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INTRODUCTION TO AEROBIC WALKING: A MANUAL FOR STUDENTS

Middle Tennessee State University

D.A. 1985

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INTRODUCTION TO AEROBIC WALKING:

A MANUAL FOR STUDENTS

Bill Dalton Bandy

A dissertation presented to the
Graduate Faculty of Middle Tennessee State University
in partial fulfillment of the requirement
for the degree Doctor of Arts

May, 1985

INTRODUCTION TO AEROBIC WALKING:
A MANUAL FOR STUDENTS

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Abstract

INTRODUCTION TO AEROBIC WALKING:

A MANUAL FOR STUDENTS

by Bill Dalton Bandy

With an increased interest in aerobic sports in the United States, people are looking for sports that are enjoyable, fun, free from injuries, and offer some degree of health benefits. Walking presents itself as one of top activities that fits these criteria. Walking is already the number one exercise activity for Americans, and additional people take up the sport of walking each year. With an older population returning to college and with young students seeking less physically taxing sports, colleges are beginning to offer courses in aerobic walking. The current books on walking are not designed or organized to give the beginning walker the basic knowledge of the sport. No book or manual exists specifically for the teaching of walking in college. The purpose of this study was to construct and develop a student instructional manual that would give the beginning walker the knowledge and techniques to develop a program of aerobic walking. The manual is presented in 14 chapters, a glossary, suggested walking course outline, references, and

Bill Dalton Bandy

appendix. The 14 chapters of the student text cover: walking history, questions and answers on walking, stretching routines, walking shoe selection, techniques of walking and training, biomechanics of walking, walking attire and aids, physiological and psychological values of walking, walking injuries, nutrition guidelines, racewalking, and walking program motivation. The course outline contains an instructor's manual and other walking-related aids to help the student get involved in a sound walking program.

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Preface

The aerobic exercise "craze" that began in the 1970's continues to grow in the United States. The "big four" aerobic activities continue to be walking, cycling, swimming, and running. In 1973 the President's Council on Physical Fitness and Sports reported on the results of its survey to determine the exercise preferences of Americans. The results showed that, of the people who exercised regularly, 43.6 million walked, 18.5 million cycled, 14.2 million swam, and 6.5 million jogged (Conrad, 1973). The participation in these four sports has increased substantially since then. However, walking is still the number one exercise activity by a three to one margin over any other activity (Sleight, 1982).

The nation's population is living longer and getting older. More people are retiring at earlier ages and many people are returning to college at an older age. With this emerging trend of an older college population, it seems likely that walking, the most popular form of physical exercise, will become even more popular. Many of these older students will have been sedentary for several years and may be somewhat reluctant to participate in competitive or high intensity sports. However, they are more likely to

participate in a lower intensity sport such as walking. Students of all ages are selecting walking as their sport because it is an inexpensive activity, it is virtually injury-free, and it can be done any place at any time without the need of special equipment. With this increased number of walkers comes the urgent need to educate them.

Everyone knows how to walk, but most do not possess the background information and techniques necessary to design a scientific walking program. In adjusting and responding to student needs, colleges will be offering physical education activity courses in walking. Physical education instructors will require good texts and manuals to assist them in teaching the sport of walking.

Books presently available on the subject of walking are not designed and organized to give the beginning walker the basic information appropriate for a semester college activity course. No book or manual currently published is written for exclusive use in the teaching of walking as a college course. The purpose of this study has been to prepare an instructional manual based on the literature related to all forms of walking. This manual is designed to give the beginning walker the pertinent knowledge and expertise to engage safely in the sport of aerobic walking. A basic instructor's supplement accompanies the manual and

contains aids and resource materials to assist the college instructor in teaching a basic aerobic walking class.

INTRODUCTION TO AEROBIC WALKING
A MANUAL FOR STUDENTS

Chapter I

Introduction

During the agrarian times of the late 1800's and the early 1900's, the very task of making a living was exercise enough for people. A strong body with plenty of endurance was a must. The farm and home chores would take 12 to 16 hours a day.

America was founded on hard physical work in the agricultural areas. In 1820 70% of the population was employed on the farm. By 1900 the figure had dropped to 40%, and in 1984 the percentage of people working on farms was about 3% (Pleas, 1982).

The industrial revolution and modern technology combined to eliminate most of the physical labor from jobs and homes. Jobs now require shuffling of papers instead of hauling hay, dialing of phones instead of feeding cattle, and sitting at computer terminals instead of plowing fields. Homes are now stocked with "labor-saving" gadgets to make life "easier."

This lack of physical activity, along with poor eating and health habits, have produced an unfit nation. People are drawn to the television set and watch it for hours as the sedentary life style causes their bodies to deteriorate.

Cureton (1974) states that "middle age for the average person begins at twenty six years, because he or she has the capacity that our ancestors had at the age of forty" (p. 112).

Donaldson (1979) states, "Our stomachs sag, our hearts ache (and often stop), our muscles wither, and we grow old before our time" (p. 15).

Allsen, Harrison, and Vance (1984) state:

The gravity of America's physical fitness problem can be gauged by the following facts and figures:

1. Approximately 55 percent of the deaths in the U.S. result from cardiovascular diseases, many of which are associated with obesity and inactivity.
2. Obesity is a major health problem. If all deaths related to obesity could be eliminated, the life span of men would increase seven years.
3. The common backache is usually a result of physical degeneration. The National Safety Council estimates that back problems cost American industry \$2 billion annually in lost goods and services and another \$225 million in worker's compensation.
4. One of every six children in the U.S. is so weak, uncoordinated, or generally inept that he or she is classified as physically underdeveloped by the P.C.P.F.S. Such a child is more likely to become

a sedentary fat adult with all the added health results of poor physical fitness. (p. 4)

James Michener, the famous author and avid exerciser, remarks: "A man or woman who drops out of recreation after an active youth is committing slow suicide" (Michener, 1976, p. 90). Mr. Michener's claim is supported by a study of 7,000 residents of Alameda County, California, performed by the California Health Department's Human Population Library. The study involved collecting the health habits of those individuals and checking their longevity. Among the men involved in the study, those who exercised regularly had one-half the mortality rate of those who only exercised occasionally (Conrad, 1976).

Overall the study indicated that men can add eleven years to their lives and women seven by following seven simple rules of clean living. The Rules:

1. Get the right amount of sleep (Eight hours a night for women, seven hours for men).
2. Eat a good breakfast each day.
3. Avoid snacks and eat three meals a day at regular times.
4. Exercise regularly (preferably by sports participation).
5. Control your weight.
6. Drink alcohol moderately.
7. Don't smoke cigarettes. (Conrad, 1976, p. 2)

This study indicates that lives are being shortened if people do not exercise and observe good health habits. Regular exercise such as walking could directly influence four of the other six rules of clean living. Most people sleep very well as a result of daily walking, and the percent of body fat of walkers also decreases. Walkers are not as likely to smoke or drink. Walking on a regular basis can add "life to your years," and "years to your life" (Conrad, 1976, p. 2).

However, the very modern technology that took away exercise has given back the leisure time to pursue exercise activity. The President's Council on Physical Fitness and Sports determined in a survey that 45% of Americans do no physical activity at all, but 55% do claim to exercise for a short period of time. Just how many of the 55% are exercising aerobically is not known (Bucher, 1974).

It does appear that the number of people exercising is increasing. Sporting goods sales are up, along with record participation in aerobic dance classes, health spas, running races, cycling races, and other forms of exercise. The warm-up suit, running shoes, and athletic attire are as common in today's society as the business suit. A real fitness revolution appears to be developing.

Walking seems to be in the "running" as a viable part of this exercise boom. With this American fitness explosion still growing, a physically-conscious nation is looking for

new sports to give it fitness. People are searching for activities to engage in that are not so physically taxing as to make them unenjoyable, but rather will provide adequate health benefits while also being fun. An activity often overlooked by the media, but nevertheless having widespread participation, is the simple act of walking. Donaldson (1979) states, "We look everywhere for gimmicks, gadgets, and new sports to keep us fit, but the oldest, easiest, and most natural way to well-being has been overlooked. It lies at our feet in the lost art of walking" (p. 12).

Sheehan (1978) believes that "only about ten to fifteen percent of the population are naturally built for running, but we all are born to walk" (p. 14). All people are walkers, with an average person covering over 70,000 miles during a lifetime in the completion of daily activities (Murphy, 1980). Approximately half of the American adults over 18 claim they exercise regularly, and 36 million walk for exercise each day, while another 16 million do so two or three times a week. These facts make walking a more popular activity than jogging and running (Walking for Exercise and Pleasure, 1982).

Many runners who suffer injuries such as stress fractures, strained muscles, and tendonitis are looking elsewhere to achieve cardiorespiratory fitness. Many are finding the sport of walking a viable alternative. Walking

is a relatively injury-free sport because of less stress on the knees, ankles, and hips.

Walking is a sport that will lend itself to all ages, because it can be done at any time, at any place, into very old age. Americans are retiring at earlier ages, usually in their mid-50's and early 60's. Many of this population find it difficult suddenly to begin participation in strenuous sports like running, but they are able and willing to engage in a moderately strenuous sport such as walking. To make walking even more attractive, one does not need any equipment except a good pair of shoes.

Walking has developed into a sport all its own. Walking attracts all segments of our society, including the younger non-athletic types. Many walkers are jogging drop-outs who found that running produced too many injuries and too much pain. Dr. Robert Sleight (1981), President of the Walking Association, states, "Brisk walking, say four miles per hour, will give the same benefits as running, but without the inherent problems of jogging" (p. 64).

Kuntzleman (1980) rates sports according to their impact on cardiovascular fitness. He gives a four-star rating to the activities that are the best and one star to the activities that are the poorest at developing aerobic fitness. Walking at 4½ m.p.h. received a four-star rating, along with cycling at 11 m.p.h., jogging-running, swimming, and cross-country skiing. Walking at 3½ m.p.h. got a

two-star rating, along with badminton, tennis doubles, and water skiing.

This information reveals the high status of brisk walking as an aerobic, endurance-producing activity. de Vries (1980) further gives credence to the sport of walking by stating, "Among the exercise modalities commonly used, jogging, walking, swimming, and cycling, there is little difference in training effect if equal levels of total work are used" (p. 301).

Dr. John Pleas, author of the book Walking Is . . . and former director of the Vanderbilt Weight Management Center, is a good example of what walking can do to a person's life style. Dr. Pleas began walking five years ago and has lost 35 pounds. He liked walking so much that he sold his car and walks everywhere he goes, averaging about one pair of shoes per month. He is the prime exponent of walking in Nashville, Tennessee, lecturing to various groups and setting the example by walking 60 to 80 miles a week. On Thanksgiving Day in 1982, Dr. Pleas walked 100 miles in 24 hours through the city of Nashville to celebrate his birthday. Pleas stated, "It's fun for me. I wasn't out to set a Nashville, Tennessee, speed record. I wanted people to walk with me" (Hea, 1981, p. B-10).

Dr. Pleas' philosophy is that people need activity to combat their sedentary life styles. He urges everyone to walk, not run, stating, "From my personal point of view,

walking is better than running. Jogging does nothing for my head. I have attained a walker's high" (Hea, 1981, p. B-10).

Walking appears to be a sport that can give its participants fun and quality aerobic exercise as well as providing a means of toning the muscles and keeping off excess body fat. Walking can also provide lasting psychological and social benefits.

Chapter II

History of Walking

Introduction

Humans begin walking around the age of 9 to 12 months and continue to refine the skill up to the ages of 7 to 10. The basic locomotive skill of man is taken for granted and is used today as a means of transporting the body only short distances in the home or office. Americans ride to work, ride elevators, sit behind desks, ride home, and sit more in front of cable television. Walking any distance has almost disappeared from the American way of life. But it was not always that way.

Early human walking. When the species Homo sapiens first appeared in the evolutionary cycle and assumed an upright posture, walking became a vital skill. Donaldson (1979) states, "Man is the only mammal that habitually walks upright" (p. 10). Sussman (1980) states, "Other animals creep, and climb, swing, fly, hop, leap, bound, gallop and most all run, but man is a walker. He may run to catch his quarry or escape his enemy, but to go from one place to another he walks" (p. 30).

This bi-pedal movement of man freed his hands to hold clubs and rocks that permitted him to kill animals and gain

easier access to food. The best walkers were usually the best hunters. The faster and longer a hunter could walk, the more likely it was for him to track and kill wounded animals. The ability to walk long distances over rugged terrain became an admired quality of early man. Washburn (1960) states that

Human walking is primarily an adaptation of covering long distances economically. To go a long way with a minimum of effort is an asset to a hunter; it seems plausible that evolutionary selection for hunting behavior in man was responsible for the rapid development of striding anatomy. (p. 63)

Walking and civilization. As man became more civilized and began to cultivate land, the walkers again came to the front. Prodigious walking was needed in cultivating and harvesting crops, in slave labor, and in soldiering. The great Roman legions that captured most of the known world would march as much as 21 miles a day (Donaldson, 1979).

Walking and religion. Walking has played a big part in Western religion as evidenced by over 300 references to walking in the Bible (Cruden, 1949). Keller (1979) states, "[the] scriptures refer to walking as a sign of strength, endurance, obedience to law, moral behavior, loyalty, faith, fellowship, and humility" (p. 76).

The Bible refers to Abraham and Isaac walking with God while Moses and David walked before the Lord in his name.

The Israelites walked for over 40 years in the wilderness and through the Red Sea before returning to the promised land (Cruden, 1949). Such biblical passages as, "The Lord walks among you to protect you and can see your enemies to fall before you" (Deut. 23:14); "For my Lord in whose presence I have walked, will send his angel with you and make your mission successful" (Gen. 24:40); "So Peter went over the boat and walked on the water toward Jesus: (Matt. 14:29); "Walk while ye have the light lest the darkness come upon you" (John 12:35); and "For three years they walked in the way of David" (Chron. 11:17) illustrate the significance of walking during that period of time. Walking was the main mode of travel during this era and was so important that the people and the authors of the Bible used it to denote a wide variety of feelings, actions, and conditions.

During the Middle Ages the crusades were a walking adventure. The large armies walked thousands of miles while the kings and commanders rode horses (Sussman, 1980). During this period and for several hundred years after, the main form of transportation was walking. About two hundred years ago, people began to ride more than walk. The horse-drawn carriages and wagons began to become more available to the public. Walking has been going "downhill" ever since. Ralph Waldo Emerson stated the change by saying, "The civilized man has built a coach, but he has lost the use of his feet" (Fletcher, 1982, p. 463).

Walking and science. Man's science, art, and literature have been profoundly affected by walking. The leisure classes of eighteenth and nineteenth century England valued long strolls in the countryside. These walks provided them opportunities for contemplation, relaxation, conversation, observation, and exploring (Keller, 1979).

Many of the world's great writers, poets, artists, philosophers, and scientists were relaxed, motivated, and inspired by walking. Hippocrates, the father of medicine, wrote that "Walking is a man's best medicine" (Fletcher, 1982). He encouraged his patients to take daily walks to preserve their health. Leonardo da Vinci was an avid walker and studied walking from an anatomical viewpoint. He also designed many buildings to human scale while designing the famous walkways of Bologna, Italy (Donaldson, 1979).

Freud took his patients and students on walks through the streets of Vienna while Einstein was said to be so totally immersed in thought as he walked near his home in Princeton, New Jersey, that he would lose his way (Davis, 1979).

Walking and literature. Many of the great English men of letters were avid walkers. They seemed to sense the connection between exercise, thought, and creative insight. Samuel Johnson and John Wesley would walk up to 32 miles a

day; Samuel Taylor Coleridge and Bertrand Russell would go up to 40 miles (Keller, 1979).

Other walking writers include Swift, Hobbs, Fielding, Shelley, Keats, Wordsworth, Arnold, Meredith, Stephen, Ruskin, Scott, Stevenson, Sedgwick, Bentham, Dickins, Henry Adams, John Stuart Mill, and C. S. Lewis (Keller, 1979). All these noted authors logged hundreds of miles each year for leisure, recreation, and meditation. Leslie Stephen remarked (Donaldson, 1974),

The author is but the accidental appendage of the tramp. Walking is a natural recreation for a man who desires not absolutely to suppress his intellect, but to turn it out to play for a season. All great men of letters have been walkers. (p. 165)

William Wordsworth may have been the most prodigious walker of all the writers. He did daily walks of 14 miles and once walked 350 miles in two weeks of a European holiday. Close friends estimate that he walked 185,000 miles during his lifetime (Sussman, 1980).

Henry David Thoreau was America's greatest walking author. In many of his works he refers to his many walks around the New England countryside. In 1862 he published an essay entitled, "Walking," which is probably the most widely quoted work on walking and the most eloquent summary of its pleasures and purposes (Davis, 1979). Thoreau (Browne, 1970) states his feelings about walking in the following

passages: "I think I cannot preserve my health and spirits unless I spend four hours a day at least--and it is commonly more than that--sauntering through woods and over the hills and fields, absolutely free from all worldly engagements" (p. 59).

Long distance walkers. Long distance walkers had been around for some time. They were attracted by the challenge of some type of competition. Walkers have challenged other walkers, nature, and long distances. Walking became popular as a spectator sport in England during the eighteenth and nineteenth centuries. Amazing feats of long distance walking attracted large crowds of people, and these pedestrians became heroes. One of the most famous English walkers was a Captain Robert Barclay Allardice, who at 6'3" and 200 pounds was also a fistfighter, wrestler, and local strongman (Lucas, 1979). In 1809 Captain Barclay won a bet of \$45,000 by walking 1,000 miles in 1,000 hours on a dirt track in England. The walk took 42 days of nearly continuous walking, with short bouts of rest, sleep, and eating. Huge crowds turned out to watch and bet (\$2.5 million) on whether Barclay could walk the 1,000 miles in the six-week period. Barclay finished the race, some 32 pounds lighter, and set off the next day to fight in the war against Napoleon (Lucas, 1979).

In the United States one of the most famous early walkers was Edward Weston, called by many "The Apostle of

Walking" (Matthews, 1979). At the age of 33, in 1861, Weston walked from Boston to Washington, D.C., a distance of 453 miles to attend the inauguration of Abraham Lincoln (Matthews, 1979). After receiving public attention following the walk to witness the Lincoln inauguration, Weston pretty much devoted his life to the promotion of the benefits of walking. Weston completed many other long walks (see the Suggested Walking Course Outline for a complete list) and reached the height of his walking successes by completing a transcontinental walk at the age of 71 in 1909. Weston walked from New York to San Francisco (3,895 miles) in 104 days, 7 hours; then one year later (at the age of 72) he walked back from Los Angeles to New York (3,600 miles in 76 days, 23 hours (Matthews, 1979).

Americans were fascinated by the ability of people like Edward Weston to walk long distances with seemingly little effort. Walking races became quite popular, with the walkers performing for large sums of money. In 1867 the New York Times ran a cartoon which showed that walkers were earning as much as \$25,000 a week and went on to comment:

A kind of pedestrian mania seems to afflict the country now. We hear of erratic pedestrians rushing across the continent in every direction just as the meteors traversed the heavens. Daily we receive telegrams announcing that of a pedestrian walking so many miles a day for so many thousand dollars. Mayors

greet them, roughs assail them, police protect them, children are kissed by them, and every detail is telegraphed. (Davis, 1979, p. 189)

Since Weston's day, many long distance walking records have been set such as: David Kwan walking around the world (18,500 miles) in 81 weeks; Plennie Wingo walking backward from Santa Monica, California, to Istanbul, Turkey, in six months; and Dimitri Dan of Romania finishing a 62,137 mile race (Kuntzleman, 1979). A listing of some of the greatest feats of walking is in the appendix of this manual.

In the twentieth century, Henry Ford and the Wright brothers gave society the luxury of speedy travel, and the necessity of long walks has long since disappeared. In the past 50 years, people have walked less and less in the performance of their daily activities, but have begun to walk more in their leisure activities and exercise programs. People need to return to a more primitive existence and include daily walking as a means of preserving their health and mental well-being.

Chapter III

Commonly Asked Questions About Walking

As students begin a walking program, they are eager to know about the sport. Many questions are asked that deserve answers before they are covered in the manual.

The following section is devoted to answering some of these most often asked questions about walking. The questions are divided into various categories, and for further information the student should consult the appropriate chapter in the manual.

General Questions

Which is better: walking, jogging, swimming, or cycling? There really is no best sport. All four sports properly done can produce pulse rates high enough to effect positive changes in the body's circulatory and respiratory systems. All four will burn calories and elevate the basal metabolic rate to produce a loss of fat. Each sport has its own unique advantages and disadvantages. Swimming uses more muscles than walking or running, but more people are going to walk and run than swim because they do not have a pool that is easily accessible. Swimming might be the "best sport" for those who have pools in their backyards. Walking and jogging enjoy such widespread popularity because they

can be done most any place with relatively small expense. Cycling is a top aerobic activity, but requires somewhat expensive equipment in the purchase of a bike, helmet, and other accessories. It requires roads with reduced traffic, but is still very dangerous. The question that must be asked is, "Which activity is 'best for me'?" The best of the four is one that: 1) can be done regularly; 2) is fun and provides psychological enjoyment; and 3) can be put into a person's present schedule and life style. Another option is to do all four or add some other aerobic activities such as aerobic dance or racquetball.

Should everyone walk for exercise? No. There are many aerobic activities to choose from to develop and maintain cardiorespiratory fitness such as running, cycling, swimming, racquetball, and so forth. However, if someone wishes to engage in an activity that is easy to learn, less stressful, non-competitive, relaxing, and also aerobic, then the sport of walking could be the best exercise.

Should I walk short distances very fast or long distances very slow? Both should be done. Variety is one of the keys to continuing a walking program. One of the fitness goals of walkers is to walk at a pace that will elevate the pulse rate into the target range and keep it there for 20 minutes to an hour. However, there will be times when a faster walk and at a greater intensity will be needed because of a lack of time to take a long walk. Both

methods will improve cardiorespiratory fitness if the pulse rate is high enough. Thus, balancing a walking routine by varying the speed, terrain, distance, and time can add interest and variety to a program.

Should I walk the same distance every day? When beginning a program, walking the same distance to acclimate the body to the stress of exercising is a good idea. However, after several weeks of adapting the body to walking, gradually add some distance or time to the walks. The walking program can then be altered to include walking long distances on some days, followed by a short walk or a rest day, and occasionally a day of fast walking over a short distance, covering different terrains at different sites. The variations of the walks will give the body chances to rest and also prevent injury.

Will walking make me tired and unable to do my work? When first beginning a walking program, the body will have to adjust to the increased physical demands. During this time, a walker may be a little more tired than usual. But it will be a "good" physical tiredness that will help the person sleep better. After the body has adjusted to the physical stress put on it, the walking will be invigorating and will stimulate the person to be alert and to work better and longer. The general effect of walking is to give more energy, not less.

Will I become addicted to walking as some runners do to running? Some runners are reported to be compulsive runners in that they get upset if they go for a few days without running and even suffer a type of withdrawal symptom when forced to give up running for a long period of time. This type of "addiction" has been hypothesized as being due to the large amount of endorphins and enkephalins that appear in the blood of runners and walkers after 30 minutes of exercise. These substances produce a narcotic-like effect on the body and may account for runners becoming very irritable when forced not to run due to an injury (Strahinich, 1982). They cannot receive their dose of "a natural narcotic." Walkers produce this same type of substance after long walks of 45 minutes or more, so walkers could produce the so-called "walker's high or addiction." However, Pleas (1981) calls this type of "high" a positive addiction.

What are the best surfaces on which to walk? Since walking does not produce much shock to the body, almost any surface is acceptable. Smooth, grassy surfaces or wooded dirt trails would be ideal. Asphalt is better than concrete because asphalt is softer. Try to avoid rough and uneven surfaces as they can cause twisted ankles or falls.

How can I check my pulse rate to insure that it is in the target pulse range? Several pulse monitors can be

purchased to fit on the finger, hand, or ear and give a pulse reading every few seconds. These instruments are usually quite expensive. The exercising pulse can be easily checked by using a stopwatch (a function in most sport watches). Simply feel the radial or carotid pulse points with the first two fingers and count the pulse beats for 10 seconds and multiply by 6. An easier method is to count the number of beats for 6 seconds and add a zero. These counts will give an estimate of the pulse rate, which is all that is needed to determine if the target pulse range has been reached.

How do I know if I am getting my pulse rate high enough while walking? To receive cardiorespiratory benefits from walking, the pulse rate should be in the "target pulse range." This range is determined generally by subtracting a person's age from 220 and multiplying that figure by 60 to 85%, depending on the physical condition of the individual. By increasing speed, walking hills, or carrying an overload (hand weights or day pack), the desired pulse rate can be achieved. Normally, the target pulse rate will be between 130 and 160 (Miller & Allen, 1982).

If I stop walking, how long will it take me to lose my fitness? There are no long-term physiological benefits to being in good cardiorespiratory condition unless that condition is maintained with regular periods of aerobic exercise. Persons should aerobically walk at least once

every 48 hours to maintain their fitness level (Lamb, 1984). If walking is stopped, conditioning begins to be lost after a few days, and most of the gains will be lost in a couple of months. To maintain fitness, walk on a regular basis.

What is the best time of day to walk? No time of the day is right for everyone. People have different work schedules and different physiologies. Some like to get up early and walk while watching the sun rise, while others prefer the cool of the late evening. People have their own biological rhythms that predispose them to best perform tasks at certain times. Some walkers like to vary their routines and walk a few days in the morning and a few days in the afternoon or at night. Some walkers' shoes and shorts are always packed in their cars in case they are afforded the opportunity during the day to walk. The best time of the day to walk is when it can be fitted into the daily schedule and when the walker feels like it. Many walkers prefer to walk during their lunch hours, thus depressing their appetites and refreshing their "tired" brains. Try walking at varied times to determine what works best. Walkers should not walk during a time they do not like, else negative feelings toward walking may ruin their day. Walk at any time, but be sure to walk!

What should I do about troublesome dogs while walking? All walkers encounter dogs at one time or another on their walks. Most of the dogs just want to warn people that they

are nearing their turf (front yard) and that they will defend it. Normally, they will bark and usually go no farther than the edge of their owners' yards. Those dogs that are not "normal" are the ones that can cause problems. If pursued by a dog, just walk briskly along and attempt to ignore it. If this technique does not work, the tossing of a rock in the direction of the dog will usually deter it. "Squirting" a solution of water and ammonia from a plastic bottle in the dog's direction is another tactic that will work (Fixx, 1977). The best method is to know the walking area and the dogs that are on the streets. Walkers will soon learn to avoid the areas of the more vicious animals.

I like to walk, but have a hard time staying with the program. What can I do to be more consistent? This is one of the questions most often asked by walkers. In the beginning of a walking program, try to walk at the same time each day. People are creatures of habit, and setting aside a definite time to walk will make walkers more prone to keep up the program. Another suggestion is to walk with a friend or group of people. The social interaction and good conversation are some of the real fringe benefits of walking. It is also difficult to postpone a walk if plans have been made to walk with others. Be sure not to "overdo it" by walking too far and getting sore during the early stages of a walking program. The physical discomfort of

walking too much too soon causes many walkers to drop their programs. Walking in different aesthetically pleasing environments increases the survival chances of a program. Visiting local parks, city historic areas, and scenic woodlands for walks can be much more stimulating than walking in a local neighborhood or at the local track. By constantly changing the environment, zest can be added to a walking program. Two last suggestions for staying with a walking program are to set walking goals and to keep a walking log. Goals of walking a certain number of miles in a certain period of time, or of walking a set number of hours in a week, can be set. These goals serve as reminders and motivators to continue walking. Writing down walking experiences in a log is a most rewarding practice. Most logs contain places for time, length of walk, weather conditions, and observations. By recording this data progress of walking experiences can be assessed. These suggestions will help maintain a walking program and make it fun and interesting.

Walking Injuries

What kind of injuries should I expect from walking?

Walking is probably the most injury-free sport of all. The act of walking places less stress on the joints and muscles than do other aerobic sports. Walkers are likely to get blisters and mild muscle soreness, depending on the fit of

the shoes and the terrain walked. Walkers do report "turned ankles" from stepping in potholes.

Should I wear ankle weights when walking? It is all right to carry weights in the hands or a day-pack on the back, but not weights on the legs or ankles. The extra poundage from the weights on the ankles (these are advertised and sold quite extensively) may disrupt a normal stride, put added pressure and stress on new areas of the body, and contribute to injuries.

The object of carrying weights is to overload the body to get a higher pulse rate and thus a better training effect for the heart and lungs. This can be overdone by overloading in the manner described in the first sentence of this answer or by walking farther, faster, and by walking hills.

I have pain in my feet after walking. Should I try orthotics? Orthotics are professionally made foot supports placed in the shoe to position properly the foot as it strides the ground while running or walking. Orthotics are recommended by podiatrists because of the unstable movements of the foot when it touches the ground as in supination or pronation (Feigel & Zumzow, 1982). Orthotics are usually custom-made from the imprint of the foot and are quite expensive (around \$100). Spenco makes a good over-the-counter orthotic for about \$15-\$20. If leg or foot pain

due to walking continues, consult a good podiatrist or sports medicine doctor.

What is the condition known as Morton's toe? Morton's toe is an anatomical condition in which the second toes of both feet are longer than the first or "big" toes (Sheehan, 1978). This condition can cause abnormal stress on the foot and produce pain or injury. Allowing a one-half to one inch space between the second toe and the end of the toe box of the shoe should solve the problem. If pain in this area persists, consult a good podiatrist.

What should I do when I get a pain in my side when walking up hills? This pain, experienced by most all athletes while exercising, is called a "side stitch." The cause of the pain is believed to be a lack of oxygen to the diaphragm muscle (Anderson, 1978). These stitches usually occur in beginning walkers as they try to push themselves to walk too fast or up steep hills. The rapidly contracting diaphragm muscle apparently does not receive an adequate amount of oxygen. The stitch can be alleviated by slowing down and consciously trying to relax the abdominal area by gently pressing inward with the fingers on the area of pain. Consuming a large meal just prior to walking can also sometimes cause a stitch.

Health Questions

Is it all right to walk with varicose veins? This depends on how bad the varicose veins are. Talking with

a doctor and getting his advice on whether to engage in a walking program is the first step. Some type of elastic support stocking on the legs to help the circulation may be needed. Some doctors recommend walking in a swimming pool about waist deep to use the support of the water.

What is the relationship between saturated fat and heart disease? Saturated fats are those present in animal products such as meats and dairy products. Unsaturated fat is the type found in all vegetable oils such as corn, peanut, and soybean. The intake of large amounts of saturated fat is thought to produce high blood cholesterol levels which are associated with arteriosclerosis and coronary heart disease. The intake of saturated fat is a risk factor of coronary heart disease.

Will walking keep me from having a heart attack? No. It has not been proven that aerobic exercise will prevent heart attacks. However, lack of exercise is one of the risk factors contributing to coronary heart disease. A mounting body of evidence does support the theory that exercise will lessen the probability of a heart attack, and, if one does occur, it is not usually as severe in chronic exercisers (de Vries, 1979). To restore the strong functioning of the heart, mild exercise programs, usually walking, are almost always prescribed by cardiologists after a person has a heart attack. This is good evidence to suggest the importance of a good aerobic walking program as a preventive

measure against coronary heart disease (Paffenbarger & Hale, 1975).

Should I walk during my pregnancy? Yes. Most obstetricians believe that it is a good idea to exercise during pregnancy, provided there are no complications. Women who exercise while pregnant seem to have fewer problems during labor and have shorter deliveries. Always consult with a doctor before beginning a walking program while pregnant.

Weather Questions

In what weather should I not walk? Another plus for walking is that it can be done in almost any type of weather. Walking should not be attempted in the extremely icy conditions of winter or during a thunderstorm with lightning. All other weather conditions are appropriate for walking if dressed properly. Be sure to keep the hands, head, and ears well covered in the winter. In the summer, wear a cap or hat to protect against the sun, and wear loose, light clothing while taking in plenty of liquids. Wear a "Gore-Tex" warm-up suit or other attire that is water repellent during rainy days.

In the summer I sweat a lot while walking. Should I take salt tablets? The taking of salt tablets may be worse than taking no salt at all (Morehouse, 1975). A solid piece of salt that is swallowed and comes to rest on the mucous membrane of the stomach may cause nausea and vomiting. Salt

tablets could even speed up heat prostration instead of slowing it down. Consuming salt without drinking the proper amount of water could be harmful to the salt and fluid balance. If walking on a very hot day is anticipated, sprinkle a little extra salt on the meal prior to walking. Be sure to supplement this extra salt with plenty of liquids. Fluid replacement is a most important factor in hot weather.

What precautions should I take while walking in the heat? Higher air temperatures and humidity levels force all exercisers to cut back on the duration and intensity of their programs. Getting rid of excess heat produced by vigorous exercise is a problem for the body. The problem is greatly compounded in hot weather. The following are some guidelines that will be helpful to persons walking in the heat:

- 1) Acclimatize the body to the heat before going for long or very fast walks. The body takes anywhere from 7 to 14 days to become accustomed to hot weather (de Vries, 1979). Walk each day in hot weather, and gradually add distance as the body adjusts to producing large amounts of perspiration.

- 2) Hydrate each night. Drink plenty of water each evening and night to insure that the body tissues will have plenty of water the next day to be lost during perspiration.

3) Drink two 8-ounce glasses of water at least 15 minutes before going on a long walk. Carry a plastic water bottle and drink periodically or have planned water stops along the walking route.

4) During hot weather, try to walk early in the morning, 6:00 a.m.-8:00 a.m., or late in the evening, 8:00 p.m.-10:00 p.m.

5) Avoid drinks with a high sugar content such as full strength Gatorade or colas. The sugar will prevent stomach emptying and delay water to the tissues.

6) Wear as little clothing as possible to expose the maximum amount of skin in order for the air to evaporate the sweat and cool the body. Clothes should be light-colored to reflect the sun's rays.

7) Add a little extra salt to meals prior to walking, but never take salt tablets.

8) Cut walks short or eliminate them altogether if the weather becomes extremely hot and humid.

Will walking in a rubber or plastic suit help me lose weight quicker by sweating more? Absolutely no! People have died from running and walking in these suits in very hot weather (Morehouse, 1975). When the body heats up while walking, the cooling mechanism of sweating and evaporation begins. To interfere with the cooling of the body could cause more sweating and produce heat exhaustion or heat stroke. Heat stroke could cause death in a few

minutes. There is a weight loss from sweating profusely, but it is mostly water and not fat. The water weight lost will be quickly regained with the ingestion of fluids.

If the weather outside is too inclement for walking, what should I do? It is always a good idea to have an alternate place to walk when complications arise. The biggest complication to outside walking is the changing weather. If inclement weather prohibits walking outside, there are several alternatives.

Many colleges, universities, and high schools have indoor tracks or large gymnasiums that can be used for walking. Check locally for indoor areas, the times the areas are available, and if community residents are permitted to use them. Many large shopping malls open their doors early to accommodate walkers. Malls are safe places to walk and are ideal for older walkers. Many office buildings are open quite early and after regular working hours. This provides a good opportunity for stair walking. Walking up and down stairs can elevate the pulse into the target range very quickly and is a convenient alternative to outside walking. Bring walking clothes to work and change at the end of the day and get in a good stair walk before going home. Stairs at apartment buildings or homes can be used just as well.

What should I wear when walking in the winter? Walking in the cold weather can be quite invigorating and exciting. Walking in snow can be beautiful and can produce a good overload and a good aerobic workout. The following are some basic guidelines for winter walking.

