



THIRD EDITION

Get Fit, Stay Fit

WILLIAM E. PRENTICE

Get **FIT** Stay **FIT**

WILLIAM E. PRENTICE, PH.D., P.T., A.T.,C.

Professor, Coordinator of the Sports Medicine Specialization,
Department of Exercise, and Sport Science
Clinical Professor, Division of Physical Therapy,
Department of Medical Allied Health Professions
Associate Professor, Department of Orthopaedics
School of Medicine
The University of North Carolina
Chapel Hill, North Carolina



Boston Burr Ridge, IL Dubuque, IA Madison, WI New York San Francisco St. Louis
Bangkok Bogotá Caracas Kuala Lumpur Lisbon London Madrid Mexico City
Milan Montreal New Delhi Santiago Seoul Singapore Sydney Taipei Toronto



GET FIT, STAY FIT, THIRD EDITION

Published by McGraw-Hill, a business unit of The McGraw-Hill Companies, Inc., 1221 Avenue of the Americas, New York, NY 10020. Copyright © 2004 by The McGraw-Hill Companies, Inc. All rights reserved. Previous edition(s) 2001, 1996. All rights reserved. No part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written consent of The McGraw-Hill Companies, Inc., including, but not limited to, in any network or other electronic storage or transmission, or broadcast for distance learning.

Some ancillaries, including electronic and print components, may not be available to customers outside the United States.



This book is printed on acid-free paper.

1 2 3 4 5 6 7 8 9 0 DOC/DOC 0 9 8 7 6 5 4 3

ISBN 0-07-255734-6

Vice president and editor-in-chief: *Thalia Dorwick*
Publisher: *Jane E. Karpacz*
Executive editor: *Vicki Malinee*
Senior developmental editor: *Michelle Turenne*
Senior marketing manager: *Pamela S. Cooper*
Project manager: *Christine Walker*
Production supervisor: *Enboge Chong*
Media technology producer: *Lance Gerhart*
Developmental editor for technology: *Lynda Huenefeld*
Cover designer: *Gino Cieslik*
Interior designer: *Joanne Schopler*
Art editor: *Jen DeVere*
Senior supplement producer: *David A. Welsh*
Compositor: *Carlisle Communications, Ltd.*
Typeface: 10/12 Palatino
Printer: *R. R. Donnelley/Crawfordsville, IN*

Library of Congress Cataloging-in-Publication Data

Prentice, William E.
Get fit, stay fit / William E. Prentice.—3rd ed.
p. cm.
Includes index.
ISBN 0-07-255734-6 (alk. paper)
1. Physical fitness. 2. Exercise. 3. Health. 1. Title.

RA781.P67 2004
613.7—dc21

2003046442

The Internet addresses listed in the text were accurate at the time of publication. The inclusion of a website does not indicate an endorsement by the author or McGraw-Hill, and McGraw-Hill does not guarantee the accuracy of the information presented at these sites.

PREFACE

If you believe what you hear, see, and read in the media, you would think that every person in America has become a “fitness junkie.” It is true that millions of people exercise in some way, shape, or form on a somewhat consistent basis. But the fact is, that for the vast majority of Americans the thought of going out and “exercising” never even crosses their minds. Through TV and videos, on the internet, in magazines or newspapers, our society is constantly bombarded by images that suggest the importance of being physically fit and healthy. It seems that people in your generation, in contrast to all the previous ones, are finally starting to realize that there really is a reason for living a healthy lifestyle and for incorporating regular exercise into that lifestyle.

Get Fit, Stay Fit is a text designed to tell you not only how you can go about getting yourself fit, but also why it is to your advantage to make fitness and exercise a regular part of your lifestyle. It begins by discussing the basic principles of fitness that apply to any type of exercise program, and then explains how being fit relates to a healthy lifestyle. Specific techniques and guidelines for developing cardiorespiratory endurance, for improving muscular strength and endurance, for increasing flexibility, and for maintaining appropriate body weight and composition are described in detail so that you can put together a personalized fitness program based on your individual needs. This book also provides recommendations and suggestions on selecting and using the exercise equipment

available to help you get fit, as well as tips for making your exercise program as safe and free of injury as possible.

FEATURES

- *Practical application chapters are dedicated to starting your own fitness program (3), becoming a wise consumer (9), and practicing safe fitness (10). These chapters cut through the confusion and provide essential information on how to start up, equip yourself, and safely execute an individual fitness program.*
- *Special boxes—Fit Lists, Health Links, and Safe Tips—highlight, summarize, and provide quick reference to important information.*
- *Lab Activities assist in evaluating a number of personal measures of fitness as well as providing guidelines for increased health.*
- *Key terms are in color and are defined in boxes to help build a working vocabulary of concepts, terms, and principles necessary for understanding, beginning, and maintaining any fitness program.*
- *Chapter pedagogy also includes chapter objectives, key terms, definition boxes, bulleted summaries, and suggested readings to enhance the learning process.*
- *All exercise safety information and illustrations have been updated to provide proper fitness techniques for a safe and effective fitness program.*
- *Each chapter contains an expanded list of reviewed websites relevant to the chapter topic. Using the power of the World Wide Web as a resource, students will be able to obtain further*

information to take their studies beyond the classroom.

