarming physical condition of the normal children mentioned above would be even more prevalent in a similar population of severely and profoundly retarded children. These children, suffering from lack of exposure to normal play activities, limited cardiovascular endurance, poor daily living habits, physical disability, emotional problems, medication (drugs), and fear of failure are likely candidates for heart and vascular disease.

It is vital that a program of physical conditioning be designed to meet the specific needs of the individual students so they can experience physical improvement and success. It is clear that the physical fitness of severely and profoundly retarded need not be at the present low level.

WHERE TO START

You as an educator have decided that an aerobic fitness program with severely and profoundly retarded students or adults should be implemented. The first question that needs to be asked is, "Where to start?" How can the teacher motivate such persons to run or even walk sufficient distances to develop minimal aerobic fitness? How do you teach them to walk or run around a track or over an arranged course? How does the teacher obtain valid test scores on students who cannot grasp concepts of time, distance, speed, force, and number? What fitness scores or data can the teacher use to determine the students present level of fitness or to measure improvement?

The critical and first phase in starting an aerobic fitness program is a determination of the child's present level of fitness. Most cardiovascular or fitness tests are inadequate for testing the severely and profoundly retarded. As Dr. Claudine Sherill writes, "This writer has not found any objective fitness test which works with persons having IQs of 35 and under. Many of the retardates can perform some of the items commonly used in fitness tests, but their failure to comprehend instructions makes evaluation of maximal or even submaximal performance impossible."[2]

To determine the child's present level of performance at the start of the aerobic fitness program the Baseline of Fitness Data can be used. The Baseline of Fitness entails taking the following measurements in each student:

Height	Resting Pulse
Weight	Crampton Blood Ptosis Test
Blood Pressure	Barach Index

When starting a fitness program, the teacher must determine with great precision, where the students fitness levels lie. This data gives the teacher a place to start so that purposeful, progressive programming can be structured for the student. Once the teacher knows where the students have started from,

he can monitor and chart improvement and have graphic information that communicates what the students have gained as a result of the program.

What follows is an explanation of why the various baseline measurements are felt to be important:

Height

The height of each student is taken at the beginning of the program. Height, along with weight, helps to give a picture of the students body type and helps to determine the ideal weight of the student.

Weight

The weight of each student is determined before beginning the aerobic fitness program. As a starting point toward body conditioning, the first step is nearly always to get the student's weight. Body weight, especially overweight, is the most obvious indication that some sort of conditioning program would be a good idea; the extent of to which the individual is overweight determines the degree to which conditioning should be conducted.

Overweight and obesity are great problems in the United States among the mentally retarded as well as the normal population. Obesity is a medical problem because of its relation to cardiovascular and other diseases.

Overweight may be defined as any excess of 10% or more above the ideal weight for a person and obesity in any excess of 20% or more above the ideal weight.[3] There are several variables that must be taken into account in determining whether a person is overweight. Among these are: sex; height; age; general body build; bone size; muscular development; accumulations of subcutaneous fat.

One goal of the aerobic exercise program is to help the overweight and obese either lose or control their weight. The teacher should plan a program of exercise within the capacity of the student to increase energy expenditure so that the caloric intake can be balanced. When a reducing diet plus an aerobic exercise program are conducted simultaneously, the student will lose weight.

Because there are so many variables such as height, sex, body type, etc., associated with overweight, it is often impossible to determine if a person is overweight just from using a height-weight table. A student's gross weight as measured directly on the scale does not tell the whole story.

An excessive amount of fat in the body is a better criterion for diagnosis of obesity than is excess weight. In markedly overweight persons excessive fatness is obviously present. However, moderate degrees of overweight do not always indicate excess fat. For example, football linemen are usually overweight, but are generally not obese. On the other hand, some extremely sedentary persons, such as many of the mentally retarded, can be obese without being markedly overweight.

Many laboratory methods for determining lean body weight and body fat

percentage have been proposed. Virtually all of these methods are beyond the scope of teachers in physical education. However, the teacher can make a few escimated predictions of percent body fat and lean body weight. Jack Welmore and Albert Behnke have developed a number of prediction equations for lean body weight and body density using anthropometric measurements such as height, weight, diameter of certain bony areas of the body, circumference of certain body parts, and skinfold measurements.[4] The equation that can be used most feasibly by physical educators in the field to predict lean body weight in young adult males is as follows:

> Lean body weight in Kg (LBW Kg) = 44.646 + (1.0817 x body weight in Kg) minus (-) (0.7396 x abdominal circumference in centimeters)

Abdominal circumference is measured at the level of the umbillicus using a cloth tape. Percent body fat is then estimated from the following equation:

$$\text{Percent fat} = 100 - 100 \times \frac{\text{LBW}}{\text{body weight in Kg}}$$

The correlation between predictions from this equation and actual estimates of lean body weight arrived at by the underwater method is V = .938.

By knowing the male student's body weight in Kg and the abdominal circumference in centimeters the teacher can plug the two measurements into the equation and come out with an accurate percent body fat.

For a young adult female the prediction equation becomes:

> Lean body weight in Kg (LBW Kg) = 8.987 + 0.732 (weight in Kg) + 3.786 (wrist diameter in cm.) - 0.157 (maximum abdominal circumference in cm.) - 0.249 (hip circumference in cm.) + 0.434 (forearm circumference in cm.)

Percent body fat is then estimated from the following equation:

$$\text{Percent fat} = 100 - 100 \times \frac{\text{LBW}}{\text{body weight in Kg}}$$

From the standpoint of good health a male should probably have less than 20% fat in the total body weight. At the opposite extreme any male who possess an excess of 30% fat would certainly be considered obese--perhaps a medical problem. Below are normal percentages for degrees of physical fitness as established by measuring middle-aged males and adjusting the scale for women:

Table 1. Percent fat in body composition.[5]

		Men	Women
Very lean	Excellent	8-10%	8-11%
Lean	Good	12-14%	13-16%
Average	Average	16-20%	18-22%
Fat	Fair	22-24%	24-27%
Very poor	Poor	26-28%	29-32%

Any person of any age whose body composition places in the fair or poor level of the table, that is one whose proportion of fat in the body exceeds 20-30% should take warning--health hazards abound. Almost all work or exertion is difficult for this person because of excess weight, and exercise should be programmed to his/her ability to tolerate it. He or she should be examined by a physician and prescribed a diet in combination with a carefully modified program of exercise to hopefully bring the weight within at least the average range of body fat percentages in a reasonable amount of time.

By using a height-weight chart plus a percent body fat on those mentally retarded students expected of being overweight or obese, the teacher can gain a better picture of the student to determine if the student does have a true weight problem. Those students who have over 20% fat can be singled out for extra exercise and if the need warrants, medical referral.

Blood Pressure

The students normal blood pressure at least is important to know, as elevation may mean pathology, and thus exercise may be contra-indicated.

By monitoring blood pressure at the beginning of the program, the teacher can discover those students who have elevated blood pressures and who may need to be watched or restricted in exercise.

Some studies have shown that exercise may help to lower blood pressure.

Table 2. Normal blood pressure for various ages.[6]

Ages	Mean Systolic ± 2 S.D.	Mean Diastolic ± 2 S.D.
3 years	100 ± 25	67 ± 23
4 years	99 ± 20	65 ± 20
5- 6 years	94 ± 14	55 ± 9
6- 7 years	100 ± 15	56 ± 8
8- 9 years	105 ± 16	57 ± 9
9-10 years	107 ± 16	57 ± 9
10-11 years	111 ± 17	58 ± 10
11-12 years	113 ± 18	59 ± 10
12-13 years	115 ± 19	59 ± 10
13-14 years	118 ± 19	60 ± 10

Resting Pulse

The resting pulse is taken to get an idea of the student's resting heart rate. It is assumed that a low resting pulse rate is a physiological characteristic that is generally associated with a fit individual. The resting pulse rate is affected by age, body position, food intake, time of day, emotions, and physical activity. Therefore, it is generally better to take 5 or 6 different resting pulse rates, so as to get a better idea of what the student's actual rate is.

Resting pulse rates in a trained athlete may be 20 to 30 beats slower than the untrained athlete's. This indicates that the trained person empties a greater volume of blood from the heart on each beat, and this is a sign of a better and more efficient coronary condition.

The heart rate is faster at birth, decreasing progressively to old age. Some average heart rates for infants and children are outlined in the following table:

Table 3. Average heart rate of infants and children at rest.[7]

Age	Average Rate	Two Standard Deviations
Birth	140	50
1st 6 mo.	130	50
6-12 mo.	115	40
1- 2 yr.	110	40
2- 6 yr.	103	35
6-10 yr.	95	30
10-14 yr.	95	30

The average heart rate for adults is 70 beats per minute.

Through exercise it is felt that the resting heart rate of many of the students can be lowered.