1) Dress in layers. Wear several layers of light-weight clothing. The air trapped between the layers will serve as good insulation. The layer next to the skin should be absorbent. The best material is polypropylene, a new synthetic, or a material made of a combination of part synthetic and cotton. Do not use all cotton, as it will retain moisture and chill the walker. A light-weight nylon jacket will help cut the wind and help repel water. Gore-tex (an expensive synthetic) jackets and warm-up suits are very good because they cut the wind, repel water, and permit body heat and water vapor from sweat to escape.

2) As soon as body heat is generated and perspiration starts, open the clothing and let the heat escape.

3) Hooded sweatshirts, warm-up jackets, and wool stocking caps are good for keeping the ears warm, a must in cold weather, and preventing heat loss through the head. Gluck and Smodic (1983) state that 40% of body heat can be lost through the top of the head if not covered.

4) Drink plenty of fluids. Even in very cold weather a walker will sweat and dehydration can occur. Fluid intake should be 8 ounces for every 15 minutes of walking.

Shoes

Which shoe would be best for me to walk in? This question does not have a clear answer, since buying a good walking shoe is a highly individual matter. Generally speaking, any shoe that feels good, has the proper arch support, and does not cause foot discomfort can be used for walking. Probably the best shoes for walking are running shoes. There are many cheap department store models on sale that will do just fine if a person walks only a few miles each week. However, it is suggested that walkers follow the old adage, "Never have cheap friends or cheap shoes." The extra money paid for top brand-name shoes is well worth the expense in terms of wear and protection to the feet.

Most authorities do not recommend a particular brand of shoes. However, there are some guidelines for shoe selection:

1) Choose a high quality shoe that feels best on the foot. Do not pick shoes because of their color, because they are seen advertised on T.V., or because good walkers wear them.

2) Try on both shoes. (Remember one foot is usually larger than the other.) Walk around in them in the store and around home later that evening. If they feel uncomfortable, return them, since they have not gotten dirty by walking outside.

3) Wear athletic socks when trying on shoes and allow one-half to one inch room in the toe box of the shoe. This will allow for expansion of the foot during exercise as greater amounts of blood enter the feet during walking.

4) Do not buy a shoe according to size. In each brand, sizes differ. A person might wear three different sizes in three different brands of shoes.

5) If the right shoe is found and it wears well, choose that same one next time. Do not switch around just for the sake of change.

Buying good walking shoes cannot be overemphasized. They are the only real expense to the sport. Use walking shoes only for walking. Do not play basketball or tennis in them, as they provide little support for lateral movement and can cause ankle injuries.

How can I build up the worn areas of my walking shoes?

All shoes will begin to wear where the sole is stressed the most. This usually occurs on the outer side of the heel and the upper front of the sole. These worn areas vary with foot plant and push-off. An electric glue gun can be used to cover the worn areas with a melted plastic. Two commercial applications available in tubes are "Shoe-Goo" and "Liqui-Sole." "Shoe-Goo" wears away with a few days of walking, while "Liqui-Sole" will last a few weeks without being replaced.

What shoes should I not wear when walking for exercise?

Many of the types of shoes worn at home and during recreational activities are only appropriate for walking short distances. The following types of shoes should not be worn when going out for a long aerobic walk: sandals, cowboy boots, high heels, and "flip-flops."

Nutrition and Weight Loss Questions

Should I take in extra protein since I am walking and building more muscle tissue? No. Walking will not significantly increase a person's need for protein. Nutritionists recommend that persons take in only about one gram of protein per kilogram of body weight. A 150-pound man would need only about 68 grams of protein a day (Nutrition for Athletics, 1971). Most Americans take in over 100 grams of protein a day. Excess protein over that needed by the body is stored as body fat. Protein powders or supplements are not needed since plenty of high quality protein is available in eggs, dairy products, fish, poultry, and meat.

Should I drink more water now that I am walking? Yes. The human body is approximately 60% water and needs large amounts each day to replace that loss in excretion and perspiration (Lamb, 1984). In hot weather, more water is needed to compensate for the increased perspiration. Thirst is not a reliable indicator of the body's need for water. Drink plenty of fluids in anticipation of sweating on a hot day.

Which foods contain the most calories? Fats contain over twice the calories of the other two energy nutrients: carbohydrates and protein. Foods containing fats, therefore, are the most fattening. Hamburger and steak are much more fattening than potatoes, bread, and pasta. Sugar has only 13 calories per teaspoonful, but 12 ounces of cola has over 12 teaspoons of sugar in it, making it a 156-calorie drink with little or no food value (Hamilton and Whitney, 1982). Most foods and beverages give caloric value per serving on the labels of their packages. Be sure to check these caloric values before eating. Controlling unnecessary caloric intake can mean a lot in proper weight management.

Does the way you cook food affect the caloric content? Ordinary food preparation consisting of cutting, slicing, cooking, freezing, or blending does not affect the caloric content of food. The addition of margarine, butter, or oil will appreciably add calories to food. Frying foods in oil adds many calories to meats and vegetables. The broiling of meats like hamburgers and chicken can permit the high calorie fat to drip off. The steaming of vegetables is a good alternative to cooking in a pot with oils or butter in reducing calories. One myth about caloric reduction is that toasted bread contains fewer calories than untoasted bread. Both toasted and untoasted bread contain the same calories.

Will walking make me hungry? No. Physical exercise tends to suppress appetite, not increase it. Most eating

is from habit and not hunger. If an individual begins walking, the caloric intake will increase somewhat. Most people add a walking program to their life style and do not significantly increase their food intake.

Is it all right to go for a walk just after eating a meal? Going for a slow, relaxing walk after eating will usually have no adverse effects on most people and may improve digestion. Many people who work in a downtown area go out for lunch and walk several blocks afterward.

Lamb (1984) states, "Mild exertion either slightly enhances or has no effect on stomach emptying or acid secretion" (p. 338). However, de Vries (1979) comments, "Any factor such as heavy exercise that interferes with either secretory or motor functions may cause nausea" (p. 528).

Most people who go for a walk after a meal usually feel better and their digestion is improved. If a person goes for a long or intense walk after eating, nausea could result. The best advice is for walkers to experiment with walking after eating and see what works for them.

How much of the energy nutrients should I consume, now that I am walking? The energy nutrients are carbohydrates, fats, and proteins. An individual's need of these nutrients depends upon body weight and activity level. Most nutritionists recommend a certain proportion of caloric

intake of the three energy nutrients to be as follows:
Fat--25 to 30%; protein--10 to 15%; and carbohydrates--55 to 60% (Hamilton & Whitney, 1984). A program may necessitate walkers consuming a little more carbohydrates. However, walkers should try to balance their caloric intake with their caloric output to avoid gaining weight.

Should I take a vitamin supplement? Probably not. Taking excess water-soluble vitamins (B and C vitamins) usually has no harmful effect on the body because the excess is excreted in the urine. Taking excessive amounts of the fat-soluble vitamins (A, D, E, K) in the diet can lead to harmful toxic effects on the body. These fat-soluble vitamins can be stored in the body's fat, and supplements containing them are unnecessary (Hamilton & Whitney, 1984). Unless specifically prescribed by a physician, a normal diet will provide all the minimum daily requirements of vitamins and minerals needed for good health.

Is it O.K. to go on one of the popular "fad diets" and walk to lose weight? No and yes. Nutritionists do not recommend any of the so-called "fad diets," such as the Beverly Hills Diet or the Cambridge Diet. The reason is that these regimens do not work! Most of these diets make caloric intake so low that the dieter feels bad most of the time. Headaches, nausea, diarrhea, and lethargy are a few physical symptoms of these "crash diets" (Mahoney & Mahoney, 1976). Worst of all, the low energy levels produced by the

lack of carbohydrates in the diet lower the basal metabolic rate, thus burning up fewer calories. Developing a walking program while on one of these diets would be difficult to do because of the reduced energy levels in the person. It is recommended that walkers moderately limit their caloric intake and use walking to burn up the excess fat instead of dieting.

Will walking just cause me to lose weight from the waist down? Exercising one particular body part will not cause fat to be lost from that area. This "spot reducing" theory is not scientifically possible. When an individual walks and burns up excess calories above what is taken in, the fat loss will mainly come from the areas where the most fat is deposited, usually around the abdominal area, hips, and thighs (Allsen, Harrison, & Vance, 1984). However, some small fat losses do occur over the entire body. If spot reducing worked, most people would all have very thin mouths due to constant talking!

What should I do when I begin a walking program, and gain weight instead of losing it? One of the main objectives for most people in instituting a walking program is to lose fat. When some people begin walking programs, they actually lose fat yet gain total body weight. The walking action will produce muscle gain in the legs, buttocks, and sometimes in the arms and chest if hand weights are carried. This muscle weighs more than fat;

therefore, the walkers see their waistlines get smaller yet the scales show a weight increase. The walkers gain muscle, which looks good on them, and lose fat at the same time. Walkers should check their percent of body fat with skinfold calipers during their walking programs. The results will usually show that they are losing "fat weight." The muscle gain will stabilize, and later, as the fat continues to be lost, the results will be seen on the scales.

Will walking help me lose weight? Yes. When combined with a sensible eating program, walking is very effective in losing fat. Walking briskly at a four-mile-per-hour pace will burn up between 210 and 384 calories in an hour, depending on the weight (de Vries, 1979). This is not a significant caloric expenditure. However, the walk will help the basal metabolic rate (the rate at which calories are burned at rest) remain elevated for several hours after the walk. Additional calories will be burned while sitting that would not have been used had the person not gone for the walk. A 30-minute walk daily, with the caloric intake remaining constant, will produce about a 13-pound weight loss in a year. This is the sensible method of weight loss: reducing caloric intake, increasing caloric output over a long period of time, to produce a permanent behavioral change (Mahoney & Mahoney, 1976).

What is percent body fat? Body composition can be divided into two parts: 1) lean body mass and 2) body fat.

The lean body weight refers to the bones, water, muscle, tissues, teeth, and organs, while body fat refers to all the fat stored in the body. If the total weight of the body is divided into the weight of the fat, the percentage obtained is the percent body fat. Percent body fat can be measured by using a mechanical device called a skinfold caliper and measuring selected sites on the body. Normal percent body fat for men is 15% and for women about 23% (Brooks & Fahey, 1984).

Will walking help me get rid of cellulite in my legs?

The lumpy fat that usually appears in the upper portions of people's legs has been called "cellulite." Some people propose that this is a special kind of fat that has to be "broken up" or massaged before it can be burned. Most nutritionists and physiologists agree that this is a hoax, and cellulite is like all other fat. It may differ in appearance, but will respond to a program of restricted caloric intake and aerobic exercise by being depleted (Hamilton & Whitney, 1984).

Is walking in cold weather dangerous? Cold weather conditions, wet clothes, and strong wind conditions could produce hyperthermia (lowering of the core body temperature due to cold conditions) and cause death (Lamb, 1984). Walkers should adequately cover the hands, head, and body trunk when air temperatures drop below 40°F-40c. On cold and windy days check the wind-chill factor before walking.

Chapter IV

Flexibility and Strength Routines

Flexibility Routine

Flexibility is defined as the range of motion in body joints (Dintiman, Stone, Pennington, & Davis, 1984). It is an essential component of good physical fitness and should be incorporated into the warm-up period of every walk. The three main reasons for participating in a good flexibility program, according to Kluft and Arnheim (1973), are:

- 1) Reduce the degree of soreness after exercise.
- 2) Reduce the probability of injury during exercise.
- 3) Increase range of motion in the joints, thus increasing movement efficiency in sports. (p. 65)

Adopting a sedentary life style with little physical activity can cause the ligaments, tendons, and muscles of the joints to lose their elasticity. Lack of flexibility in the spine can cause bad posture and inability to absorb the shock of walking. The limited range of movements of a joint caused by a loss of flexibility produces shortened muscles. These shortened and tight muscles make the individual more susceptible to muscle soreness, strains, sprains, and fractures.

Even though the act of walking does produce a stretching effect on the muscles of the legs and hips, the

repetitive walking action will result in a tightening of the muscles if continued for more than 15 minutes. All walkers should employ a sound flexibility routine before and after each walk. The stretching will help stimulate blood flow in the muscles and loosen the joints and tendons. Thus, the shoulder and hip joints will have a wider range of movement while walking.

The flexibility routine should be done daily, even if the individual does not walk each day. Gradually, over a period of time, the joints will become more flexible and the walker will enjoy that free range of movement. The key to a flexibility program is consistency over a long period of time (Anderson, 1978).

Static stretching techniques are favored over ballistic stretching. Ballistic stretching involves a bouncing or jerking movement that many people do while stretching. The muscles contain nerve receptors that are stimulated by fast, bouncy, or jerky movements. When the receptors are stimulated, they cause the muscle to contract and resist the stretch (Lamb, 1984). These ballistic movements are counter-productive and can make the muscles quite sore.

Static is the preferred method of flexing to produce maximum flexibility as efficiently as possible. All stretches should be executed slowly and gently to minimize the stretch reflex action and allow the muscle to stretch without pain or injury. Stretches should be held from 10 to

30 seconds or longer, depending on the stretch being done and flexibility of the person (Williams, 1983).

The following is a list of important guidelines to consider in executing a flexibility routine.

Guidelines for a pre-walk flexibility program.

1. Walk for 2 or 3 minutes to stimulate blood flow and warm up the muscles.
2. Pre-walk stretching should be done before beginning the walking program using a gradual, slow, sustained stretch until mild pain is felt.
3. The length of time to hold a stretch is from 10 to 30 seconds.
4. Stretch daily to progress and develop a high level of flexibility.
5. Breathe normally while stretching and do not hold the breath.
6. While stretching, try to avoid any rapid bouncing or jerky movements. These types of movements will stimulate the stretch reflex and limit the effectiveness of the flexibility routine.
7. Flexibility varies within individuals. Stretch the joints that need a further range of motion.
8. If possible perform the stretching routine after walking to relax fatigued muscles and to prevent soreness.
9. Learn to enjoy stretching. Stretch to the point where the stress on the muscle feels good.

10. If while walking a muscle group in the legs or back begins to tighten, stop and do some stretches for the tightened area and continue to walk.

The seven fundamental stretches described below are for walkers just beginning a walking program. For maximum results, the stretches should be performed before and after a walk. The times and repetitions of the stretches can be extended as the walker becomes more flexible.

Pre-walk stretching routine.

1. Billig Stretch

Body Parts Stretched--Muscles and Ligaments of the Pelvic Girdle.

Beginning Position--Stand 16 to 20 inches from a wall with the right or left side to the wall. Feet should be together with the hand opposite the wall on hip. Place forearm on the wall at shoulder level.

Execution of Stretch--Dip the hip into the wall, but do not rest weight against the wall. Be sure to keep the body straight. Return to the starting position and repeat to the opposite side.

Guidelines--Keep body straight. Do not lean against the wall. Do not place feet too far from the wall.

Duration--10 to 30 seconds per repetition.

Repetitions--2 to each side.

2. Trunk Roll Stretch

Body Parts Stretched--Lumbar region of the spine, trunk rotator muscles, stomach muscles, lower back muscles.

Beginning Position--Stand erect with feet parallel and a little wider than shoulder width. Legs are straight with the hands resting on the hips. Flex the body at the waist until a 90° angle is reached.

Execution of the Stretch--Slowly roll the upper body clockwise around in a 360° circle. Be sure to hyperextend the back at 180° and flex the back again at the starting point. Reverse the roll by rotating in a counterclockwise direction using the same execution.

Guidelines--Keep the knees locked. Rotate the trunk slowly. Support back with hands when it is hyperextended.

Duration--10-15 seconds per repetition.

Repetitions--2 clockwise, 2 counterclockwise.

3. Quad Stretch

Body Parts Stretched--Quadriceps muscles, tendons and ligaments at the knee.

Beginning Position--Stand erect and balance the body with one leg. Straighten the balancing leg and grasp the other leg by the foot and pull toward the buttocks. Steadily, but gently, pull the foot to stretch the thigh region. To begin the stretch the person may want to balance the body with the other arm pushing against the wall or holding on to a railing.

Guidelines--Do not strain the knee by over pulling. Support body with free hand by holding on to a support. Lean forward to get a better stretch. Keep knees close together.

Duration--10-20 seconds per repetition.

Repetitions--2 for each leg.

4. Hamstring Stretch

Body Parts Stretched--Hamstring muscles and lower back.

Beginning Position--Sit on a table or bleacher with one leg extended and the other leg dangling on the floor.

Execution of the Stretch--Flex forward at the waist and attempt to grasp the toes and touch the head to the knee.

Guidelines--Do not bounce or use jerky movements. Keep extended leg straight. Do not force the stretch.

Duration--Hold stretch 10-15 seconds per repetition.

Repetitions--2 on each leg.

5. Sit and Reach Stretch

Body Parts Stretched--Hamstring muscles, lower back, shoulders.

Beginning Position--Sit on floor with the legs together.

Execution of Stretch--Bend forward at the waist with the head down and the arms extended, palms up. Attempt to stretch palms beyond toes or until pain is felt.

Guidelines--Keep legs straight. Keep palms supinated (up). Do not force stretch.

Duration--8 to 12 seconds per repetition.

Repetitions--3.

6. Heel and Toe Stretch

Body Parts Stretched--Groin area, hamstrings.

Beginning Position--Assume a stance with one leg forward and the other leg back. Exaggerate and widen the stance until the weight of the body is resting on the front foot and the rear toe. Balance the body with both hands outside the front leg and resting on the floor.

Execution of the Stretch--To stretch groin area, shift until body's weight is forward on the front toe. Hold this position for 8 seconds, then shift the weight on to the heel of the front foot for another 8 seconds. This movement will stretch the hamstrings. Repeat the stretch after switching legs.

Guidelines--Keep hands outside front leg.
Difficult to maintain balance at first. Keep buttocks down during stretch.

Duration--8 seconds on the toe, 8 seconds on heel per repetition.

Repetitions--2 on each leg.

7A. Calf Stretch

Body Parts Stretched--Achilles tendon, calf muscle (Gastrocnemius), Soleus muscle.

Beginning Position--Stand erect facing a wall with feet about 6 inches apart. Feet should be 3 to 4 feet from the wall. Extend arms with palms flat against the wall.

Execution of the Stretch--While being sure to keep the feet flat on the floor, lean forward toward the wall, allowing the elbows to bend. Keep the body straight and lean forward until a stretch is felt on the calf muscles.

Guidelines--Keep knees straight. Keep body straight. Do not let heels lift off the floor.

Duration--15 to 25 seconds per repetition.

Repetitions--3.

7B. Calf Stretch Variation

Same as calf stretch, but instead of leaning into the wall with both feet together lean with one leg placed forward with the knee at a 90° angle. This variation places a much greater stretch on the straightened leg.

Duration--15 to 25 seconds per repetition.

Repetitions--2 on each leg.

8. Knee-Chest Pull

Body Parts Stretched--Hip flexors, muscles of lower back.

Beginning Position--Supine position on the floor with legs extended.

Execution of Stretch--Grasp behind the right knee with both hands and pull the knee to the chest. Pull hard until the stretch is felt. Repeat on the left leg.

Guidelines--Stretch is usually not readily felt. Maintain extended leg on the floor. Pull leg slowly.

Duration--10 to 15 seconds per repetition.

Repetitions--3 on each leg.

Upper Body Strengthening for Walkers

The joints, ligaments, muscles and tendons of the lower body will become conditioned with walking. However, unless a walker does vigorous racewalking, the upper body will not receive enough exercise to keep it strong. Supplementing of the walking program with upper-body calisthenics will be an advantage in maintaining muscle balance and increasing overall fitness.

Some walkers weight train to maintain upper-body strength as do many swimmers and runners. However, many walkers do not have the time, equipment, or inclination to lift weights.

Remember that, in strength training of any type, one of the basic principles is to be sure to exercise opposing muscle groups equally to prevent muscle imbalance. Sheehan (1978) believes that

Overdeveloped muscles and weak opposing muscles do more than just pull muscles, they cause further pronation at footstrike, and thereby increase

tendency toward problems in the foot, leg, and knee. At the same time, they increase misalignment at the lumbar area, creating low-back and sciatic difficulties. (p. 13)

Listed below are some basic upper body calisthenics which can be performed with little equipment.

1) Push-ups. The "old" push-up has been a part of most exercise programs for many years, and remains an excellent calisthenic for strengthening the upper arms, stomach, shoulders, chest, and wrists. The following procedures should be followed in doing push-ups correctly:

- a) Assume a prone position (face down) on the floor with the legs together and stiffened.
- b) Bend the elbows and place the hands on the floor just outside the shoulders.
- c) Keeping the body straight and looking forward, push the weight of the body off the floor until the elbows are fully extended.
- d) Lower the body to the floor, being sure to maintain a straight line and touch the chest to the floor.
- e) Do several push-ups, then rest, and repeat the procedures twice for a total of three sets.

Strength of individuals varies, and the number of

push-ups executed will be different for each person.

2) Modified Push-ups. If the person is not strong enough to do the conventional push-ups, then the modified version is less strenuous.

- a) Instead of the toes touching the floor, modify the prone position so the knees are bent and touching the floor with the lower legs extended upward.
- b) Keep the body straight from the knees to the shoulders.
- c) Do several repetitions, then rest, and repeat twice for a total of three sets.
- d) As strength is gained, the person can move on to the regular push ups.

3) Sit-up or Curl-up. This exercise is strictly for the rectus abdominus muscles of the stomach area. Sit-ups, or curl-ups as they are sometimes called, should always be performed with bent knees to prevent undue strain in the hip flexors and the lower back (Clarke, 1976B). The procedures for doing the sit-ups correctly are as follows:

- a) Lie flat on the floor in a supine (back on the floor) position with the heels of the feet near the buttocks and the knees bent.

b) The feet should be anchored for best results.

Most sit-up boards on weight machines contain apparatus to anchor the feet. At home use the bottom of a couch or chair. Sit-ups can be done without being stable if no anchor can be found.

4) Carrying Hand Weights. This has recently become a "fad," and the popularity of carrying hand weights while walking, running, doing calisthenics and aerobic dance seems to be increasing. It is not uncommon to see several runners and walkers carrying the characteristic red "Heavy Hands" weights as they move along. Several brands and styles of hand weights (listed in Chapter VIII of this manual) can be used. No matter if the weights are rocks, tape-covered pieces of iron, or fancy chrome-plated dumbbells, they all accomplish the same result--to overload the body, making exercise more difficult, thus raising the pulse rate quicker and making the exercise more intense while making muscles stronger. Schwartz (1982), Division Head of Psychiatry at Montefiore Hospital in Pittsburgh, is the inventor of the "Heavy Hands" and claims they "make you strong, powerful, and speedy while giving you endurance and cardiovascular training at the same time" (p. 2). This is quite a claim and has not been proven by Schwartz.

The carrying of any weight, such as a back-pack when hiking, makes walking much more difficult and greatly

increases the pulse rate. By carrying hand weights and swinging the arms vigorously, a person can strengthen the skeletal muscles of the back, chest, and arms. Start by carrying the one pound "Heavy Hands" or a weight of one-half to one pound when walking and gradually increase the weight. The maximum weight to carry and maintain a good heel strike is about three pounds in each hand.

Chapter V

Selection of Walking Shoes

Introduction

A good pair of quality walking shoes is the walker's primary monetary investment in the sport. Some people think nothing of purchasing a \$100 tennis racquet or a \$500 bicycle, but "cringe" at the thought of paying \$50 for a pair of walking shoes. With the buying of shoes as the only need of a beginning walker, \$30 to \$50 for a pair of shoes is a small price to pay to engage in a sport. This chapter discusses what to look for in good walking shoes and how to purchase them.

History of the Walking Shoe

The first shoes were not really shoes, but a strip of raw leather tied to the foot with a threaded leather thong and called a "corbatine" (Donaldson, 1979). Since then, man has tied animal skins to his feet and filled them with grass or moss as protection from the cold; made shoes from hollowed-out wood; and used plastic, rubber, cloth, leather, and nylon in odd assortments to produce shoes for fashion, comfort, and protection.

The shoe with the widest popularity of all has been the American "sneaker." The term "sneaker" was coined in 1873,

and refers basically to any rubber-soled shoe with canvas or nylon uppers (Walker, 1978). Thus, a basketball, tennis, running, or walking shoe could be termed a "sneaker."

Walker (1978) estimates that over 220 million pairs of sneakers are bought in the U.S. each year. Most of these shoes are made and imported from Korea and Taiwan. The shoes that most walkers use now and the ones they purchase in the future will probably come from these areas.

The running shoe sneaker market has literally exploded in this country. Most everyone wears the running shoe sneaker. There are some 50 manufacturers of running shoes with hundreds of styles to choose from. Kuntzleman (1979) states, "We believe that running shoes are best for use by persons following a specific walking program" (p. 89).

Walking Shoe Selection

The key to a walking program is the proper selection of a good shoe. A walker's feet will strike the ground approximately 1,600-1,800 times per mile, depending on the length of the stride (Fixx, 1977). Shoes are the only special equipment a beginning walker needs. Any pair of shoes that are comfortable and do not cause foot pain or blisters will be sufficient to begin a walking program. If a shoe style meets the needs of a walker, it should be purchased again when a new pair is needed. As walkers become more involved in the sport, they may wish to buy a

better pair of shoes that would be more appropriate to their level of walking. A walker covering 15 miles a week produces 24,000 to 27,000 foot strikes each week! If the cost of walking shoes is projected over the time they last, then the shoes only cost only a few cents per mile to use. The following are some walking shoe selection guidelines.

Shoe selection guidelines.

1. Plan to spend at least one hour at the shoe store in order to try on as many brands and styles as possible. Most new shoes will feel good when tried on. Put on both shoes, lace them up, and walk around in the store. Take time to look at several pairs of shoes and do not be afraid to ask the clerk to bring out several pairs. This is the biggest investment for a walker and it should be made carefully. After purchasing the shoes, take them home and walk around in the house or dorm to make sure they are comfortable. Most stores will exchange the shoes if they have not been used outside the store.

2. Wear socks when trying on shoes. This will insure a good fit.

3. Choose the shoe that feels best. Do not choose a shoe because it matches a favorite warm-up suit, is the fashion color of the year, or is advertised extensively.

4. Make sure the shoe fits snugly on each foot. Allow one-half to one inch room in the toe box between the ends of

the big toes and the ends of the shoes (Pleas, 1981). This will allow for the expansion of the foot as it fills with blood during exercise. If the toes cannot be wiggled, the shoes are probably too small. If there is a question of choosing a shoe that is too small or too large, choose the larger shoe. Larger shoes will mold to fit to a certain extent, but they will not get any longer.

5. Do not get hung up on sizes. All brands of shoes are cut to different specifications. An individual might wear three different sizes in three different brands.

6. Purchase good shoes. Kuntzleman (1979) states, "If you want to progress smoothly and without pain, invest in a good pair of shoes. Cheap shoes may save you money, but high quality running shoes will save your feet" (p. 94). Keeping this point in mind, the following is a list of the name-brand running shoes taken from Runner's World (1984):

Major Running Shoe Manufacturers

- | | |
|----------------|---------------|
| 1. Adidas | 9. Nike |
| 2. Autry | 10. Pony |
| 3. Brooks | 11. Pro-Keds |
| 4. Converse | 12. Pro-Specs |
| 5. Etonic | 13. Puma |
| 6. Kangaroos | 14. Reebok |
| 7. Mizuno | 15. Saucony |
| 8. New Balance | 16. Tiger |

(pp. 156-209)

7. Cost. Walking/running shoes vary in cost from \$10 (the discount and department store models) to \$100 for the most expensive. Watch for sales on the above mentioned shoe brands at local running stores. When buying walking shoes, ask the salesperson if there are any shoes on "close out." Major shoe manufacturers are constantly adding new models and eliminating others. The store will try to reduce the inventory of the discontinued models, and will significantly reduce the price. A good pair of walking shoes will probably cost from \$30 to \$50.

Qualities of a good walking shoe.

1. A slightly elevated heel that provides good support. Most all shoes have heels that are elevated; therefore, a walking shoe should be selected with a heel elevation of one-half to one inch (Kuntzleman, 1979). A flat heel would produce much stress and stretching of the calf area. Most all shoes built for running and walking contain this feature.

2. A wide-flared heel bottom. This will distribute the impact of the foot striking the ground over a wider area and will give more stability to the foot.

3. A stiff heel counter. This will prevent the rear of the foot from sliding outward (pronation) or inward (supination). This instability could cause injuries to the foot, such as blisters or heel spurs. The heel counter

should be firmly padded to help hold the heel in place and provide more stability when the foot strikes the ground.

4. Good flexibility. The walking shoe should be especially flexible near where the ball of the foot rests because this is where most of the bend in the foot takes place as the leg pushes off with each step (Donaldson, 1979). Bend the shoe several times to make sure it is flexible in the upper one-third of the shoe. If it is stiff and inflexible, then buy another shoe.

5. Contains good shock-absorbing cushioning. This includes a removable inner cushioning that can be replaced if it wears out and a multi-layered sole. These multi-layers include a durable, wear-resistant outer layer and a shock-absorbing inner layer. The inner padding should be soft and resilient to absorb the foot impact of walking. Subotnick (1977) states, "The major function of a shoe is to cushion shock" (p. 16).

6. The upper part of the shoe should consist of breathable material. Walking shoe uppers should be made of suede, leather, nylon, or combinations of these. These materials are light-weight, dry quickly, and permit good ventilation. Walking shoes will invariably become wet either from perspiration inside or from water on the outside. Nylon or synthetic dries very quickly at room temperature, while leather will take much longer. Leather has the greatest breatheability.

7. Good arch support. This is a must. Some cheaper brands of shoes have little or no arch supports. If the arch support is not adequate for the foot, consider seeing a podiatrist to have an arch support constructed.

8. Light-weight. A walking shoe, unless it is a hiking boot for rough terrain, does not have to be rigid, sturdy, and heavy. It should be as light as possible and still meet the requirements for good support and stable foot placement on the ground. Rossi (1983) states, "Every four ounces of weight added to a pair of shoes means an added one ton of foot lift load over a four-mile walk and this could produce foot fatigue quicker" (p. 19).

Pleas (1981) proposes a list of 12 questions to ask oneself when shopping for a new pair of walking shoes. The questions are as follows:

- | | | |
|---|-----|----|
| 1. Does this shoe fit snug like a glove? | yes | no |
| 2. Does my heel fit snugly into the heel cup of the shoe? | yes | no |
| 3. Is the heel rim biting into my Achilles tendon with each step? | yes | no |
| 4. Is there slippage of my heel? | yes | no |
| 5. Is my foot sliding down too much when I walk in the shoe? | yes | no |
| 6. Can I flex my toes? | yes | no |
| 7. Is there an obstruction which my toe keeps hitting? | yes | no |

- | | | | |
|-----|---|-----|----|
| 8. | Does the arch support feel right? | yes | no |
| 9. | Does the shoe feel light? | yes | no |
| 10. | Is the heel wide enough to absorb the impact? | yes | no |
| 11. | Do the shoes make me feel and look like a walker? | yes | no |
| 12. | Is this a good investment?
(If the answer to the previous question was yes, then the answer to this one is yes.) | yes | no |

(p. 54)

CONSTRUCTION OF A WALKING/RUNNING SHOE

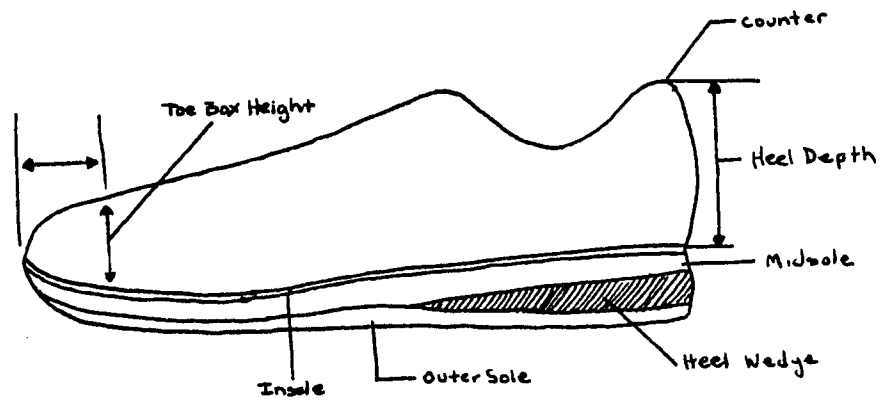
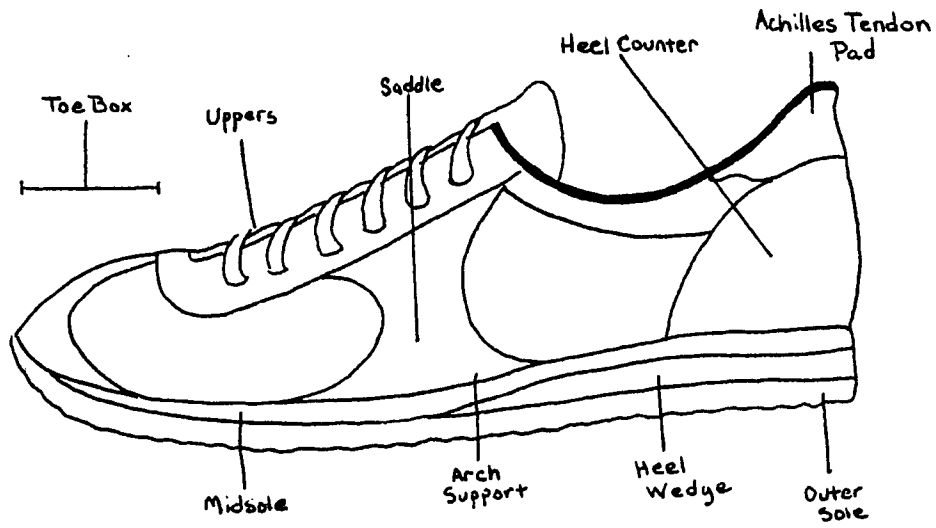


Figure 1. Construction of a Walking/Running Shoe.
A good pair of quality walking shoes is the walker's
primary monetary investment.

Chapter VI

Walking Techniques and Guidelines

Introduction

Walking is like any other sport in that it requires the use of proper form and technique for the walker to receive optimum benefits. Each individual possesses a unique muscle and bone structure that produces a walking style like no one else's. But, because of poor posture or improper muscle balance, the walking styles of many people may have deteriorated somewhat from what they should be. The following are some proper techniques that, if practiced, can make walking more efficient, more anatomically balanced, and more enjoyable.

Walking Techniques

Walk with good posture. The head should be level with eyes looking forward. The shoulders should be back and relaxed. Many walkers tilt the head to one side and lean forward. The forward lean in walking, as in running, shortens the stride, and a sideward lean of the head can cause neck pain. With the chest raised and the shoulders back, it is much easier to breathe. The body parts will also better align themselves if the stomach is in and the

buttocks are tightened. While walking, try to concentrate on one of these postural guidelines at a time until each becomes incorporated into the walking pattern and they become automatic. Remember the following (Walking for Exercise and Pleasure, 1982):

- 1) Head level and erect
- 2) Shoulders back and relaxed
- 3) Stomach in and buttocks tightened
- 4) Keep body level--not leaning forward
- 5) Back straight
- 6) Toes pointed forward with feet parallel (p. 5)

Walk with a natural arm swing. While walking with good posture, the arms will swing naturally in a pendulum motion from the shoulders. As explained in the section on bio-mechanics, each arm will swing in opposition to the legs to balance the hip rotation. As the left leg swings forward, the right arm also moves forward and vice versa. This balancing movement of the arms and legs provides for a smooth, rhythmical movement of the body.