- An updated and expanded list of references provides a significant resource for students as well as instructors for further study of key issues and topics.
- The Appendix includes an extensive Food Composition Table that provides the nutritive value of commonly used foods.

NEW TO THIS EDITION

CHAPTER 1

- New information on the Healthy People 2010 objectives

CHAPTER 2

- Added information on Ecstasy
- Added information on androstenedione
- Added information on the hepatitis B virus

CHAPTER 3

- Added information on the new guidelines for the quantity of exercise from the National Academy of Science Institute of Medicine

CHAPTER 5

- Added information on core stabilization training

CHAPTER 6

- Added information on Pilates exercise
- Added information on yoga

CHAPTER 7

- Reversed presentation order with old Chapter 7 to create a more logical flow of material

- Added information on “added Sugars”
- Added information on “total” fiber
- Added information on trans fatty acids
- Added information on omega-3 and omega-6 fatty acids
- Updated information on Dietary Reference Intake tables
- Added information on oxygenated water
- Added new and healthy cooking tips
- Added information on herbs, particularly ephedrine
- Added information about fast foods

CHAPTER 8

- Added information on calculating body mass index and an accompanying Lab Activity
- Introduced Jackson, Pollack, and Ward skinfold technique for calculating percent body fat

CHAPTER 10

- Expanded table of common injuries associated with physical activity
- Added information on exercise during pregnancy

ANCILLARIES

COMPUTERIZED TEST BANK CD-ROM

Brownstone’s Computerized Testing is the most flexible, powerful, easy-to-use electronic testing program available in higher education. The Diploma system (for Windows users) allows the test maker to create a print version, an online version (to be delivered to a computer lab), or an internet version of each test. Diploma includes a built-in instructor gradebook, into which student rosters and files can be imported. The CD-ROM includes a separate testing program, Exam VI, for Macintosh users. The Computerized Test Bank for *Get Fit, Stay Fit* contains

more than 300 multiple choice, true-false, fill-in, and short essay test questions for convenience in preparing examinations.

FITSOLVE II SOFTWARE

The Fitsolve software package enhances learning of health concepts by personalizing information and explaining the meaning of the results, rather than just grading students. It begins with a heart-disease risk questionnaire, followed by input of fitness test scores. Features include a score summary, heart-attack risk categorization, and assessment of health-related fitness. This product is available on diskette for Windows users.

HEALTHQUEST CD

The HealthQuest CD helps students explore their personal wellness behaviors using state-of-the-art interactive technology. Students will be able to assess their current health status, determine their risks, and explore options for positive lifestyle change. Tailored feedback gives a meaningful and individualized learning experience. Modules include the Wellboard (a health self-assessment); Stress Management; Fitness; Nutrition; Communicable Diseases; Cardiovascular Health; Cancer; Tobacco; Alcohol; and other Drugs.

ACKNOWLEDGMENTS

In revising *Get Fit, Stay Fit*, my editors, Christine Walker and Michelle Turenne, have been instrumental in the development of the third edition, and have provided a great deal of help and support. The reviewers provided many constructive recommendations about content and organization. Their input and suggestions have been greatly appreciated and are reflected throughout the text. They include the following:

Megan D. Franks
North Harris College (TX)

Serena Reese
East Tennessee State University

Diana Mozen
Virginia State University

And finally, as always, this is for my wife Tena and our boys, Brian and Zach, who each day make my life more worthwhile.

By writing this book, I have tried to provide you with all the details you need to know about getting yourself fit and to stress the importance of developing a healthy lifestyle. But the bottom line is that, to get fit, you need to stop reading about it and start doing it. There is no better time than now!