Barach Index

The Barach Energy Index has been utilized for over fifty years. The test was devised to measure the amount of energy expended by the heart. The items measured are the pulse rate, the systolic blood pressure, and the diastolic blood pressure.[8]

Many non-ambulatory and wheelchair students cannot move independently from a lying to a standing position as is required in the Crampton Blood Ptosis Test. The Barach Index measurements are to be taken while the subject is sitting, therefore, this test is used for the non-ambulatory and wheelchair

students, instead of the Crampton Test. Using the Barach Index the teacher can acquire a quantitative score or index which can be used to measure progression in the aerobic fitness program for the non-ambulatory student.

The readings are taken while the subject is seated and after consistent consecutive readings have been obtained.

$$\text{ENERGY INDEX} = \frac{\text{SYSTOLIC PRESSURE} + \text{DIASTOLIC PRESSURE} \times \text{PULSE RATE}}{100}$$

Example: A student has a blood pressure reading of 140/80 and a resting pulse rate of 80. His energy index is:

$$\text{ENERGY INDEX} = \frac{(140 + 80)}{100} \times 80 = 176.0$$

Barach indicated that healthy persons could be expected to have scores of about 110 to 160. Individuals scoring over 200 were considered hypertensed. Hunsicker found the index to correlate fairly well with a measure of cardiac output, which consisted of heart stroke volume for an all-out run on a treadmill divided by body surface area.

Crampton Blood Ptosis Test

This test can be given to all those students who can move from a reclining position to a standing one. This test is given to the students before they start the aerobic exercise program and at the end of the school year. Students confined to wheel chairs or who cannot bear weight are given the Barach Index Test.

Crampton indicates that for vigorous subjects a rise of 8 to 10mm of mercury occurs when the subject stands. On the other hand, for those people in poor condition, the systolic pressure fails to rise and in fact may fall, as much as 10mm of mercury. The pulse for subjects in good condition failed to rise on standing, where as in less fit students, it increased by as much as 44 beats. By assigning equal values to the variations in pulse rate and blood pressure, Crampton constructed the data observed in Table 4 to express the vascular tone of the student in percentages.

Although research indicated that pulse rate changes are not a good indication of physical fitness when measuring those in average physical conditions with those in excellent physical conditions, they can be assumed to be reliable indications when measuring those who are extremely sedentary, as many of the severely and profoundly retarded tend to be.

The advantages of the Crampton Test for use with the severely and profoundly retarded are as follows:

1. All the student has to do to take the test is to be able to lie down and stand up. It requires no skill or hard to follow directions.

2. The test is easy and quick to give.

3. The test gives a quantitative score or factor to measure the student with at the beginning of the program. Thus, progress or regression can be charted easier.

4. The test shows which students have low values and are in need of aerobic fitness work.

TEST ADMINISTRATION

1. The subject is placed in a comfortable reclining position with a low pillow.

2. The resting pulse is recorded for one minute.

3. The systolic blood pressure is taken.

4. The subject rises and the standing pulse is taken. Care should be exercised to see that the pulse rate has returned to standing normal, that is, that the pulse rates of two 15-second counts are normal.

5. Standing blood pressure taken.

6. Scoring: The difference between lying and standing pulse and between lying and standing systolic blood pressure are figured. Table 2 is then consulted to obtain the test score.

Crampton says that most people in good health will receive a score between 60 and 100. A person with a score below 50 should be investigated further to determine cause, and a score below zero is evidence of impaired circulation, a toxic state, or severe physical disturbance.[9]

Table 4. Crampton's scoring table.

Heart Rate Increase	Systolic Blood Pressure										
	Increase						Decrease				
	10	8	6	4	2	0	-2	-4	-6	-8	-10
0-4	100	95	90	85	80	75	70	65	60	55	50
5-8	95	90	85	80	75	70	65	60	55	50	45
9-12	90	85	80	75	70	65	60	55	50	45	40
13-16	85	80	75	70	65	60	55	50	45	40	35
17-20	80	75	70	65	60	55	50	45	40	35	30
21-24	75	70	65	60	55	50	45	40	35	30	25
25-28	70	65	60	55	50	45	40	35	30	25	20
29-32	65	60	55	50	45	40	35	30	25	20	15
33-36	60	55	50	45	40	35	30	25	20	15	10
37-40	55	50	45	40	35	30	25	20	15	10	05
41-44	50	45	40	35	30	25	20	15	10	05	00

To supplement the Baseline of Fitness Data and to help measure progress in the aerobic fitness program the following variable can be charted:

A. Cardio-vascular responses to exercise or activity.

1. Aerobic exercise or conditioning can decrease the resting pulse rate. With conditioning, the resting pulse rate will decrease. By noting and charting resting pulse rates, the teacher can determine if the exercise or activity is being effective. A decrease in pulse rate, over a period of time, will indicate that conditioning is being effective.

2. Better physical condition cuts down the time required for the pulse rate to return to normal after exercise. A student whose pulse requires a long time to return to normal after exercise (recovery rate) will be assumed to be in poor physical condition. As this recovery rate improves, he may be said to be getting in better condition. By charting recovery rates 5 or 10 minutes after exercise the teacher can observe if the student is becoming better conditioned.

B. Increased tolerance to exercise.

1. If the student can cover more distance in the same amount of time, he/she is becoming more fit.

2. If it takes the student less time to cover a distance, he/she is becoming more fit. By charting distance covered or time worked, the teacher can note improvement in the running, walking, or other aerobic activities.

300-YARD AND 12-MINUTE TESTS

There are also two other screening devices or tests that can be used to evaluate the students to meet specific needs in designing the fitness program. The best time to give these tests is when the fall semester begins, or when a new child begins school. To measure progress the tests can also be given at intervals throughout the school year.

1. 300-yard test. The 300-yard times are divided into two categories: UNASSISTED 300-YARD TIMES--measures those students who could run/walk around a track or designated course independently or unaided; ASSISTED 300-YARD TIMES--measures those students who need either teacher aid or some other type of assistance such as a walker or wheelchair, or those who can only crawl.

The educator who wishes to obtain 300-yard times for the severely and profoundly mentally retarded must first teach the students to walk, run, crawl, or push their wheelchair around a designated course. This alone entails many months of drill and instruction. Thus those students who can walk or run and stay on course for 300 yards are far above those who can't in terms of present performance level.

However, by drill and perseverance the severely and profoundly retarded can learn to run, walk, crawl, or push their wheelchairs around a track or prescribed course. Once they learn this skill it is possible to time them.

By timing the students for the 300-yard distance it is hoped the educator will be able to use these times to: determine progress of each child; provide the teacher with a test to determine the present level of ability of each child.

2. Modifications of Cooper's 12-minute test. Runs of different distances, endurance ratios (proportions between times on short and long runs) have been used to show cardiovascular endurance. Some runs such as the 300-yard run are too short to be aerobic in nature; they have large unaerobic components. According to a study by Ismail, McLeod, and Fall, the 600-yard run primarily measures motor fitness and is only moderately related to physical fitness as defined by the criterion test batteries.[10]

Ribsi and Kachadnian did not obtain significant correlation between relative Max VO2 and various running times for college men until the distance reached a half-mile; thereafter, the correlations were higher as the distance became longer. Their correlations were: 60 yards, -.14; 100 yards, -.23; 220 yards, -.05; 440 yards, -.31; 080 yards, -.67; 1 mile, -.79; 2 miles, -.85.[11]

The 12-minute run/walk was proposed and popularized by Cooper as a test of cardiovascular fitness. The distance covered is recorded in miles. Correlations between the 12-minute run and relative Max VO2 have been recorded as .90 by Cooper, Doolittle, and Bigbee.[12]

Severely and profoundly retarded students can be tested using a modification of Cooper's 12-minute test. A 12-minute test is a better indication of aerobic fitness than a 300- or 600-yard test. The basic idea is to have the students walk, run, crawl, or push their wheelchairs for 12 minutes and record the distance covered in such time.

If the instructor desires heart rate measurements before and after testing, resting pulse and exercise pulse can be used to give a better indication of student fitness levels and effort put forth. According to Matthews and Fox:

> Measurement of heart rate by counting the pulse is relatively simple. This simplicity, plus the relationship of heart rate to VO2, workload and training has made it the single most often used index of circulatory function during exercise. As a physical educator you can use heart rate responses: (1) as a guide to the severity of any given exercise; (2) in assessing the effect of training; and (3) based on the results of the first two, in developing the most effective training program employing progressive overload principle.[13]

Student's sample test scores may look like this:

STUDENT	HEIGHT	WEIGHT	AGE	RESTING PULSE	EXERCISE PULSE	DISTANCE
K.S.	4'5"	68	12	96	150	1 mile
M.B. (crawling)	4'2"	69	13	80	148	1/10 mile

By keeping track of the covered distance, resting and exercise pulse rates during each student's test, a present level of performance in fitness can be obtained. Improvement in distance covered, resting, or exercise pulse rates would also indicate if the student was becoming better conditioned.