Some people move their arms too fast for the movement of the legs, and some restrict arm movement by holding the arms still at their sides. Both techniques are incorrect. The arms should be left to hang down by the sides to move in a natural arc during most walking. If a faster walk is desired, the arms should be bent at the elbow in a 90^o

angle, which would shorten the arm swing and align with the faster leg stride (Jacobson, 1980).

If a walker carries hand weights, attempts to racewalk or walks fast, the bent arm swing is the only style to use. As the arm swings forward, keep the forearm straight and parallel to the ground and allow the hand to come up to near chest level. As the arm swings backward, the hand should swing back to just behind the buttocks. This arm-swing technique uses very little wasted motion, will aid the walking speed, and will provide strengthening movements for the shoulders, chest, and arms.

Breathe deeply and slowly. Breathing is an involuntary act that increases or decreases with the walking intensity. However, the natural breathing can be altered by practice to breathing that would be more beneficial to the walker. Pleas (1981) recommends an "inhalation-exhalation ratio of 1:2, meaning that the exhalation should take twice as long as inhalation" (p. 77). This breathing technique can be practiced by taking a deep relaxed breath while walking and counting to two, then exhale through the mouth while counting to four. Continue practicing this until feeling somewhat relaxed, inhaling for two seconds and exhaling for four seconds. This breathing cycle may have to be shorter while walking fast or walking hills, but practicing slow, rhythmic breathing will get more oxygen to the body and improve walking endurance.

Proper heel-strike. In normal striding, the back part of the heel should strike the ground first in line with the direction of the walk. Yanker (1983) recommends that the proper heel strike "involves placing the heel at a forty degree angle from the ground, making the foot and leg form a ninety degree angle with each other" (p. 42). The weight of the body is transferred from the heel to the outside of the foot as it rolls forward.

Poor walking form is exhibited when the foot lands flat on the ground. This causes body momentum to be lost, poor body alignment, and the walk to slow down. Even when walking up hills or stairs, let the heel strike first. This will have to be practiced before it becomes natural, but will prevent soreness and possible injury to the calves and Achilles tendon.

Proper leg pull and toe push-off. With both feet on the ground, the walker is in the double support phase of walking. During the leg pull, the back leg is lifted by pushing off with the toes and flexing the knee, and the leg is swung under the body. The front foot bears all the weight of the body and rolls to the outside, and the weight is transferred to the ball of the foot. By now the rear leg has passed the support leg and has extended in preparation for another heel strike (Luttgens & Wells, 1976). On both the heel strike and push-off, the leg should be fully extended in the direction of the walk to give good power.

Some walkers do not push off correctly and thus waste energy and lose the momentum of the walk.

Eliminate wasted motion. Walkers should try to conserve energy by eliminating wasted motion. Any bouncing or vertical movement or excessive side-to-side motion is not economical and results in an awkward, non-rhythmic walk (Luttgens & Wells, 1982). Walk as though a crown rested on the head. One way to assess walking motion is to watch the body's shadow while walking in the sun.

Practice and assessment. Try to practice the walking techniques one at a time for a few minutes. While practicing walkers should pretend they are putting on a demonstration to a panel of experts on how to walk. Try to observe the proper form, and with practice the good form will begin to become a habit. The goal should be to incorporate proper walking techniques into an individual style of walking. Strive for a rhythmic walk that is relaxed and "flows" with the natural movements of the body.

Walking Program Guidelines

Health assessment. The first step in beginning a walking program is the assessment of the person's health. Most people will know if they have arthritis, diabetes, anemia, lung, or kidney disease. However, not everyone will know the condition of his heart and blood vessels. Even if a person appears to be perfectly healthy and exhibits no

signs of heart trouble and exercises, it is still wise to get a yearly medical check-up after the age of 30. The medical examination should be a thorough one, consisting of examinations of the muscles, joints, heart, blood vessels, blood, and urine. A resting electrocardiogram or stress test should also be done by a cardiologist. According to Cooper (1977), the following recommendations should be adhered to concerning physical examinations:

- Under 30--Start exercising if you have had a medical check-up within the last year and nothing was found wrong with you.
- 30-39 --Medical examination within the last three months, complete with a resting electrocardiogram.
- 40-59 --Guidelines same for 30-39 group, plus an exercise E.C.G.
- 59 and Over --Same guidelines for 40-59 group with examination coming immediately before starting an exercise program. (p. 52)

Having gained medical clearance, the individual is ready to begin. But how far, how long, how fast, and how many times a week should a person walk? Prescribing exercise is a very serious matter. If someone, who has been sedentary for 15 to 20 years, smokes, and is overweight, is told to go out and "exercise," he/she could suffer a heart attack and die. de Vries (1979) states that "Telling

someone to 'go get some exercise' is roughly analogous to a doctor prescribing 'you must get some drugs' without specifying which pharmaceutical, how much, and how often to take it" (p. 280). The exercise prescribed for a muscle-strengthening program would be quite different from recommendations for a flexibility or cardiorespiratory program.

Since walking is an aerobic activity and the primary objective of a walking program is to improve cardiorespiratory functioning, the walking program recommendations will be in accordance with the present accepted scientific guidelines.

Walking frequency. The walking program recommended in this manual includes The American College of Sports Medicine's Position Statement on exercise. The A.C.S.M.'s (1978) recommended frequency (how many times a week) of exercise (includes walking and all aerobic sports) is three to five days a week. This does not mean that a person can not walk every day. Walking frequency depends on the person's beginning fitness level. However, in the beginning of the walking program, allow the body some days of rest and be perceptive to its aches and pains. Beginning with a frequency of three walks per week is the recommendation of most authorities (Kuntzleman, 1979). Gradually over a period of 12 to 20 weeks additional days of walking can be added.

Walking duration. The duration of walking is again a difficult item to prescribe due to the varying fitness

levels of beginning walkers. The A.C.S.M.'s (1978) recommendation is from 15 to 60 minutes of continuous aerobic activity. The A.C.S.M. (1978) further states that "duration is dependent on intensity of the activity, thus lower intensity activity should be performed over a longer period of time. The lower to moderate intensity activity of longer duration is recommended for the non-athlete older adult" (p. 10).

The walking program should begin with a set number of minutes that corresponds to the individual's fitness level. For beginners who have been sedentary, 15 minutes may be the best starting duration. For younger walkers or those who have been quite active, 20 to 30 minutes may be a good place to start. Luria and Koepke (1976) showed that a duration of 30 minutes and a frequency of five days a week were sufficient to produce a training effect in 46% of the subjects who walked for a 10-week period. The best advice is to consult with an exercise-knowledgeable doctor or physical educator at a college or university. A walking duration goal should be to walk for an hour or more at one time. To accomplish this goal may require months of training. Remember that the basic concept of developing cardiorespiratory fitness through walking is to develop the circulatory, respiratory, and muscular systems of the body through a planned, consistent, and long-term program based on the individual's condition.

Sleight (1983B) proposes the following beginning walking program for beginners:

Suggested Walking Plan

Day 1-7	Walk 15 minutes--faster than a stroll
Day 8-14	5 min. walk--faster than a stroll 10 min. at a moderate pace
Day 15-21	5 min. at a moderate pace 15 min. at a brisk pace
Day 29-31 and future	10 min. at a moderate pace 20 min. at a brisk pace (p. 2)

This program provides no days off and does not include pulse monitoring to guide the intensity of the walking, but does provide gradual overload of walking time over a 31-day period.

Pollock (1978) showed in his study of middle-aged men who walked for a duration of 40 minutes a day and a frequency of four days a week that walking could improve aerobic fitness. The men, aged 40 to 57, when compared to joggers running 30 minutes a week, were found to have produced similar cardiorespiratory training effects.

Walking intensity. The intensity of a walking program is measured not by perceived exertion, but by the pulse rate. The A.C.S.M. (1978) recommends a training intensity of 60% to 90% of the maximum heart rate reserve, or 50% to 85% of maximum oxygen uptake. First, the maximum heart rate and target heart rate should be determined (it will vary

with age). The maximum heart rate for an individual is determined by subtracting age from 220. If a walker is 40 years of age, the maximum heart rate would be 180. This is the maximum pulse rate the person should obtain while walking. A higher pulse than 180 could be dangerous to the person's cardiovascular system.

The target heart rate is the pulse rate the walker should attain in order to gain a training effect on the body's cardiorespiratory system. Most authorities agree that 60% of the maximum heart rate, as does the A.C.S.M. (1978), is the minimum pulse rate that will yield a training effect. Again, just as in duration and frequency, the intensity of a walking program is dependent on the physical condition of the person. Beginners should start at 60% of the maximum heart rate, while persons in better condition may opt for 70 to 80% of the maximum heart rate. The professional advice of a qualified cardiologist or sports medicine doctor should always be followed in beginning a walking program.

A training intensity of 75 to 80% was used by Flint, Drinkwater, and Horvath (1974) who assessed the cardiorespiratory training effects of walking on women ages 23 to 49 years. The women walked on treadmills for 6 weeks, 3 times per week, 30 minutes per session, at a constant speed of 90 meters per minute. The training heart rate was monitored at 75 to 80% of maximum by adjusting the slope of

the treadmill. "All the subjects produced significant training effects" (p. 89).

To check the pulse, the walker needs a stopwatch chronograph. These plastic chronograph watches (see the list of chronographs and a discussion of them in Chapter VIII of this manual) are inexpensive and should always be carried on a walk to time the walk and to stop every 10 minutes or so to check the pulse. Count the pulse by placing the two middle fingers over the carotid (neck) or radial (wrist) arteries. If the carotid artery is chosen, be sure not to press too hard as excessive pressure will cause the pulse to slow down (Allson, Harrison, & Vance, 1984). The pulse count should be taken for 10 seconds and multiplied by six, or take the pulse for six seconds and add a zero. Be sure to stop walking only long enough to take the pulse so as to maintain the aerobic condition of the walk. Table 1 gives the maximum heart rates for various ages, along with the target heart rates for 60 to 85% of the maximum heart rate.

While walking, take several pulse counts to insure that the target heart or pulse rate has been reached in order to get the maximum cardiorespiratory benefits.

Table 1

Average Maximal Heart Rates and Target Heart Rates

Age	Maximal Heart Rate	Target Heart Rate				
		60%	70%	75%	80%	85%
10	210	126	147	158	168	179
15	205	123	144	154	164	174
20	200	120	140	150	160	170
25	195	117	137	146	156	166
30	190	114	133	143	152	162
35	185	111	130	139	148	157
40	180	108	126	135	144	153
45	175	105	123	131	140	149
50	170	102	119	128	136	145
55	165	99	116	124	132	140
60	160	96	112	120	128	136
65	155	93	109	116	124	132
70	150	90	105	113	120	128
75	145	87	102	109	116	123

In summary the guidelines for setting up a fundamentally sound walking program are as follows:

1) Get medical clearance from a doctor, preferably with a stress test given.

2) Walk at a frequency of three to five days a week, depending on the fitness level of the individual.

3) Walking duration should be 15-60 minutes or beyond. This is also dependent on the walker's fitness level.

4) Walk at an intensity of between 60 and 85% of the maximum heart rate.

Warm-up and Cool-down

Warm-up. The warm-up phase of a walk begins with a 5 to 10 minute period of pre-walk flexibility stretches (see Chapter IV) while observing the proper guidelines of static stretching. The warm-up continues with the person beginning to walk at a slow pace to gradually elevate the pulse. By doing this, the body's muscles are allowed to get warm and the blood vessels are given time to open gradually. Many beginning walkers want to walk immediately and skip the warm-up and cool-down periods because of lack of time. If this is done too often, the sudden stress of brisk walking could lead to soreness and injury (Allsen, Harrison, & Vance, 1984).

The bout of walking begins when the person has stretched adequately and walked slowly to warm the muscles with blood and elevate the pulse to near the target pulse rate. The walking pace can be increased and the pulse rate elevated into the target pulse zone. As mentioned previously, the walker should attain a pulse rate of 60 to 80% of the maximum pulse rate and sustain it for 15 to 16 minutes.

Cool-down. The third phase of the program begins when the person is ready to end the walk. Walks should not be

stopped abruptly. Doing so puts a severe strain on the body and can cause soreness. The proper way to end a walk is to slow the pace and give the pulse and body temperature a chance to return to normal gradually. This cool-down period of slower walking should be similar to the warm-up period of walking. Once the cool-down walk is over, a post-walk stretching routine should be initiated. This flexibility routine should be about the same as the pre-walk routine.

Gradualism and Progression

Another walking guideline to keep in mind is that of gradualism and progression. Gradually increase the three exercise variables of intensity, duration, and frequency over several weeks or months. These mild increases are termed overloads. The body must have time and rest to adjust to the physical stress caused by these overloads. If a program allows for the body to adapt to the physical stress of walking, the individual will progress and have less chance of quitting and of getting injured.

The following is a walker's decalogue consisting of basic suggestions about beginning a walking program. The decalogue summarizes many of the basic points already mentioned in the manual.

The Walker's Decalogue

The following suggestions are provided to help those persons who are beginning an aerobic walking program.

1) People over 30 years of age and not accustomed to regular exercise should get a complete medical examination, preferably with an exercise ECG by a cardiologist.

2) Purchase good walking shoes. Although the cost may seem high, this is the largest purchase the beginning walker will make.

3) Use a pre-walk and post-walk flexibility routine to keep freedom of movement in the muscles and joints. Stretching should be done statically instead of ballistically.

4) Start walking slowly and gradually increase distance and intensity over a period of weeks. Let the body adapt to the physical stress of exercise.

5) Relax while walking, being sure to keep the body erect and balanced, not hunched forward. The foot plant should be heel-toe. Shoulders and arms should move freely and rhythmically.

6) For maximum health benefits, walk 3 to 5 times a week within the target pulse rate for a duration of 15 to 60 minutes.

7) Walkers should not force themselves to walk if they are ill or have an injury. "Listen" to the body and be

perceptive to its aches and pains. Give the body a day off if fatigue is experienced too often.

8) In the beginning of a program try to walk with someone at the same time in the same place. This will help build up the walking habit. Then the walks can be varied.

9) Train; don't strain. Never walk so fast that a normal conversation can not be carried on with a companion.

10) Always let walking be fun and enjoyable. Walk in pleasant places with pleasant company.

Chapter VII

Mechanics of Walking

Introduction

Walking is the most often used form of human locomotion. Napier (1967) states that man has been walking upright for more than one million years. The body's levers are moved about in perfect synchronization by powerful skeletal muscles that propel the body forward with great beauty and precision. Napier (1967) calls the human stride "the quintessence of the human locomotor achievement" (p. 56). The human bipedal gait is a coordinated rhythmical movement of steps taken as the body's weight rests for a short while on one leg and then on the other.

All quadripeds (four-legged animals) are quite stable as they move about, because their centers of gravity are always safely within their bases of support. However, the human condition is quite different as man has an elevated center of gravity situated over a small base of support. As man walks, the center of gravity is swung forward and out beyond the base of support, creating a precarious situation in which, to prevent falling, a new base must be created.

The Human Stride

This striding upright walk of man is unique to him and is exhibited by no other form of life. Man's walking action has been described in several ways. Napier (1967) refers to human walking as "a unique activity during which the body step by step teeters on catastrophe" (p. 57), while Straus (1964) refers to the human gait as "continuously arrested falling" (p. 43).

Whatever the description, the act of walking is a very complex series of human movements. However, to the average person, walking appears to be a rather simple act, but this is not the case.

Human Gait

All individuals walk differently and an individual's gait is as usual as his/her signature (Donaldson, 1979). Everyone can identify friends as they walk toward them from a distance just by the way they walk. All people have their own unique anatomy, bone structure, and muscle structure that produce a peculiar gait and style of walking.

Center of Gravity

While standing, the human body has an elevated center of gravity, located in the lower abdominal area anterior to the sacrum, situated over a small base of support, the feet (Northrip, Logan, & McKinney, 1983). This situation provides man with flexibility and variability of movement but increases instability and the danger of falling. The

center of gravity in adult males is 54 to 57% of the total height from the floor, and that of adult females is 53 to 56% of the height (Broer & Zernicke, 1979).

The Walking Cycle

The walking cycle consists of the heel strike of one leg to the heel strike of the other foot and then back to the heel contact of the starting foot. In between those two heel strikes much happens. The walking cycle can be broken down into a support phase and a swing phase for each leg (Luttgens & Wells, 1982). One foot is always in contact with the ground, and for a brief time both feet are touching the ground. This double-support phase is the main characteristic of walking and distinguishes it from running, which has no double-support phase (Broer & Zernicke, 1979).

The walking cycle is a reflex action (no conscious control is necessary) and begins with ankle flexion and a push-off by one foot as the inertia of the body is overcome. The other leg enters the swinging phase in which the knee and hip flex, and the toe is lifted off the ground. At this time, one foot supports the entire weight of the body and gravity begins to pull the body forward and downward. Unless the swinging leg comes forward and produces a new base of support, the body will fall. Support is denied for a moment until the leg brought forward prevents the threatening fall (Straus, 1964). The body continues forward due to its momentum and the contraction of muscles

in the supporting leg. The swinging leg, shortened by knee and hip flexion, continues under the body. The knee extends and straightens and the ankle flexes to prepare for the heel strike. The swinging leg is brought forward by hip flexion, the forward motion of the center of gravity, and the momentum of the swinging leg. The heel strikes the ground and the support phase of that leg begins.

Marsden and Montgomery (1972) found that the heel strikes the ground most of the time during normal walking, but during fast walking, step walking, or running the weight of the body is taken on the sole 25% more of the time.

An overlapping of the support phases of both legs produces a double-support phase. In a complete walking cycle each leg is involved in the support phase for 60% of the cycle and in the swing phase for 40% of the time (Donaldson, 1979). However, the two support phases of each leg overlap as the body's weight is transferred to the support leg and the swinging leg still has contact with the ground.

Vertical and Lateral Displacement

While walking, any unusual vertical or lateral displacement by the body causes a loss of momentum, is wasted motion, and makes the walking less efficient in terms of energy required. Any excessive bouncing up and down or side to side arm motion detracts from the forward motion of the body. Because of the toe push-off and the rotation of

the pelvis, some vertical and lateral movement will be present. But in the normal efficient walking style of most people, these components are barely noticeable.

Arm Swing

The arms will swing alongside the body in opposition to the leg movements. As the left leg moves forward, the right arm moves forward and vice versa. This is a reflex movement and is done to offset the lateral displacement of the pelvis as it rotates. As the speed of the legs increases, so does the arm swing. The arms are swung by a combination of the pull of gravity and the contraction of the shoulder and back muscles.

Walking on level ground under normal circumstances has been described. However, when the terrain changes or additional weight is added to the body, the walking cycle changes.

Incline Walking

When walking upstairs or a steep incline, the swing phase of the leg is characterized by an exaggerated knee lift and flexion at the ankle (Luttgens & Wells, 1982). The body is slightly tilted forward and the muscles of the trunk and back must be contracted to maintain a straight line of movement.

If a pack or other load is carried on the back, the walking gait is also somewhat altered. Martin and Nelson (1983) found in cinematographical studies as pack loads

increased on tested subjects "the stride lengths began to decrease along with the non-support time for a single leg" (p. 171). They also observed an increase in stride rate and double leg support time. As expected, the subjects increased their forward lean as the pack loads increased.

In the walking motion, nearly all the body's bones and muscles are brought into play at some time or another. If the walker's head turns from side to side to view the scenery and if the walker talks to a companion, then the total body involvement in walking is almost 100%. When viewed in terms of the many body parts involved and the integration of these segments into a beautiful, skilled, and coordinated motion, walking truly is a "work of art."

Chapter VIII

Walking Attire, Gear, and Aids

Introduction

Walking, like any other sport, is far more involved and complicated than it first appears. To build a complete walking program requires more equipment and paraphernalia than just shoes. Peterson (1983) states that one of the reasons that walking is held in low esteem as an exercise is the fact that walking "requires no special equipment or clothing as do the other sports like skiing or tennis that require elaborate equipment" (p. 8).

However, there are several pieces of equipment that a walker should possess to enhance the walking program and make it safe and enjoyable. This section contains a brief discussion of the walking-related items followed by a list of the companies that manufacture the item, its brand name, and the company's address or where the item can be purchased, and the approximate cost as of the Fall of 1984.

This section is provided to eliminate the "fog" and confusion around purchasing supplementary equipment of a walking program. These listings are by no means complete, but do contain some of the top items and the producers of the walking gear and aids.

Walking Attire

Socks. Socks can be purchased in all sorts of colors, lengths, and are made of all types of materials: silk, acrylic, cotton, nylon, wool, polypropylene, and combinations of these five. For most aerobic walking, a good cotton, light wool, or combination cotton and synthetic sock is best. These socks are absorbent, allow air to get to the feet, and fit snugly. Hikers and backpackers wear heavy wool socks to absorb perspiration, dry quickly, and provide cushioning. Some walkers prefer to wear two pairs of socks. Justice William O. Douglas (Sussman & Goode, 1980), a formidable walker, advocated "a thin inner pair of cotton socks (some prefer silk) and a thick outer pair of textured cotton or wool" (p. 134).

The following are some guidelines concerning socks:

1. Always wear some type of clean sock while walking.
2. Do not wear thin nylon socks as they are tight and tend to bind the toes together. They do not absorb perspiration well.
3. Be sure the socks are the right size for the feet. Sock sizes are larger than shoe sizes.
4. Socks should fit snugly, but the toes should have room to move around.
5. Cotton and wool combinations are the ones most often preferred by walkers. They breathe, provide cushioning, and absorb perspiration.

6. Socks should not have any seams, lumps, or folds in them as they can cause blisters.

7. No brands of socks are recommended, but all sporting goods stores, running stores, or outdoor and camping stores stock a wide assortment of varying blends of socks.

Hats. Hats for walking are sometimes used in the summer, are seldom needed in the spring and fall, but are a necessity in the winter. While walking in the hot summer sun for long periods of time, a walker may need a hat to protect the head from the sun. Davis (1979) mentions that the outdoor walker "needs a broad-brimmed hat to shade the eyes from the sun and protect the face and neck against sunburn" (p. 123). The eyes need protection from the sun, so a hat with a rounded brim is appropriate, or a cap could be used. The hat or cap should have plenty of holes to let in air. In winter most of the body's heat escapes through the head, and the ears tend to become very cold. Wool, synthetic, or cotton stocking caps are very good for controlling the heat loss from the head and for pulling down over the ears. Earmuffs or ski masks can be worn if the temperature gets very cold.

Sunglasses. Sunglasses reduce the sun's glare and shield the eyes from the harmful rays. There are many models and brands that range widely in price. Obtain a good

pair (about \$20) and wear them on very sunny days. However, when the scenery is beautiful, be sure to remove them.

Headbands and scarfs. If excessive perspiration is a problem, walkers may want to wear a handkerchief folded and tied around the forehead or a cotton headband. This attire is very fashionable today, but serves an important function in keeping the sweat out of the eyes.

Gloves. The hands must be covered during cold-weather walking because the fingers lose heat rapidly, and there is reduced blood flow to the extremities. The best type of gloves to wear depends on the temperature. Cotton work gloves are very good because they allow air to enter and they absorb any perspiration from the hands. Wool or polypropylene gloves are very good for colder temperatures. In extreme cold, lined leather gloves can be worn. Sometimes the leather gloves, if worn in middle temperatures, cause profuse sweating in the hands because of the lack of ventilation.

Shirts and jackets. In warm weather, the familiar cotton tee-shirt is just right. It allows freedom of movement and dries quickly in the sun. As the weather cools, the cotton should be exchanged for a material that will absorb perspiration as well as cotton, but will dry in the cold air. The best materials for this are the same recommended for socks and gloves, cotton and wool blends and the synthetic polypropylene. Long-sleeved shirts made of

these fabrics keep the walker quite warm in the cool fall weather. In cold weather, a nylon windbreaker over the wool or polypropylene shirt will be sufficient. Nylon holds in the heat well and breaks the wind. In rainy weather a waterproof poncho is the best shirt. A Gore-Tex, warm-up jacket will shed water and allow air to enter and let the perspiration in the form of water vapor escape. Large, heavy coats will feel good at first, but will probably be too hot as the body produces heat from walking. In sunny weather, many walkers prefer to wear no shirt at all. Be sure to gradually expose the body to the sun to allow the skin to tan and prevent sunburn. Use sunscreen lotion to prevent burning if long walks are attempted early in the summer.

Pants. The best walking pants are shorts. Nylon running shorts, hiking shorts, tennis shorts, or sports shorts are great for walking because they allow freedom of movement of the legs. If the weather becomes too cold for shorts, then loose-fitting, warm-up pants or slacks can be worn. Avoid any tight-fitting pants, shorts, or blue jeans as they restrict leg movements.

Walking Gear

Body fat calipers. With the problem of overweight and obesity in the U.S., people are constantly checking their body weight on scales and checking the height and weight tables. However, checking height and weight tables and

looking at the scales will not always tell people how much body fat they are carrying. Many people, as they decrease their activity, lose muscle and gain fat. Thus, a person's weight may not change for ten years, but the body composition can change. A person could be within the guidelines of the height and weight table provided by insurance companies, but still be overweight. Also, weight lifters and very muscular athletes who have low percent body fat would appear to be overweight according to the height/weight tables.

To eliminate the confusion of whether a person is overweight or not, a more scientific approach should be taken. The most practical method to estimate body fat is by use of a skinfold caliper. By pinching double thickness of skin and fat on various sites of the body and measuring them, a good estimate of body fat can be obtained (Myers, Golding, & Sinning, 1973).

As a walking program continues, it would be a good motivator to see a reduction in body fat. By purchasing a skinfold caliper and regularly measuring the percent body fat, walkers can accurately determine if they are losing fat weight.

The various models of skinfold calipers available range from very accurate and expensive ones like the Harpenden models that sell for \$200 to the inexpensive Fat-O-Meter that sells for \$10. Instruments such as the Fat-O-Meter and

Skin-Guide are quite accurate when used properly and would be as functional as a more expensive model. After purchasing a skinfold caliper, the walker should consult a physical educator or exercise physiologist for instruction in the proper use of the instrument. The practice of taking measurements on several people will help the individual to become familiar with the measurement sites and how hard to pinch the skinfolds. The individual will soon become familiar with the measuring techniques and be able to accurately assess percent body fat.

The following is a list of some of the recommended skinfold calipers on the market today:

Body Fat Calipers

Fat Control	Fat Control, Inc. P.O. Box 10117 Towson, MD 21204	plastic; reasonably accurate	\$ 15
Fat-O-Meter	Fat-O-Meter Health and Education Services 2442 Irving Park Rd. Chicago, IL 60618	plastic; accuracy corresponds well with more expensive instruments	\$ 10
Harpenden Skinfold Caliper	Quinton Instrument Co. 2121 Terry Ave. Seattle, WA 97121	scientific quality instrument; very accurate; used by colleges	\$200
Lafayette Skinfold Caliper	Lafayette Instrument Co. P.O. Box 527B Lafayette, TN 47403	good quality instrument	\$175

Lange Skinfold Caliper	Cambridge Scientific Industries P.O. Box 265 Cambridge, MD 21613	very accurate; scientific quality instrument; used by colleges	\$165
Skyndex System 1	Caldwell Justiss & Co. Box 520 #7 Colt Square Fayetteville, AR 72702	electronic with a digital read out; program auto- matically figures body fat	\$400
Skyndex System 2	Caldwell Justiss & Co. Box 520 #7 Colt Square Fayetteville, AR 72702	digital read out, but does not auto- matically figure body fat	\$200
Slim Guide	Creative Health Products 9135 General Court Plymouth, MI 48170	made of plastic; accurate; durable	\$ 20

Foot massagers. Foot massage can be an important procedure in the care of the feet. More emphasis is being placed on body massage in physical fitness today. The feet, having to absorb the weight of the body plus the additional force of walking and running, greatly benefit from massage. Massaging the feet is a pleasurable sensation that stimulates nerves, improves blood flow, and relaxes the tired muscles of the feet.

Massaging the feet with the hands is probably the best technique. To get a foot massage at work or at home while watching television, one of the wooden rollers available is quite good. These rollers contain ridges and grooves that massage the feet when it is rolled over them. Keep one handy in the briefcase and, when the feet feel tired, slip

off the shoes (under the desk) and put the roller on the floor. Ten minutes of roller massage can be of great benefit to the feet.

The following is a listing of the foot massagers available today:

Foot Massagers			
Foot Massage	Walkways Woodward Bldg. #426 733 15th, N.W. Washington, D.C . 20005	3 rows of wooden balls rub soles of feet--stimulate circulation	\$ 10
Footsie	Natural Energies P.O. Box 8018, Dept. J Ann Arbor, MI 48107	made of solid cherry wood with ridges to roll foot over	\$ 10
"Hot Tub"	Edmund Scientific 101 E. Gloucester Pk. Barrington, N.J. 08007	water filled con- tainer with whirl- pool, vibration action, thermostat to keep water warm	\$ 80
Runner's Foot Massage	Lone Runner Sports, Inc. 10-50 Jackson Ave. Long Island City, N.Y. 11101	solid maple with ridges and grooves for foot to roll over	\$ 10

Hand weights. The use of hand weights was discussed in Chapter VII with strength routines. To summarize, carrying hand weights of any type is good for overloading the body and giving a quicker rise in pulse rate and building strength in the upper body.

The Heavy Hands System has the advantage of the spongy grips, and the weights on the ends can be changed to

different poundages. However, any weight will work, even the ones a walker can make.

The following list contains the four most popular hand weight systems used by walkers:

Hand Weights

Aerobic Comfort Grips	Arthur Brian Co., Inc. 24440 Sperry Circle Cleveland, OH 44145	grips weigh 1 lb. each; conform to hand contours	\$14
Band Wrist Weights	Edmund Scientific 101 E. Gloucester Pk. Barrington, N.J. 08007	vinyl-covered weights with vel- cro snaps; fit snug	\$14-
Fitness Weight Gloves	Fitness Concepts Decatur, IL 62523	come in sizes and weight 1 lb. each	\$20
Heavy Hands	Available at all sports and running stores	handles cushioned and absorbent; can unscrew weights and change poundage; ideal for walkers 2 lb. starter set to 1, 2, 3, or 5 lbs. per grip	\$20- \$25

Identification tags. In case a walker is injured or becomes severely ill, readily available identification with medical information would be most helpful in treatment and in notifying relatives.

Either of the two types of identification tags listed would be excellent to carry when walking. They are inexpensive and easy to carry.

Identification Tags

I.D. Tag (dog-tag style with chain)	Fronco Enterprises Box 2503 Dept. R74 Northridge, CA 91323-2503	\$ 5
Run-I-Dent Tag (same for walking clips to an elastic band for the wrist)	Run-I-Dent Box 144 Francestown, NH 03043	\$ 3

Night reflective gear. Various types of reflective gear is a must if walkers do any training at night. Various types of reflective equipment are available which can be easily seen on a walker at night. A reflective vest or warm-up suit is a must for night walkers who frequent heavy traffic areas.

The following is a list of the reflective gear available. Note that many essential walking aids are available with reflective qualities.

Night Reflective Gear

Jog-A-Lite	Jog-A-Lite Box 125 Silver Lake, NJ 03875	
Jog-A-Lite Reflec- tive Sash Bands		\$ 7
Jog-A-Lite Reflec- tive Tape		\$ 3
Jog-A-Lite Reflec- tive Leg Bands		\$ 5
Jog-A-Lite Reflec- tive Safety Vest		\$ 9- \$15

Jog-A-Lite Reflective Safety Belt		\$10
Jog-A-Lite Reflec- tive Headband		\$ 5
Jog-A-Lite Warm-up Suit		\$45- \$70
Moss Brown Reflectives	Moss Brown & Co. 1522 Wisconsin Ave. Washington, DC 20007	
Reflective Vest	One size fits all, velcro fasteners	\$27
Reflective Mitts	One size fits all	\$17
Reflective Bands	for wear on arms or legs	\$10 (set of two)
Reflective Wrist Wrist Wallet	Men's and women's	\$ 6
Safety Vest	Edmund Scientific 101 E. Gloucester Pk. Barrington, NJ 08007 (mesh design; one size fits all)	\$ 9

Pedometer. A pedometer is a small, distance-measuring instrument that can be hooked to the pants or belt. The instrument records the number of steps taken by means of an internal pendulum that moves with each stride. The accumulated strides are converted to miles, and the distance walked appears on the face of the pedometer.

Most walkers have a stride length of two and one-half to three feet, but this will vary due to leg length, terrain walked, and the speed of the walk. The pedometer can be set at stride lengths of 2, 2½, 3, or 3½ feet, depending on the

stride length. Gayle, Montoye, and Philpot (1977) suggest that "for greatest accuracy a pedometer must be calibrated by using a correction factor calculated by measuring stride length particular to that individual" (p. 635).

The stride length can be checked by walking normally in soft dirt or sand and measuring from the toe of one foot to the toe of the other foot. This measurement will give a reasonably accurate stride length to set the pedometer. A more accurate stride length can be calculated by walking a measured distance, such as 25 feet, and dividing the distance by the number of foot impressions made in the soft ground. If the number of steps is 10, then 25 feet divided by 10 steps yields a stride length of 2.5 feet.

As mentioned before, stride length will vary with the terrain. A stride will lengthen on level surfaces or when walkers increase the speed of their walking and will shorten when they encounter hills.

The variation of the stride lengths usually evens out over a long period walked, and the pedometer gives a very close estimate of the distance walked. This is important for recording the distance in a log.

The accuracy of a pedometer and the stride length setting can be checked by walking a known or previously measured one-mile distance. Walkers could also go to a 440-yard track and walk four laps (one mile) on the inside lane. Check the pedometer after each walk to see if it has

recorded a mile. If the pedometer does not agree with the one mile walked, then adjust the stride length setting accordingly.

Pedometers may be purchased at most sporting goods and running stores. There are several brands and models on the market. The type with the inside pendulum that attaches to the belt is the most reliable.

The following is a list of some of the various pedometers now available:

	Pedometer	
Cronus Digital Walking/Jogging Meter	C.P.P.I. 2895 Northwestern Pkwy. Santa Clara, CA 90051	\$20.00
Digital Distance Pedometer	Aristo Import Co. 15 Hunt Road Orangeburg, NY 10962	\$20.00
Digital Pedometer	The West Bend Co. West Bend Wisc. 53095 (Readings up to 99.9 mi. measure 8" to 3'4" stride)	\$20.00
Digital Pedo-Meter	Edmund Scientific 101 E. Gloucester Pk. Barrington, NJ 08007 1-800-257-6173	\$25.00
Walk-N-Jog Meter	Total Fitness Magazine Dept. 1314 G*03 15115 S. 76 East Ave. Bixby, OK 74008	\$ 3.50

Pulse monitors. The normal method of monitoring the pulse during walking has been discussed. By simply taking a six-second pulse count at the carotid or radial arteries and

adding a zero, an estimation of the exercising pulse rate can be obtained. This method involves stopping and interrupting the walk to obtain a pulse count, and many walkers do not like this, but prefer to have a continuous read-out of the pulse by use of a pulsometer.

Most of these instruments are quite expensive (\$50-\$200), but are fairly accurate when attached correctly. The computer part is usually attached to the wrist, with an electrode running from the computer and attached to the little finger. The computer has a digital display which updates the pulse rate every few seconds. This knowledge of the exercise pulse insures that the walker can safely stay in the target pulse rate.

Several of these instruments are on the market. The following list contains names and prices of a sampling of six brands:

Pulse Monitors

Activemeter	Edmund Scientific 101 E. Gloucester Pk. Barrington, NJ 08007	attaches to wrist and finger	\$100
Delux Electronic Pulse Monitor #69-2093	Carolina Human Physiology Equipment 2700 York Rd. Burlington, NC 27215	Insert finger in pulse sensor; battery-powered	\$ 55
Exercise Pulse Monitor #69-2093	Carolina Human Physiology Equipment 2700 York Rd. Burlington, NC 27215	wrist-worn; attaches to small finger; buzzer signals when target pulse rate reached	\$185

Heart-Rate Trainer	Edmund Scientific 101 E. Gloucester Pk. Barrington, NJ 08007	attaches to wrist with electrodes attached to chest and arm	\$230
Phoenix Pulse	Edmund Scientific 101 E. Gloucester Pk. Barrington, NJ 08007	chronograph and watch, has a touch sensor that gives pulse rate	\$ 55
Pulse Tach Fingertip Heart Computer #5-025	Sharper Image 680 Davis St. San Francisco, CA 94111	attaches to finger; contains stop- watch	\$ 50

Self-defense products. The use of self-defense products, particularly by women walkers, is increasing. Many female walkers are concerned with being assaulted during night walks and are seeking mace sprays or walking sticks to protect themselves. As mentioned in Chapter X, the best defense against being mugged is to walk in groups. When this is not possible, the following listing of self-defense products may be of interest to walkers.

Self-defense Products

Counter Attack	Counter Attack Counter Attack, International Assn., Inc. 71 Mott Ave. Inwood, N.Y. 11696	Fits in hand, pro- duces a surprise electric shock to would-be attackers; Battery operated	\$ 20
Halt Aerosol	Millerhouse Box 4196 Great Neck, NY 11027		\$ 20
Lifesaver	Walkways, Woodward Bldg. #426 733 15th St. N.W. Washington, D.C. 20005	Combination alarm and flashlight Generates a loud noise	\$ 13

Shoe-cushioning products. To absorb foot impacts or to protect a foot injury, the purchase of a product to add cushioning to the foot may be necessary. If the injury persists, or for advice in purchasing the right shoe insert, check with a podiatrist.

The following is a listing of some of the shoe-cushioning products:

Shoe-cushioning Products

Sorbothane Shoe Inserts	Available at all sports and running stores	absorb impact of foot striking ground. Very durable, come in sizes, will add weight to shoes	\$16
Sorbothane Shoe Inserts for the Heel Only	Available at all sports and running stores	same as above	\$10 pr.
Urethane Heel Inserts	Edmund Scientific 101 E. Gloucester Pk. Barrington, NJ	doesn't give off odor; light weight, firm yet cushioned	\$10

Shoe repair. Shoes are the biggest walking expense and should be preserved and maintained as long as possible. Walking shoes will begin to wear on the heels and the outer sides the most. To insure that the wear does not disturb the foot plant of the feet, the worn areas should be built back up with a shoe cement. These cements can also be used to bond together other torn parts of the shoe.

The following is a list of the top four products used by runners and walkers on their shoes:

Shoe-repair Products

Eternal Sole	all local sports and running stores	permanent urethane patch; attached to worn area of heel	\$ 5
LiquiSole	all local sports and running stores	urethane in a tube; repairs worn areas of shoe; flexible and lasts for several weeks. Can be used to glue back separated parts of shoes	\$ 5
Shoe-Goo	all local sports and running stores	a rubber-like cement that is applied to the worn areas of the shoe; has to be replaced after several days	\$ 5
Shoe-Goo II	all local sports and running stores	improved product similar to LiquiSole	\$ 5

Walking Aids

Walking treadmills. Treadmills are quite expensive (\$150 to \$3,000), but are increasing in popularity. They come as motorized and non-motorized machines which can stimulate level walking, or tilted to represent hills. Treadmill walking is highly recommended by cardiologists for heart-attack patients to rehabilitate themselves while they are confined to the indoors.

For people who dislike inclement weather, treadmills are a good walking alternative. Some walkers stay at home to watch after children or claim their business interests

do not allow them enough time to walk outside. These walkers can use the treadmill, as well as outdoor walkers who want a supplementary change in their walking routines.

When using a treadmill, there is no worry about stepping on rocks or in potholes, and television can be viewed while treadmill walking in the home. The instrument panel on most treadmills gives a convenient read-out of the walking speed and miles walked.

The following is a list of some various treadmills available to walkers:

Walking Treadmills

Indoor Jogger-Walker	Edmund Scientific Co. 101 E. Gloucester Pk. Barrington, NJ 08007	Non-electric small in size, can be used in small area	\$ 150
Pacemaster 600 X	Aerobics, Inc. 30 Colsax Ave.	electric, variable speed, electronic timer	\$1,000
Quinton Cardio-Exercise Treadmills	Quinton Instrument Co. 2121 Terry Ave. Seattle, WA 98121	various models high quality and durable	\$ 600- \$2,000
Tredex Exercise Treadmills	Universal Equipment 8130 New LaGrange Rd. Louisville, KY	various models electric and manual	\$1,300 to \$13,000
Tunturi Exercise Treadmills	Americ Tunturi P.O. Box 3825 Bellevue, WA 98009 1-800-426-0858	non-electric can walk at various speeds	\$ 850
Vitamaster Treadmill #EV1600	Sharper Image 680 Davis Street San Francisco, CA 94111	non-motorized and durable	\$ 400

Walking sticks. The idea of walkers carrying sticks, canes, or staffs has its origins in Biblical times. Shepherds and travelers of that day carried a staff about five feet long, and it was used for handling the sheep and for self-protection. The Twenty-Third Psalm mentions the walking staff, "Yea, though I walk through the valley of the shadow of death, I will fear no evil: for Thou art with me, Thy rod and staff they comfort me" (Psalm 23:4).

Donaldson (1979) states,

Walking sticks have been made from an assortment of materials including ivory, bone, ebony, bamboo, whargee, and whampoo as well as pear, cherry, tobacco, vine, and banana woods and have been bejeweled with diamonds, gold, sapphires, emeralds, amber, or jade.

(p. 101)

Today, walking sticks are less fanciful, but can be useful in maintaining balance on rugged or unstable terrain or for fending off dogs and muggers. Sleight (1981) recommends carrying a walking stick and says that, "A staff can be used to give extra support and balance and is good exercise for the arms" (p. 39).

Good wooden walking sticks can be purchased at flea markets or craft fairs or they can be made by cutting small sapplings in the woods. The commercially-manufactured sticks available are listed in the following section, and most are used for support and protection.

Walking Canes/Sticks

Folding Cane	Walkways Woodward Bldg. #426 733 15th St. N.W. Washington, DC 20005	made of light-weight aluminum, wooden handle; folds up to 9"; available in lengths of 33" or 36"	\$ 22
Joystk	JoySTK P.O. Box 17756 Greenville, SC 29606	19" long; laminated wood; strong; light	\$ 10
Rhode Stick	Rhode Runner Ltd. P.O. Box 566 Bristol, RI 02809	fiberglass rod; has clip to put on waist; closes to 9", but opens to 27"	\$ 20
Road Companion	Fenagh Stick Co. P.O. Box 10 Fair Haven Station New Haven, CT 06513	made of wood; nylon loop for hand; looks like a billy club	\$ 10
Sceptre	Group Tradiing Ltd. 5219 N. 27th Ave.	contains stopwatch; is flourescent; has hollow compartment for carrying change and keys	\$ 30

Watches. Everyone has a watch, but not all watches contain accurate stopwatches. Walkers will need a stopwatch to check their pulse rates to see if they are in the target pulse-rate zone or if the rates are too high. Many walkers like to time their walks and stop their watches when they stop to drink, eat, or chat with someone. A watch that permits a walker to stop and restart it can accurately measure the actual time of the walk.

The so-called plastic "runner's watch" can easily be converted to a "walker's watch." They vary in price and quality as does most equipment. One should be bought that is waterproof, but not one that has a multitude of functions that a walker will never use. A watch that tells the time and date and converts to a stopwatch is sufficient.

The following is a sampling of some top chronograph watches.

Chronographs and Stopwatches

Accusplit 930XP	Accusplit 2290 A Ringold Ave. San Jose, CA 95131	plastic; contains all modes	\$ 40
Casio Joggers Watch J-30W	Available at all sports and running stores or Casio, Inc. 15 Gardner Rd. Fairfield, NJ 07006	plastic, water resistant; con- tains many functions	\$ 25
Cronus W-Watch	Cronus Precision 2895 Northwestern Parkway Santa Clara, CA 95051	plastic; contains standard modes	\$ 40
Pulsar KB003S	Pulsar Time, Inc. 111 MacArthur Blvd. Mehwah, NU 07430	plastic, contains standard modes	\$ 50
Seiko Training Times	Available at jewelry stores, sports and running stores, or Seiko 640 5th Ave. New York, NY 10019	metal; water resis- tant to 100 feet; detachable cable for thumb control to start and stop watch	\$ 95
Timex 67731	Timex Box 2126 Waterbury, CT 06720	plastic; contains all modes	\$ 29

Chapter IX

Values of Walking

Aerobic walking provides a person with a series of physiological and psychological benefits. This chapter discusses in detail the various values derived from a consistent walking program.

Physiological Values

There are a multitude of beneficial effects of aerobic exercise. An exhausting list of factors improves steadily as walkers overload their bodies with physical exercise. Aerobic walkers will experience the very same benefits as runners, cyclists, swimmers, and other aerobic athletes. The President's Council on Physical Fitness and Sports (Conrad, 1973) states, "A fast walk may cover more ground in a given time and be more vigorous, creating a greater circulatory and respiratory involvement than does a slow run" (p. 1).

Pollack, Miller, Janeway, Linnerud, Robertson, & Valentino (1971), in a study of the effects of walking for 40 minutes 4 times a week for 20 weeks on 16 middle-aged men, found the following positive physiological changes to occur: a decrease in blood pressure, a decrease in resting heart rate, decrease in body fat, and a decrease in body weight.

Further evidence of the physiological effects of walking on the body was reported by Dawson of Wake Forest College (Bogira, 1979). He compared the fitness level of walkers and runners. One group of subjects jogged three days a week, and the other group walked briskly. In the 20-week study, the joggers' cardiorespiratory fitness levels improved only slightly over the walkers. The fitness differences were slight, and Dawson concluded that brisk walking was as good as jogging; it only took longer.

More research into the physiological values of walking was done by Leon and Associates (1979) at the University of Minnesota. In a study with six obese men aged 19 to 31 years, the men walked five days a week for a duration of 15 to 90 minutes for 20 weeks. The men showed cardiorespiratory training effects and weight loss (fat) ranging from 11 to 13 pounds. The high density lipoprotein cholesterol levels increased significantly.

The physiological effects of walking with packs was studied by Clarke, Shay, and Matthews (1955). Thirty college men carried regulation army equipment (clothing, rifles, combat boots, and packs with supplies) on marches of 7.5 miles for about three hours. Seven marches were done, one week apart. The subjects improved significantly the strength of the trunk, shoulder, and hip muscle groups and in motor fitness.

The previously mentioned studies are a small sampling of the research that substantiates the many positive changes brought about by good quality aerobic walking. The following is a list of physiological values to the body brought on by walking and other cardiorespiratory activities as reported by the President's Council on Physical Fitness and Sports (Clarke, 1977A):

- 1) Improvement of the fitness of the cardiovascular and blood transport systems.
- 2) Reduction in the likelihood of coronary heart attacks.
- 3) An effective modality in post-coronary care and rehabilitation.
- 4) Strengthening of bones, muscles, ligaments, and tendons, especially in the lower part of the body.
- 5) Improvement in the regulation of anabolism and catabolism through the human growth hormone and cortisol processes.
- 6) Aid in fat reduction and increase in lean body tissue.
- 7) Retardation of the aging process. (p. 18)

More specifically, the following physiological changes have been found to be induced by aerobic endurance activities such as brisk walking.

Physiological Benefits of Aerobic Walking

1) Lowers blood pressure. The more active a person is, the lower the systolic and diastolic blood pressure on the average, regardless of age (de Vries, 1979).

2) Increases the amount of H.D.L.'s (High Density Lipoproteins) in blood. H.D.L.'s are thought to give protection against heart disease. They are considered the "good guys" because they work against the hardening of the arteries (Hamilton & Whitney, 1982).

3) Decreased serum cholesterol, low-density lipoproteins, and triglyceride levels. These are three constituents of the blood, when elevated, are thought to contribute to coronary artery disease. Exercise temporarily (a few days) decreases the cholesterol, L.D.L., and triglycerides in the blood (Lamb, 1984).

4) Increased blood volume. Oscai, Williams and Hertig (1968) reported that endurance training can increase blood volume by as much as 6%. This was mainly due to increased plasma volume.

5) Increased amount of hemoglobin. The increased hemoglobin is in part due to the increase in blood volume. With more hemoglobin the blood can carry more oxygen to the tissues.

6) Lowered resting heart rate. With exercise the heart becomes stronger, the stroke volume increases, and with each beat the heart is able to pump more blood.

7) Increased cardiac output. The heart, because it is strengthened by exercise and has become more efficient, will pump more blood with less beats.

8) Tones muscles. Yanker (1983) reports that walking strengthens the muscles of the buttocks, thighs, shins, calves, hamstrings, and some upper body muscles (triceps, forearms, and shoulders).

9) Aids in weight loss of fat. Numerous studies substantiating the positive relationship between walking and increased loss of fat weight have been undertaken. See the section on weight control in this manual for some of them.

10) Increased stroke volume of the heart. Research evidence shows that exercise has a favorable effect on cardiac contractibility and increases the stroke volume of the heart. Lamb (1984) states that "regardless of the mechanism involved it is commonly observed that trained individuals have greater stroke volumes" (p. 373).

11) Increased blood circulation efficiency. The leg muscles and diaphragm contract and act as auxiliary hearts. Clarke (1976A) reported that peripheral circulation improved 300% in patients with peripheral vascular disease when they walked on a treadmill over a six-month period.

12) Increased vital lung capacity. Lungs will handle more air by taking in larger volumes. The more air taken in, the more is absorbed and carried to the working muscles.

13) Better oxygen absorption by lungs. With more capillaries the lungs are able to absorb more oxygen, and thus the oxygen transport system will perform better.

Psychological Values

The mental and psychological rewards of walking have been expounded by writers for centuries. Thoreau (Browne, 1970) stated, "I think I cannot preserve my spirits unless I spend four hours a day sauntering through the woods and over the hills--free of worldly entanglements" (p. 59). Rousseau (Donaldson, 1979) remarked that "Never have I thought so much, never have I realized my own existence so much, been so much alive, as in those journeys which I have made alone and on foot" (p. 163).

However, many people are not aware of the abundant mental rewards of walking. The mind is closely related to the body; the condition of one directly affects the other. Many people start out walking to get the physiological and health benefits of walking, but as they walk more and more they begin to discover the multiple psychological benefits. Donaldson (1979) states that walking can "be a source of inspiration and creativity, stimulate thought, be a tranquilizer for a troubled mind, and can unlock secrets of ourselves" (p. 158).

The following is a list of some of the psychological and social values of walking.

Psychological and Social Values of Walking

1) Relaxes the body and relieves the psychological tensions of daily living. During the course of the day, the problems of business and personal relationships build up and produce a "heavy" psychological burden. Many times, while walking, solutions to these problems can be found and, even if not, the problems do not seem nearly as bad after a good, long walk.

2) Enhances creativity and the ability to think clearly. Many scientists, poets, writers, and philosophers were avid walkers and told of the positive effects of their walking. The mind can be freed to think, meditate, and be creative without phone interruptions or someone dropping in. George Sheehan (Kuntzleman, 1979) says, "Never trust an idea lying down, when you want to think, go for a walk" (p. 56).

3) Experience and learn from the environment. By walking through various parts of a town or city, walkers will discover many interesting sights. Most of the time people move too fast to really see the beauty and uniqueness of their surroundings. By slowing down to "a walk" people can take the time to look at buildings, parks, rivers, animals, and plants that surround them. Many interesting places and people lie within walking distance. If people will only walk through life at about three or four miles per hour, they can better experience and respond to it. When people run, cycle, or drive a car, life becomes a blur.

4) A good way to meet people and make friends. People are friendly to walkers, and asking people to walk along a route is a good opportunity for relaxed conversation. Going for a walk at a local college track will give walkers a chance to meet other people who share their interest in the sport.

5) Walking is fun and enjoyable. If bored, people should go for a walk. Things will be seen and people will be met who will stimulate the senses. Going for a walk costs nothing and, when walking with friends or family, there are often events that happen which are amusing and fun.

6) Relieves anxiety and depression. Anxiety is being anxious about upcoming events. Most people get some anxiety as they perform their daily activities. A good walk can reduce that anxiety by producing morphine-like substances called endorphins that may be responsible for easing the anxiety (Strahinich, 1982). When people get "down" or in the "doldrums," it is termed depression. This condition is usually short-lived in most people, but can be more pronounced and be quite serious in some. Schultz (1980A) reports that cardiac rehabilitation patients who walk have less depression and tension.

7) The President's Council on Physical Fitness and Sports (Clark, 1977A) reports the additional enhancement of

the following psychological traits due to cardiorespiratory exercises, such as walking:

- 1) Self-concept
- 2) Intellectual inclinations
- 3) Emotional stability
- 4) Easy-going and adventurous attitude
- 5) Dominance and aggressiveness
- 6) Extroversion
- 7) Self-sufficiency and social poise (p. 18).

Pleas (1981) lists other psychological benefits of walking:

- 1) Increases confidence
- 2) Promotes a sense of well-being
- 3) A positive way to deal with anger
- 4) Increases ability to handle stress
- 5) Improves your disposition
- 6) A way to gain inner peace
- 7) Makes you self-reliant
- 8) Unclogs the mind
- 9) Builds an appreciation of solitude
- 10) Sets the stage of meditation (p. 92).

Undoubtedly, as walkers grow and develop their walking programs, they will experience some or all the psychological rewards of walking. Walking may even supply some mental or emotional rewards that the writer failed to mention.

Chapter X

Walking Safety

Walking is an exercise relatively safe from injuries that plague participants in other sports. However, there are injuries that can occur not from the act of walking but from the walking environment. Traffic, muggers, dogs, darkness, and poor weather conditions are a few of the "foes" walkers must face when they venture outside.

Safety should never be taken for granted. While walking, try to avoid dangerous situations and surroundings and be prepared to deal with them. The following are some safety considerations that all walkers should attempt to follow if they want to have a long walking career.

Road Safety

1) Walkers should obey all pedestrian laws. Jaywalking is not a good advertisement for walking. Do not cross against traffic lights and always yield to vehicular traffic.

2) Walk facing the traffic and always walk on the outside of blind curves. Oncoming cars can be seen better from this vantage point.

3) Avoid walking during the rush-hour periods of traffic. Besides the congestion of all the cars,

breathing exhaust fumes from cars is not good for the lungs.

4) Never challenge a car. The walker always loses! Move to the outside of the road when an oncoming car approaches.

5) Walkers should not assume they have the right-of-way at an intersection. Always make eye contact with drivers as they turn.

6) Walkers should be alert and ready to move quickly off the road if an automobile swerves in their direction. Be a defensive walker.

7) When walking with others, do not walk two abreast on roads with a lot of traffic. Walk single file. Do not force a car over into the other lane of traffic. Walking two abreast is all right on deserted country roads or in parks that prohibit cars.

Safety from Plants and Animals

1) Avoid walking in areas that contain poison ivy, poison oak, or sumac. Be able to identify these plants.

2) Be alert for poisonous snakes while walking through wooded, grassy, and rocky areas.

3) Watch out for nests of wasps, hornets, or yellow jackets.

4) Use a good insect repellent when walking in the woods, particularly near water, to protect against mosquito and tick bites.

Personal Safety

- 1) Female walkers should almost always walk with a friend or group.
- 2) Be aware of potential troublemakers. Be suspicious of bothersome people. If this type of person passes or is seen up ahead, walkers should alter their routes.
- 3) Carry or wear some form of identification listing name, phone number, and any other pertinent medical information.
- 4) If any suspicious noises are heard or sudden movements are seen in bushy or wooded areas, move quickly to the other side of the street and assess the situation.
- 5) Carry a walking stick, cannister of "Halt," or some mace spray to repel muggers or hostile dogs.
- 6) Hand weights or smooth rocks can be deterrent to would-be attackers or mischievous dogs.
- 7) Walkers should let someone know where they are walking and when they expect to return.
- 8) Avoid walking in high crime areas.
- 9) Walk briskly with confidence.
- 10) Carry a loud alarm or whistle to draw attention if assaulted.
- 11) Do not carry a purse or wear expensive-looking jewelry.
- 12) Carry some loose change to make emergency phone calls if an ankle is turned or if the walker gets sick.

13) Do not walk in the same place each day. Walkers should vary their walking routes and times.

Inclement Weather Conditions

1) Always check the weather report before walking.

2) Do not walk on roads with large piles of snow on the shoulders that would offer no avenue of escape from cars.

3) Stay off snowy or icy roads that may cause a walker to fall or slip into the path of an oncoming car.

4) On foggy days wait until the sun "melts" the fog before walking.

5) Avoid walking when the air is still or a temperature inversion has trapped smog in an area. Most large cities announce smog alerts on the weather forecasts.

6) Dress appropriately on very cold or very hot days. (See Chapter III.)

7) Never walk in a thunderstorm when lightning is present.

Night Safety

Studies have shown that, in pedestrian fatalities at night, 85% of the motorists claim they did not see the pedestrians in time to avoid hitting them, and in 50% of the cases motorists said they did not see the pedestrians at all (Sleight, 1981).

- 1) Carry a small but visible flashlight in a pocket.
- 2) Wear white clothing. This will not guarantee the walker of being seen.
- 3) Sleight (1981) recommends the wearing of reflective tape on the soles of the shoes. This is so that a car coming from behind can see the feet pick up as the light from the head lamps bounces off the reflective material.
- 4) Other reflective gear which can be worn to increase invisibility are reflective gloves, vests, hats, arm bands, and tape on jackets. Some walkers wrap reflective tape around their walking sticks.
- 5) When possible, walk in areas that have mercury vapor street lamps. Visibility is very good on these streets.
- 6) Be familiar with the surface of the roads walked. Knowing where all the potholes and curves are located is a must.

Prevention of Falls while Walking

Some 12,000 people die each year of falls, making falls the number two accident killer in the United States. Falling is a common problem and one of the few real hazards, besides cars, that a walker has to face (Sleight, 1983B).

- 1) Be alert to unevenness in the road or pavement and watch for objects in the pathway.
- 2) Try to wear walking shoes with rubber-cleated soles, particularly in rainy, snowy, and icy weather.

3) Use handrails when walking up and down stairs for exercise.

4) Remove the hands from coat or pants while walking so if a fall occurs the shock can be absorbed with the hands.

5) Use small, shuffling steps on slippery surfaces when walking.

6) Carry a walking stick for support and balance while walking on tough terrain and to break a fall, if it should occur.

Dog Safety

1) Try to ignore a barking, troublesome dog by walking briskly onward with confidence.

2) Do not run from dogs or show fear of them.

3) Walk on the side of the road farthest away from the dog, as dogs are defenders of turf and want to let any intruder know where theirs is located.

4) If pursued by a dog, stop and tell it in a firm voice to "go home." This will work on some dogs, but not German Shepherds or Dobermans!

5) Carry a walking stick for protection from dogs that will not respond to the previous suggestions.

6) A solution of 1 to 3 ammonia and water squirted on a dog will also deter its aggressiveness (Fixx, 1977). A can of mace or "Halt" will do the same.

7) Walkers will soon learn about the dogs in the neighborhood where they walk. Try to avoid the areas where the really troublesome ones reside.

Chapter XI

Injuries and Foot Care

Walkers should take good care of their feet and be concerned about the possibility of experiencing injuries. Many walkers are discouraged by injuries and foot problems. Persistent injuries can interrupt or even stop an aerobic walking program. Therefore, steps should be taken to follow sound guidelines that will lessen the probability of walking-related injuries and provide good care for the feet.

The feet are amazing appendages of the body. Each foot contains 26 bones, 56 ligaments, 28 muscles, and 4 arches (Stutman, 1980). They carry and balance the entire weight of the body and last a lifetime. The feet move in four different directions and are capable of absorbing the body's impact with the ground as it walks, runs, and jumps.

When compared with running, the sport of walking has much fewer injuries. Running has enjoyed a popularity "boom" in the last 15 years. Millions of people have taken up running for its health and stress-relieving benefits. As these runners ran higher mileages and participated in more races, the number of running-related injuries began to

climb. Sheehan (1980) calls these overuse running injuries "diseases of excellence" (p. 11).

To further substantiate the increased injury rate that runners experience when compared to walkers, a study by Dr. David Brody should be viewed. Brody (1980) found in a study of 3,000 runners that 60% will sustain an injury that will prevent them from running. Many runners complain of either being injured or recovering from an injury. When asked how they are running, runners proudly answer that they are "running injury free." The main reason for the high injury rate in runners is the tremendous force with which the foot strikes the ground and is transferred up the legs. With each step of running, the feet and legs must absorb the force of three and one-half to four times the body's weight, while the shock impact of walking is only one and one-half times the body weight (Yanker, 1983).

With less shock to contend with, such running injuries as stress fractures, tendonitis, and plantar fasciitis are almost unknown to walkers. Sheehan (1980), commenting on racewalking (a faster form of walking), states, "Racewalking is virtually injury-free, and is a safe refuge for any injured athlete. Walking is the perfect sport for recuperating from other sports" (p. 33).

Most of the injuries and foot problems walkers encounter will be small ones, but they do require some attention and prevention to make walking as enjoyable as

possible. Most of the pain experienced will be the result of improper walking techniques, poor walking surfaces, ill-fitting shoes, and too much walking too soon (Kuntzleman, 1979). As small aches and pains are experienced, the walker should attempt to find the causes. Most of the time the walker just needs to cut back on the walking program or take an extra day of rest in order for small injuries to heal.

Injury-prevention Guidelines

The following is a list of injury-prevention guidelines that, if followed, can help make a walking program more pleasant and enjoyable.

1) Perform the flexibility routine consistently before and after walking. On the days not walked, perform the flexibility routine mentioned in Chapter IV.

2) Start walking slowly and gradually over a period of weeks and months, add more miles or minutes to the walks. Avoid intense training during the first few months of the walking program. Give the body a chance to acclimate to the physical stress of walking.

3) Buy good fitting walking shoes with flexible soles and a strong arch support.

4) Wear clean cushioned socks to prevent blisters.

5) Break in new shoes by wearing them around the house or while shopping before going on any long walks.

6) Walk on level, soft surfaces when possible. Dr. Stan Newell (Newell & Subotnick, 1976) says, "All training should be done on a soft surface, whether it be grass, wood chip trail, or a specially constructed soft track" (p. 40). Avoid banked tracks or uneven terrain.

7) Warm up gradually until the pulse rate reaches the target pulse range. Then cool down slowly after walking and let the pulse rate return to normal.

8) Avoid walking too many hills at one time as this can cause muscle strains and contribute to overuse injuries.

9) Condition and strengthen the muscles of the body not used in walking by doing light calisthenics two or three times a week.

Walking Injuries

After getting involved with a walking program, some type of injury will probably occur. By training too hard and violating some of the previously mentioned guidelines, an injury may be imminent. It should be noted that, if any injury or painful condition persists, consult a sports medicine doctor or orthopedic physician immediately.

Muscle, Bone and Connective Tissue Injuries

Muscle soreness. Any muscle or muscle group that is overloaded during prolonged exercise will probably experience some amount of soreness. Muscle soreness is much more pronounced in sedentary people who suddenly begin exercising. Therefore, some muscle soreness is natural and

to be expected. de Vries (1979) identifies two types of soreness: 1) pain during and immediately after exercise, which may persist for several hours, and 2) a localized soreness, which usually does not appear until 24 to 48 hours later. Muscle soreness, while uncomfortable and painful, only lasts for a day or two and soon disappears.

The treatment for muscle soreness is rest, mild stretching, gentle massage, continued exercise at a reduced level, and soaking in a whirlpool bath with warm water. The application of analgesic creams or ointments that claim to reduce "aches and pains" does very little to relieve muscle soreness.

Muscle strain. A muscle strain is the stretching and minor tearing of muscle tissue (Moore, 1983). If, while walking, a muscle is strained, the first procedure is to get off the feet and rest. While resting, apply ice in a plastic bag or a rubber ice pack to the damaged areas. Never apply heat immediately to a trauma injury. If hemorrhaging has occurred, heat will dilate blood vessels, which can cause more swelling, thus slowing the healing of the strain. Ice should be applied to the strained muscle twice a day for 10 to 20 minutes at a time for one or two days. After 24-48 hours, most authorities recommend the application of heat to improve blood circulation after the threat of further hemorrhaging has gone (Klafts & Arnheim, 1973). If the

walker's strain is not severe, then mild activity can resume after two or three days.

Sprained ankle. A sprain is a stretching or partial tear of the ligaments surrounding the bones of the foot and rupture of the lubricating sac surrounding the joint (O'Donoghue, 1965). While walking on uneven or rough surfaces, a walker may step into a pothole or on a rock and "twist" or sprain the ankle. The four basic treatment steps of a sprain are: 1) cease activity, 2) apply ice twice a day for one to two days, depending on the severity of the sprain, 3) elevate the leg, and 4) wrap it with an elastic bandage to immobilize it.

Achilles tendon injuries. Achilles tendons can be torn, stretched, or become inflamed with tendonitis (Parks, 1978). The Achilles tendon attaches the calf muscle to the heel bone. Injuries to this tendon are very serious and are difficult to recover from. The cure for these injuries is rest, application of ice, and mild stretching. One of the main causes of Achilles tendon injuries is tight calf muscles. Proper stretching of the calves after recovery, along with avoidance of hill walking, will help prevent the injury from reoccurring.

Shin splints. Shin splints refers to any generalized pain in front of the lower leg alongside the tibia bone (Sheehan, 1978). The pain is a result of the microscopic tearing of muscles and tendons of the anterior compartment

of the lower leg accompanied by inflammation (Moore, 1983). The most common causes of shin splints are: walking excessively long distances, walking on hard surfaces, and lower leg muscle imbalance. If the calf muscle becomes much stronger than the muscles in the front of the leg, the pull and stress on the front muscles of the leg could cause shin splints. Treatment is rest, application of ice, and moderate walking on soft surfaces in good flexible shoes.

Heel pain. Pain in the heel region of the foot usually means a bone bruise ("stone bruise") or heel spur (painful bony growths on the heel) (Sheehan, 1978). These conditions are usually caused by walking on hard surfaces such as concrete, or by stepping on rough gravel or sharp objects, or by wearing poorly cushioned shoes.

Treatment is the application of ice to the heel immediately after walking and the use of a heel cup or a Sorbothane pad in the heel of the shoe. Prevention of heel pain is accomplished by avoiding walking on hard surfaces and by wearing well-cushioned shoes.

Side stitches. A side stitch usually occurs as a sharp pain in the upper right side of the abdominal area. The cause of the pain experienced by most walkers at some time is somewhat of a mystery. Some possible causes of side stitches are as follows: 1) reduced blood flow to the area due to demands elsewhere in the body, 2) accumulation of lactic acid in the diaphragm, 3) diaphragm spasm produced by

faulty breathing, and 4) the formation of gas in the ascending colon (Anderson, 1978). Most authorities conclude that the cause could be faulty breathing that reduces the oxygen supply to the diaphragm muscle and causes it to spasm.

To relieve the side stitch, change walking speeds and press the fingers into the area of pain. Pushing the stomach outward (belly breathing) may help reduce the pain. Many times, if the pain is not too severe and walking is continued, the side stitch will gradually subside.

Chest pain. Chest pain during walking could be the most serious medical emergency that can occur. If a person is over 30 years of age, a pain in the chest region can be of great concern with the high incidence of heart attacks in the United States. No chest pain should be completely ignored or permitted to continue for any length of time. The pain could be only mild heartburn, or it could signal the onset of a heart attack. If chest pain is experienced while walking, stop immediately and, if it reoccurs, consult a cardiologist.

Skin Injuries

Athlete's foot. Almost all athletes get the fungus known as athlete's foot at one time or another. During walking, if the feet sweat a lot, if showers are taken in public dressing rooms, and if a walker fails to dry between the toes, there is a good probability that athlete's foot

will occur. The fungal infection causes itching, scaling of skin, and cracks between the toes (Lyght, 1966). Treatment is accomplished by application of several over-the-counter sprays, powders, and ointments that are especially made to destroy athletic fungal infections. All will do the job if applied regularly. Prevention involves drying with a towel between the toes after each shower and using powder between the toes to prevent the wet environment necessary for athlete's foot growth.

Blisters. Blisters are skin burns caused by excessive friction between the skin and shoe surface (Miller & Allen, 1982). If the blister is small, then leave it alone and keep it clean. The fluid will be absorbed and new skin will replace the blistered skin. If the blister is large and painful and is in an area where constant pressure is exerted, then the fluid should be drained. Sterilize a needle in an open flame from a match or lighter and pierce the blister at the base. The fluid will drain, and a sterile dressing containing an antiseptic should be applied. To reduce pressure and allow the blister to heal, cut a round hole in a small piece of foam rubber and tape it over the blister. Blisters can be prevented by wearing properly fitting shoes, wearing clean socks, and by putting Vaseline or a similar lubricant on the areas of the feet most likely to blister in order to reduce friction.

Calluses. Similar to a corn, a callus is a flat thickening of the skin caused by friction or pressure between the bones of the foot and shoe surfaces (Klafts & Arnheim, 1973). Some callusing of the foot is normal and serves as a protective pad for the foot. However, excessive thickening of the callus can cause pain and discomfort. Preventive measures are as follows: wear clean socks, apply petroleum jelly, insert new shoe liners, and wear proper-fitting shoes.

Corns. A corn is a built-up area, usually cone-shaped, of thickened skin caused by friction or pressure between the bones of the foot and the shoe surfaces (Lyght, 1966). The build-up of the corn could be caused by ill-fitting shoes or by structural abnormalities of the feet. Every effort should be made to eliminate the friction on the corn by buying new shoes, applying petroleum jelly, or buying new shoe liners. If these remedies fail, then seek treatment by a good podiatrist.

Heat-related Injuries

High temperatures and relative humidity levels can produce excessive heat that can be both troublesome and deadly to exercisers. When walking in the hot summer months, it is wise to take precautions and exercise good judgment. The three heat injuries that can occur when the body becomes overheated and begins to lose excess body fluids are heat cramps, heat exhaustion, and heat stroke.

Heat cramps. Heat cramps are sudden, painful and forceful involuntary contractions of skeletal muscles (Lyght, 1966). Their cause is not completely understood, but usually they occur when a walker is fatigued, has sweated a lot, and has been depleted of fluids and minerals such as potassium and salt. Murphy (1984) states, "Heat cramps are caused by a fluid volume problem and can be prevented by providing copious amounts of water throughout the exercise" (p. 259). Treatment of a cramp is to stop walking immediately and vigorously massage the affected muscle. After the cramp subsides, gradually exert a mild stretch on the muscle. Heat cramps can be prevented during walking by drinking plenty of fluids before and during the walk, eating potassium-rich fruits such as bananas, and by lightly salting food at the meal several hours before the walk.