A word of caution may be expressed concerning the use of the 12-minute and other fitness tests for the mentally retarded. The tests may require exhausting efforts and impose stress on the cariovascular system. It is advisable to first condition those who will take the 12-minute test. The student should be carefully observed by the teacher during the test. The teacher should watch for signs of unusual fatigue or stress. Knowledge of the exercise capabilities of the student will be needed by the teacher who uses the 12-minute test with the mentally retarded.

HOW LONG TO EXERCISE - HOW HARD

An important consideration in planning exercise or activity periods for aerobic fitness improvement is the length of time to exercise and the intensity needed.

There is much controversy over how long a person should exercise. To illustrate two extremes, Dr. Lawrence E. Morehouse, Ph.D. suggests 10 minutes, three times a week; while Dr. Thomas Bassler, M.D., suggests 60 minutes, six times a week.[14]

Somewhere between the two above-mentioned extremes lies the optimal amount of exercise for most people. Part of the confusion stems from failing to take intensity into account when comparing these estimates.

The use of the exercise heart rate is a simple and practical method of monitoring the intensity of exercise. It is safer and better than using distance or time alone during the early phase of training. It is the intensity of exercise that has the greatest significance in fitness training. If the student is exercising at only 20% of his actual capacity there will be no training effect. On the other hand, if he exercises at 100% of his capacity he may collapse.

Dr. Cooper has published a table which may help the teacher get some idea of what intensity the student has to exercise at to achieve a training effect.

Table 5. Cooper's heart rates.[15]

		Training Effect			
Daily time requirements (minutes)	180	90	45	20	10
Heart rate (beats per minute)	110	120	130	140	150

A student with a heart rate of 110 would have to exercise for 180 minutes to achieve a training effect, but a student with a heart rate of 150 only has to exercise for 10 minutes to achieve the training effect.

The Borg Scale given below in Table 6 gives an estimate of exertion put forth according to heart rate. The educator charting heart rates can use the scale as a guide as to how much effort the student is putting out.

Table 6. Borg scale perceived exertion.[16]

Rating		Pulse
6- 7	very-very light	60-70
8- 9	very light	80-80
10-11	fairly light	100-110
12-13	somewhat light	120-130
14-15	hard	140-150
16-17	very hard	160-170
18-20	very-very hard	180-200

ORGANIZING THE AEROBIC FITNESS PROGRAM

1. Practice giving each test until speed and accuracy are obtained. Train volunteers to take heart rates, or give tests.

2. Score sheets can be prepared for each child. Distance covered, time worked, Crampton Score, and heart rates can be charted on these for future reference.

3. Plan a program using test results as a guide. It does no good to test and not use the results for purposeful planning.

4. Retest at least twice a year, more often if needed.

5. Obtaining test results progress from mentally retarded children requires time, patience, and hard work but it can be done.

ACTIVITIES FOR AEROBIC FITNESS

Although the range of activities in physical education programs for the severely and profoundly retarded is necessarily limited, the activities listed on the pages that follow will contribute to increasing cardiorespiratory endurance or increased tolerance to exercise. Many of the activities listed contribute to more than just cardiorespiratory endurance and could be used in an agility or strength-building program also. The activities offered build on basic motor skills such as walking, running, crawling, etc., and after these skills have been mastered, new activities building on these skills may be introduced.

Walking

Walking is an excellent way to increase aerobic fitness in the mentally retarded. "Three miles of brisk walking will accomplish the same thing as three miles of jogging," according to C. Carson Conrad, Executive Director of the President's Council on Physical Fitness and Sports.[17]

Walking is an excellent activity because almost everyone can do it, at almost any time and under any circumstances. According to Charles T. Kuntzleman, Senior Consultant on Physical Fitness to the executive board of the YMCA, walking can be every bit as much an aerobic exercise as more strenuous sports.[18]

Walking and running form the core of any aerobic fitness program. Walking is the mildest form of aerobic fitness activity and is usually the starting point of the program. As endurance and exercise tolerance increase, distance may be increased and the pace stepped up to a slow run or jog. Walking is an ideal fitness activity for younger children under 10 or 12 years of age as well as for obese students.

It is important to begin the walking program at each students' tolerance level and attempt to build upward from that point, using the overload principle.

The overload principle states that increases in aerobic fitness result from an increase in the intensity of work performed in a given unit of time. The instructor can progressively increase the work load in the walking program by gradually increasing the distance covered or increasing the speed of the walk.

Teaching Suggestions

1. Students just learning to walk can hold on to the end of a wagon or cart for support while walking.

2. Keep track of the distance covered or time walked by each student and gradually try to increase the distance covered or time walked.

3. Have the students walk clockwise or counter-clockwise around a marked course or track. The goal is to have the students walk around the course on their own without assistance.

4. Food rewards can be used to teach the students to walk and stay on course.

5. Structure is important. Always walk in the same direction and insist that the students stay on course.

Running for Distance

Running is an effective and easily available way of developing aerobic fitness. In this activity, as well as walking, distance and duration can be regulated to the specific fitness status of the individual student. Progression can be planned for from time to time as needed.

The running program should start at each student's present level of fitness. The endurance of each student will vary at the start of the program. If once around the track leaves the student exhausted, the distance must be shortened or the pace lessened. Eventually the amount of work the student can do without unreasonable discomfort will be determined.

Three types of running can be considered for the severely and profoundly retarded. The first is the run-walk method, which is generally employed during the early phases of running. Using this method the student can cover a selected distance by a combination of running and walking. The teacher can pull, push, or let the student run until they tire, then let them walk until they or the teacher feels it is time to run again. This method works best with the profoundly retarded who seldom run for any distance on their own. Progression is realized by having the child eliminate as much of the walking as possible while maintaining the selected distance.

Another way to use the running-walk method is to divide the selected distance to be run into specified increments of walking and running. For example, the student, to cover a quarter of a mile, could run 110 yards, walk 55 yards, run 110 yards, walk 55 yards, and run 110 yards. Using this method the teacher will have to direct the students when to run or walk.

A second method is to have the students run all the way over a set distance. Obviously, the student must have high levels of conditioning to use this method. Some of the severely retarded may be able to run distances of a half mile to a mile or more using this method. It is important to carefully watch for signs of stress and over-fatigue among the students if this method is used.

A third method is maintaining the pace but increasing the distance. Using this method the overload principle is brought into play and endurance increased.

Teaching Suggestions

1. Some of the students may have to be pushed or pulled by the teacher in order to run.

2. At the start of the program the teacher can pull or push the student. Give a food or candy reward each time the student shows signs of running or not pulling back.

3. The teacher may have to run with some students for quite some time before they run on their own.

4. Lollipops and small marshmallows make good rewards. Gradually the food rewards should lessen and the student rewarded with praise or hugs.

5. It is important to have a track or designated area for the students to run or walk on. This can be a sidewalk, gym area marked with a line or cones. The course should be in an area that will not interfere with other activities. The course should be designed so that

each circuit or lap is a convenient unit. 110 yards seems to work well with the mentally retarded. By knowing the distance around the track, the teacher can easily chart distance run or walked.

6. Anyone who wishes to start a running program with the mentally retarded will have to have abundant energy and a high level of fitness. The classroom teacher or aide can help pull or push beginning students. Volunteers from colleges or high schools can also be effectively used.

7. To add the needed structure it is best to begin the running always at the same end of the track and always have the students run in the same direction. Reward and praise those who stay on course.

8. The key to teaching the mentally retarded to run and walk in a prescribed direction is repetition and reward. Be as stubborn in insisting they run and stay on course as they may be in trying to avoid running.

9. It is important to chart how far each of the students have run/walked each running period so the distance they cover can gradually be increased and the overload principle brought into play.

10. In addition to running for distance or time the teacher can use a form of interval training with the students. Interval training was originally developed to condition long distance runners and swimmers. Interval training can be adapted to any physical activity. It is good for children with low physical fitness. The basis of interval training is to exercise for short periods of time with a rest interrest interval between bouts.

    Possible Interval Training Activities

    a. Each student runs two laps, walks a lap, and runs two more laps. Repeat as students endurance allows.

    b. Each student runs a lap, then walks a lap backwards. Repeat.

    c. Each student runs a lap, then rides a bike a lap. Repeat.

    d. Each student runs two laps, rests two minutes, then runs two more laps. Repeat.

11. Children with certain types of handicaps, such as cardiac abnormalities, diabetes, and asthma should run within stipulated medical limitations. Also, progression in running programs should be slow. The development of endurance is the result of a deep systematic capacity, which changes slowly in response to the demands put on it.

12. The same amount of running executed faithfully each day will contribute to the maintenance of whatever level of aerobic fitness already exists, but it will not improve fitness. In order to increase existing levels of fitness, the principle of overload must be applied.