Heat exhaustion. Heat exhaustion is a condition of the body characterized by weakness, fainting, dizziness, pallor, and sometimes vomiting and is caused by exposure to excessively hot air temperatures with accompanying loss of body fluids (Lamb, 1984). If brisk walking is done in hot, humid weather for long durations with the walker sweating excessively, then heat exhaustion can occur. The signs and symptoms of heat exhaustion include thirst, muscle cramps, lightheadedness, "goose bumps," nausea, increasing fatigue, vomiting, blurred vision, fainting, and confusion or

disorientation (Gluck & Smodic, 1983). If these symptoms are experienced, the walker should stop immediately and take action quickly. Treatment includes cessation of activity, rest, movement to a cool area, ingestion of liquids, application of moist towels, and cooling with a fan or air conditioner. Water is the preferred liquid to replace lost body fluids. Costill (1974) states that any fluid or electrolyte replacement drink should be low in sugar concentration (less than 2.5 ml/100 ml of water) to allow the fluids to move from the stomach into the tissues. A high concentration of sugar as in colas or full-strength "Gatorade" would slow down gastric emptying and prevent the fluids from getting out into the body. If electrolytic replacement drinks are used, such as Sportade, ERG, or Gatorade, they should be diluted with water two to one to reduce sugar concentrations.

Heat stroke. Heat stroke is a condition where the body loses its ability to regulate its temperature (Klaft & Arnheim, 1973). Heat stroke is a serious medical emergency. If the walker experiences heat exhaustion and continues to walk, the body could experience heat stroke. Murphy (1984) emphasizes, "When 90% or more of the total body fluid has been depleted, the brain shuts down the sweating mechanism in order to halt the loss. Once sweating ceases, body temperature can rise from 98.6° to 106° in 20 minutes" (p. 259). When the body temperature rises to 106° or higher, this elevated temperature could kill a person in a

matter of minutes if not lowered, When heat stroke occurs, the skin is usually hot and dry with accompanying dizziness, vomiting, diarrhea, and confusion.

The person should be transmitted to a hospital and seen by a doctor immediately. If there is a delay in getting the doctor, the person should be kept as cool as possible. Take the individual to a cool area, remove the clothes, apply moist towels, and obtain fans or an air conditioner to blow cool air over the body. These are the proper treatments until medical help can be obtained.

Foot Care

Americans take very good care of their faces, skin, and hair. They spend large sums of money on cosmetics and facials to keep their faces looking good and spend countless hours brushing, conditioning, and perming their hair. But little attention is paid to the feet. People only become concerned about their feet when they hurt and cause discomfort. Proper foot care is not practiced by most people. This statement is supported by the fact that "90% of Americans have foot problems of some type" (Neiman, 1984, p. 11). However, to keep the feet in proper condition and to prevent discomforting conditions from developing, walkers should, as British pedestrian John Hillaby suggested, "treat the feet like premature twins" (Donaldson, 1979, p. 67).

The feet take a "terrible beating" as they perform the primary function of supporting the weight of the body as a

person walks, stands, and runs. They absorb the impact of the body movements and are enclosed in socks and shoes. They sweat, become wet, and are exposed to various types of bacteria and fungi which can attack the skin of the feet.

Walkers should treat their feet with more respect and care for them by spending a few minutes each day cleaning and maintaining them. The following suggestions are recommended to maintain the feet in good condition:

- 1) Wash the feet daily, preferably in warm water, using a mild soap. If showers are taken, be sure to take the time to wash between the toes and the bottom of the feet with a wash cloth.

- 2) Rinse and completely dry the feet, being sure to dry between the toes and remove any dead skin. Leaving water and dead skin between the toes can provide a thriving environment for athlete's foot, other fungi, and bacteria.

- 3) Application of a foot powder between the toes will insure that all moisture is removed.

- 4) For athlete's foot, apply one of the many commercial powders, creams, or sprays made to control the fungus. The athlete's foot medicine should be applied daily until all traces of the fungus disappears (Klafts & Arnheim, 1973).

- 5) Examine the feet thoroughly every two or three days to see if corns, calluses, or blisters have developed.

6) Wear clean, dry socks with walking shoes. They should be soft and free of irritating seams or holes. Cotton and wool blends are the best.

7) Cut the toenails regularly to prevent ingrown toenails. Toenails should be trimmed straight across the nail with clippers or sharp scissors.

8) "Treat" the feet by applying a moisturizing lotion just before bed. This can soften the skin and prevent cracking of the skin.

9) Take off the shoes while sitting at the desk at work. Roll the feet over a coke bottle or over a wooden foot massager to stretch the muscles and tendons while stimulating the blood flow. The feet will get ventilation and be allowed to dry.

10) Apply petroleum jelly to any irritated areas of the feet before walking.

11) Go barefooted during the summer. Walking on carpet, grass, or sand performs a natural massaging effect. Pleas (1981) states, "Walking barefooted allows freedom of movement, the weight and balance of the body are distributed more evenly and the feet are grounded in their natural state" (p. 88).

12) Massage the feet with the hands. This should be done daily to stimulate blood flow and nerves. Many people feel very relaxed after a foot massage.

13) Elevate the feet whenever possible to allow blood in the feet and legs to move faster.

Foot and leg exercises. Maintaining strong muscles of the feet, ankles, and lower leg is a good preventive measure against injuries. Foot exercises stretch the tendons and ligaments, thus providing for more flexibility and a greater range of motion. The following are a few of the many exercises that can be used to strengthen the muscles of the feet, ankles, and legs.

1) Walk on the sides of the feet to strengthen the ankles. Walk around in a circle on the outside of the feet for 15 seconds. Then walk on the inside of the feet for 15 seconds in a circle. Repeat twice (Pleas, 1981).

2) While sitting, rotate the ankles clockwise for 10 times. Then rotate them 10 times in a counter clockwise direction. Repeat three times.

3) Walk forward on the heels for 10 steps, holding the toes high, then walk backwards doing the same. Repeat three times.

4) To strengthen the calves and stretch the Achilles tendons, place the balls of the feet on a 2" x 4" board or a book about 2" thick. First lean forward as far as possible with the heels on the floor. Then raise the heels up off the floor as far as possible. Do two sets of this exercise with 10 repetitions each.

5) With the bare feet and toes, try to pick up various objects such as marbles, tennis balls, pencils, or other objects. See how long the objects can be held.

6) While standing, lift one leg off the floor and point the toe as far forward as possible. Rotate the lifted leg around in a circle. Make 10 large, slow circles in a counterclockwise direction, then do the same with the other leg. Repeat twice.

Knowledge of how to treat and prevent the various injuries that a walker may experience can help the walker maintain a more enjoyable and consistent aerobic walking program. Care should also be taken to clean the feet, keep them free of fungal growths, and strengthen the muscles of the feet and legs. By following the recommendations of this chapter, walkers can avoid many unpleasant conditions that could hamper their walking programs.

Chapter XII

Nutrition and Weight Control

Nutrition

The subject of nutrition may be the most widely discussed topic of the health-fitness movement. Most fitness-related magazines, including public and professional periodicals, include one or more nutrition articles about fiber, vitamins, or new diet regimens. The television talk shows regularly contain authorities, both self-proclaimed and authentic, talking about nutrition and their latest books on the subject. With so much to be learned about food and its various roles in body functioning, the public has adopted a nutrition news craze. The best-seller lists contain the names of such books as Dr. Atkin's Diet Revolution and The Beverly Hills Diet. Both of these popular weight-loss books are included on the "books not recommended" list in the Nutrition References and Book Reviews (Hamilton & Whitney, 1984). These best sellers were found to contain misleading and false information about nutrition.

Nutrition is indeed a popular topic for discussion, but unfortunately not everyone knows what constitutes good

nutrition. This chapter is directed toward sorting out the scientific nutrition information and facts from the old-wives tales, myths, and misinformation.

Good nutrition practices are a must for all people if they are to maintain their exercise programs and develop their total fitness. Walkers need to eat a diet that is adequate in calories and the basic nutrients. The optimum diet for the physically active person must supply adequate amounts of calories, carbohydrates, protein, fat, water, vitamins, and minerals (Williams, 1983).

Foods are divided into four basic groups. The following is a brief discussion of the four groups:

1) Vegetables and Fruits. This group includes vegetables such as carrots, tomatoes, lettuce, beans, asparagus, and many others, while the fruits include apples, pears, oranges, bananas, grapes, and many others. The recommended servings of this group are four or more per day. Most vegetables are high in complex carbohydrates, and the dark, leafy or yellow vegetables and fruits contain large amounts of vitamin A. Vitamin C can be obtained from the citrus fruits, along with trace vitamins, minerals, and dietary fiber. Vegetables should be washed sparingly and cooked in small amounts of water for a short period of time to keep from destroying the vitamin C and other water soluble vitamins (Dintiman, Stone, Pennington, & Davis, 1984).

2) Meat Group. This group includes the muscle meats (beef and pork), along with poultry, fish, and eggs. The diet can obtain high quality protein from this group, but it is usually high in saturated or animal fat. Intake of too much saturated fat is a risk factor in coronary heart disease. Fish and poultry should be substituted sometimes for beef and pork to reduce saturated fat intake. The meat group is high in iron and B vitamins, and the recommended serving per day is two or more. Beans, peas, nuts, and peanut butter, when combined with other grain products, can produce a high quality protein and substitute for meat.

3) Breads and Cereals. This group includes rolls, breads, cereals, rice, and pasta. Four or more servings of this group should be consumed daily. Enriched and whole grain breads and cereals are preferred over others because they contain more vitamins, minerals, and dietary fiber. This group supplies the body with energy, iron, some B vitamins, and incomplete proteins (Fox, 1983).

4) Milk Group. This group includes milk, cheese, ice cream, cottage cheese, and other milk-made products. Milk products are the main source of calcium, and children need three glasses of milk a day, teenagers need four or more, and adults around two (Williams, 1983). Other milk products, like ice cream, can substitute for milk. Milk contains the same saturated fat as meat, so low-fat milk products are recommended. Besides supplying calcium, this group provides

the body with protein, vitamin A, and the B vitamin, riboflavin.

Food supplies the body with fuel and the materials to grow, repair itself, and carry on all the necessary physiological processes. All food is composed of six nutrients: water, vitamins, minerals, carbohydrates, protein, and fat. The following list of 11 nutritional guidelines is advocated by most nutritional authorities.

Good Nutrition Guidelines

1) Drink more water. Consume from 8 to 12 glasses per day. This water consumption can be in the form of tea, colas, juices, coffee, and other beverages as well as tap water. Intake should depend on air temperature, humidity, and exercise level (Krause & Hunscher, 1972).

The adult human body is about 50 to 55% water (Hamilton & Whitney, 1984). All the chemical activities of the body occur in fluids made of water, and water helps eliminate waste products from the body. The body loses water in sweat, urine, feces, and exhaled air. This lost water has to be replaced from fluid intake and water in food. Water is a most important nutrient and should not be overlooked.

2) Eat more dietary fiber. This can be accomplished by eating more fruits, vegetables, pasta, and whole grain cereals and breads. Dietary fiber is indigestible cellulose found in plants. This fiber has no food value for the body but is believed to be helpful to the body in moving waste

material through the large intestine. The fiber gives bulk to fecal material, and this bulk allows the muscles lining the large intestine to push the fecal material through the large intestine easier. A link between colon cancer and the intake of dietary fiber has been established. Studies of populations have suggested that a high dietary fiber intake offers some protection from cancer of the rectum and colon (Burkitt, 1978).

3) Eat less refined and processed sugars. Besides table sugar, this includes honey, corn syrup, and brown sugar. The McGovern Commission on Nutrition states that Americans reduced their processed sugar intake to account for about 10% of total energy intake instead of the present 24% (Dietary Goals for the United States, 1977). Foods and beverages can be sweetened by using the many artificial sweeteners on the market. These artificial sweetening agents have no calories.

Refined sugar in colas and candy has no food value except calories. Excessive sugar intake can cause dental caries, along with providing extra calories that can add extra body fat. Sweets, such as cakes, jellies, syrups, candy, and colas, should be reduced in favor of fruits and low-calorie sweets. Some estimates of American sugar intake place it at 130 pounds a year (Hamilton & Whitney, 1984). This amount of yearly sugar intake is too high and should be reduced by 50%.

4) Eat more complex carbohydrates. This includes starchy vegetables like corn, beans, potatoes, along with pasta, rice, breads, and cereals. The McGovern Commission on Nutrition (Dietary Goals for the United States, 1977) suggests that consumption of "naturally occurring" starches and carbohydrates be increased from 22% of the calories taken in to about 48%.

Carbohydrates are the main source of energy, comprising 46% of the daily caloric consumption. However, of that 46%, 24% is refined sugar, and only 22% is complex carbohydrates. That 22% should be raised to 48% and the refined sugar should be reduced to 10% of the caloric intake (Hamilton & Whitney, 1984).

Carbohydrates are broken down in the body to units of glucose, which is the main fuel of our cells. Glucose is stored in the body as glycogen in the muscles and liver (de Vries, 1979). Carbohydrates have been given a bad reputation as being responsible for being the nutrient that "puts weight" on people and causes obesity. Many of the popular diets advocate low carbohydrate consumption. However, carbohydrates have the same amount of calories as protein and only half the calories of fat. Never reduce the intake of complex carbohydrates, but rather reduce the fat intake for help in controlling obesity.

5) Eat less saturated fat. Saturated fat is animal fat that is present in all muscle meats and dairy products.

while unsaturated fat is vegetable fat found in corn, peanuts, and sunflowers. The intake of saturated fat is a risk factor in heart disease. One should consume less beef, pork, and whole milk products that contain excessive amounts of saturated fat. More fish and chicken should be substituted for the pork and beef because they contain less fat. The McGovern Commission (Dietary Goals for the United States, 1977) recommends that saturated fat consumption be reduced to 10% of the total energy intake. Corn, peanut or sunflower oil should be used to cook with instead of lard or animal fat.

6) Eat less total fat. This includes both saturated and unsaturated fat. Fat has twice as many calories as carbohydrates and protein, and excessive caloric intake is directly related to body fat gains. Fat is important in the body in helping absorb fat soluble vitamins, providing a store of energy (1 pound of fat contains 3,500 calories), protecting the body from heat, cold, and physical shock, and maintaining the health of the hair and skin. Fat is consumed in vegetable oils (unsaturated fat), meats, poultry, and dairy products. However, the McGovern Commission (Dietary Goals for the United States, 1977) recommends that the overall fat (saturated and unsaturated) consumption be reduced from about 40% to about 30%. Saturated fat can be reduced by: (1) eating less beef and

pork; (2) consuming low fat dairy products; and (3) cooking with vegetable oils instead of animal fat.

7) Eat less protein. This means eating only the amount of protein that is needed daily. Depending on a person's weight, most people need only 40 to 70 grams a day. Average daily consumption in the United States is 106 grams (Eisenman & Johnson, 1982).

Protein is an important nutrient. The amino acids that make up protein form the basis of enzymes, skin, muscle, and blood. Protein is found in meat, fish, poultry, eggs, and milk products. The vegetable proteins, such as peanuts and soybeans, can add to the protein measurement.

Walkers need more protein than sedentary people but, because they eat more food, they get more than enough protein. Excess protein taken in during the day is stored as fat just like excess fat or carbohydrates.

Most people need about one gram of protein for each kilogram of body weight per day (Fike, 1984). The number of grams of protein a person needs per day can be computed by dividing the body weight by 2.2 to get the kilogram weight, and this will be the number of grams of protein needed. If a person weighs 150 pounds, the weight in kilograms is 68.1; therefore, the daily protein requirement for that person is 68 grams (Bogert, 1973).

Most of the protein one consumes in the United States is in the form of beef and pork, which contain too much

saturated fat. By reducing the protein intake, saturated fat intake is reduced.

8) Eat less salt. Sodium is a mineral that is necessary for good health, but in excess it can be harmful. One should only add 5 to 8 grams (one-eighth of a teaspoon) of salt to one's food daily (Hamilton & Whitney, 1982). This includes salt added by the manufacturer and consumer above that already present in food. Intake of foods that contain a lot of salt, such as potato chips, pickles, pretzels, salted nuts, cured meats, cheese, soy sauce, and T.V. dinners, should be reduced. Salt intake has been linked to high blood pressure in some populations (Briggs & Calloway, 1979).

9) Eat a wide variety of the four basic food groups each day. This insures that one gets an adequate supply of the six nutrients. There is no food that is perfect and contains all the nutrients necessary for good health. Therefore, one should eat several servings of the four basic food groups daily.

10) Eat less calories. Caloric balance (caloric intake equal to caloric expenditure) should be everyone's primary nutritional goal. To avoid becoming overweight, consume only as many calories daily that will be expended. An individual in a positive caloric balance (caloric intake is more than caloric expenditure) should exercise more and

decrease food intake. By reducing consumption of high fat and sugar foods, the caloric intake can be significantly lowered.

11) Eat a good breakfast. A good breakfast is one that consists mainly of carbohydrates and small amounts of protein and fat. A breakfast of skim milk, poached eggs, toast and orange juice will help provide a substantial part of the daily need of protein, calcium, vitamin C, and other nutrients (Williams, 1983). Eating a good breakfast will raise blood sugar levels and help people stay alert and mentally active during the day. The Alameda County Study in California revealed that eating a good breakfast was one of the factors that promoted a longer life (Conrad, 1976).

12) Vitamin and mineral supplement tablets may not be necessary. Vitamins are organic compounds that comprise part of the structure of enzymes and coenzymes (Hamilton & Whitney, 1984). These enzymes and coenzymes aid in the digestion, absorption, and metabolism of the energy nutrients, carbohydrates, proteins, and fat. They are classified as water soluble or fat soluble. The fat-soluble vitamins (A, D, E, and K) are stored in the fatty tissues of the body, do not need replacing daily, and an excess of A and D can cause toxic side effects. The water-soluble vitamins (C and the 8 vitamins of the B complex) cannot be stored and must be supplied on a daily basis.

When taken in excess, these vitamins are excreted in the urine.

Deficiencies of vitamins in persons in the United States are somewhat rare but they can be harmful to the body (Fox, 1983). Most all the vitamins can easily be obtained by eating a wide variety of the four basic food groups. Multiple vitamin supplements are probably not needed since all the vitamins can be obtained from a balanced diet (Williams, 1983). If a doctor prescribes them or if a person simply wants to take them, the body will store the fat-soluble ones and excrete the water-soluble ones.

Minerals are inorganic compounds found in very small amounts in the body and are necessary for proper body functioning. The minerals include calcium, phosphorus, potassium, sodium, iron, iodine, and some 15 others (Bogert, 1973). These minerals are easily obtained from a normal, varied diet.

Since minerals are easily obtained in a wide variety of foods, mineral supplements are probably not needed. However, iron and calcium may be deficient in the diets of women and young children and may be needed (Hamilton & Whitney, 1984). These groups may need to take supplements containing these minerals. Generally speaking, taking mineral supplements is unnecessary.

Weight Control

As a nation, Americans have become obsessed with losing excess body fat. Bray (1982) states that "Adult Americans carry an excess of 2.3 billion pounds of fat. If these calories were used for daily metabolic needs, the reduced intake of food would be the equivalent of 3 billion gallons of gasoline" (p. 171). This large amount of fat is distributed among some 25 million overweight and obese Americans who are constantly trying the latest diet regimens to get rid of the weight (Hamilton & Whitney, 1984). The Scarsdale, Cambridge, and Beverly Hills diets have been popularized and are advertised in magazines and on television. Mahoney and Mahoney (1976) state that the average person goes on 1.4 diets per year.

Some of the reasons that weight loss is such a preoccupation with Americans is the media advertising diets, diet foods and colas, the emphasis in fashion on the perfect physique, and the reminders from the medical community that obesity is associated with unhealthy conditions.

It is well documented that obesity is associated with the following conditions: heart attacks, strokes, diabetes, hypertension, arthritis, varicose veins, gout, and post-surgical complications (de Vries, 1979). Add to this the social rejection and higher insurance premiums and it can be seen why people are eager to try any miracle cure to alleviate the fat problem.

Weight losses do occur on the low-carbohydrate and other food-restrictive diets, but this loss is mostly water in the first few days and muscle tissue due to the lack of exercise. These diets can cause headaches, dizziness, diarrhea, fatigue, indigestion, skin disorders, constipation, and psychological problems such as irritability and depression (Mahoney & Mahoney, 1976).

To lose weight safely and sensibly, a simple formula of reduced caloric intake and increased caloric output, in the form of an endurance aerobic activity, is advocated. If a caloric deficit of 500 calories a day can be realized, then the calorie loss would be 3,500 calories a week, which is equivalent to the loss of one pound of fat.

There exist no real secrets or short cuts to effective fat loss. Body wraps, saunas, and rubber "sweat suits" only dehydrate the body and could cause heat exhaustion or heat stroke. Before embarking on any form of weight reduction, seek the advice of a knowledgeable physician or a professional nutritionist. The following is a list of suggested weight-reduction guidelines.

Weight-reduction Guidelines

- 1) Do not eat less than 1,200 calories a day on any diet. The American College of Sports Medicine states, "Prolonged fasting and diet programs that severely restrict caloric intake are dangerous because they cause metabolic

disruptions and the loss of fat-free tissue--with little fat loss" (Stamford & Weltman, 1982, p. 10).

2) Restrict the intake of foods that contain large amounts of fat and sugar. Consumption of such high caloric fatty foods such as beef, pork, whole milk products, and fried foods should be reduced. Foods containing large amounts of sugar such as cakes, soft drinks, pies, candy, and sweet cereals should also be reduced. Sugar contains nothing but empty calories, and fat contains twice as many calories as protein or carbohydrates.

3) Engage in an endurance exercise program lasting at least 20 to 30 minutes for three days or more a week.

Walking has been shown to be a very good exercise in reducing body fat. Gwinup (1975) reported a study of 11 adult overweight women who walked for one year without changing their diet. All the women lost weight, ranging from 10 to 38 pounds. Pollock, Miller, Janeway, Linnerud, Robertson, and Valentino (1971) had 16 subjects aged 40 to 56 years walk on a treadmill for 40 minutes four times a week for a period of 20 weeks. The walkers showed a decrease in body weight and body fat. Wilmore (1983) reviewed 55 studies involving exercise and the loss of total weight and fat weight. In most of the studies (several of these studies involved walking), exercise appears to produce moderate losses in total weight and moderate to large losses

in body fat. It appears that exercise is an important part of any weight-loss or weight-management program.

4) Avoid crash diets, fasting, or diet programs that restrict caloric intake. These reducing programs are at best foolish, are scientifically unsound, and medically dangerous. Large amounts of water, minerals, electrolytes, glycogen stores, and muscle are lost with only minimal amounts of fat loss (American College of Sports Medicine, 1978).

5) Consume a nutritionally sound diet with a mild caloric restriction and a behavioral modification of normal eating habits. The rate of weight loss should not exceed more than 1 or 2 pounds a week (Stamford & Weltman, 1982).

6) Plan on losing excess weight over a long period of time (one or two years). If one pound a month is lost, in two years 24 pounds will be lost, and by this time a permanent behavioral change in eating and exercise habits will probably have been effected.

To maintain the proper body weight will require a permanent commitment to proper eating habits and regular physical activity such as walking. To help support the commitment people need reminders and aids to accomplish their weight-reduction goal.

The following is a list of some specific practical tips to help control body weight.

Practical Tips to Help Control Body Weight

- 1) Do not eat while watching television or reading. This can lead to stimulus eating where it will not feel comfortable doing these activities unless eating.
- 2) Avoid dinner invitations or situations that might cause eating patterns to be compromised.
- 3) Regularly assess percent body fat by using an inexpensive skinfold caliper. Watching the body fat decline is a good motivator.
- 4) Learn the caloric values of common foods and fast-food items. Know the approximate caloric values of meals.
- 5) Never turn down a chance to walk, run, or play physically active games. The increased metabolic rate generated by exercise will burn calories at a greater rate.
- 6) Cook vegetables in as little water as possible without the use of much animal fat or oil.
- 7) Eat or snack only in the kitchen when at home.
- 8) Plan to exercise at a time when a snack might be a temptation.
- 9) Make some eating rules, but do not make them so rigid that they cannot be followed.
- 10) Try to gradually work diet desserts, colas, and low-calorie main entrees into eating habits.
- 11) Avoid eating "by the clock." Eat not at 8:00, 12:00, and 6:00, but only when hungry.

12) Cut down on fried foods and eat very little bacon, sausage, butter, cream, eggs, and French fries.

13) Avoid diet pills or amphetamines to speed up metabolism and lose weight.

14) Eat slowly and give the body time to react to the food consumed. Allow the body to send out a hormonal message to say, "that's enough."

15) Keep a record of eating habits to determine when to eat and how much to consume. This information will enable changes to be made in eating habits.

16) Do not eat "recreationally." Many people eat at ballgames, movies, or during visits with friends. If snacking recreationally, make sure the food is low in calories.

17) Eat small portions of food and do not encourage family members to take second helpings.

Good nutrition is vital to the health of walkers of all ages. When people eat they are doing much more than filling an empty stomach. The nutrients in the food will provide the raw materials for the skin, hair, muscle, hormones, bones, and provide fuel for body movement. Food consumption should not be too little or too much. Too much food can lead to over-fatness and contribute to many diseased body conditions. Food should be enjoyed but the type of food and the amount should be watched closely to insure a

well-balanced diet. The contents and condition of the body are truly dependent on what and how one eats.

Chapter XIII

Racewalking

Introduction

Racewalking, although having relatively little exposure in this country, has been around for a long time. The "ugly duckling of track and field," as Kummant (1981) calls it, has been an Olympic sport since 1908. In the 1984 Olympic Games at Los Angeles there were two racewalking events--the 20 kilometer (12.4 miles) and the 50 kilometer (31 miles) walks. Racewalking enjoys tremendous popularity in Europe, South America, Mexico, and Russia (Canfield, 1980).

If a walking program has progressed to the point where the person would like to attempt something competitive or the walker is having trouble elevating the pulse into the target range, then the Olympic sport of racewalking may be a viable alternative.

Racewalking is actually a sport of skill and form as well as one of strength and endurance. Racewalkers must have good upper body strength for the vigorous arm motion and good cardiorespiratory endurance to walk the long distances, but this is not enough. Racewalking has rules that must be obeyed at all times, for with two rule violations the competitor can be disqualified from the race.

Racewalking in the United States

There are a few racewalking races all around the country almost every weekend with low attendance and few participants. Some school systems, like New York State, have included racewalking as a part of their track and field program. The New York City Marathon has a racewalking division and gives trophies to the top finishers. The Athletic Congress, the governing body of track and field in the United States, has a racewalking division that actively supports the sport. In 1968 Larry Young, a top American racewalker, won a bronze medal at the Munich Olympics, and American interest in the sport picked up.

Despite all these efforts, racewalking is still considered the "poor cousin of running" (Dunnett & Kitchen, 1981). There are several problems associated with the teaching and learning of racewalking.

Problems of Racewalking

One problem with racewalking is the difficulty in finding coaches and administrators who will accept, coach, and officiate the sport. Most are unfamiliar with racewalking and consider it too difficult to teach. However, the biggest drawback of racewalking is the way racewalkers appear to the public. Racewalkers simply look "funny" to people who have never witnessed the sport, much the same as joggers did 15 years ago. A racewalker walking at top speed brings every body part into play. Rudow (1975) states,

"Knees, hips, arms, shoulders, even facial expressions have total effort written all over them" (p. 3). The problems of unfamiliarity with the sport, difficulty in teaching and officiating, and public acceptance of the exaggerated walking motion must be overcome in order for racewalking to grow in the United States.

Characteristics of Racewalking

The predominant physical characteristic of racewalking is the swivel-like movement of the hips as they rotate from side to side in an effort to gain a longer stride for the racewalker. This hip rotation is necessary for a fast, efficient walk, but to the average person it appears strange and some say male racewalkers appear effeminate or "sissy." This view keeps many potential male racewalkers from engaging in the sport. Jim Heiring, one of the United States' top racewalkers, states, "When I started racewalking, it embarrassed me. If people saw me, I'd start jogging. Now, I'm proud to be a walker and enjoy the heck out of it" (Knight, 1984, p. 43).

Racewalking Defined

Racewalking is defined by the International Amateur Athletic Federation (Canfield, 1980) as:

A rapid progression of steps so taken that unbroken contact with the ground is maintained. At each step, the advancing foot of the walker must make contact with the ground before the rear foot leaves

the ground. During the period of each step in which a foot is on the ground, the leg must be straightened at least for a moment, and in particular the supporting leg must be straight in the vertical upright position. (p. 1)

Racewalking Rules

To simplify this definition, racewalking is the taking of rapid steps by an athlete in a race to get from the start to the finish as quickly as possible while following these two basic rules:

1) Lifting is a rule violation that occurs when both feet are off the ground at the same time. One foot must always be in contact with the ground.

2) Creeping is a rule violation that occurs when one of the racewalker's legs is not straightened during a stride. Each leg must straighten momentarily during each stride (Rudow, 1975).

During a sanctioned racewalking competition, the participants walk on a regulation 440-yard or 400-meter track and are constantly observed by judges. Violation of either the "lifting" or "creeping" rule results in a warning and, if the walker commits another violation, disqualification occurs.

Racewalking and Fitness

Racewalking does not always have to be competitive. Walkers can add racewalking to their regular walking

programs as a means of increasing fitness levels.

Jacobson (1980) states, "Racewalking is safe, it works effectively on more body parts than running does, burns calories, develops cardiovascular fitness, trims the thighs, buttocks and hips, firms the upper torso and arms while being inexpensive and virtually injury free" (p. 1).

Kummant (1981) states, "Top distance runners and racewalkers usually reach the same pulse rates and achieve about the same cardiovascular benefit" (p. 20). Racewalking is quite easy to learn and can be a fine complement to a regular aerobic walking program. Basically, racewalking is just a faster, exaggerated version of normal walking. Beginning racewalkers should concentrate on the basics first and not be overly concerned with the two competition rules of racewalking.

Racewalking Techniques

There is much more arm movement in racewalking than in other forms of walking or running. In normal slow walking, the arms hang at the sides and move in synchronization with the legs. However, in racewalking the arm lengths are "shortened" by bending the arms at the elbow to form a 90° angle, so they can move faster as the tempo of the legs increases. As the arms swing, they should be no higher than chest level and no farther back than mid-hip. This vigorous

arm motion increases strength and power in the shoulders, arms, and chest (Laird, 1984).

The hips should be rotated, not "swung from side to side." As one leg swings forward, the hip of that leg rotates downward and forward, increasing the length of the stride (Rudow, 1975). With increased flexibility the hip rotation will become more pronounced and will produce a longer stride and increased leg speed. With each step the heel-to-toe method is the basic style. The heel of the foot being advanced should touch the ground first, followed by the rest of the foot and the toe leaving the ground last. The support leg thus "pulls" the other leg forward. This pulling action develops the muscles in the front part of the leg and is the opposite of running, where the athlete pushes off with the foot and develops the back muscles (hamstrings) of the leg.

Each stride should begin with a "straight" leg or locked knee. This gives more pulling power to move the body. The leg should remain straightened until it stops being the support leg and leaves the ground (Dunnett & Kitchen, 1981).

Summary

Racewalking, when done correctly, is more strenuous than running, because there is no "floating phase" when both feet are off the ground. The no support or floating phase of running removes stress from the legs, but in racewalking

one foot is always in contact with the ground. The constant contact with the ground, vigorous arm movement, and increased leg speed cause racewalkers to expend more calories than runners. A 150-pound man will use about 480 calories in running five miles, while a racewalker of the same weight will burn over 530 calories (Walk Don't Run, 1981).

Sheehan (1980) comments, "Racewalkers are part of a groundswell that may become the wave of the future" (p. 33). Jacobson (1981) states, "Racewalking can be as big or bigger than running. It hasn't achieved the boom that running has, but it will. After all, only about 25 million Americans run. But everybody walks" (p. 56).

Racewalking appears to have a real future in the United States. The sport can be pursued as a form of competition or just for its fitness benefits. Racewalking can add variety and intensity to an aerobic walking program. Physical educators and coaches need to understand the sport better in order for racewalking to be presented and taught in schools. With more public exposure and participation, racewalking can become a popular aerobic activity.

Chapter XIV

Techniques for Continuing the Program

Unfortunately, most people who engage in exercise programs usually drop out within a few months. Some quit because of the bad weather or injuries. Others can not find anyone with whom to walk, or they just plain lose interest. Staying motivated to continue a walking program is a problem that most all walkers have. The following is a list of motivational techniques that can be used to help maintain a consistent walking program through the difficult times.

Set Personal Goals

Most people have goals they set for themselves in various areas of their lives to motivate them to improve and progress. The type of goal set is unimportant, but the key is to set realistic goals to help strive for health and fitness in a walking program. Walking goals should be written down in a walking log or diary and progress toward the goals reviewed periodically. Walking goals should be specific and objectives clear. A vague generalization of "I want to get in shape," does little to motivate people.

Walking goals will vary from walking a certain number of minutes per day, a set number of miles per day, or to

average a set number of minutes or miles per week. Goals are also individual and should be tailored to fit one's personality and the level of fitness desired. One walker's goal may be to complete the New York City Marathon (which contains a walking division), while another's may be to do a five-mile walk at the end of a six-month walking program.

Advantages of a Walking Log

Most good walkers are meticulous keepers of detailed logs that include all sorts of data about walking. They keep records of how far and how long they walked, the weather conditions and what they saw during the walk. They know how many miles they have walked weekly, yearly, and even in their lifetime! This sounds fanatical, but, when asked why they keep such a detailed log, walkers answer that it motivates them to keep walking and serves as a storage record of their walking memories. A walking log conveniently placed on the bedroom dresser or bedside table can act as a stimulus to take that daily walk.

There are other advantages of keeping a log. It helps one plan a walking schedule. During the week it is sound to mix long walks with short, medium, and fast walks (Henderson, 1979). If a large number of miles were walked during one week, then the mileage the next week should be reduced. By using the log to determine what distances and times have been walked in the past, the future walks can be planned intelligently and allow the body to rest after stressful

days or weeks. If walkers do not keep a record of their walking and forget how far they have walked and continue to push themselves without rest, an injury could result. By jotting down how one feels during the walks and any injuries incurred, it will be easier to go back through the log and determine what caused the injury.

One disadvantage of keeping a log is that "it is not difficult to become a prisoner of your log and let the tail wag the dog" (Rubanowice, 1978, p. 5). The record of walking experiences is to be used as a tool in keeping a walking program going and assessing its progress. Do not feel pressured to walk every day if injured or ill just to put something in the log. Walking is the main goal, not just keeping a log.

What is written in a log is a highly individual matter. Some people like to be very descriptive and detailed and include all the details of the walking including what they had for breakfast! Others prefer to just jot down the time and distance walked. As runners and walkers get into their sports more, they tend to keep better, more thorough logs. Keep only the records that will be helpful and meaningful. The following is a list of the suggested items one could put in a walking log.

Suggested Walking Log Data

1) Date--Some runners and walkers begin their week on Sunday or some other day that fits their schedule better.

2) A.M. pulse--Take a pulse count while lying in bed right after waking. Count the pulse beats at the carotid artery with the two middle fingers for six seconds and add a zero. A high pulse rate can be a warning sign of too much physical stress. After several months most walkers see their resting pulse rates fall.

3) Weight--Record weight at the same time daily, immediately after rising in the morning. Any sudden weight loss or gain should be noted.

4) Time of walk/weather--Time of day and weather conditions can greatly influence the quality and duration of the walk.

5) Miles walked--If the distance walked is not known, take the total time walked and divide by the estimated pace. After timing several known distances, the pace can then be judged.

6) Time walked--Keep the time on a chronography stop-watch. If there has been a stop to rest or drink fluids, the watch can be stopped and restarted. Beginning walkers should always emphasize minutes walked, not distance as mentioned in Chapter VI.

7) Weekly miles--Some walkers like to keep a cumulative total of the miles walked that week.

8) Pulse at the end of walk--Take the pulse at the carotid artery immediately after walking. The pulse should

be within the target pulse rate or the walk was not strenuous enough.

9) Daily and weekly caloric intake--A record of the food eaten and the caloric value of each meal.

10) Total miles walked for the year--This helps some walkers as they set goals of walking from their town to another city or place. They find out the mileage and envision themselves walking to their destination as the miles increase.

11) Total miles walked during the walking program--A piece of important data for some walkers. They are proud of having walked thousands of miles while on their programs.

12) Miscellaneous comments--Could be anything of interest to the walker: injuries, stresses, shoe evaluations, sights viewed during the walk, personal feelings, food eaten, mental conditions.

Join Walking Clubs and Associations

Walking organizations are not as plentiful as running clubs and associations, but they are on the increase as more are forming each day. One of the greatest advantages of joining local walking clubs is to meet others who share an interest in walking. The social interaction with other people who are interested in walking can serve as a motivator. It is encouraging to meet with other walkers and exchange stories about walks, shoes, dogs, and training methods. By becoming members of clubs and associations that

promote walking, walkers can greatly increase their chances of staying with the program. There is one national organization for walking, The Walking Association in Arlington, Virginia. The president and founder, Dr. Robert Sleight, has done a great deal to promote walking and protect the rights and privileges of walkers across the nation. The membership dues are \$12 a year, and the subscriber receives a monthly newsletter containing an assortment of news items about walking.

Joining the Volkspport Association is another way of creating motivation to continue walking. Volksmarches or "people's walk" are large, non-competitive group walks that are becoming very popular in the United States. There is an American Volkspport Association (AVA) that promotes these mass marches or walks. The AVA has 52 member clubs in 20 states with 50,000 participants since 1976 (Schultz, 1080B). Volkspport walking was imported to the United States by military personnel and has mushroomed ever since. Volksmarches are set in certain cities and consist of 10 or 20 km courses where as many as 800 to 1,000 walkers attend. Upon completion of the volksmarches awards are given to all participants (Janeck, 1983). The main theme of the marches is to walk at a comfortable speed, talk with everyone, and have a good time. Joining in these walks would add zest,

interest, and variety to any walking program. An additional list of national walking clubs and organizations is located in the reference section of this manual.

Local walking clubs are being formed all across the nation as walkers are realizing the need for such organizations to promote the sport of walking and motivate its members.

Walking with a Companion

Walks are easy to postpone or eliminate if they are done alone. To share a scenic walk and good conversation with a fellow-walker tends to make one look forward to walks instead of dreading them. When walkers know that others are counting on them to walk, it is a commitment that is hard to break. By encouraging one another, walking companions can enhance the motivation to walk.

Married couples can use the time while walking to talk and discuss problems that otherwise would not be mentioned. Walking is a good family activity to get everyone away from the television and video games and into the beautiful out-of-doors. A weekend trip to a nearby state park to walk the nature trails can be a worthwhile family experience as family members can share quality conversation.

When walking with a friend, always observe the "talk test." Kuntzleman (1979) explains,

The talk test is especially important during the first six to twelve weeks of a beginning walking

program. You should be able to hold a conversation with someone beside you as you go. If this isn't possible you are walking too fast and should slow down to prevent making the walk unpleasant and risking injury. (p. 74)

Read Walking Books and Publications

There are over 34 current books written on the subject of walking. (A complete list is available in the reference section of this manual.) Many of the books are somewhat technical, such as The Complete Book of Walking by Charles Kuntzleman, and show the beginning walker how to set up a walking program, while others, like Gerald Donaldson's book The Walking Book, contain a lot of anecdotes and interesting history about all aspects of walking. Each book is written from a different viewpoint, and something new and helpful can be gained from each publication. The reading of these books can inspire walkers and give them various insights into the sport of walking.

Only recently have magazines dealing with walking appeared on the scene. The Walking Journal, published in Athens, Georgia, and Walkways, published in New York City, are the only regularly published magazines devoted to the various aspects of walking. Both periodicals are published quarterly, and the subscription prices are moderate. Walking magazines are at about the point that running

magazines were in the mid-1960's when only one small running magazine, Runner's World, was available in a booklet form. Today there are six widely distributed magazines dealing with running.

All aspects of walking are covered in these walking periodicals from "how to start a walking club" to "walking tours of famous cities." The reading of these publications and their discussion of various walking aids can further stimulate walkers' interests and give them pride in the sport.

Teaching Others to Walk

Having experienced the many benefits to be derived from the sport, walkers may want to help others begin a program. Walkers should promote their sport. By talking about walking and letting their friends see them walk, they could motivate others to begin a program. By teaching and encouraging family and friends to walk, walkers make a deeper commitment to their own aerobic walking programs.

A walking club could be started where one works or attends church. Establish a time for everyone to meet and walk regularly as a group two or three times a week. Fortin (1983) suggests two guiding principles to keep in mind when forming a club: get people walking for fitness on a regular basis, and keep walking fun for all.

T-shirts can be purchased with the club's name on them, and routes around the neighborhood and city can be

developed. Walkers who form clubs must know a lot about walking and set the example for others to follow. By being enthusiastic about walking and helping others to enjoy the sport, walkers can gain much personal satisfaction.

Enter Races or Walk-a-thons

If a walker has trained for several months and is competitive by nature, then training for and entering a race may be a source of motivation. In Chapter XIII on racewalking, the correct form necessary to be a good racewalker was discussed. If good racewalking techniques and training programs are developed, there are several distance racewalking competitions around the country. Some running road races have racewalking divisions. Howard Jacobson's book, Racewalk to Fitness, is an excellent guide for training and preparation for competition. Many people find that racing motivates them to walk better and faster. They view the race as an exhibition of the excellence they have achieved in the sport.

Various charities, such as the American Heart Association and the American Cancer Society, are constantly having walk-a-thons where people secure pledges for a certain amount of money for each mile walked. These charity walks can be a lot of fun, they are non-competitive, and always aid a good cause. Getting a walking club or group of neighborhood walkers to participate in a local walk-a-thon is an excellent motivational activity.

Making a Commitment

Having realized the physiological and psychological benefits of walking, it is time for walkers to make a real commitment to walking. Most people are creatures of habit. Walking can become a daily ritual if people will motivate themselves with a commitment. Pleas (1981) calls commitment a way of saying, "I will," and advocates a four-point walking creed to follow:

- 1) I will schedule my daily activities around my walking and not my walking around my activities,
- 2) I will make time for walking rather than try to find time for walking,
- 3) I will go for a walk every day,
- 4) I will not stand or ride when I can walk. (p. 107)

Kuntzleman (1979) also comments,

You will find it easy to stay with a walking program if you can allow it to become part of your daily routine--so much a part that you'll feel compelled to walk despite your own excuses for skipping a day. (p. 123)

By following these commitments, discipline will be found, and the walking will continue.

Short Walks During the Day

As people go about their daily tasks of work and living, there are always periods of time where short walks can be added. The following is a list of suggestions to add walking to their daily routines.

Supplemental Walking Suggestions

- 1) Carry groceries to the car instead of using a shopping cart.
- 2) Use the stairs at work instead of taking the elevator. If working on a top floor, stop two or three floors below and walk the stairs.
- 3) Park the car in far-away places when shopping. Take the long way back to the car.
- 4) Walk to work one or two days a week. If the distance is too far, take the bus to a point near work from which to walk. Over 5.3 million people walk to work (Sleight, 1983A).
- 5) When vacationing, plan to take walking tours of the scenic and historic areas near the vacation site. People will be able to get more of the "flavor" of the area by stopping and talking with the local people as they walk.
- 6) If one or two small items are needed from the local convenience store, walk instead of sending the children or driving. One-quarter of urban automobile trips are less than one mile (Sleight, 1983A).
- 7) At work, instead of smoking or drinking coffee and eating doughnuts, take a short walk. Walkers will save money, burn calories, and return much more refreshed and energetic.
- 8) When walkers find themselves sitting in a car waiting for someone, they should leave a note

stating they will return in 5 or 10 minutes and go for a short walk.

9) When shopping, walk to several stores to window-shop and take someone along and walk with them while they are shopping.

10) Go for a walk once a month at a scenic or historic site.

11) Plan regular weekly family walks. Plan to talk with each person and find out what is going on in their lives.

12) Take a couple of pieces of fruit to work and during lunch go for a walk while eating the fruit. Return and have a diet cola or glass of juice.

13) While flying on a business trip and having to wait for a flight in an airport, take a walk through the long concourses.

14) Take an early morning walk (as the sun rises before breakfast) at least once a week to meditate and watch the world awake. This will elevate the metabolism and burn extra calories all day.

15) Always carry an extra pair of walking shoes in the car in case an unexpected opportunity to walk occurs during the day.

GLOSSARY

GLOSSARY

- Acclimatization--Adaptation of the body to changes in environmental conditions such as temperature, humidity, or altitude.
- Aerobics--Sports or activities that develop increased oxygen utilization and transportation, thus increasing cardio-respiratory endurance.
- Aerobic Capacity--The maximum amount of oxygen the body can utilize when engaged in vigorous physical activity.
- Arthritis--Inflammation of the joints of the body.
- Athlete's Foot--A foot fungus, at times accompanied by bacterial infection and itching, redness, and cracking of the skin on the feet and between the toes.
- Ballistic Stretching--Flexibility stretches that involve using bouncy and jerky movements. These are not recommended for a good stretching routine.
- Basal Metabolic Rate--The energy expenditure of an awake person during absolute rest.
- Basic Food Groups--The four major categories of food (meats, milk products, vegetables and fruits, and cereals and breads) necessary for good nutrition and a balanced diet.
- Blister--Skin burns usually caused by friction. The top layer of skin separates from the second and fills with fluid.

Body Composition--The proportion of fat and lean constituents of the body.

Brisk Walking--Walking at a rate of around 4 m.p.h. or 15-minute miles. This pace is usually enough to get the pulse rate within the target pulse range.

Calorie--The measurement of a unit of energy, scientifically defined as the amount of heat required to raise the temperature of 1 kilogram of water one degree centigrade.

Caloric Balance--The condition when calories taken in from food equals the calories expended in body maintenance and exercise.

Callus--A flat thickening of skin caused by friction or pressure.

Capillaries--The smallest blood vessels that form the connection between arteries and veins and where the exchange of nutrients, oxygen, hormones and waste products occur.

Carbohydrates--A food nutrient composed of oxygen, hydrogen and carbon. They are the main energy nutrient in food.

Carotid Pulse--Pulse rate taken at the neck just under the jaw on either side.

Cellulite--A name given to lumpy deposits of fat that usually appear on the front and back of the legs and buttocks in overweight individuals.

Center of Gravity--The balance point or weight center of the human body. Located in the lower abdominal area anterior to the sacrum. It varies with body build and is lower in females.

Cholesterol--A chemical substance in animal fat that, when present in large quantities in the blood, is believed to cause plaque build-up in the body's arteries.

Cool Down--Five or ten minutes of light exercise at the end of an exercise workout to slowly lower the pulse rate and return the body temperature to near normal.

Corn--A cone-shaped of thickened skin caused by friction or pressure.

Dehydration--The excessive loss of body fluids and electrolytes.

Dietary Fiber--The indigestible carbohydrate cellulose found in plant foods.

Dumbbell--A hand weight.

E.C.G.--Stands for electrocardiogram and consists of tracings on a chart of the electrical changes of the heart. This is helpful in determining the health of the heart.

Electrolyte--Any substance that disassociates into positively and negatively charged ions when dissolved in water. In the human body the term refers to minerals in the body's tissues.

Endorphins--Hormones produced by the pituitary gland that are similar in composition to morphine and are believed to help reduce pain, anxiety, and stress.

Endurance Fitness--The same as cardiorespiratory fitness and indicates the ability or capacity of the heart and lungs to bring blood and oxygen to the exercising muscles during extended periods of vigorous physical activity.

Enkephalins--Hormones similar to endorphins with similar properties. The level of both drugs in the blood rises during long bouts of exercise.

Exercise Duration--The elapsed time during a bout of exercise.

Exercise Frequency--The number of bouts of exercise during a week.

Exercise Intensity--The pulse rate (heart rate) of the individual during exercise.

Exercise Walking--Walking briskly at a rate of around 4 miles per hour or faster. At this pace, the cardio-respiratory system is sufficiently stimulated to improve.

Extension--The return movement from flexion. Movement in the body joint where the angle of the joint increases.

Fat--A food nutrient that stores energy and vitamins in the body.

Fatigue--The inability to maintain a given level of performance resulting in decreased work capacity.

Flexion--Movement in a body joint where the angle at the joint diminishes.

Glucose--Blood sugar.

Glycogen--Glucose stored in the body in the liver and muscles.

Heart Rate--The same as pulse rate and refers to the number of contractions of the heart per minute.

Heat Cramps--Muscle cramps associated with heat-induced changes in water and electrolyte balance in muscle tissue. Can be relieved by administration of water and electrolyte drinks.

Heat Exhaustion--A condition characterized by fatigue, collapse or fainting caused by heat-induced reduction in cardiac output.

Heat Stroke--A serious heat illness where the body loses its ability to regulate body temperature. The condition represents a major medical emergency.

H.D.L.--High density lipoproteins are the part of the serum cholesterol that move fats out of the blood and are considered beneficial to the body. They increase in the blood with endurance exercise.

Heel Spur--An extension of bone on the outer surface of the heel that causes pain when walking or running.

Hiking--Walking a long distance or rugged trail and fairly rough terrain.

- Hydration--The excessive consumption of water in anticipation of sweating profusely during hot weather exercise.
- Hydrostatic Weighing--Underwater weighing to determine percent body fat. The most accurate method of determining body composition.
- Hypertension--The term for high blood pressure and occurs when the systolic pressure exceeds 140 mm Hg. and/or the diastolic pressure exceeds 90 mm Hg.
- Leisure Walking--Normal relaxed walking during performance of daily activities or when shopping. Usually around 1 to 2 miles per hour. This type of walking does not elevate the pulse rate high enough to produce a training effect on the heart and lungs.
- L.D.L.--Low density lipoproteins are the part of the serum cholesterol that is believed to be responsible for the build-up of plaque on the artery walls.
- Maximum Heart Rate--The highest heart rate that a person should attain during exercise. The M.H.R. is based on age and physical condition.
- Maximum Oxygen Uptake--The volume of oxygen (VO_2) extracted from the air inhaled, usually expressed in liters per minute. An indication of cardiorespiratory fitness.
- Metabolism--The chemical transformations of food in the body.

Minerals--A basic micro nutrient in food that forms part of various hormones, enzymes, and other substances that help regulate chemical reactions in cells.

Morton's Toe--Foot structure with the great or large toe shorter than the second one.

Muscular Endurance--The ability to perform repeated muscle movements over an extended period of time.

Nutrient--A substance obtained from food and used in the body to promote growth, repair, and maintenance.

Obesity--The accumulation of large amounts of excess body fat. Most authorities indicate that obesity for men is around 20% body fat and for women about 30% body fat.

Orthopedic Surgeon--A doctor who specializes in surgery dealing with bones and joints.

Orthotics--Corrective devices that are inserted in the shoes to help guide the foot into a functionally neutral position during walking or running. They are usually prescribed to correct excessive supination or pronation of the foot.

Overload--A principle of endurance and strength training where the body or system is worked harder than normal.

Pacewalking--Walking at a steady speed for a period of time to gain the training effect of exercise.

Pedestrian--Refers to a person walking or traveling by foot.

P.H.A.--Stands for peripheral heart action. The contracting skeletal muscles squeeze the veins and arteries and force the blood through them, thus assisting circulation.

Physical Fitness--A measure of the body's muscular strength, flexibility, endurance, and body composition. The ability to perform work and daily activities with vigor and undue fatigue while having enough energy left to pursue sports and recreational activities.

Podiatrist--A specialist who treats disorders of the foot and ankle.

Pronation--A condition in which the foot rolls to the inside upon striking the ground while walking or running.

Proteins--A food nutrient composed of structural units called amino acids that forms the structure of muscle, skin, blood, enzymes, and hormones.

Racewalking--A progression of rapid steps taken so that unbroken contact with the ground is maintained with each step and the advancing foot touches the ground before the rear foot leaves the ground. During each step when a foot is in contact with the ground, that leg must be straightened in a vertical upright position. Racewalking is an international and Olympic competitive event.

Range of Motion--The degree of freedom of movement in a body joint.

Radial Pulse--Pulse rate taken on the top side of the wrist.

- Repetition--The number of times an exercise is performed through a full range of motion without rest.
- Running--Forward locomotion of the body while in the erect position, faster than a walk, characterized by a "no support" phase where at times both feet are off the ground at the same time.
- Saturated Fat--Fats derived from animal sources that are solid at room temperature. Saturated fat is associated with heart disease.
- Sedentary--Refers to a lifestyle of inactivity and very little exercise.
- Set--A given number of repetitions for a particular exercise.
- Shin Splints--Generalized pain along the tibia (lower leg bone). Can be caused by overuse or tight calf muscles.
- Skinfold Measurement--The thickness of two layers of skin and the attached fatty tissue measured by an instrument to assess percent body fat.
- Sprain--A stretch or tear in a ligament.
- Sports Medicine--The branch of medicine which deals primarily with the treatment and prevention of athletic injuries.
- Static Stretch--Slow sustained stretching movements.
- Strain--A tear in a muscle or tendon.
- Stroke Volume--The amount of blood pumped by the heart with each beat.

Supination--A condition in which the foot rolls to the outside upon striking the ground while walking or running.

Target Heart Rate--The predetermined heart rate to be reached during physical exercise, which is needed to produce an improvement in the cardiorespiratory efficiency of the body.

Tendonitis--Inflammation of tendons around joints like the shoulder, elbow, or knee.

Training Effect--A strengthening of the body's heart and lung systems produced by big muscle aerobic activities.

Vitamins--Organic compounds found in food that are necessary in small amounts to proper body functioning.

Volksmarch--A non-competitive hike composed of a large number of people. Originated in Germany and brought to the United States by military personnel.

Walking--Forward locomotion of the body while in the erect position supported first by one leg, then by the other with one foot always in contact with the ground. At times, both feet are in contact with the ground, producing a double support phase.

Walking Cycle--Heel contact of one foot to heel contact of the other foot and then back to the heel contact of the starting foot.

Warm-up--The pre-exercise phase of a workout consisting of stretching, calisthenics, or light exercise to raise the pulse rate and body temperature.

SUGGESTED WALKING COURSE OUTLINE

The following is a suggested course outline for a college aerobic walking class. The materials in the syllabus can be adapted to fit the needs of each particular instructor and university.

RECOMMENDED
COURSE SYLLABUS

Course: Walking
Course Number:
Credit Hours:
Classroom:
Time:
Instructor:
Office:
Home:

Course Description: The course is designed to give the student the knowledge and technical skills to set up and participate in a regular aerobic walking program.

Course Objectives: After completing this course, the student should be able to:

1. Structure and organize a walking program of progressive intensity that meets his/her particular needs.
2. Understand the exercise physiology of walking.
3. Select the proper walking shoes, attire, and aids.
4. Select the most appropriate walking sites.
5. Demonstrate the proper mechanics of walking and race-walking.
6. Understand the multiple health benefits of walking.
7. Be properly motivated to include walking as an integral part of his/her lifestyle.
8. Appreciate the aesthetic benefits received from walking in pleasant and scenic environments.
9. Recognize the psychological values derived from walking.

CLASS ATTENDANCE:

Students are expected to attend classes punctually. Two class absences will not affect the student's grade. All unexcused absences above two will result in the loss of 35 points from the student's point total. If a student misses a total of eight class meetings (excused and unexcused), the student must drop the course or receive a grade of F.

Call the instructor and inform him of the reason for the absence. If this is not possible, upon return to the class inform him of the reason for being absent. If this is not done, the instructor will assume that the absence is unexcused.

If students come to class after the roll has been checked, it is their responsibility to notify the instructor, before leaving, that they were present. Failure to do this will result in the student being counted absent.

GRADING PROCEDURE:

	<u>Percentage of Grade</u>
1. Class Participation--600 points.....	60%
a. attendance	
b. attitude	
c. effort	
2. Written test--200 points.....	20%
3. Completion of the two batteries of physiology tests--150 points.....	15%
4. Six mile walk--50 points.....	5%
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TOTAL POINTS 1,000 points	100%

A minimum point total of 750 is required to receive a grade of "P" and pass the course. Any point total lower than 750 will result in the student being given a grade of "F."

WALKING CLASS
STUDENT ITINERARY

Date	Time	Subject or Activity	Class Assignment	Meeting Place
1	11:00	Class Orientation, Lecture "Introduction to Walking"	--	Classroom
2	11:05	2-Mile Walk for Time	Dress Out	Campus Track
3	11:00	Lecture--History of Walking"	Read Chapt. 1, 2 of manual	Classroom
4	11:05	Physiology Testing 1. Flexibility Test 2. Percent Body Fat 3. Weight 4. Resting Pulse Rate 5. Blood Pressure 6. Harvard Step Test	Dress Out	Physiology Lab
5	11:05	Flexibility and Strength Routines	Dress Out Read Chapt. 4	Dance Studio
6	11:05	Campus Walk--30 minutes	Dress Out	Lobby of P.E. Bldg.
7	11:00	Lecture--"Commonly Asked Questions About Walking"	Read Chapt 3 of manual	Classroom
8	11:05	Walk in local park	Dress Out	Lobby of P.E. Bldg.

<u>Date</u>	<u>Time</u>	<u>Subject or Activity</u>	<u>Class Assignment</u>	<u>Meeting Place</u>
9	11:00	Lecture--:Selection of Walking Shoes"	Read Chapt. 5 of manual	Classroom
10	11:05	Neighborhood Walk--30 min. near campus	Dress Out	Lobby of P.E. Bldg.
11	11:00	Lecture--Walking Techniques and Guidelines"	Read Chapt. 6 of manual	Classroom
12	11:05	Campus Walk--25 min. Bring some type of hand weight	Dress Out	Lobby of P.E. Bldg.
13	11:00	Lecture--"Mechanics of Walking"	Read Chapt. 7 of manual	Classroom
14	11:05	Local neighborhood walk 25 min. includes some hills	Dress Out	Lobby of P.E. Bldg.
15	11:00	Lecture--"Walking Attire and Aids"	Read Chapt. 8 of manual	Classroom
16	11:05	Walk to a local historic site and back--35 min.	Dress Out	Lobby of P.E. Bldg.
17	11:00	Lecture--"Values of Walking"	Read Chapt. 9 of manual	Classroom
18	11:05	Interval Walk--25 min. Intersperse walk with short bouts of fast walking	Dress Out	Lobby of P.E. Bldg.

<u>Date</u>	<u>Time</u>	<u>Subject or Activity</u>	<u>Class Assignment</u>	<u>Meeting Place</u>
19	11:00	Lecture--"Walking Safety" "Injuries and Footcare"	Read Chapts. 10 and 11 of manual	Classroom
20	11:05	Walk around a local pond or body of water--30 min.	Dress Out	Lobby of P.E. Bldg.
21	11:00	Lecture on Nutrition	Read Chapt. 12 of manual	Classroom
22	11:05	Campus Walk--40 min. Students carry weights	Dress Out	Lobby of P.E. Bldg.
23	11:00	Racewalking	Read Chapt. 13 of manual	Classroom
24	11:05	Practice Racewalking 40 min.	Dress Out	Gym Floor
25	11:05	Local neighborhood walk 35 min.	Dress Out	Lobby of P.E. Bldg.
26	11:00	Lecture--"Tips for Continuing the Program" and "Great Walking Feats"	Read Chapt. 14 and Appendix I of manual	Classroom
27	11:05	2-mile walk for time on track--compare with first 2-mile walk	Dress Out	Lobby of P.E. Bldg.

<u>Date</u>	<u>Time</u>	<u>Subject or Activity</u>	<u>Class Assignment</u>	<u>Meeting Place</u>
28	11:00	Second Physiology Test Compare with the first tests	Dress Out	Physiology Lab
29	11:00	Written Exam	Review all Chapters. of manual	Classroom
30	11:05	Campus Walk--40 min.	Dress Out	Lobby of P.E. Bldg.
31	11:00	Review Written Exam Check Logs	Bring Walking Logs	Classroom
32	7:00 a.m.	6-mile walk at local park followed by a picnic	Dress Out	Lobby of Gym

INSTRUCTOR'S ITINERARY

Class Period 1--Class Orientation, lecture, Chapter 1,
Introduction to Walking"

1) Go over course syllabus with students. Be sure they understand the course objectives and the instructor's policy on class attendance, grading procedure, dressing out, and class meeting sites.

2) Give each student a copy of the class itinerary and inform them that every effort will be made to adhere to the schedule. The semester-long schedule enables everyone to know when they dress out, meeting time, where to meet, the nature of the activity, and what chapters of the manual are to be covered. At each class meeting, remind students what is on the itinerary for the next class meeting.

3) Ask the students to be in class at 11:00 on lecture days, as the class will dismiss at 11:50. On days that call for the students to dress out, they should be at the designated area at 11:05. Since some students have classes before the walking class (that class ends at 10:50), the extra five minutes will give them a total of fifteen minutes to dress out and fifteen minutes to shower and dress before their next class.

4) Remind students to wear athletic shoes to class on the days they dress out, along with shorts, tee-shirt, or warm-up pants. They should be cautioned not to wear

tight-fitting clothes or blue jeans, as they will restrict walking motion.

5) Mention the six physiology tests to be given on the fourth class meeting. Emphasize that the students will not be graded on their performance on the tests or their improvement from the tests at the beginning of the semester to those at the end.

6) Students are required to keep a written record of their walking experiences in the form of a walking log. The form for the log is contained in the course syllabus of the manual. Have the log form copied and give each student enough weekly copies to fill out during the semester. There is also a monthly summary that goes with the log. Most students have never kept logs and need this concept fully explained. The topic of walking logs is discussed in Chapter 14 of the manual. Assign the students to read this section.

The monthly summary and the first day of the log in the syllabus is already filled out. The data were taken from the instructor's log. This shows the student exactly how to fill out the log, as many students want only to put down how far they walked. Students will get much more out of the walking program if they completely fill out the log and monthly summaries. Stress this with the students. The logs will be checked at mid-semester to see if the students are filling them out correctly.

Instructors may wish to alter the log and summary to fit their particular needs.

7) Teaching Points. Chapter 1. "Introduction to Walking": America was formerly an agricultural nation.

Farm work provided enough exercise to keep people fit.

Today's jobs do not require enough physical work to keep people fit.

Research indicates that many health problems could be helped by exercise.

America is not a healthy nation.

America is in the midst of a fitness boom.

The overlooked sport of walking is one of the easiest exercises.

More people walk for fitness than any other activity.

Walking can be adapted to any age and is almost injury-free.

Walking can be as beneficial to the body as any other activity.

It appears to be a worthwhile effort to decide on a class goal at the beginning of the semester. In doing this the instructor should attempt to convince the students to set a goal of doing a six-mile walk at a local park or scenic area. To many the very idea of walking six miles seems impossible, and some students may actually not be able to perform the feat at the semester's end. However, tell them they have 16 weeks to train and they can gradually work

up to walking that distance. The class, with the instructor's persuasion, will usually adopt this goal. Choose a local running or walking course that would be a challenge to the class.

8) Remind students to dress out for the next class period and to meet at the campus for a two-mile walk.

9) Key Terms: Sedentary Lifestyle, Walking, Cardiovascular Disease, Fitness Boom, Cardiorespiratory Fitness, Physical Fitness.

Class Period 2--2-mile Walk for Time

1) Explain to the students that the 2-mile walk for time is an activity for them to assess their cardio-respiratory endurance and compare their time today with their time at the end of the semester. The results will show their improvement but are not part of the grading system. However, they are required to take both 2-mile walks.

2) Caution students that, if any time during the walk they should get nauseated, sick, dizzy, or feel any type of chest pain, to stop immediately. The test can be made up at a later date.

3) Let the students stretch for 5 minutes. Most will not know how to stretch, so lead them in a few basic stretches.

4) Have students take one warm-up lap.

5) Use a stopwatch to time the students as they walk 8 laps of a regulation 440-yard track. If the track is a 400-meter track, then the test should be 8 laps plus 67 feet, since 400 meters is 8.45 feet shorter than 440 yards. Make sure they walk on the inside lane of the track as this is the official point where the track is measured.

6) Students should walk as fast as possible and push themselves as this is a test. Remind them that most walks in the class will be brisk and will elevate the pulse rate, but they will be asked to extend themselves walking only twice, both during the 2-mile walks for time.

7) Have students call out the number of laps they have completed as they come by, since they tend to forget how many laps they have covered. Give them their elapsed time as they come around. Constant words of encouragement will motivate students to do their best.

8) As the students come around on the eighth lap, call out their time and, after all have finished, call out each person's name and record their times in the Class Testing Record (located in the syllabus).

9) If it rains or snows and the track cannot be used, try to conduct the test in the gym. Walking around a regulation basketball floor, and allowing some distance

for going around the corners (3 feet per corner), the number of laps in a mile is 17.6. Therefore, to conduct the test in a gym would require the student to walk 35.2 laps.

10) Remind students about the text assignment and to meet in the classroom next time.

Class Period 3--Lecture, Chapter 3, "History of Walking"
Teaching Points:

1) Walking is one of the first skills learned by infants.

Upright posture freed man's hands to hunt and develop hand skills.

The ability to walk long distances was an admirable trait of man in early history.

Walking was a means of relaxing for many great scientists, philosophers, and writers.

The Bible contains over 300 references to walking.

2) Remind students to dress out and meet in the physiology lab for the tests next time.

2) Key Terms: Bi-pedal movement, Locomotive skill, Homo Sapiens, Hippocrates' "Walking is Man's Best Medicine," Roman legions marching, English writers walking.

Class Period 4--Physiology Testing
Teaching Points:

1) By performing some relatively simple physiological tests on the students at the beginning and at the end of the semester, they can possibly see improvement in their physical fitness. This improvement may motivate them to continue their walking programs.

2) The six tests to be given, the instructions for administration of the tests, and the forms for recording the information are in the Class Testing section of the course syllabus. The tests selected are relatively easy to administer, reflect the physical fitness of the students, and most of the students' scores can be improved in a 15- to 16-week period.

3) Recruit four or more upper division physical education majors to assist in administering the tests. Assign each major a test to administer, and the instructor should move around and supervise. Most college classes are limited to 25 and, with help, everyone can usually be tested in one class period.

4) As the students complete the tests, they should record their scores and ratings on their own Student Class Testing Record (see form following). After all tests have been completed, the student turns the form into the instructor who records the results on the master class testing form.

- 6) Emphasize static instead of ballistic stretching.
- 7) Remind students to read Chapter 3 of the text and meet in the classroom next time.
- 8) Covering the flexibility routine early in the semester affords the students the opportunity to use the routine daily and before all walks.
- 9) Key Terms: Flexibility, Strength, Muscle Imbalance, Static Stretches, Stretch Reflex.

Class Period 6--20 minute Campus Walk
Teaching Points:

- 1) 5 minutes of flexibility stretches.
- 2) This campus walk should already have been walked and measured. A 30 minute walk for most students will be about 1.8 to 2 miles depending on walking speed.
- 3) Try to walk by conspicuous places on campus where students and faculty can see the class walking. Be proud of the walking class! Being seen is a good way to promote the class and the physical education department.
- 4) Encourage the students not to be self-conscious or ashamed of their sport of walking, but to walk "proud" and set the example.
- 5) During all the walks, encourage (but don't require this early in the course) students to carry hand weights or day-packs. This overload will increase heart rate faster and build strength in the upper body and legs.

6) Stop three times during the walk, one being at the end of the walk to check pulse rates and see if they are in the target zone.

Class Period 7--Lecture, Chapter 3, "Commonly Asked Questions About Walking"
Teaching Points:

1) Begin class by asking the students to answer some of the questions asked in Chapter 3. Go around the class randomly asking the questions to determine if the chapter has been read and to clear up pertinent questions about walking early in the semester.

2) Later ask for questions that were not asked in Chapter 3, and discuss them with the class. This is a good time for dialogue between the instructor and the class.

3) Remind students to dress out for a walk next class meeting.

4) Reserve two school vans to transport the class (within 5 minutes of the college) to a scenic local park for the next class meeting. Transporting students to various scenic places to walk is sometimes a hassle and costs the department money, but it makes the class more interesting and motivates the students to enjoy their walking.

Class Period 8--20-minute Walk in Local Park

1) 5 minutes of flexibility stretches.

2) Have the school vans gassed and ready to go in front of the physical education building at 11:00. Be sure to get a responsible person to drive the other van. If the class leaves at 11:05 and 5 minutes for travel are allowed, 5 minutes to stretch and call roll, that permits about 20 minutes to walk. End the walk at 11:40, and the students can be transported back at the college by 11:45. These trips may be somewhat of a problem in obtaining transportation and getting students to be on time. They may also cut down on the time available to walk. However, students will have been introduced to new, interesting places to walk in the city and the boredom of walking in the same place each day will have been reduced.

3) The students will walk at varying paces as the route is covered. Try to stop and wait on the slower walkers to catch up if the path of the walking route is not clear.

4) In walking at different sites, remind the students to walk on the left side of the road facing traffic and to always watch for cars.

5) Stop twice during the walk and have students check their pulse rates to see if they are in the target pulse range. Count the carotid or radial pulse for six seconds and add a zero.

6) Remind students to read Chapter 4 of the text and meet in the classroom next time. Even though they have a class meeting itinerary, students must always be reminded.

Class Period 9--Chapter 5, Selection of Walking Shoes
Teaching Points:

1) Take an old running shoe and cut it in half to show the various parts of a walking shoe.

2) Bring various types of walking shoes to class (hiking boots, basketball shoes, flip-flops, cowboy boots) to show what shoes are appropriate and inappropriate for walking.

3) Emphasize the importance of buying a good pair of shoes that fit well. This is one of the most important decisions a walker will make.

4) Cover the guidelines in Chapter 5 of how to purchase a pair of walking shoes.

5) Emphasize the qualities of a good walking shoe and show these qualities in a pair of shoes.

6) Mention the stores that carry the best inventory of shoes and the ones that will give discounts to walkers.

7) Remind students to dress out for a 30-minute neighborhood walk next class meeting.

8) Key Terms: Sneakers, Toe Box, Mid-sole, Heel Counter, Flared Heel, Multi-layered Sole, Arch Support, Uppers.

Class Period 10--30-minute Neighborhood Walk
Teaching Points:

- 1) 5 minutes of flexibility stretches.
- 2) This walk, like all others taken during the course, should be scouted beforehand to determine its length (about 2½ miles) and any hazards that might exist such as excess traffic or troublesome dogs.
- 3) Try to find a route that has pretty homes and pleasant surroundings with little traffic and that is near the campus.
- 4) Take three pulse counts during the walk with one coming at the end of the walk.
- 5) During all the walks, try to check each student to see if they have dressed appropriately for the weather (see Chapters 3 and 8).
- 6) Remind students to read Chapter 5 of the text and meet in the classroom next time.