13. Once the students have been taught to run or walk around a track or prescribed course, the teacher can use this skill as a lead into other aerobic fitness activities, such as interval training, bike riding, scooter pushing, relays, roller skating, etc. Thus, the learning to run and walk in a guided direction are the foundation of many of the aerobic activities.

Roller Skating

Roller skating is an excellent exercise. The major muscle groups of the body, such as the legs and arms, get an excellent workout because of the vigorous movement needed to skate. The lungs and heart also get a good workout if the skating is strenuous enough. If the skating is done vigorously, calories will be burned and circulo-respiratory endurance increased. Since roller skating may burn from 295 to 350 calories (skating vigorously), it can play an important part in weight control.[19]

Problems will arise in starting a skating program. Before any actual skating is attempted, students will need to know how to put on and remove their own skates. The children at first will require much assistance in getting their skates on and off. As time-consuming as this task may seem, it's accomplishment in the long run will provide for more time skating and more organized skating sessions.

Teaching Suggestions

1. To better organize the skating program each child can be fitted with a pair of skates (labeled with their name on a piece of masking tape).

   a. Clamp-on skates or shoe skates can be used. Clamp-on skates are relatively simple to put on. The students can master putting these on after some step-by-step practice. Shoe skates are harder to put on, but have the advantage of not coming off during skating.

2. During the early part of the skating program many students may have trouble learning to skate. Some teaching progressions may include:

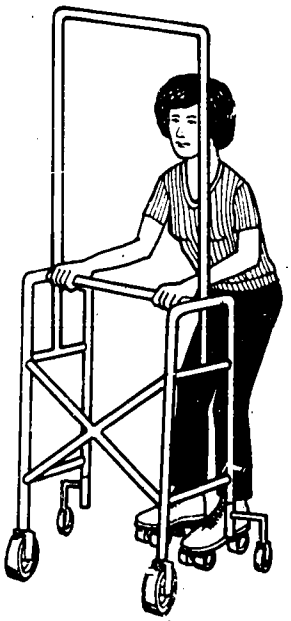
   a. At first provide a soft environment that will allow the students learning to skate to avoid falling hard. Use mats or carpeted areas while the students are learning to stand.

   b. Masking tape on the wheels will enable students with poor balance to stand and skate slowly.

   c. Start the student by teaching him to get up safely from the floor with one skate on while hanging onto a rope, chair, or stool with wheels, for assistance in balance. Practice:

      1) Shifting weight to skate and pushing with the other foot.

      2) Gliding forward on the skate, simultaneously holding the other foot off the ground.



Roller skating with the aid of a harness walker.

d. Getting up safely from the floor with two skates on while:

   1) Standing with feet 6-8 inches apart.

   2) Learning to skate using chair, skate aid, or rope for support.

e. Once the student can skate unaided they can progress to skating on the sidewalk or smooth asphalt surface.

3. Safety is an important consideration. Close supervision and forethought are essential.

4. Skating to music will appeal to the students.

5. Students can be taught to skate around a track or over a designated course so the distance skated can be measured.

6. Once the child learns to skate well in physical education class, he can practice at home, in and around the neighborhood and can also enjoy the activity at the local arena.

7. Exercise is provided through roller skating which will raise the heart rate and develop endurance. Watch for signs of over-fatigue among the students and permit those who are tired to rest.

Obstacle Course Work

One type of activity program especially effective for the mentally retarded is the obstacle course which contains equipment and materials that require a variety of movement patterns. The flexibility of the obstacle course is one of its greatest assets. The fact that the teacher can use one or more stations makes the course adaptable to almost any type of body-building the teacher may want to concentrate on.

The obstacle course can include equipment that can accommodate children with a wide range of skill and proficiency. It should also require a wide variety of motor responses and enable the students to test their motor

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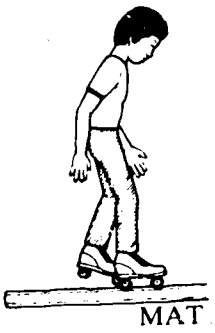

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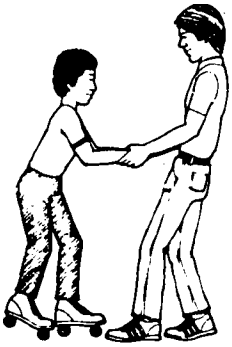

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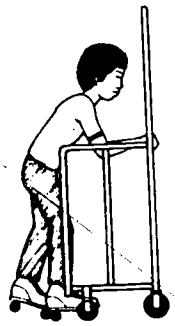

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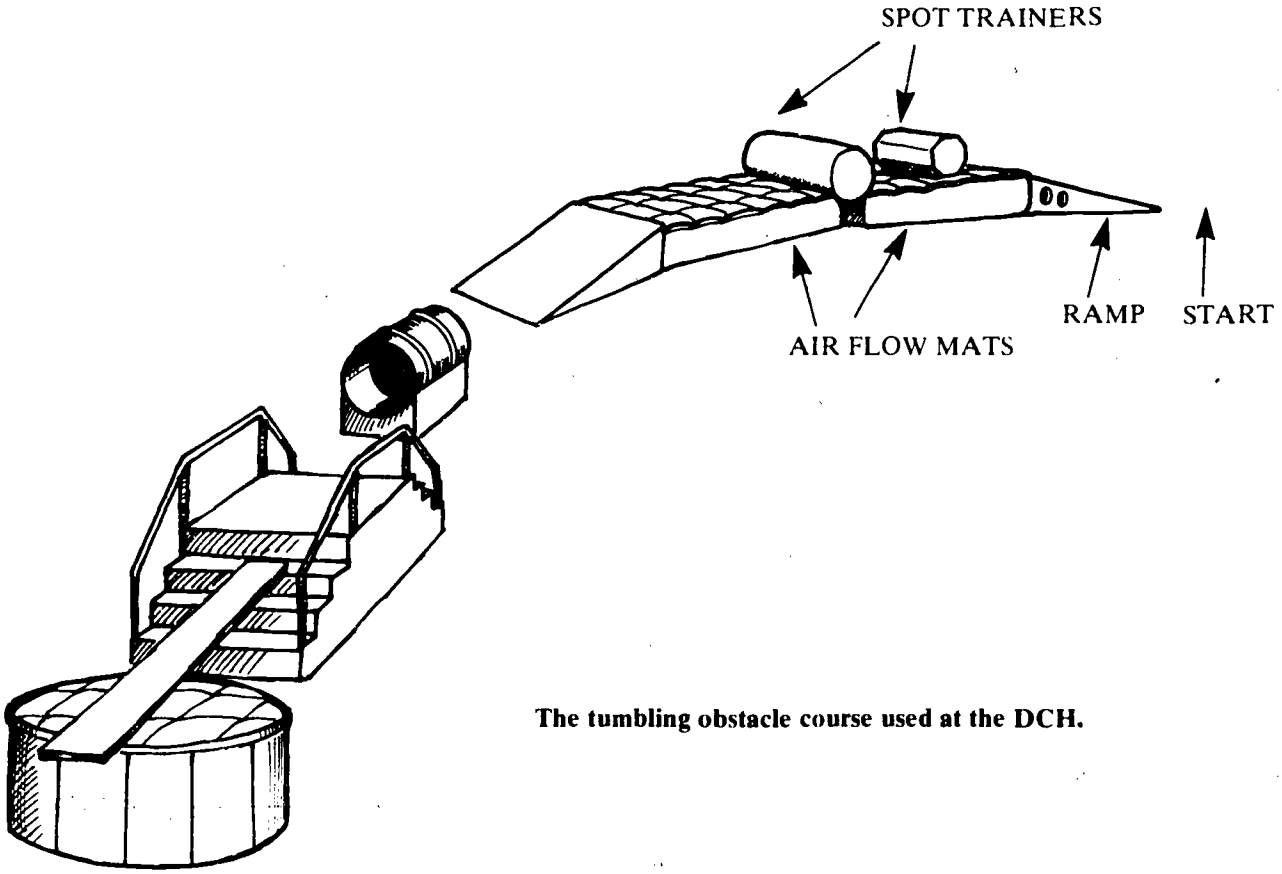
Progressions in learning to roller skate.

abilities. By having the students go through the obstacle course two, three, or many times, the teacher can build cardiovascular endurance. The teacher can also build aerobic fitness by reducing the time each student rests between tries through the course.

The obstacle course may be adjusted in simplicity or complexity to any ability level. Students of various ages and skill levels can participate together. An obstacle course can even be set up to accommodate wheelchair students. The course can be individually run, for competition against another student or against the clock, or as a team activity. If the obstacle course is big enough or has enough stations, 3-10 students may go through it at once. Thus, no students or few students are watching or waiting a turn and all students are engaged in the obstacle course activity.



The tumbling obstacle course used at the DCH.

Some equipment that can be used in constructing an obstacle course might include: barrels; tunnels; ramps; ladders; balance beams; step hurdles; ropes; mats; etc., in short, almost anything an imaginative teacher can come up with. Also sturdy equipment can easily be made by the teacher, parents, or janitor.

Another rather unique type of obstacle course that greatly benefits the profoundly and severely retarded is the tumbling obstacle course. This activity combines the skills of tumbling with the large muscle activity and fitness work needed to go through a challenging obstacle course. It also has the added benefit of being fun.

Tumbling stations, in the form of two large air flow mats, can be added on the front part of any obstacle course. These mats, manufactured by the Skill Development Equipment Company, 1340 North Jefferson Street, Anaheim, California, make the tumbling activity safer and greatly enhance learning patterns. When used with spot trainers the mentally retarded can learn to tumble on a safe, soft surface that lessens their fear of landing.

Teaching Suggestions

1. The profoundly and severely retarded may have to be pushed, pulled, or guided through the obstacle course for a length of time.

2. Candy or other rewards are useful to entice the retarded from station to station.

3. Keeping the stations close together with little room between will keep the student from crawling, running, or walking away. This also cuts down on the need for teacher supervision.

4. Watch for fatigue among the students, especially after 2 or 3 times through the course.

5. Music may help to enhance the fun and excitement of going through the course.

6. For those well-coordinated students who need a challenge, or those students who are prone to running, wearing a pair of roller skates will add a challenge and keep running away to a minimum.

7. Crawling through tunnels, barrels, or under boards is an activity that contributes to general body strength and fitness development.

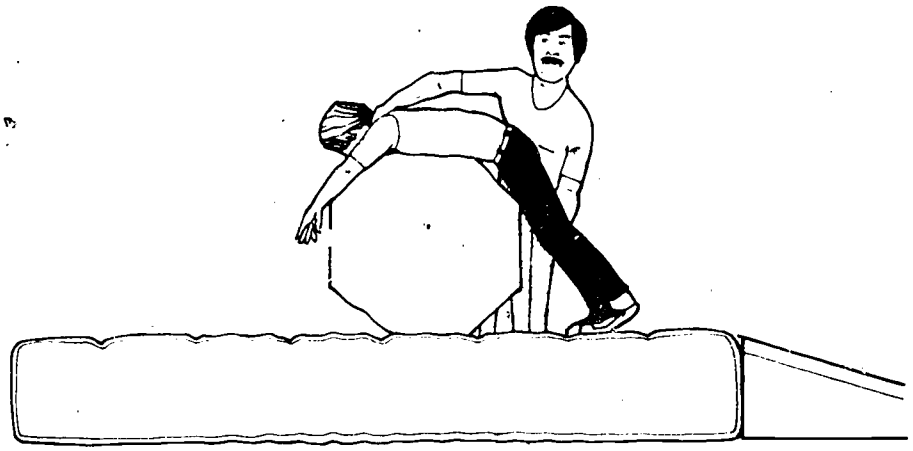
8. For wheelchair students, the obstacle course might require them to turn, go forward and backward, and do other movements which will strengthen their arms and shoulders, build fitness, and give them practice in pushing their wheelchairs in new and different situations.

9. Many of the students may be frightened by the thought of tumbling. Always assure the child you are right beside him and will not let him get hurt.

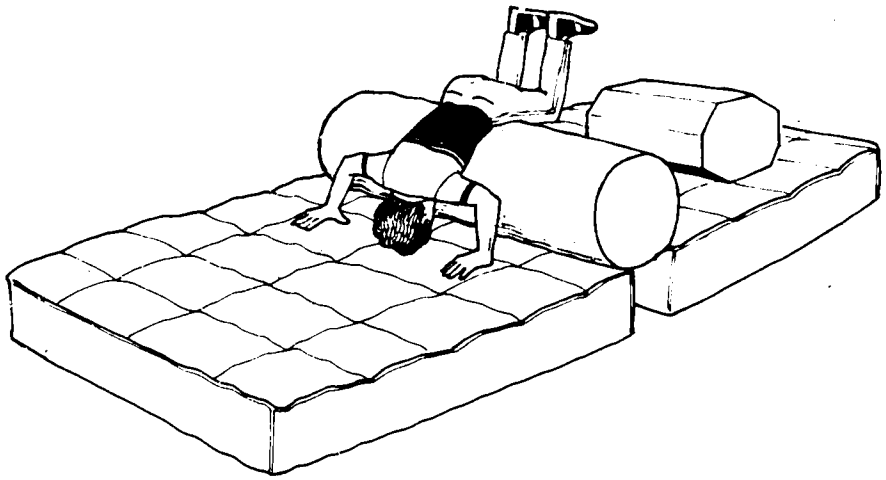
10. When first teaching the child to do the forward rolls over the spot trainer onto the air flow mat, it is best to use the kinesthetic method. That is, placing their bodies in position and repeating the following phrases over and over as they go through the rolls: arms out; head down sideways on the spot trainer.

11. Use progressions in the tumbling part of the unit. Progress from the spot trainer to an incline mat or wedge.

12. Safety is of extreme importance in the tumbling obstacle course unit. Never roll a student whose head is up. They must learn to keep their heads down or bend their head as they roll over.



Forward roll over spot trainer onto air mat.



Unassisted forward roll onto air mat.

13. The tumbling obstacle course unit can be adapted for non-ambulatory students. Some will have to be manually placed over the spot trainers.

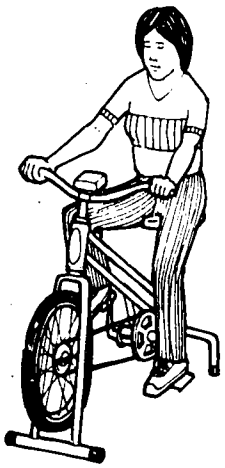
Bike Riding

Bike riding is an excellent activity for childre young adults. It has the advantages of conditioning the cardiovascular and being fun at the same time.

Another advantage is that bicycling subjects the body to little trauma. The obese, overweight, or the very unfit sometimes find that running causes some leg problems. Bike riding is not hard on the legs and is excellent for improving the strength of the leg and back muscles.

Tricycling, or bike riding, is good for the student as soon as he can support his trunk in a sitting position whether he can walk or not. There are harnesses that come with some tricycles so the child's sitting balance can be supported while riding. The child's feet may be fastened to the pedals and the tricycle pulled about. This sets the alternating pattern necessary for walking and also serves to loosen tension in the knees.

A blind student pedaling a stationary exercise bike.



Teaching Suggestions

1. Determine the suitable size bike or trike for the student, one that allows the student to reach the pedals comfortably and have a good grasp on the handle bars.

2. To entice the student to move while on the bike, the teacher may hold a reward, such as a piece of candy in front of the student. Reward anytime the student makes any effort at all to turn the pedals. Through drills and rewards the student should eventually learn to pedal the bike.

3. Use a front wheel drive trike for those students who are just starting to learn. In this type of trike, the pedals turn when the wheels are turning. This is important because the student's legs will move when the bike is pulled or pushed. The student then gets the idea of moving his legs from the trike.

4. Foot clamps that can be attached to the pedals help hold the student's feet on the pedals; thus, when the student's feet are fastened to the pedals and a front wheel drive trike is used, the student will get the feel of his legs and feet moving in the proper motion as the instructor pulls or pushes the trike.

5. Once the student has learned to pedal the trike or bike, teach them to pedal around the track or designated course in a counter-clockwise or clockwise direction so that trike and bike riding is incorporated with other track fitness activities.

6. There are many good bikes and trikes on the market. A good bike for older students is a 3-wheeler with a 24" wheel size, especially designed for adult use. It is easy to ride and almost impossible to tip over. The bike comes with regular gears or a 3-speed gear and has front caliper brakes.

Air Flow Mat Movement

This large mattress is inflated by air supplied by a power inflator housed in a fiberglass console. The mattress or mat is constructed of reinforced vinyl. The amount of air in the mattress can easily be controlled to vary its softness or firmness while maintaining equal surface pressure.

These air flow mats can have many uses in an aerobic fitness program. The mat is a safe trampoline, a place to crawl, roll, and a place to walk on changing surfaces.