Class Period 11--Lecture, Chapter 6, "Walking Techniques and Guidelines"
Teaching Points:

- 1) Bring several students to the front of the class and analyze their walking techniques as they walk across the room. Emphasize the guidelines in Chapter 5 and encourage the students to practice them.
- 2) Have the same students or instructor demonstrate the proper walking techniques.

3) Emphasize obtaining medical clearance from a doctor for anyone beginning a walking program.

4) Clearly define the three exercise variables: intensity, duration, and frequency.

5) Also emphasize that the key to obtaining cardio-respiratory benefits from walking is to walk briskly enough to get the pulse rate in the target pulse range.

6) Point out that a successful walking program is built on gradualism and consistency over a long period of time.

7) Have the students practice taking their pulse rates at least four times during class. One pulse count should be taken after they have gotten out of their chairs and walked in place for 15 seconds.

8) Have the students calculate their target pulse rate.

9) Remind students to dress out for a 25-minute campus walk next time and to bring some type of hand weight or backpack to carry.

10) Key Terms: Posture, Arm Swing, Rhythmic Breathing, Bent Arm Swing, Heel Strike, Toe Push-off, Leg Pull, Economy of Walking, American College of Sports Medicine, E.C.G., Stress Test, Intensity, Duration, Frequency, Pulse Monitoring, Target Pulse Rate, Maximum Heart Rate, Medical Clearance.

Class Period 12--25-minute Campus Walk with Hand Weights
or Packs

Teaching Points:

- 1) 5 minutes of stretching to begin class.
- 2) Bring to class some extra hand weights (rocks, small pieces of iron, or any heavy small weight) because many students will forget to bring their weights, and the instructor will have to supply them.
- 3) This campus walk should be different from the ones held on class periods 6 and 12. Try to never repeat a walking route. The students like this method and are always asking what route the scheduled walk will take.
- 4) The route should have been previously walked and measured.
- 5) Expect higher pulse rates during this walk because of the overload carried. The pace of the walk may have to be reduced if the pulse rate gets above 180.
- 6) Invite other faculty members and administrators to join in the campus walks. Give them a student itinerary and welcome their participation.
- 7) Remind students about the assignment for the next class meeting.

Class Period 13--Lecture, Chapter 7, "Mechanics of Walking"
Teaching Points:

1) This lecture will deal with the anatomy and kinesiology of walking. To many students this topic is very boring and uninteresting.

2) Borrow a human skeleton and large muscle chart from the biology department to aid in explaining the various muscles and bones used in walking.

3) The use of prepared video tapes of people walking is a useful audio-visual aid. Try to obtain a machine that has stop-action so the stages of the walking cycle can be analyzed.

4) Use students as models to help illustrate the various stages of walking.

5) Emphasize the basic mechanics of walking without being too scientific.

6) The smooth integration of all the muscles, bones, and joints by the body during the walking cycle should be stressed.

7) Mention that man has never created a machine that can come close to duplicating the human walk.

8) Remind students of the next class activities.

9) Key Terms: Walking Cycle, Double Support Phase, Swinging Phase, Single Support Phase, Hamstring Muscle, Quadriceps Muscles, Base of Support, Center of Gravity, Gait, Kinesiology, Biomechanics, Hip Rotation, Arm Swing.

Class Period 14--25-minute Local Neighborhood Walk with Hills

Teaching Points:

- 1) 5 minutes of flexibility stretching.
- 2) The route should be different class period 10 and should include several hills to add variety to the walk.
- 3) Check pulse rates twice for target pulse ranges.
- 4) Emphasize that when walking hills to lean forward a little more and swing the arms more vigorously to increase walking efficiency.
- 5) Pulse rate will be higher due to the overload of the hills.
- 6) Remind students about next class meeting.

Class Period 15--Lecture, Chapter 8, "Walking, Attire, and Aids"

Teaching Points:

- 1) Bring as many of the items as possible mentioned in Chapter 8 to class. Go to a local running store and ask the manager to borrow several items of walking attire and equipment to present to the class during this lecture.
- 2) Some of the items, like skinfold calipers, can be obtained from the college physiology department.
- 3) Discuss each item mentioned in Chapter 8 and its role in aiding a walking program.

4) Emphasize that many of these products are quite expensive and are not necessary to have a good walking program.

5) Relate any personal experiences with the products mentioned in the lecture.

6) Remind students about the next class activity.

7) Key Terms: Skinfold Calipers, Treadmills, Pedometers, Calibration, Pulse Monitors, Shoe Cushioning, Self-defense Products, Walking Sticks, Canes, and Staffs, Chronograph Watches, Reflective Gear, Hand Weights, Food Massage, I.D. Tags, Shoe Repair.

Class Period 16--35-minute Walk to a Local Historic Site
Teaching Points:

1) Locate some historic house or site about 15 minutes from the school's campus.

2) Measure and scout the route.

3) Stretch for 5 minutes.

4) Have class walk to the site and back. If no historic site is near, pick a landmark such as a hospital or fire station.

5) Tell students to bring their logs to class the next class period.

6) Remind students of the next class activity.

Class Period 17--Lecture, Chapter 9, "Values of Walking"
Teaching Points:

1) Cover the list of physiological benefits in Chapter 9 derived from walking. Studies should be cited to substantiate the benefits. Emphasize the benefits to the heart and circulatory system.

2) Cover the lists of psychological benefits listed in Chapter 9 of the manual. Emphasize the role of walking in relieving stress.

3) Briefly look at all students' logs to see if they have been writing a complete record of all their walks.

4) Remind students of the next class activity.

5) Key Terms: Heart Attack, Serum Cholesterol, High Density Lipoproteins, Low Density Lipoproteins, Stroke Volume, Serum Triglycerides, Mental Stress, Tension, Anxiety.

Class Period 18--25 minute Interval Walk on Campus
Teaching Points:

1) 5-minute stretching routine.

2) Check route and measure distance.

3) During the course of the walk, about every 4 minutes, have the class walk fast for 30 seconds, then resume their normal walking. About seven or eight 30-second intervals of fast walking should be interspersed in the 25-minute walk.

4) Check pulse rate after two of the intervals and at the end of the walk.

5) Remind students of the next class activity.

Class Period 19--Lecture, Chapter 10, "Walking Safety"
Chapter 11, "Injuries and Footcare"
Teaching Points:

1) It will be difficult to cover both of these chapters in a 50-minute class period. The first 20 minutes should be devoted to walking safety, while the remaining 30 minutes should be given to walking injuries and footcare.

2) Safety, though not a popular subject with students, should be stressed, and those safety guidelines should be adhered to on all class walks.

3) The footcare section, though important, should receive minimal treatment, 10 minutes of class time.

4) The topic of injuries will usually provoke a lot of questions from students.

5) Key Terms: Road Safety, Dog Safety, Personal Safety, Night Safety, Inclimate Weather Safety, Safety from Falls, Chest Pain, Strains, Sprains, Blisters, Corns, Callouses, Cramps, Athlete's Foot, Muscle Soreness, Shin Splints, Side Stitches, Heat Exhaustion, Heat Stroke.

Class Period 20--Walk Around a Local Pond or Body of Water
Teaching Points:

1) If there is a lake or pond near the campus, plan a 20- to 30-minute walk around its banks.

2) Again, arrange for transportation and walk and measure the course.

3) If no body of water is nearby, then plan a local neighborhood walk.

4) 5 minutes of flexibility stretches.

5) Remind students of the next class activity.

Class Period 21--Lecture, Chapter 12, "Nutrition and Weight Control"

Teaching Points:

1) These two subjects are much too broad to be covered in detail. Just present the basics.

2) Cover the Nutritional Guidelines presented in Chapter 12.

3) Discuss the problem of obesity in the U.S. and outline the scientific approach to safely losing weight by controlling caloric intake and increasing caloric output.

4) These topics really interest students. Be prepared to answer their many questions.

5) Remind students of the next class activity.

6) Key Terms: Calorie, Obesity, Overweight, Behavior Modification, Percent Body Fat, Carbohydrates, Nutrients, Vitamins, Minerals, Proteins, Fats, Low Carbohydrate Diets, Caloric Intake, Caloric Output, Amino Acids, R.D.A., Empty Calories, Saturated Fat.

Class Period 22--40-minute Campus Walk with Students
Carrying Handweights
Teaching Points:

- 1) 5 minutes stretching.
- 2) The increased walking time is necessary to prepare students for the 6-mile walk on the last day of class.
- 3) Bring additional handweights for the students who forget to bring their own.
- 4) Combine the campus walks done on classes 8 and 12 into one walk.
- 5) Encourage students to walk on the days when the class does not meet to improve aerobic fitness.
- 6) Remind students about the next class activity.

Class Period 23--Lecture, Chapter 13, "Racewalking"
Teaching Points:

- 1) Emphasize the following:
 - a. The role of racewalking in international sports and the Olympics.
 - b. Racewalking opportunities in the U.S.
 - c. Racewalking rules of "Lifting" and "Creeping."
 - d. Racewalking form and technique.
- 2) The instructor should demonstrate the proper form for racewalking to the class.
- 3) Health benefits of racewalking.
- 4) Key Terms: Lifting, Creeping, Hip Rotation, Leg Synchronization, 20 Kilometer Walk, 50 Kilometer Walk, Olympic Walking.

Class Period 24--Racewalking Practice--40 Minutes
Teaching Points:

- 1) 5 minutes stretching
- 2) Demonstrate racewalking form to students in gym.
- 3) Have students line up and attempt to racewalk.

Criticize and evaluate each student's form.

4) Have students walk several laps around the gym while observing their form.

5) Explain how racewalking can be added to the regular walking program.

- 6) Remind students of the next class activity.

Class Period 25--35-minute Local Neighborhood Walk
Teaching Points:

- 1) 5 minutes of stretching.
- 2) Put in four 30-second spurts of racewalking in the walk.
- 3) Take two pulse counts during the walk.
- 4) Remind students to train outside class for the 6-mile walk at the end of the semester.
- 5) Remind students of the next class activity.

Class Period 26--Lecture, Chapter 14, "Tips for Continuing the Program"
Appendix I, "Great Walking Feats"
Teaching Points:

- 1) This is an important lecture because Chapter 14, "Tips for Continuing the Program," contains ways in which

walkers can motivate themselves to stay with the walking program and not abandon it in a few months.

2) Stress the following from Chapter 14:

- a. Setting of personal goals.
- b. Keeping track of walking experiences by writing in a walking log.
- c. Join local and national walking clubs and associations.
- d. Walking with friends, groups, or members of the family.
- e. Reading of books and magazines on walking.
- f. Teaching other people to walk serves as a motivator to walk more and set the example.
- g. Enter races or walk-a-thons. Competition motivates many people.
- h. Make a time and priority commitment to walking.

3) The glossary contains the records of some of the great walkers of the world in the section, "Great Feats of Walking," pages 275-277.

4) Remind students to do at least a 4-mile walk outside class to prepare for the 6-mile walk.

Class Period 27--Second 2-mile Walk
Teaching Points:

- 1) Meet at campus track.
- 2) 5 minutes of stretching.

3) Encourage students to walk as fast as they can and attempt to better their time of the first 2-mile walk on class period number 2.

4) The procedure for administering the test is the same as the first.

- a. Have students walk on the inside lane unless they are passing someone.
- b. Students walk 8 laps of the track.
- c. Each time they pass the instructor they should call out the number of laps walked in order to make sure they don't forget how many laps they have covered.
- d. Call out the time elapsed constantly as students pass.
- e. Encourage students as they pass. This will really help some of the students.
- f. Call out finishing times as students complete their eighth lap.
- g. Record their times and let the students compare the time with their time on the first 2-mile walk.
- h. Encourage them to walk on the days the walking class does not meet.
- i. Remind students that a comprehensive written examination on walking will be given during the next class period. The exam will cover the first 14 chapters of the text. Questions will be of the true or false and multiple choice type with some short discussion questions.

Class Period 28--Second Physiology Tests
Teaching Points:

- 1) Meet at the physiology lab.
- 2) 5 minutes of stretching.

3) Perform the same tests, using the same procedure as during class period 4.

4) Have the students record their scores on the test form.

5) Be sure to compare the results of the two tests and let the students see if they have improved their fitness with the walking course. Most students will show some improvements.

6) Remind students of the next class activity and to keep walking outside of class to prepare for the 6-mile walk.

Class Period 29--Written Examination on Walking
Teaching Points:

1) The written test provided in the glossary of this manual can be used. All the questions were taken from the manual.

2) The instructor may wish to add or delete questions from the exam.

3) It is recommended to use answer sheets along with the test as they are easier to grade.

4) Remind students of the following:

- a. 40-minute campus walk during next class.
- b. To bring their walking logs to be checked on class meeting number 31.
- c. Continue to train for the 6-mile walk on the last day of classes.

Class Period 30--40-minute Campus Walk
Teaching Points:

- 1) 5 minutes of stretching.
- 2) Increase the intensity of the walk in order to prepare students for the 6-mile walk.
- 3) Check pulse rates three times.
- 4) Include any hills on campus.
- 5) Remind students:
 - a. To bring logs to be checked at next class meeting.
 - b. The written test will be reviewed at next class meeting.

Class Period 31--Go Over Written Exams and Check Walking Logs
Teaching Points:

- 1) Give a copy of the test to the students along with their graded answer sheets.
- 2) Go over the questions so students can see what questions they missed and find out the correct answers.
- 3) If time permits, check the students' logs to see if they have been keeping records of their walking experiences. If there is not enough time, have the students turn in their logs to be graded and returned to them on the last day of class.
- 4) Assign each student to bring some food for the picnic following the 6-mile walk.

Class Period 32--6-mile Walk and Picnic
Teaching Points:

- 1) The course chosen should be one that is challenging and scenic in a local park.
- 2) School transportation may be necessary to get the students to and from the park.
- 3) Conduct this long walk during the 2-hour segment of the class's final exam time.
- 4) For most students, this is a real challenge and may be the farthest distance they have ever walked.
- 5) Have a physical education major go along and follow the walkers in case someone gets sick or wants to quit.
- 6) If some students are sick and do not feel well on this day, require them to go anyway if able and attend the picnic.
- 7) Most all the students will complete the walk.
- 8) They will feel very proud and elated over having finished such a long walk. Those who had complained about the length of the walk at the first of the class will probably be glad they completed the course.
- 9) After the walk go to a scenic part of the park and have a picnic while talking about the walk.
- 10) This is a positive way to finish the course.

CLASS TESTING

The following tests will be administered to all the students in the walking classes. The tests will be given twice during the semester, first during the second week of classes and secondly the week before final exams. Students are not graded on their performance or improvement on the tests. They are given points for taking the tests and all students are required to take them. Students who are sick or absent on the days the tests are given must arrange a special time with the instructor to make up the test. The test results are for the student's own information and to help the instructor evaluate the effects of the walking on the student's health and well being.

The tests given in the walking class are:

1. The 2-mile walks for time on a regulation 440 yd. track. Students are encouraged to walk as fast as possible for the 8 laps on the track and times are recorded.
2. Two flexibility tests. Recognizing that flexibility is specific to each joint, the trunk flexion will be used as being representative of total body flexibility.
3. Two assessments of the percent body fat. The Harpenden or Lange skinfold calipers are used at most colleges. Use the procedures and calculations that accompany whatever instrument the instructor has in the lab.
4. Two weigh-ins on an accurate scale. Body weight is not indicative of the amount of fat lost or gained, but can be used as assessment data.
5. Two Harvard step tests are administered to assess cardiorespiratory endurance.
6. Two resting pulse rates. The pulse rate checks should be done with students working in pairs. The student being checked should be seated and relaxed. One student should check the carotid pulse (neck) or radial pulse (wrist) by placing the first two fingers of one hand lightly on the artery. When the pulse can be felt, count the number of pulse beats for 10 seconds and multiply by 6.
7. Blood pressure--Using a good sphygmomanometer and stethoscope, the instructor should check each student's blood pressure. A student aid, if qualified, can assist.

HARVARD STEP TEST

Equipment Needed

1. One sturdy 20-inch bench; one sturdy 18-inch bench.
If gymnasium bleachers are to be used, 2-inch by 6-inch boards bolted into place on top of the seat increase the step height sufficiently to permit substitution for the 20-inch bench.
2. Metronome
3. Timer with a second hand that will run for 8.5 minutes consecutively

Procedure

The male subject steps up and down on the 20-inch bench 30 times per minute for 5 minutes. The female steps up and down on the 18-inch bench 30 times per minute for 4 minutes.

At the end of the test, the subject sits immediately. The pulse is counted and recorded during 30-second intervals after 1 minute, 2 minutes, and 3 minutes of recovery. Use the following score sheet to calculate your score for the test.

Recovery Period	Pulse Count
1 to 1.5 min.	_____
2 to 2.5 min.	_____
3 to 3.5 min.	_____
Sum of 3 pulse counts	_____

Long Form

$$\text{Index} = \frac{(\text{duration of exercise in seconds}) \times 100}{2 \times (\text{sum of pulse counts during recovery})}$$

$$= \frac{(\quad) \times 100}{2 \times (\quad)}$$

$$= \underline{\hspace{2cm}}$$

$$\text{Index} = \underline{\hspace{2cm}}$$

Short Form

$$\text{Index} = \frac{(\text{duration of exercise in seconds}) \times 100}{5.5 \times (\text{pulse count, 1 to 1.5 min.})}$$

$$= \frac{(\quad) \times 100}{5.5 \times (\quad)}$$

$$= \underline{\hspace{2cm}}$$

$$\text{Index} = \underline{\hspace{2cm}}$$

Classification

Below 55	Poor
55-64	Low Average
65-79	Average
80-89	Good
90 and above	Excellent

TRUNK FLEXION TEST

There is no "general" flexibility test which is representative of total body flexibility, and it is recognized that flexibility is specific to the joint in question. Therefore, trunk flexion was selected as being the most important measure of flexibility.

Test Administration

There is a limited danger that the subject could pull a muscle or strain the back with too vigorous a movement in this test. It is recommended that a short warm-up of stretching exercises precede the actual measurement.

Equipment

1. A yardstick or tape measure to measure the distance reached.
2. A piece of tape to keep the measuring instrument in place on the floor.
3. Testing forms to record data.

Procedure

1. In addition to a short warm-up prior to this test, it is also recommended that the subject refrain from fast, jerky movements which may increase the possibility of injury.
2. The subject assumes a sitting position on the floor with the legs extended at right angles to a line drawn on the floor. The heels should touch the near edge of line and be about 5 inches apart.
3. The subject should slowly reach with both hands as far forward as possible on the yardstick and hold this position momentarily. The yardstick is placed between the legs of the subject so that it rests on the floor with the 15-inch mark resting on the near edge of the heel line. The score is the most distant point (in inches) reached on the yardstick by the fingertips in the best of three trials.

4. Finally, this score can be scored to norms.

Trunk Flexion Norms

Rating	Trunk Flexion (in.)
Excellent	22-23
Good	20-21
Average	14-18
Fair	12-13
Poor	10-11

Aerobic Walking

CLASS TESTING

Semester _____
 Year _____

NAME	DATE Beginning and End of Semester	TIMED EVENTS		RATINGS					
		2-mile Walk	6-mile Walk	Flexibility Rating	Percent Body Fat	Body Weight	Harvard Step Test	Resting Pulse Rate	Blood Pressure

SAMPLE
WALKING LOG

A journey of a thousand
miles begins with a
single step.

Month
July

Confucius

Date	Time	Location	Distance	Duration	Weather	Highest Pulse	Comments and Observations
9	7:30 a.m.	Percy Warner Park	5.8 miles	97 min.	Hot, Humid 76°	156	Felt good toward end. Hills tough!
10	5:30 p.m.	Neighborhood	3.3 9.1	52 min.	Cooler Breeze 72°	146	Saw 4 people mowing yards. They don't walk.
11		NO WALKING	PLAYED 2 SETS OF SINGLES TENNIS WITH JOHN COLE - WON!!!				
12	7:15 a.m.	Lake Exercise Trails	4.5 13.6	1 hr. 17 min.	Humid Warm 82°	160	Saw rabbits, sailboats on lake. Felt good.
13		OFF - NO WALKING	- CYCLED 4 MILES IN NEIGHBORHOOD - 25 MINUTES				
14	8:00 a.m.	Centennial Park	10 mi. 23.6	2 hrs. 49 min.	Hot 84°	172 near end	Longest walk of the week. Tired at end.
15	6:00 p.m.	Neighborhood	2 mi. 25.6	No Time	Hot 86°	120	Walked with wife and dog.

Total Mileage This Week - 25.6

Total Mileage This Year - 496.8

Next Week's Goal - 30

Weekly Summary - Walked 5 days, no injuries now, hot weather made walking tough at times, feel good about my program.

Month

WALKING LOG

A journey of a thousand miles begins with a single step.

Confucius

Date	Time	Location	Distance	Duration	Weather	Highest Pulse	Comments and Observations

Total Mileage This Week

Total Mileage This Year

Next Week's Goal

Weekly Summary

SAMPLE
MONTHLY SUMMARY

Month
JULY

Distance Walked this Month - 86 miles

Average Pace - 15:30 per mile

Highest Pulse Rate Attained - 178

Distance of Longest Walk - 8 miles

Physiological Evaluations.

Resting Pulse Rate - 60	Blood Pressure - $\frac{134}{84}$
-------------------------	-----------------------------------

Weight - 165	Monthly weight loss or gain - -1
--------------	----------------------------------

Other Physiological Changes - Lost 1/2 inch in my waist,
feel like I have more energy

Injury Report

Legs and Feet - Slight pain in left outside of knee; used
ice, disappeared after one week

Upper Body - NO problems, except some mild back soreness
when I climb hills

Nutrition Report

I am eating less "junk food" and more fruits and vegetables.
Hard to turn down desserts. I really cannot now. Ate less
red meat this month. Am beginning to like fish and chicken.

Mental Attitude

I feel much better about myself. I am more confident in
walking long distances. The firming of my muscles and loss
of fat have been noticed by several of my friends.

MONTHLY SUMMARY

Month

Distance Walked this Month

Average Pace

Highest Pulse Rate Attained

Distance of Longest Walk

Physiological Evaluations

Resting Pulse Rate

Blood Pressure

Weight

Monthly weight loss or gain

Other Physiological Changes

Injury Report

Legs and Feet

Upper Body

Nurtition Report

Mental Attitude

WALKING EXAMINATION

True or False

- ___ 1. Sweating is good for the body because it helps maintain a lower body temperature.
- ___ 2. When going on long walks, you should replace body fluids with drinks containing a high concentration of sugar.
- ___ 3. Walkers experience about the same injury rate as runners.
- ___ 4. Good posture during walking facilitates breathing.
- ___ 5. Most people's feet, when measured in a shoe store, are found to be the same size.
- ___ 6. Always walk on the right shoulder of the road.
- ___ 7. For safety's sake, you should vary the time and place of your walks.
- ___ 8. Any shoe that is comfortable and feels good can be used for walking.
- ___ 9. Walking tends to make one tired and sleepy.
- ___ 10. Increased energy demands due to walking will help reduce weight from the waist down.
- ___ 11. One pound of fat contains 3500 calories.
- ___ 12. Brisk walking tends to reduce hunger on a temporary basis.
- ___ 13. Because they are adding more muscle tissue, walkers should eat more than normal protein.
- ___ 14. Most running shoes will make appropriate walking shoes.
- ___ 15. When walking, always carry a purse or bag containing a can of mace.
- ___ 16. A pedometer is a small precision instrument that can be hooked to your belt to record the mileage walked.

- ___ 17. Leather gloves are the best kind to wear when walking in cold weather.
- ___ 18. Flexibility stretching should be done with ballistic movements.
- ___ 19. Ankle weights are recommended for overloading the body during walking.
- ___ 20. During man's early evolution, the best hunters were usually the best walkers.
- ___ 21. Walking is only mentioned a few times in the Bible.
- ___ 22. When performing flexibility stretches, one should "hold the breath."
- ___ 23. Most walkers have strong upper bodies.
- ___ 24. The term "sneaker" refers to any rubber soled shoe with nylon or canvas uppers.
- ___ 25. It is all right to begin a walking program if you feel good, are over 35 years of age, and have had no history of heart trouble.
- ___ 26. The common backache is usually a result of physical deterioration.
- ___ 27. There exists a negative relationship between saturated fat intake and coronary heart disease.
- ___ 28. Take salt tablets before going for a walk on a hot day.
- ___ 29. A side stitch is a pain in the side experienced while walking.
- ___ 30. Cellulite is a special kind of fat that can be broken up by massage.
- ___ 31. While engaging in a walking program, it is possible to gain weight and lose fat at the same time.
- ___ 32. Toasted bread has fewer calories than untoasted.
- ___ 33. An anatomical condition in which the second toe is longer than the first is known as planter's toe.
- ___ 34. Spot reducing of fat on the legs can be brought about by walking.

- ___ 35. In choosing shoes, pick the brand that you see most often advertised on television.
- ___ 36. When buying a pair of shoes, be sure and try on both shoes.
- ___ 37. Fad diets are a good complement to a walking program.
- ___ 38. It is a well-established fact that regular exercise will prevent heart attacks.
- ___ 39. If there is a question of buying a shoe that is too small or too large, buy the one that is smaller.
- ___ 40. Each person possesses his/her own unique gait and style of walking.
- ___ 41. While walking, the posture is unimportant.
- ___ 42. As you walk, the arms will swing naturally in a pendulum motion from the shoulders.
- ___ 43. To begin a walking program, walk as far as you can and see how you feel.
- ___ 44. Man is the only animal with a striding upright walk.
- ___ 45. While walking, the arms swing alongside the body with the movement of the legs.
- ___ 46. While walking, the center of gravity stays safely within the base of support.
- ___ 47. While walking with a back pack, the body should be slightly leaned forward.
- ___ 48. Pedometers, when properly calibrated, can accurately measure distance walked.
- ___ 49. One of the problems with walking in the city during rush hour traffic is breathing automobile exhaust fumes.
- ___ 50. A walker should always carry some form of identification while walking.
- ___ 51. In most of the pedestrian fatalities at night, the motorists claim they saw the pedestrian in time before hitting them, but couldn't stop.

- ___ 52. Heat stroke is not considered to be a medical emergency.
- ___ 53. Thirst is a reliable indication of the body's need for water.
- ___ 54. Racewalking is an Olympic sport.
- ___ 55. Persons can be disqualified from racewalking competitions due to form violations.
- ___ 56. Keeping a log of your walking experiences can be a good motivator to continue walking.
- ___ 57. Volksmarches are large group walks that are very competitive.
- ___ 58. There are no organized associations that promote walking.
- ___ 59. Racewalking is a popular sport throughout the world.

WALKING

- ___ 1. Which statement best describes the development of a walking program?
 - a. Walk as far as you can each day and try to increase the distance each day.
 - b. Walk at least 3 to 5 miles per day at a 15 minute pace.
 - c. Begin walking short distances at a leisurely pace and gradually increase duration and distance over a long period of time.
 - d. Walk several hills to start out and try to overload as much as possible to quickly acclimate the body.

- ___ 2. The three basic principles of a walking program advocated by most authorities are:
 - a. speed, endurance, distance
 - b. form, competition, exploring
 - c. quickness, long distance, coordination
 - d. gradualism, consistency, enjoyment

- ___ 3. The nation's number one health problem is:
 - a. colds and flu
 - b. venereal disease
 - c. heart disease
 - d. cancer

- ___ 4. In determining if a walking shoe fits, the longest toe should be how many inches from the front of the shoe?
 - a. 0 to $\frac{1}{2}$ inch
 - b. $\frac{1}{2}$ to 1 inch
 - c. $\frac{1}{4}$ inch to $\frac{1}{2}$ inch
 - d. as snug as possible

- ___ 5. The average person walks how many miles in a lifetime?
 - a. 51,000
 - b. 125,000
 - c. 70,000
 - d. 25,000
 - e. none of these

- ___ 6. The classes of nutrients are:
 - a. carbohydrates, fats, vitamins
 - b. carbohydrates, fats, proteins
 - c. carbohydrates, fats, vitamins, minerals, proteins
 - d. carbohydrates, water, fats, minerals, proteins, vitamins

- ___ 7. Which of the following nutrients can supply energy to the body?
- water
 - vitamins
 - minerals
 - all of the above
 - none of the above
- ___ 8. Nutritionists recommend the intake of about how many grams of protein per day?
- .25 g/kg of body weight
 - 5g/kg of body weight
 - 1g/kg of body weight
 - .5g/kg of body weight
- ___ 9. Which of the following nutrients contain the most calories?
- protein
 - carbohydrates
 - vitamins
 - fat
- ___ 10. Normal body fat for men is around
- 15%
 - 20%
 - 25%
 - 10%
- ___ 11. The maximum pulse rate of a twenty year old is
- 190
 - 220
 - 200
 - 210
- ___ 12. Which of the following is not a proper guideline in purchasing walking shoes?
- Wear socks when trying on walking shoes.
 - Buy shoes according to size.
 - Try on both shoes.
 - Try on several pairs of shoes.
- ___ 13. Normal body fat for women is around
- 20%
 - 10%
 - 15%
 - 30%

- ___14. As the individual increases his/her walking level, the energy supply should be increased by consuming additional
- fats
 - proteins
 - carbohydrates
 - vitamins
- ___15. The maintenance of good joint movement is best termed:
- agility
 - quickness
 - motor skill eprformance
 - flexibility
- ___16. To be effective, a stretching routine should be performed
- twice a week
 - every other day
 - daily
 - three times a week
- ___17. When one muscle group is stronger than the opposing group of muscles, this is known as
- overload
 - poor flexibility
 - muscle-boundness
 - muscle imbalance
- ___18. The American College of Sports Medicine's recommendation for frequency of aerobic walking and other endurance activities is:
- every day
 - 3 to 5 days per week
 - 2 days per week
 - 6 days per week
- ___19. The appropriate way to monitor the intensity of walking is
- see how you feel after the walk
 - monitor the pulse several times during the walk
 - determine how far you have walked
 - determine how long you walked
- ___20. The two parts of the body most likely to get cold while walking in the winter are:
- feet and hands
 - hands and face
 - hands and ears
 - feet and ears

- ___21. Most walkers have a stride length of:
- $2\frac{1}{2}$ to 3 feet
 - $1\frac{1}{2}$ to 2 feet
 - 3 to 4 feet
 - 1 to 2 feet
- ___22. Which of the following statements is not a characteristic of walking?
- One foot is always in contact with the ground.
 - At times both feet are in contact with the ground.
 - Consists of a swing phase and support phase for each leg.
 - For a brief time both feet are off the ground at the same time.
- ___23. The American College of Sports Medicine's recommendation for the duration of aerobic walking and other endurance activities is:
- 15 to 60 minutes
 - 1 to 2 hours
 - 10 to 20 minutes
 - 30 minutes
- ___24. Each foot of the body contains how many bones?
- 10
 - 52
 - 26
 - 13
- ___25. Which of the following is not a good safety measure while walking?
- Wear reflective gear at night when walking.
 - Always walk facing automobile traffic.
 - Use small shuffling steps on slippery surfaces when walking.
 - Walk in the same place and the same time each day.
- ___26. Which of the following is not a characteristic of heat exhaustion?
- muscle cramps
 - lightheadedness
 - hot, dry skin
 - vomiting
- ___27. The human body is what percentage water?
- 80%
 - 60%
 - 90%
 - 70%

- ___ 28. If on a diet program, a person should not eat less than how many calories per day?
- 1000
 - 500
 - 2000
 - 1200
- ___ 29. Which of the following is not true of the sport of racewalking?
- The two Olympic racewalking distances are 20 kilometers and 50 kilometers.
 - The hips are rotated to increase the stride length in racewalking.
 - The legs should be straightened as they pass under the body while racewalking.
 - In racewalking form, the fast walking requires the front part of the foot to touch the ground first.
- ___ 30. For best aerobic conditioning benefits you should walk
- anytime during the day
 - in the morning
 - whenever it is hottest
 - whenever it is coldest
- ___ 31. Immediate walking goals should be
- easy to accomplish
 - hard to accomplish
 - small but challenging steps
 - similar to your workout
- ___ 32. The dietary fat more closely associated with high blood lipid levels and fatty deposits in the arteries is
- animal fat
 - cottonseed oil
 - plant fat
 - polyunsaturated fat
- ___ 33. To engage in flexibility exercises one needs
- expensive flexibility apparatus
 - inexpensive flexibility apparatus
 - no special flexibility apparatus at all
 - a willing individual interested in flexibility improvement

- ___ 34. Excess salt in the American diet has been associated with
- diabetes
 - hypertension
 - poor nutrition
 - obesity
- ___ 35. Research findings indicate that walking
- helps maintain normal blood pressure
 - strengthens the heart muscle
 - lowers resting pulse
 - all of the above are correct
- ___ 36. The major causes of obesity are
- normal eating or inactivity
 - overeating or inactivity
 - a combination of overeating and inactivity
 - hormonal secretions are abnormal
 - b and c
- ___ 37. Refined sugar provides:
- calories
 - protein
 - fat
 - vitamins
 - all of the above
- ___ 38. The best food sources of high quality protein are
- grains and cereals
 - leafy or stalky vegetables
 - meats and dairy products
 - fruits
- ___ 39. To improve flexibility of the lower leg one should use the _____ stretch.
- hamstring
 - heel cord
 - patella
 - quadriceps
- ___ 40. As a result of modern technology and mechanization, the amount of physical work required of the most Americans has:
- decreased
 - increased
 - not been affected.
- ___ 41. Weight reduction should be at the rate of ___ pounds per week.
- | | |
|--------|--------|
| a. 0-1 | c. 2-3 |
| b. 1-2 | d. 4+ |

Discussion

1. List four guidelines to follow when walking in the heat.
 - a.
 - b.
 - c.
 - d.
2. List four motivators that will help a person stay with a walking program.
 - a.
 - b.
 - c.
 - d.
3. Name five guidelines for safe walking.
 - a.
 - b.
 - c.
 - d.
 - e.
4. List five qualities of a good walking shoe.
 - a.
 - b.
 - c.
 - d.
 - e.
5. List three alternative walking sites when the weather outside is inclement.
 - a.
 - b.
 - c.
6. Name three guidelines to cold weather walking.
 - a.
 - b.
 - c.
7. List four things you should do just before going on a walk.
 - a.
 - b.
 - c.
 - d.

8. Name four psychological benefits derived from walking.
 - a.
 - b.
 - c.
 - d.
9. Identify four physiological benefits of walking.
 - a.
 - b.
 - c.
 - c.
10. Briefly discuss how you can insert extra walking into your daily routine.
11. Briefly discuss the importance of a flexibility program in a walking program.
12. List five nutrition guidelines to keep in mind while developing your eating habits.
 - a.
 - b.
 - c.
 - d.
 - e.
13. List 5 guidelines that will help prevent walking injuries.
 - a.
 - b.
 - c.
 - d.
 - e.
14. Discuss the proper techniques for losing body fat.

WALKING

Answer Sheet

1. True	25. False	49. True	1. C	25. D
2. False	26. True	50. True	2. D	26. C
3. False	27. False	51. False	3. C	27. B
4. True	28. False	52. False	4. B	28. D
5. False	29. True	53. False	5. C	29. D
6. False	30. False	54. True	6. D	30. A
7. True	31. True	55. True	7. E	31. A
8. True	32. False	56. True	8. C	32. A
9. False	33. False	57. False	9. D	33. C
10. False	34. False	58. False	10. A	34. B
11. True	35. False	59. True	11. C	35. D
12. True	36. True		12. B	36. C
13. False	37. False		13. A	37. A
14. True	38. False		14. C	38. C.
15. False	39. False		15. D	39. B
16. True	40. True		16. C	40. A
17. False	41. False		17. D	41. B
18. False	42. True		18. B	
19. False	43. False		19. B	
20. True	44. True		20. C	
21. False	45. False		21. A	
22. False	46. False		22. D	
23. False	47. True		23. A	
24. True	48. True		24. C	

LISTING AND DISCUSSION

Answer Sheet

- 1)
 1. Give the body time to acclimatize to the heat before going on long walks.
 2. Drink plenty of liquids before and during the walks.
 3. Wear light-colored, breathable clothes.
 4. Walk in the early morning or late afternoon to avoid the heat.
 5. Avoid high sugar drinks.
 6. Wear as little clothing as possible to allow evaporation of sweat.
 7. Cut the walk short if you experience any dizziness, nausea, or other signs of heat exhaustion.
 8. Add a little extra salt to the meal prior to walking, but never take salt tablets.

- 2)
 1. Set personal walking goals.
 2. Keep a log of your walking experiences.
 3. Read walking magazines and books.
 4. Join walking clubs and associations.
 5. Walk with friends or family that you enjoy being with.
 6. Teach others how to engage in a walking program.
 7. Walk in pleasant surroundings.
 8. Enter races or walk-a-thons.
 9. Make a personal commitment of time and effort to put into your walking program.

- 3)
 1. Obey all pedestrian traffic laws while walking.
 2. Walk facing the traffic when on a road.
 3. Never walk two abreast.
 4. Females should walk in groups whenever possible.
 5. Avoid walking in high crime areas.
 6. Don't carry a purse or wear expensive-looking jewelry.
 7. Always carry some form of identification.
 8. Carry a can of "Halt" or mace to repel dogs or muggers.
 9. Carry a loud whistle or alarm in case of being assaulted.
 10. Don't walk in the same place at the same time of day.
 11. Avoid walking near suspicious-looking people.
 12. Carry a walking stick, rock, or hand weights to use as protection in case of an emergency.
 13. Avoid walking during icy or foggy conditions.

14. Wear white clothing and reflective gear when walking at night.
15. Use handrails when walking up and down stairs.

Several other safety guidelines could be accepted.

- 4)
 1. Slightly elevated heel
 2. Stiff heel counter
 3. Wide flared heel bottom
 4. Good arch support
 5. Good flexibility
 6. Shoe upper made of breathable material
 7. Contains good shock-absorbing cushioning
 8. Light-weight
 9. Durable wear
- 5)
 1. Shopping malls
 2. College or high school gymnasiums
 3. Stairs of the office building where you work
 4. Indoor tracks at YMCA's or colleges
 5. Chair-stepping at home
- 6)
 1. Wear cotton or wool gloves on the hands.
 2. Wear a wool or synthetic stocking cap to cover the head and ears.
 3. Dress in layers of light-weight clothing.
 4. Don't overdress.
 5. Wear a nylon jacket to break the wind.
 6. Drink liquids to account for perspiration lost.
 7. Wear cleated walking shoes when the weather conditions are icy or snowy.
- 7)
 1. Tell someone where you are going and when you expect to return.
 2. Put a dime in your walking shorts in case an emergency necessitates a phone call.
 3. Make sure you have your car or house keys with you.
 4. Check to see if you have all your walking equipment: walking sticks, identification, water, etc.
 5. Check the weather report to avoid getting caught in sudden weather changes.
- 8)
 1. Relieves tension
 2. Reduces stress
 3. Lessens anxiety
 4. Enhances creativity
 5. Can think more clearly
 6. Greater "feeling" for nature and the environment
 7. Relieves depression
 8. Fun and enjoyment

9. Meet people and make friends
10. Enhances self-concept
11. Increases confidence
12. Increases ability to handle stress

Several other answers are acceptable.

- 9)
 1. Lowers blood pressure
 2. Decreases serum cholesterol and triglyceride levels
 3. Increased blood volume
 4. Lowered resting heart rate
 5. Increased hemoglobin
 6. Increased amount of high density lipoproteins
 7. Increased cardiac output
 8. Tones skeletal muscles
 9. Aids in fat loss
 10. Increased vital lung capacity
 11. Increased efficiency of total blood circulation
 12. Increased stroke volume of the heart
 13. Better absorption by lungs

Other answers could be accepted.

- 10) In this discussion, students should mention at least five of the following ways of introducing extra walking into their daily schedules:
 1. At work take the stairs instead of the elevator.
 2. When shopping, park the car a good distance from the store.
 3. Take walking tours during vacations.
 4. Take a "walk break" instead of a coffee break at work.
 5. When you need one or two items from the local grocery, walk instead of taking the car.
 6. Take a bus near to where you work and walk the rest of the way.
 7. When you find yourself waiting for someone, leave them a note stating when you will return and go for a short walk.

Several other student answers are acceptable.

- 11) Proper flexibility stretches help maintain the proper range of motion in the body joints. Proper stretching techniques can reduce the amount of soreness experienced after exercise and lessen the chance of injury during exercise. Walkers who perform daily flexibility routines will be able to take longer strides and have more walks free of soreness and injury.

- 12)
 1. Drink more water.
 2. Eat more dietary fiber.
 3. Eat less refined sugar.
 4. Eat more complex carbohydrates.
 5. Eat less fat.
 6. Eat less saturated fat.
 7. Eat less protein.
 8. Eat less salt.
 9. Eat a wide variety of the four basic food groups.
 10. Eat less total calories.
 11. Eat a good breakfast.

- 13)
 1. Maintain flexibility by stretching daily.
 2. Buy good fitting flexible walking shoes.
 3. Avoid long or intense walks early in your walking program.
 4. Walk on soft level surfaces such as grass, tracks, chip trails, or dirt.
 5. Avoid hard walking surfaces such as concrete and asphalt.
 6. Warm-up slowly and follow the walk with a slow cool-down.
 7. Avoid walking a lot of hills at one time.
 8. Strengthen opposing leg muscles to prevent muscle imbalance.
 9. Break in new shoes before going on long walks.
 10. Wear clean cotton socks and use vaseline on the feet to prevent blisters.

- 14) Students should mention at least four of the following points:
 1. Engage in a regular aerobic exercise program such as walking.
 2. Avoid going on "crash" or "fad" diets.
 3. Do not eat less than 1200 calories per day.
 4. Restrict intake of foods containing large amounts of sugar and fat.
 5. Lose no more than one or two pounds per week.
 6. Plan on losing weight over a long period of time to change permanently eating and exercise behavior.
 7. Keep a record of your eating habits to see if your diet is nutritionally sound.

WALKING BOOKS

A Walk Across America by Peter Jenkins

Creative Walking for Physical Fitness by Harry Johnson and Ralph Bass

Dr. Marchetti's Walking Book: Getting All the Physical Benefits of Running Without Taking the Risks by Dr. Albert Marchetti

Hill Walking by Peter Lumley

Now that We have to Walk: Exploring the Out-of-Doors by Raymond Fuller

Powerwalking by Steve Reeves and James Peterson

Racewalking by Martin Rudow

Racewalk to Fitness by Howard Jacobson

The Art of Walking by Edwin Mitchell

The Complete Book of Exercise Walking by Gary Yanker

The Complete Book of Walking by Arthur Dreyfack

The Complete Book of Walking by Charles Kuntzleman

The Doctor's Walking Book by Fred Stutman and Lillian Africano

The Foot Book by Devaki Berkson

The Gentle Art of Walking by George Trent (ed.)

The Joy of Walking by Jack Scognetti

The Magic of Walking by Ruth Goode and Aaron Sussman

The New Complete Walker by Colin Fletcher

The Pleasures of Walking by Edwin Mitchell

The Walk West: A Walk Across America by Barbara and Peter Jenkins

- The Walking Book by Gerald Donaldson
- The Wonderful World of Walking by Bill Gale
- Tramping in Europe: A Walking Guide by Sydney Jones
- Walk Don't Run by Simon Wikler
- Walk Don't Run by Elvira Monroe
- Walk! It Could Change Your Life by John Mann
- Walking by J. T. David
- Walking by Rob Hunter
- Walking: A Guide to Beautiful Walks and Trails in America
by Jean Calder
- Walking and Climbing by Walt Unsworth
- Walking Is. . . by John Pleas
- Walking: The Joy of Taking It Slow by John T. Davis
- Walking Tours of America: Mini-tours in Major Cities on Foot by Wayne Barrett

WALKING-RELATED PERIODICALS

Walkways
733 15th St. N.W.
Suite 427
Washington, D.C. 20005

Walking Journal
P.O. Box 454
Athens, GA 30603

Walking Association Newsletter
The Walking Association
4113 Lee Highway
Arlington, VA 22207

The American Wanderer
American Volkspport
Association Newsletter
Universal City, TX 78148

WALKING-RELATED ORGANIZATIONS

Wilderness Society
1901 Pennsylvania Ave., N.W.
Washington, D.C. 20006

American Hiking Society
1255 Portland St.
Boulder, CO 80302

The Walker's Club of America
445 East 86th St.
New York, NY 10028

United States Orienteering
Fed.
P.O. Box 1039
Baldwin, MO 63011

Tennessee Trails Association
P.O. Box 4913
Chattanooga, TN 37405

National Audubon Society
950 Third Avenue
New York, NY 10022

The Walking Association
4113 Lee Highway
Arlington, VA 22207

President's Council on
Physical Fitness and
Sports
Washington, D.C. 20201

National Campus and Hikers
Association
7172 Transit Road
Buffalo, NY 14221

Sierra Club
530 Bush Street
San Francisco, CA 94108

Appalachian Trail Conference
P.O. Box 236
Harper's Ferry, WV 25425

International Backpackers
P.O. Box 85
Lincoln Center, ME 04458

Federation of Western Outdoor
Clubs
16603 53rd Ave. South
Seattle, WA 98188

American Volkspport Assn.
1001 Pat Booker Road
Universal City, TX 78148

RACEWALKING-RELATED PERIODICALS

Ohio Race Walker
3184 Summit Street
Columbus, Ohio 43202

Dixie Racewalkers
Newsletter
3535 Gleneagles Drive
Augusta, GA 39092

RACEWALKING-RELATED ORGANIZATIONS

New York Road Runners Club
Racewalking Division
9 East 89th Street
New York, NY 10128

The Athletic Contress
Regional Racewalking
Association
1304 Fairland
Louisville, KY 40211

The Dixie Walkers
3535 Gleneagles Drive
Augusta, GA 30902

Senior Sports Inter-
national
5225 Wilshire Blvd.
Los Angeles, CA 90036

SELECTION OF WALKING ROUTE

There exists in most neighborhoods, cities, and surrounding regions many areas that could be interesting and stimulating places to walk. Some places that could provide areas for good walking routes:

1. Old historic sections of cities
2. City parks
3. State parks
4. The immediate neighborhood
5. Hiking trails
6. Areas used by runners
7. Large shopping centers (for use early in the morning before they open because of traffic)
8. Waterfront areas, lakes, or rivers
9. Farms (get permission from the owner)
10. Shopping malls--Several of these should be mapped for walking if the weather is inclement.

Many times it is fun to go to these parks, neighborhoods, downtown areas, and just walk and explore. However, not knowing the areas and the possible dangers to walkers that could exist could make for an unpleasant experience. Always walk in groups if a course is in a high crime area.

If a potential walking area is explored, the distance calculated and the possible dangers such as dogs or muggers are assessed, then the walk in that area could be a pleasant

one. By mapping out walking routes of varying lengths in diverse environments, variety will be added to walking programs, walks will be safer, and walkers will be motivated to participate in interesting walks.

It is important to measure accurately the distance of a walking course since doing so enables walkers to apply the exercise principles of duration and intensity. By knowing the distance walked and the time walked, the walking pace can be calculated.

If the walking route is on a road, an automobile odometer can be used. However, sometimes odometers are not accurate (usually measuring short). If the course covers areas where a car cannot go, then a bicycle distance counter or a waist pedometer may be used. Be sure to calibrate each on a track to validate the reliability. Many running clubs or college physical education departments have a distance measuring wheel. This device is a wheel with a handle attached and a distance counter on the wheel. By walking along and pushing the wheel, the course can be measured. However, borrowing the wheel may be a problem.

The following form will assist in the mapping of walking routes.

SAMPLE
WALKING ROUTE SELECTION

City and State Nashville, Tennessee

Area Percy Warner Park

Name of Route 5.8 mile loop

Classification of Environment Very scenic, part of Percy and Edwin Warner Parks--beautiful trees, nice views. Hardwood trees especially pretty in the fall.

Distance 5.8 miles

Surface Type All asphalt

Surface Condition Poor, needs resurfacing, some loose gravel and several medium to large potholes.

Course Difficulty For advanced walkers only. Very hilly with steep grades, few level areas.

Automobile Traffic One-way traffic, usually light, but can be heavy in the afternoon about 2:00 p.m. when high school students frequent the area. Motorists usually courteous.

Pedestrian Traffic A favorite route for runners, cyclists, and walkers. Difficult to complete route at any time of the day without seeing several walkers, runners, or cyclists.

Liquid Availability Water fountain at the beginning of route on golf course near entrance to the park.

Weather Considerations Course lined with trees that provide shade and produce cooler temperatures. The trees do block out breezes.

Safety Considerations With a constant flow of traffic
through the area and surveillance by the park patrol, the
route is relatively safe from muggers. The Percy Warner
Golf Course is adjacent to the start of the walk. Walking
with someone is suggested. Watch for stepping in large pot
holes and falling.

Beginning of Walk Entrance to Percy Warner Park at the
end of Belle Meade Boulevard. Two large stone arches mark
the beginning. Take the one on the right.

Landmarks Along the Way

- Large white stone markers are
- 1) located on the left side of 6) _____
the road.
 - 2) First $\frac{1}{2}$ mi. is up steep hill 7) _____
 - 3) There is a 1.6 mi. and 11.2^{mi.} 8) course that branches off
the 5.8 mi. course. Cut-off points are clearly marked.
 - 4) At mi. 2.5 a long gradual hill 9) goes for at .75 mi.
 - 5) The last .8 of a mi. is down-10) hill.

End of Walk The route ends some 50 feet from the
beginning as the park road returns to the entrance.

Map of the Course

WALKING ROUTE SELECTION

City and State _____

Area _____

Name of Route _____

Classification of
Environment _____

Distance _____

Surface Type _____

Surface Condition _____

Course Difficulty _____

Automobile Traffic _____

Pedestrian Traffic _____

Liquid Availability _____

Weather Considerations _____

Safety Considerations _____

Beginning of Walk _____

Landmarks Along the Way

1) _____ 6) _____

2) _____ 7) _____

3) _____ 8) _____

4) _____ 9) _____

5) _____ 10) _____

End of Walk _____

Map of the Course

QUOTATIONS ON WALKING

"A turn or two I'll walk, to still my beating mind."
(Shakespeare, Cymbeline, Act III)

"Today I gave grown taller from walking with the trees."
(C.F., Karle Wilson)

"I like to walk about amidst the beautiful things that adorn the world."
(George Santayana)

"If you pick 'em up, O Lord, I'll put 'em down."
(Anonymous, The Prayer of the Tired Walker)

"The civilized man has built a coach, but he has lost the use of his feet."
(Ralph Waldo Emerson)

"Walk while ye have the light, lest darkness come upon you."
(St. John 12:35)

"Can two walk together, except they be agreed."
(Amos 3:3)

"I find that the three truly great times for thinking thoughts are when I am standing in the shower, sitting on the john, or walking, and the greatest of these, by far, is walking."
(Colin Fletcher, The New Complete Walker)

"Walking is a man's best medicine."
(Hippocrates)

"The road is always better than the Inn."
(Cervantes)

"All individuals walk differently - A gait is as unique as a signature."
(Gerald Donaldson)

"I think I cannot preserve my health or spirits unless I spend four hours a day sauntering through the woods and over the hills and fields."
(Thoreau)

"Give me thy hand, stand up: Prithee, let's walk."
(William Shakespeare)

"The Age is dull and mean, Men creep, not walk."
(John Whittier)

"Of all exercises walking is the best."
(Thomas Jefferson)

"Take a two mile walk every morning before breakfast."
(Harry Truman)

"I have two doctors, my left leg and my right."
(John Macauley Trevelyon)

"A journey of a thousand miles begins with a single step."
(Confucius)

"You can do anything that you want to but, honey, don't you
step on my blue suede shoes."
(Elvis Presley)

"Thou hadst, for weary feet, the gift of rest."
(William Watson)

"My feet, they haul me round the house, they hoist me up the
stairs; I have only to steer them and they ride me every-
where."
(Gelett Burgess)

"Come on, my lords, the better foot before."
(Shakespeare, "Titus Andronicus")

"He stood on one foot first, then stood a spell on t'other,
An' on which one he felt the worst He couldn't ha' told ye
nuther."
(J. R. Lowell)

"He hath left you all his walks, His private arbours, and
new-planted orchards - common pleasures, To walk abroad,
and recreate ourselves."
(William Shakespeare)

"Every walk is a crusade to reconquer the Holy land from the
hands of the infidels."
(Henry Thoreau)

"Walk and be happy; Walk and be healthy."
(Charles Dickens)

"Unhappy businessmen would increase their happiness more by
walking six miles a day than any conceivable change of
philosophy."
(Bertrand Russell)

"Walking has something in it which animates and heightens my ideas: I can scarcely think when I stay in one place: my body must be set a-going if my mind is to work."
(Jean Jacques Rousseau)

"A sedentary life is the real sin against the Holy Spirit. Only those thoughts that come by walking have any value."
(Nietzsche)

"Is not the road to Athens made for conversation?"
(Socrates to Phaedrus)

"I walked a mile with Pleasure
She chattered all the way.
But left me none the wiser
For all she had to say."
(Robert Browning Hamilton)

"I took a day to search for God,
And found Him not. But as I trod
By rocky ledge, through woods untamed,
Just where one scarlet lily flamed,
I saw His footprint in the sod."
(Bliss Corman)

"I'd rather see a sermon than hear one any day
I'd rather one should walk with me than merely tell the way."
(Edgar Guest)

"Walking is definitely in the 'running' as real aerobic exercise."
(Bill Bandy)

"Walking allows so much togetherness and so little competitiveness."
(Robert Sleight)

"Walking is for the unfit, for thousands who are afraid not to exercise, but are equally afraid to begin."
(John Man)

"The wheel became the walker's worst enemy."
(Gerald Donaldson)

"There is no orthodoxy in walking. It is a land of many paths and no paths, where everyone goes his own way and is right."
(George M. Trevelan)

"Walking could be our number one tranquilizer if we would try it."
(Bill Bandy)

"Afoot and Light-hearted I take to the open road,
Healthy, free, the world before me,
The long brown path before me leading wherever I choose.
Henceforth I ask not good-fortune, I myself am good-
fortune.
Henceforth I whimper no more, postpone no more, need
nothing,
Dance with indoor complaints, libraries, querulous
criticisms,
Strong and content I travel the open road."
(Walt Whitman)

"I cannot see the wit of walking and talking at the same time."
(William Hazlitt)

"Give me the clear blue sky over my head, and the green turf beneath my feet, a winding road before me and a three hours march to dinner - and then to thinking."
(William Hazlitt)

"I used, when I was younger, to take my holidays walking. I would cover 25 miles a day, and when the evening came, I had no need of anything to keep me from boredom, since the delight of sitting simply sufficed. . . ."
(Bertrand Russell)

"The swiftest traveler is he that goes afoot."
(Thoreau)

"He that riseth late must trot all day."
(Ben Franklin)

"And the Lord said unto Satan, Whence comest thou? Then Satan answered the Lord, and said, From going to and for in the earth, and from walking up and down in it."
(Job 1:7)

"The true male never yet walked
Who liked to listen when his mate talked."
(Anna Wickham)

"Who walks with beauty has no need of fear;
The sun and moon and stars keep pace with him;
Invisible hands restore the ruined year,
And time, itself, grows beautifully dim."
(David Morton)

"'I'm sure nobody walks much faster than I do.' 'He
can't do that,' said the King, 'or else he'd have been here
first.'"
(Lewis Carroll from Through the Looking Glass)

"The walking stick serves the purpose of an advertisement
that the bearer's hands are employed otherwise than in
useful effort, and it therefore has utility as an evidence
of leisure."
(Thorstein Veblen)

"When I am not walking, I am reading; I cannot sit and
think, [but] books think for me."
(Charles Lamb)

"Man . . . walks up the stairs of his concepts, [and]
emerges ahead of his accomplishments."
(John Steinbeck)

"Two roads diverged in a wood, and I -
I took the one less traveled by,
And that has made all the difference."
(Robert Frost)

"And as I turn me home,
My shadow walks before."
(Robert Bridges)

METRIC CONVERSIONS

Meters to Miles

1 kilometer	(1,000 meters)	=	.621 miles
2 kilometers	(5,000 meters)	=	3.1 miles
10 kilometers	(10,000 meters)	=	6.2 miles
15 kilometers	(15,000 meters)	=	9.3 miles
*20 kilometers	(20,000 meters)	=	12.4 miles
*50 kilometers	(50,000 meters)	=	31 miles
100 kilometers	(100,000 meters)	=	62.1 miles
400 meters	=	.248 miles	
800 meters	=	.497 miles	
1,500 meters	=	.931 miles	

Miles to Meters

1 mile	=	1,609.34 meters	=	1.61 km.
2 miles	=	3,218.69 meters	=	3.22 km.
3 miles	=	4,428.03 meters	=	4.43 km.
4 miles	=	8,046.72 meters	=	8.04 km.
6 miles	=	9,656.06 meters	=	9.65 km.
7 miles	=	11,265.4 meters	=	11.26 km.
10 miles	=	16,093.4 meters	=	16.09 km.
15 miles	=	24,140.16 meters	=	24.1 km.
25 miles	=	40,233.6 meters	=	40.23 km.
30 miles	=	48,280.3 meters	=	48.28 km.
50 miles	=	80,467.2 meters	=	80.46 km.
100 miles	=	160,943.4 meters	=	160.94 km.

*Olympic racewalking distances

Calorie Expenditure Per Minute for Walking and
Walking-related Activities

	Body Weight										
	90	99	108	117	125	134	143	152	161	170	178
Walking (2.0 mph)	2.1	2.3	2.5	2.7	2.9	3.1	3.3	3.5	3.7	4.0	4.2
Walking (4.5 mph)	4.0	4.4	4.7	5.1	5.5	5.9	6.3	6.7	7.1	7.5	7.8
Walking 110-120 steps/min.	3.1	3.4	3.7	4.0	4.3	4.7	5.0	5.3	5.6	5.9	6.2
Hiking, 40 lb. pack, 3.0 mph	4.1	4.5	4.9	5.3	5.7	6.1	6.5	6.9	7.3	7.7	8.1
Snowshoeing (2.3 mph)	3.7	4.1	4.5	4.8	5.2	5.5	5.9	6.3	6.7	7.0	7.4
Snowshoeing (2.5 mph)	5.4	5.9	6.5	7.0	7.5	8.0	7.6	9.1	9.7	10.2	10.7
Golf, twosome	3.3	3.6	3.9	4.2	4.5	4.8	5.2	5.5	5.8	6.1	6.4
Golf, foursome	2.4	2.7	2.9	3.2	3.4	3.6	3.9	4.1	4.3	4.6	4.8
Stair Climbing and Descending											
1 stair--25 trips/min.	4.1	4.5	4.9	5.3	5.6	6.0	6.4	6.8	7.2	7.7	8.0
1 stair--30 trips/min.	4.4	4.9	5.3	5.7	6.1	6.6	7.0	7.4	7.9	8.3	8.7
1 stair--35 trips/min.	5.0	5.5	6.0	6.6	7.0	7.5	8.0	8.5	9.0	9.5	10.0
3 stairs--12 trips/min.	4.8	5.2	5.7	6.2	6.6	7.1	7.6	8.1	8.5	9.0	9.4
3 stairs--15 trips/min.	5.8	6.3	6.9	7.5	8.0	8.6	9.2	9.8	10.3	10.9	11.4
3 stairs--18 trips/min.	6.8	7.4	8.1	8.8	9.4	10.1	10.7	11.4	12.1	12.8	13.4
5 stairs--8 trips/min.	4.9	5.3	5.8	6.3	6.8	7.2	7.7	8.2	8.7	9.2	9.6
5 stairs--10 trips/min.	6.0	6.6	7.2	7.8	8.4	9.0	9.6	10.2	10.8	11.4	11.9
5 stairs--12 trips/min.	6.8	7.5	8.2	8.9	9.5	10.2	10.9	11.6	12.2	12.9	13.5

Calorie Expenditure (Continued)

	Body Weight										
	90	99	108	117	125	134	143	152	161	170	178
7 stairs--6 trips/min.	5.1	5.6	6.2	6.7	7.1	7.7	8.2	8.7	9.2	9.7	10.1
7 stairs--7½ trips/min.	6.1	6.7	7.3	8.0	8.5	9.1	9.7	10.3	10.9	11.6	12.1
7 stairs--9 trips/min.	7.2	7.9	8.6	9.4	10.0	10.7	11.4	12.2	12.9	13.6	14.2

Calorie Expenditure (Continued)

	Body Weight										
	187	196	205	213	222	231	240	249	257	266	275
Walking (2.0 mph)	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.4
Walking (4.5 mph)	8.2	8.6	9.0	9.4	9.8	10.1	10.6	10.9	11.3	11.7	12.0
Walking 110-120 steps/min.	6.5	6.8	7.1	7.4	7.7	8.0	8.3	8.6	8.9	9.2	9.5
Hiking, 40 lb. pack, 3.0 mph	8.5	8.9	9.3	9.7	10.1	10.5	10.9	11.3	11.7	12.1	12.5
Snowshoeing (2.3 mph)	7.8	8.1	8.5	8.8	9.2	9.6	9.9	10.3	10.6	11.0	11.4
Snowshoeing (2.5 mph)	11.2	11.8	12.3	12.8	13.3	13.9	14.4	14.9	15.4	16.0	16.5
Golf, twosome	6.7	7.1	7.4	7.7	8.0	8.3	8.6	9.0	9.3	9.6	10.0
Golf, foursome	5.1	5.3	5.5	5.8	6.0	6.2	6.5	6.7	7.0	7.2	7.4
Stair Climbing and Descending											
1 stair--25 trips/min.	8.4	8.8	9.2	9.6	10.0	10.4	10.8	11.2	11.6	12.0	12.4
1 stair--30 trips/min.	9.2	9.6	10.0	10.4	10.9	11.3	11.8	12.2	12.6	13.0	13.5
1 stair--35 trips/min.	10.5	11.0	11.5	11.9	12.4	12.9	13.4	13.9	14.4	14.9	15.4
3 stairs--12 trips/min.	9.9	10.4	10.9	11.3	11.8	12.2	12.7	13.2	13.6	14.1	14.6
3 stairs--15 trips/min.	12.0	12.5	13.1	13.6	14.2	14.8	15.4	15.9	16.4	17.0	17.6
3 stairs--18 trips/min.	14.0	14.7	15.4	16.0	16.7	17.3	18.0	18.7	19.3	20.0	20.6
5 stairs--8 trips/min.	10.1	10.6	11.1	11.5	12.0	12.5	13.0	13.4	13.9	14.4	14.9
5 stairs--10 trips/min.	12.5	13.1	13.7	14.3	14.9	15.5	16.1	16.7	17.2	17.8	18.4
5 stairs--12 trips/min.	14.2	14.9	15.6	16.2	16.9	17.6	18.2	18.9	19.5	20.2	20.9

Calorie Expenditure (Continued)

	Body Weight										
	187	196	205	213	222	231	240	249	257	266	275
7 stairs--6 trips/min.	10.7	11.2	11.7	12.1	12.7	13.2	12.7	14.2	14.6	15.2	15.7
7 stairs--7½ trips/min.	12.7	13.3	13.9	14.5	15.1	15.7	16.3	16.9	17.5	18.1	18.7
7 stairs--9 trips/min.	15.0	15.7	16.4	17.0	17.8	18.5	19.2	19.9	20.6	21.3	22.0

Source: Adapted from Physiological Measurements of Metabolic Functions in Man by C. Frank Consolazio, Robert E. Johnson, and Louis J. Pecora, pp. 331-32. Copyright 1963 by McGraw-Hill Book Company. Reprinted by permission of the publisher. Research completed at the Human Performance Laboratory, Brigham Young University, Provo, Utah.

GREAT FEATS OF WALKING

<u>Date</u>	<u>Name</u>	<u>Distance Walked</u>	<u>Time</u>	<u>From</u>	<u>To</u>
March, 1861	Edward Weston	453 miles	unknown	Boston	Wash., D.C.
1867	Edward Weston	1,326 miles	25 days 23 hours	Portland, Ma.	Chicago
1868	Edward Weston	100 consecutive miles	22 hours 19 min.	-----	-----
1869	Edward Weston	1,058 miles	30 days	through New England	
1871	Edward Weston	200 miles (two backwards)	41 hours	-----	-----
1874	Edward Weston	500 miles	5 days 23 hours 38 min.	-----	-----
1879	Edward Weston	550 miles	141 hours 44 min.	England	
1907	Edward Weston (age 69)	1,345 miles	24 days 19 hours	Portland, Ma.	Chicago
1909	Edward Weston (age 71)	3,895 miles	104 days 7 hours	New York	San Francisco
1910	Edward Weston (age 72)	3,600 miles	76 days 23 hours	Los Angeles	New York
1913	Edward Weston (Age 75)	1,546		New York	Minneapolis

<u>Date</u>	<u>Name</u>	<u>Distance Walked</u>	<u>Time</u>	
Sept. 1976	Jesse Castaneda	142 miles, 448 yds.	24 hours	World record for distance walked in 24 hours
March 16, 1973	Jesse Castaneda	302 miles without sleep	102 hours 59 min.	Track
--	Jesse Castaneda	Has walked to the summit of 10,695 foot Saudia Peak in Mexico 300 times		
June 1926	George Hassler Johnson walked from Chicago to Chambersburg, Pennsylvania, a distance of 577.88 miles in 20 days without eating.			
May 1957	David Kwan walked 18,500 miles from Singapore to London in a period of 81 weeks averaging 32 miles a day, and passing through 14 countries.			
April 1931	Plennie L. Wingo walked backwards from Santa Monica, Calif., to Istanbul, Turkey, in six months. Later at age 81 he walked backwards from Santa Monica to San Francisco, a distance of 45 miles, in 85 days.			
June 1970	John and David Kurst walked around the world (14,500 miles) from their home in Waseca, Minnesota. John made it home, but David was killed in Afghanistan.			
April 1972	John Lees of Brighton, England, holds the record for walking the United States--Los Angeles to New York, a distance of 2,876 miles in 53 days.			
Oct. 1975	Dorothy Whitfield of Bristol, England, walked 72 miles (a world record) in 24 hours.			

<u>Date</u>	<u>Name</u>	<u>Distance Walked</u>	<u>Time</u>
April 1976	Lindsay R. Dodd	holds the record for longest distance walked backward in 24 hours--80 miles.	
1981	Dimitri Dan of Rumania	set the record for the 100,000 kilometer (62,137 mile) race. He was the only one to finish out of 200 starters.	
Oct. 1982 to July 1983	Rob Sweetball	walked 10,600 miles around the perimeter of the United States. He began and ended in Washington, D.C.; he averaged 38 miles a day. The walk took him almost 10 months.	
1809	Robert Barclay Alardice	won a bet of 19,000 pounds (\$45,000) by walking 1,000 miles in 1,000 hours of continuous walking on a dirt track in England. The British wagered \$2.5 million on whether he would complete the walk.	
1960	Emma "Grandma" Gatewood	walked the 2,023-mile Appalachian trail for the third time at the age of 77. She was famous for her attire, which included a stocking cap, a wool shirt, a cotton skirt or blue jeans and tennis shoes. The rest of her gear she carried in a denim duffle bag slung over her shoulder. The bag rarely weighed more than twenty pounds.	
1977	President and Mrs. Carter	walked the two miles from the Capitol to the White House following the inaugural ceremony. This is a record for a president and his wife after an inauguration.	

HOW TO QUALIFY FOR THE PRESIDENTIAL SPORTS AWARD IN WALKING

Qualifying Standards:

The Qualifying Standards for the Award in Fitness Walking are as follows:

1. Walk a minimum of 125 miles.
2. Each walk must be continuous, without pauses for rest, and the pace must be at least four (4) m.p.h. (15 minutes per mile).
3. No more than two and one-half (2½) miles in any one day may be credited to total.

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Keep a record of your progress on the special Fitness Walking Log. When you have completed the Standards, follow the remaining directions on the Log, mail it together with the designated fee and you will receive the PRESIDENTIAL SPORTS AWARD, recognizing your dedication to personal fitness and that you are part of a national effort towards a more fit and vital America.

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For Further Information Write:

Presidential Sports Award
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APPENDIX

LETTERS OF PERMISSION

September 7, 1984

Dr. John Pleas
10th & Rogers
Columbia, MO 65201

Dear Dr. Pleas:

I am presently preparing my dissertation "Introduction to Walking: A Manual for Students" at Middle Tennessee State University. I am requesting permission to use the questionnaire on walking shoes on page 54 of your book Walking Is

Thank you,

/s/

Bill Bandy

COLUMBIA COLLEGE

10th and Rogers
Columbia, Missouri 65216
314-875-8700

September 12, 1984

Dear Bill,

In response to your letter of September 7th concerning using my material from my book Walking Is . . ., you have my permission to use the questionnaire on walking shoes which appears on page 54 for your dissertation.

Let me know if I can be of any further assistance.

Happy Walking

/s/

John Pleas, Ph.D.

BELMONT
COLLEGE
NASHVILLE

October 5, 1984

McGraw Hill Book Company
1221 Avenue of the Americas
New York, NY 10020

Attention: Copyrights and Permission Department

Dear Sirs:

As I stated in my previous letter, I am preparing my doctoral dissertation at Middle Tennessee State University in Murfreesboro, TN. The dissertation is in the form of a student manual for use as a text in the teaching of aerobic walking as a college activity course. The title of the manual is "Introduction to Aerobic Walking: A Manual for Students."

I would like permission to use the "Caloric Expenditure Chart for Various Activities" as it appears on page 331 and page 332 of the book, Physiological Measurements of Metabolic Functions in Man, by Consolazio, Johnson, and Pecova. The chart will appear, beginning on page 271 of my dissertation.

Thank you,

/s/

Bill Bandy

bb/lb

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1221 Avenue of the Americas
New York, New York 10020
Telephone 212/512-2613

Copyrights and Permissions Department

October 11, 1984

Mr. Bill Bandy
Office of the Dean of Students
Department of Athletics
Belmont College
Nashville, TN 37203-5723

Dear Mr. Bandy:

I have your letter of October 5th in regard to the material you wish to use from Consolazio, et. al.: METABOLIC FUNCTIONS IN MAN. I have checked pages 331 and 332 in the text and I do not find a chart with the caption "Caloric Expenditure Chart for Various Activities." There are various tables and charts on these two pages, however, and if you are requesting one of these to include in your dissertation, you have our permission to do so. We ask that proper credit be given to the author, title, copyright date and publisher. No further reproduction is authorized.

If at some later date your dissertation should be submitted for commercial publication, this permission will have to be renegotiated, at which time we would ask you to submit a copy of the material as it appears in our book.

Sincerely yours,

/s/

Eileen Dowd
Permissions Supervisor

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