Teaching Suggestions

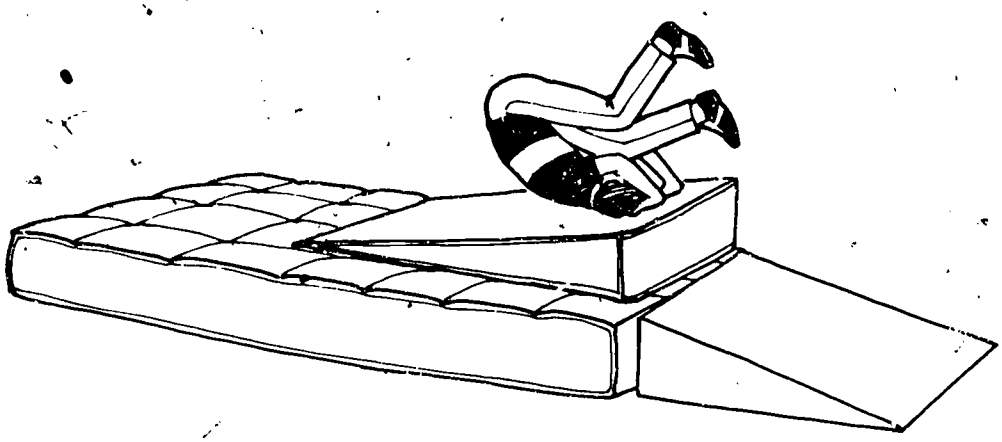
1. Permit the students time to familiarize themselves with the air mats. This can be done by having the student sit on the mat as the teacher bounces it up and down. Have the children experiment with crawling, creeping, walking, rolling, or bouncing on the mat.

2. Before the children learn to jump on the mat they should master the following skills:

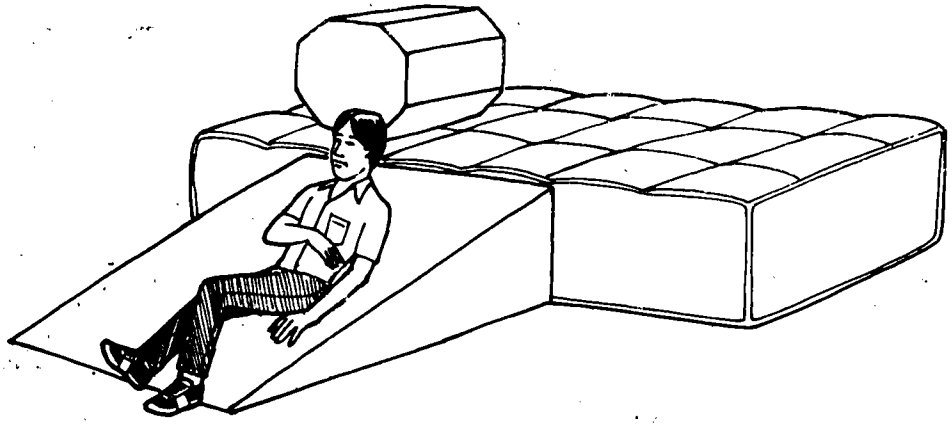
   a. Bouncing while on hands and knees.. The teacher can help by pushing the mat up and down so the student gets the up and down rhythm. The children will soon feel the rhythm and bounce on their hands and knees by themselves.

   b. Bouncing while standing. The teacher can hold the child by the waist or arms and bounce him up and down manually, until the child gets the idea of jumping on his own. With some children this may have to be repeated over and over until they get the idea of jumping.

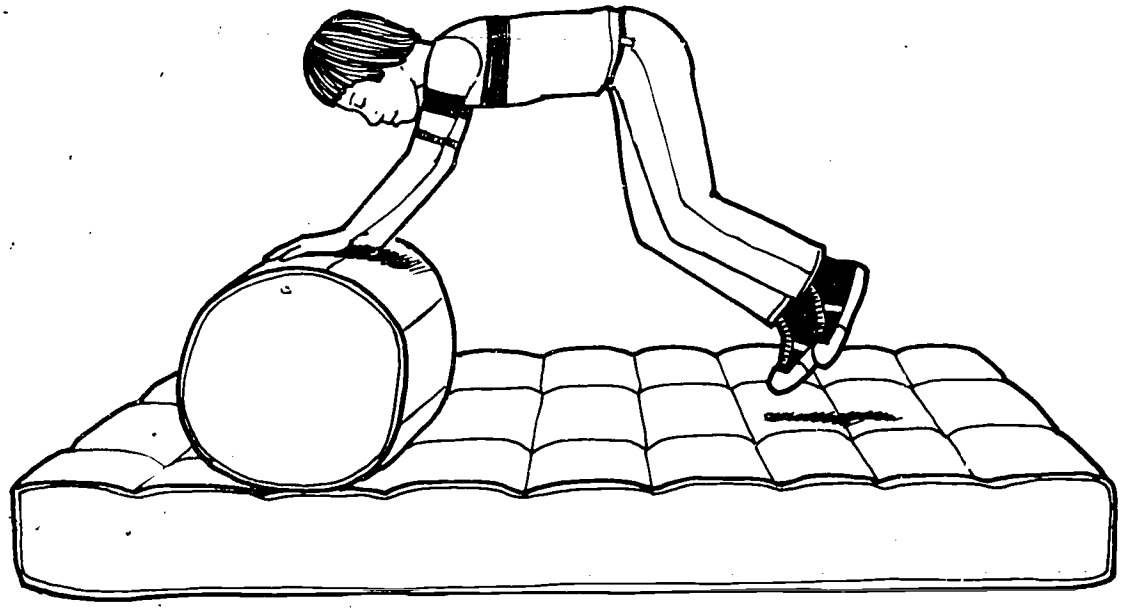
   c. Maintaining balance on the mat. The teacher can help the child reach this level by putting a spot trainer or inflated log on the mat for the child to hold onto while jumping. With practice the child at some time should be able to jump and maintain standing balance on the mat unaided.



Forward roll over a wedge onto an air flow mat.



Backing up the ramp to the spot trainer during tumbling.



Air flow mat jumping.

3. Once the child has learned to jump on the mat the teacher can use the air flow mat activities to build aerobic fitness.

   a. Jumping is not only good for balance and self-confidence, but a few minutes of jumping raises the heart rate and develops the heart, lungs, and muscles.

4. Some suggested jumping activities:

   a. Each student jumps up and down on the mat for 2 minutes or 50, 75, or 100 jumps.

   b. Each student jumps around in a circle. Occasionally have them reverse directions.

   c. Jump and land on stomach; jump and land on back. Repeat for two minutes.

   d. Jump and land on knees; jump and land on back. Repeat for two minutes.

   e. Have each student jump as high as he/she can, attempting to touch the tip of a stick or bat the teacher holds above his/her head.

5. For more activity use two air mats at once.

6. The above activities are only a suggested sequence. There can be no standard progression or sequence for the mentally retarded since the range of performance levels are so varied. Goals are to develop increased fitness through jumping, crawling, rolling, or walking on the mats and also, to develop generalized motor abilities in changing situations on the mat.

7. Have the students remove all objects from their pockets before getting on the mat.

8. Have the students remove their shoes and jump in their socks or bare feet. This will save wear and tear on the mats.

9. Safety factors and bounce control are first and foremost in the teaching sequence and may need continual reinforcement. Make sure the area around the mats is padded.

10. Make each activity period on the mat brief. Permit as much time for rest as needed. Several short turns are better than one long turn.

11. See that balance and control in jumping are achieved before permitting more advanced moves.

Relays

These activities are not really relays in the competitive sense as these children have little or no sense of competition or team concepts. The activities used can be simple ball handling, ball pushing, or scooter pushing drills, that can be used to improve strength, movement skills, and through movement, aerobic fitness.

Relays can consist of the following activities:

1. Running and jumping over a small hurdle.
2. Running or walking backwards.
3. Running to and landing on the air flow mat.
4. Kicking balls down to a barrel or wall and back.
5. Crawling to a wall or line and back.
6. Carry playground ball to a barrel, put it in and run back.
7. Push a large pushball (comes in sizes 24" in diameter to 72" in diameter) to a line or wall and back.
8. Run to a barrel, crawl through, and run back.
9. Dribble a playground ball to a wall and back.

Teaching Suggestions

1. The teacher can have two students race. Tell the winner he will get a reward, such as a small marshmallow, to encourage competition.

2. It will help to have an aide or volunteer down at the other end to turn around or send back those who stand or forget to return.

3. The teacher may have to lead some of the students by the hand the first few times until they learn what is expected of them.

4. Some students may have to be manually helped over the blocks or pieces of wood used for hurdles. Start with very low hurdles, the severely and profoundly retarded will never master the feat of jumping very high. A low balance beam makes a good starting hurdle.

5. To learn to kick the ball during the relay race, the teacher may have to manually move the student's foot onto the ball until he gets the idea.

6. For added fitness have the same student run two or three times in a row.

7. The teacher should keep the activity going; don't allow the students to sit long. Use as many balls or equipment needed as possible. Run 2, 3, or 4 students at a time if there is sufficient supervision and they are doing well in the activity.

8. At the same time watch for fatigue; allow those students who are tired to rest. The student's safety is the first concern.

Pushing a moon-buggy in a relay race.

Aerobic Activities for the Non-Ambulatory

Some of the profound and severely retarded will be inefficient in locomotion. This inability to perform fundamental locomotor functions, in some cases, has resulted in contractures of the muscles affecting the joints of the upper and lower extremities. The muscle contractures, due in some cases to a lack of activity, further impairs motor function and leads to limited sterotyped patterns of activity.

However, many of these students and children can be helped and ambulation or movement achieved with an intensive program tailored to each child's needs. To determine these needs, the student must be observed to ascertain in what ways he/she is capable of moving. A period of trial and error may be necessary before the best movement plan is formulated which will provide the child with the best opportunity to achieve better physical fitness.

Before starting a program for the non-ambulatory child the teacher should check the medical records of the student to acquire some idea of limitations and possible contraindications. The physical educator cannot assume that virtually any kind of physical activity, if vigorously engaged in, will be good for the child. Some apparently useful physical activities may lead to less than helpful outcomes with a physically handicapped child. The teacher must be aware of safety concerns and should work in concert with physical and occupational therapists who are working with the same children so that the fitness program is not counteracting helpful therapies which are being applied to the child at other parts of the day.

The non-ambulatory need physical activity in a planned progressive program to help their basic movement skills and to develop at least minimal levels of fitness. In such a program, the first consideration of the educator should be the safety of the child, yet at the same time normal risk-taking is also essential to the development of all children including the non-ambulatory. These children must not be over-protected to the extent that they are prevented from exercising their gross skeletal muscles and practicing new motor or ambulation skills. In addition, no child can learn about the relationship of his/her body to other objects in the environment or acquire the basic self-proctective skills without receiving a few minor bumps or bruises.

Through a planned, progressive program of vigorous activities the fitness levels of the students can be increased and body mechanics improved. In addition, the student can become more skilled in the use of previously unused portions of the body and in the use of walkers or wheelchairs.

Often the physical educator, new to working with the non-ambulatory, will be at a loss as to how to get the students to move. Increased fitness can only come through movement, preferably at a sustained rate for a good period of time. It is important for the teacher to make full use of the many aides that are available, many of which are designed to assist the handicapped child to move around as independently as possible.

Movement Activities and Teaching Suggestions

1. Scooter board movement. The scooter board is a flat board to which four caster wheels are attached for easy movement. Either a sitting, supine, or prone lying position may be taken on the scooter board; movement is created by pushing with the arms and legs. Commercial scooter boards are usually 14 by 18 inches in size, but longer ones can be purchased or made at home or in school.

   Scooter boards, especially those of longer length, are excellent means of providing mobility to the non-ambulatory student. Use of the board greatly extends the opportunities for participation in

physical education activities for those students with disabilities of the lower parts of the body.

a. Rewards or toys may entice the lazy student to move.

b. The teacher may have to manually move the limbs through the desired movement pattern needed to move the board.

c. May need a one-to-one pupil-teacher ratio to keep the student moving in the desired direction.

2. Roller walker. Using this device the student just learning how to walk, or needing some hand and arm support, can move forward or on a direct course. The teacher can pull with a rope to help the student learn to move with the walker.

3. Tricycles. Tricycles provide an opportunity for exercise among the non-ambulatory as well as opportunity for fun.

a. A good place to start for younger non-ambulatory children is a small wooden or metal tricycle without pedals. The child has to move the legs to push himself/herself around.

b. Bikes can be purchased with hand drive; these can be used by students who cannot push or pedal with their legs.

c. A Whiz-Wheel, a sitting platform with large wheels, can be used by the non-ambulatory also. The student sits and pushes the wheels with his hands, thus moving the device forward or backward. Builds fitness as well as shoulder, arm strength.

4. Full body suspension walker. This device consists of an overhead frame with suspension straps that holds the student in a standing position while freeing him/her to walk. Handles on the side provide a good grasping surface.

a. A one-to-one ratio of teacher to pupil is needed when using this piece of equipment.

b. The physiological benefits of standing and walking are so great that this piece of equipment is extremely useful. According to Astrand,

> It appears that man, through evolution, has become adjusted to his upright, two-legged, gravity-stressed existence, and ambulatory activity is necessary to maintain normal functions.[20]

5. Wheelchair pushing. The wheelchair provides a means of movement to those who are so severely immobilized by their condition that they cannot stand or walk with the aid of ambulatory devices.

Wheelchair bound mentally retarded students can be taught to push

their wheelchairs around a hard surface track on a designated course, or through an obstacle course.

a. While the ambulatory students run or walk around the track during the activity period, those students in wheelchairs can push their chairs around the track.

b. Wheelchair pushing helps to build fitness and attending skills, and gives the student practice in pushing the chair, which has carry-over value for daily living skills.

c. To increase the difficulty and to bring the overload principal, weights can be added to the chair.

6. Log rolling. At times this may be the only way a severely handicapped child can move.

a. Log rolling can be done across:

1) Air Flow Mats-these have give and make it easier for the child to roll.

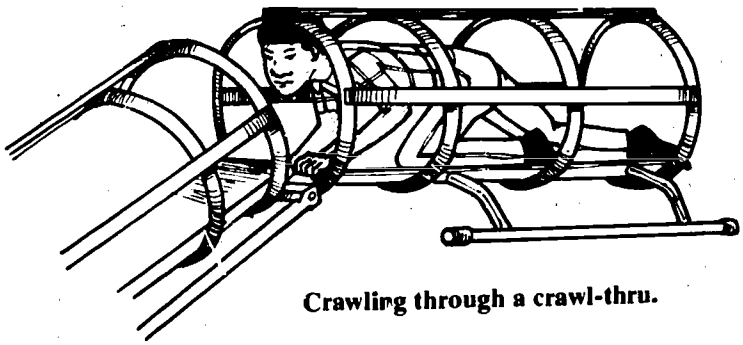
2) Up and Down Ramps and Wedges--a reward may be placed at the top to motivate the student to move. Must make sure the incline isn't too steep. This is a good way to overload a student who can roll with ease across a flat surface.

3) Across Floor Mats

b. Measure the distance rolled, or the number of times the distance was covered. Record this and try to increase either gradually.

c. Rolling also promotes motor coordination, head control, directionality, and body image.

7. Crawling-creeping. The terms crawling and creeping are sometimes used interchangeably but there is a difference between the two. Crawling is primarily an arm action which pulls the body along while the stomach and legs drag along behind. Creeping is primarily a movement pattern in which weight is distributed equally to the hands and knees and movement occurs with a cross-lateral pattern.



Crawling through a crawl-thru.

a. Crawling-creeping is excellent for building aerobic fitness as well as shoulder and arm strength.

b. Scooter board activities can be used as a lead up to creeping.

c. A shoulder and trunk harness attached to a suspension walker can help hold up the student who is learning to crawl or creep.

d. The principle of overload can be brought into play by having the student creep up a ramp, or over a wedge or obstacle placed on the mat or floor.

e. Students can be taught to crawl around a circuit, track, or designated course so the distance they cover can be measured.

EVALUATION

Variables that can be used to chart improvement in aerobic fitness among the non-ambulatory can include:

1. Increase in the distance covered.
2. Less time needed to cover the distance.
3. Lower resting heart rate.
4. Faster recovery heart rate, 3, 5, or 10 minutes after exercise.
5. Improvement in the Barach Index Score.

By charting daily or weekly, resting and recovery heart rates, along with distance covered, or time worked, the teacher can measure and record progression and regression. Giving the Barach Index at the beginning of the program or school year and at intervals during the year helps to quantitatively measure the student's progress.

A FINAL THOUGHT

Many of the severely and profoundly retarded non-ambulatory students will have low or minimal levels of aerobic fitness. Many of these students have not been engaged in any kind of fitness program at any time during their lives. Movement and exertion for any length of time may be foreign to these students.

Teachers who work with these non-ambulatory children must realize the importance that fitness can play in their lives. The life spans (as well as the quality of life) of many of these students are substantially reduced by cardiovascular and/or cardiorespiratory problems. Claudine Sherill in her excellent book on adapted physical education writes,

> It is disconcerting that fitness is so poorly understood that 140 teachers and administrators recently ranked fitness as

the least important competency area for teachers of the severely mentally retarded.[21]

Inactivity is completely unnatural to the human body. With inactivity comes overweight, high blood pressure, and high heart rate. With inactivity any kind of fitness becomes impossible. Many of the non-ambulatory severely and profoundly retarded have remained inactive much too long. Through vigorous movement these students can gain the degree of fitness that will enable them to enjoy health and a better life.

GAINS IN FITNESS RECORDED BY SEVERELY & PROFOUNDLY RETARDED STUDENTS (1)
1978-1981

STUDENT INITIALS	AGE	LEVEL OF RETARDATION	1978 LEVEL OF (2) PERFORMANCE	1979 300-YARD RUN( ) 1. Time	1980 12-MINUTE TEST (3) 1. Resting Pulse 2. Exercise Pulse 3. Distance in miles	1981 1.5-MILE TEST (4) 1. Resting Pulse 2. Exercise Pulse 3. Time
P.M.	21	Severely Retarded	Would run 440yd. unaided around 110 yd. track	1:45	1. 76 B.P.M. 2. 162 B.P.M. 3. 1.14 miles	1. 88 B.P.M. 2. 125 B.P.M. 3. 18 min.
D.F.	21	Severely Retarded	Would walk one lap unaided 110 yd. track	2:10	1. 124 B.P.M. 2. 192 B.P.M. 3. 1.33 miles	
B.L.	15	Severely Retarded	Would run 60ft. unaided around 110 yd. track	1:23	1. 76 B.P.M. 2. 132 B.P.M. 3. 1.04 miles	1. 95 B.P.M. 2. 150 B.P.M. 3. 17:15 min.
B.P.	21	Severely Retarded	Would run 220yd. unaided around 110 yd. track	1:16	1. 90 B.P.M. 2. 174 B.P.M. 3. 1.04 miles	1. 68 B.P.M. 2. 144 B.P.M. 3. 18:10 min.
P.M.	21	Severely Retarded	Would run 220yd unaided around 110 yd. track	1:52	1. 80 B.P.M. 2. 138 B.P.M. 3. .8 mile	1. 70 B.P.M. 2. 105 B.P.M. 3. 20:00 min.
T.B.	16	Profoundly Retarded	Would not run or walk in guided direction unaided	2:30	1. 76 B.P.M. 2. 108 B.P.M. 3. .66 mile	1. 84 B.P.M. 2. 128 B.P.M. 3. 34:00 min.
K.S.	15	Severely Retarded	Would push her wheelchair 110 yd. unaided around 110 yd. track	5:16 (wheelchair push)	1. 84 B.P.M. 2. 138 B.P.M. 3. .33 miles (wheelchair push)	

GAINS IN FITNESS RECORDED BY SEVERELY & PROFOUNDLY RETARDED STUDENTS (1)
1978-1981

STUDENT INITIALS	AGE	LEVEL OF RETARDATION	1978 LEVEL OF (2) PERFORMANCE	1979 300-YARD RUN( ) 1. Time	1980 12-MINUTE TEST (3) 1. Resting Pulse 2. Exercise Pulse 3. Distance in miles	1981 1.5-MILE TEST (4) 1. Resting Pulse 2. Exercise Pulse 3. Time
C.B.	20	Profoundly Retarded	Would not run or walk in desired direction unaided	2:50	1. 78 B.P.M. 2. 108 B.P.M. 3. .61 mile	1. 62 B.P.M. 2. 80 B.P.M. 3. 32:25 min.
D.R.	20	Profoundly Retarded	Would not run or walk in desired direction unaided	3:07	1. 86 B.P.M. 2. 114 B.P.M. 3. .52 mile	
M.B.	14	Profoundly Retarded	Would crawl 20ft. in desired direction around 110 yd. track	12:07 (crawling)	1. 80 B.P.M. 2. 148 B.P.M. 3. 1/10 mile (crawling)	
C.C.	13	Profoundly Retarded	Walks in suspension walker. Did not have this skill in 1978	6:35	1. 104 B.P.M. 2. 156 B.P.M. 3. 1/3 mile	
K.S.	11	Profoundly Retarded	Would not run or walk in desired direction unaided	2:13	1. 100 B.P.M. 2. 156 B.P.M. 3. .57 mile	
K.C.	9	Profoundly Retarded	Would not run or walk in desired direction unaided	5:05	1. 122 B.P.M. 2. 156 B.P.M. 3. 2/3 mile	

GAINS IN FITNESS RECORDED BY SEVERELY & PROFOUNDLY RETARDED STUDENTS (1)
1978-1981

STUDENT INITIALS	AGE	LEVEL OF RETARDATION	1978 LEVEL OF (2) PERFORMANCE	1979 300-YARD RUN ( ) 1. Time	1980 12-MINUTE TEST (3) 1. Resting Pulse 2. Exercise Pulse 3. Distance in miles	1981 1.5-MILE TEST (4) 1. Resting Pulse 2. Exercise Pulse 3. Time
E.G.	21	Severely Retarded	Would run 220yd. unaided around 110 yd.track	1:51	1. 90 B.P.M. 2. 144 B.P.M. 3. 1.0 mile	
E.F.	10	Severely Retarded	Would not run or walk in desired direction unaided	2:35	1. 92 B.P.M. 2. 186 B.P.M. 3. .75 mile	
T.L.	5	Severely Retarded	Would not run or walk in desired direction unaided	4:05	1. 108 B.P.M. 2. 156 B.P.M. 3. .4 mile	
K.S.	10	Profoundly Retarded	Would not run or walk in desired direction unaided	2:40	1. 96 B.P.M. 2. 150 B.P.M. 3. 1.0 mile	

1. Students at Yvonne Harmon Developmental Center for Handicapped, San Bernardino, California.

2. One of the goals of the aerobic fitness program was to teach the students to walk, crawl, push their wheelchairs, or run/walk around the 110-yard track unaided. Unaided means walking, running, etc., when told to and staying on course without a one-to-one student-teacher ratio. Once the students have learned this skill one or two teachers can monitor many students and the one-to-one ratio is no longer needed. Thus, parents and care providers can monitor their children in a fitness program without having to push or pull the children.

3. The heart rate information is provided because it gives some indication of the effort put forth by the student. There is no other way to tell how much effort these students are putting forth. Also, the heart rate information helps to measure progress.

4. Not all of the students have yet required the endurance needed to run or walk 1.5 miles in one activity session.

SAMPLE AEROBIC FITNESS SCORE CARD

NAME_____ DATE_____

COUNTRAINDICATIONS TO EXERCISE_____

_____

AGE_____ HEIGHT_____

BLOOD PRESSURE_____ WEIGHT_____

RESTING PULSE_____ % BODY FAT_____

CRAMPTON TEST SCORE_____ BARACH TEST SCORE_____

300-YARD TIME: 12 MIN. TEST DISTANCE_____

Assisted_____ 1. Resting Pulse_____

Unassisted_____ 2. Exercise Pulse_____

3. Recovery Rate_____

FOOTNOTES

[1]Glass, Walter. "Coronary Heart Disease Sessions Prove Vitally Interesting." CAHPER Journal, May/June 1973, p.7.

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[3]Arnheim, Daniel D.; Auxter, David; and Crowe, Walter C. Adapted Physical Education and Recreation. St. Louis, MO: C. V. Mosby Company, 1977, p. 156.

[4]Wilmore, Jack H., and Behnke, Albert R. "An Anthropometric Estimation of Body Density and Lean Body Weight in Young Men." Journal of Applied Physiology 27, July 1969, pp. 25-31.

[5]Myers, Clayton R. The Official YMCA Physical Fitness Handbook. New York: Popular Library, 1975, p. 58.

[6]Haggerty, R. J.; Maroney, M. W.; and Nadas, A. S. "Essential Hypertension in Infancy and Childhood." A.M.A.J. Dis. Child 92:536.

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[8]Matthews, Donald K. Measurement in Physical Education. Philadelphia, PA: W. B. Saunders Company, 1973, p. 238.

[9]Ibid., pp. 241, 242.

[10]Kirkendall, D.; Gruber, J.; and Johnson R. Measurement and Evaluation for Physical Educators. Dubuque, IA: Wm. C. Brown Company, 1980, p. 293.

[11]Clarke, H. Harrison; Clarke, David H. Developmental and Adapted Physical Education, 2d ed. Englewood Cliffs, NJ: Prentice-Hall Inc., p. 98.

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[13]Matthews, D. and Fox, E. The Physiological Basis of Physical Education and Athletics. Philadelphia, PA: W. B. Saunders Company, 1976, p. 211.

[14]Kuntzleman, Charles T. Rating the Exercises. New York: Penguin Books, 1980, p. 56.

[15]Cooper, Kenneth H., M.D. The New Aerobics. New York: Bantam Books, 1970, p. 155.

[16]Sheehan, George, M.D. Dr. Sheehan On Running. Mt. View, CA: World Publications, 1975, p. 128.

[17]Carson, C. "Lets Go Walking!" Modern Maturity. Washington, DC: American Association of Retired Persons, 1980, p. 26.

[18]Kuntzleman, Charles T. Ibid., p. 74

[19]Zehman, Lenore R., M.D.; Kattus, Albert, A., M.D.; and Softness, Donald G. The Cardiologist, Guide to Fitness and Health Through Exercise. New York: Simon and Schuster, 1979, p. 170.

[20]Astrand, Per-Olaf, M.D., and Rodahl, Kaare, M.D. Textbook for Work Physiology. New York: McGraw-Hill, 1970, p. 419.

[21]Sherrill, Claudine, Ibid., p. 168.

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