William E. Prentice

BRIEF CONTENTS

Preface vii

**1 Getting Fit: Why Should
You Care? 1**

**2 Creating a Healthy
Lifestyle 19**

**3 Starting Your Own Fitness
Program 51**

**4 Developing
Cardiorespiratory
Fitness 65**

**5 Improving Muscular
Strength, Endurance, and
Power 89**

**6 Increasing Flexibility
Through Stretching 133**

7 Eating Right 157

**8 Limiting Your Body Fat
Through Diet & Exercise 193**

**9 Becoming a Wise
Consumer 233**

**10 Practicing Safe
Fitness 249**

**Epilogue Now Do You See Why
You Should Care About Getting
Fit? E-1**

**Appendix A Food Composition
Table A-1**

Index I-1

CONTENTS

Preface vii

1 Getting Fit: Why Should You Care? 1

Why should you care about being physically active? 1

Healthy People 2010 Objectives, 4

What components of fitness are important to you? 4

Determining your reasons for wanting to be fit, 10

Determining your present level of physical fitness, 11

How long will it take you to get fit? 11

Summary, 13

Lab Activity 1-1: Importance of Physical Fitness, 15

Lab Activity 1-2: Daily Fitness Schedule, 17

2 Creating a Healthy Lifestyle 19

Why should you be concerned about your lifestyle? 19

How can you prevent coronary artery disease? 20

What is cancer? 23

What is the effect of stress on a healthy lifestyle? 24

What lifestyle habits are deterrents to fitness? 29

What are the effects of sexually transmitted infections? 35

Creating a healthy lifestyle: your personal responsibility, 37

Summary, 39

Lab Activity 2-1: Your Personal Stress Inventory, 41

Lab Activity 2-2: Health Style: A Self Test, 45

3 Starting Your Own Fitness Program 51

What are the seven principles of a fitness program? 51

Should you do a warm-up routine before you exercise? 55

What are the goals of your fitness program? 56

How should you exercise? 56

Where do you begin? 58

Precautions in beginning a fitness program, 58

Ready to begin? 59

Summary, 60

Lab Activity 3-1: Medical History Questionnaire, 61

Lab Activity 3-2: Planning for a Physical Activity Program, 63

4 Developing Cardiorespiratory Fitness 65

Why is cardiorespiratory fitness important for you? 65

How does exercise affect the function of the heart? 67

What training techniques can be used to improve cardiorespiratory endurance? 71
 Advanced training methods, 74
 Good aerobic activities for improving cardiorespiratory endurance, 75
 What is your level of cardiorespiratory endurance? 80
 Summary, 82

Lab Activity 4-1: Calculating Target Heart Rate, 83

Lab Activity 4-2: 1.5-Mile Test, 85

Lab Activity 4-3: Cooper's 12-Minute Walking/Running Test, 87

5 Improving Muscular Strength, Endurance, and Power 89

Why is muscular strength important for everyone? 89
 How are strength and muscular endurance related? 90
 Why is muscular power important in sport activities? 90
 Types of skeletal muscle contraction, 90
 What determines how much strength you have? 91
 What physiological changes occur to cause increased strength? 92
 What are the techniques of resistance training? 93
 Should you exercise differently to improve muscular endurance? 102
 Strength training for women, 102
 Specific weight-training exercises, 103
 Core stabilization training, 121
 Assessment of muscular strength and endurance, 121
 Summary, 124
Lab Activity 5-1: Push-Ups, 125
Lab Activity 5-2: Bent-Knee Sit-Ups, 127
Lab Activity 5-3: Muscular Endurance Test, 129

6 Increasing Flexibility Through Stretching 133

Why is it important to have good flexibility? 133
 What structures in the body can limit flexibility? 134
 What are the different stretching techniques? 136
 Alternative stretching techniques, 138
 Is there a relationship between strength and flexibility? 140
 Stretching exercises, 141
 How do you know if you have good flexibility? 148
 Summary, 149
Lab Activity 6-1: Trunk Flexion, 151
Lab Activity 6-2: Trunk Extension, 153
Lab Activity 6-3: Shoulder Lift Test, 155

7 Eating Right 157

Why do you need to know about nutrition? 157
 Basic principles of nutrition, 158
 Nutrient requirements and recommendations, 170
 What is the role of nutrition in physical activity? 177
 Summary, 186
Lab Activity 7-1: Nutritional Knowledge Survey, 187
Lab Activity 7-2: Assessing Your Nutritional Habits, 189
Lab Activity 7-3: 7-Day Diet Analysis, 191

8 Limiting Your Body Fat Through Diet & Exercise 193

Why is weight control important to you? 193
 What is body composition? 194
 What causes obesity? 196
 How many calories do you expend each day? 198

What can you do to lose weight? 201

What if you want to gain weight? 204

What are eating disorders? 209

Summary, 212

Lab Activity 8-1: Calculating Percent Body

Fat Using Skinfold Measurements, 215

Lab Activity 8-2: Calculating Body Mass

Index (BMI), 219

Lab Activity 8-3: Determining Your Basal

Metabolic rate (BMR), 221

Lab Activity 8-4: Calculating Caloric

Expenditure, 225

Lab Activity 8-5: Calculating Caloric

Intake, 229

9 Becoming a Wise Consumer 233

Are you a wise consumer of fitness products? 233

What do you need to consider when buying fitness equipment? 234

How should you choose appropriate clothing and shoes for exercise? 240

What do you look for when shopping for a health club? 243

What to look for in fitness magazines, books, and videos, 245

The bottom line for the consumer, 246

Summary, 247

10 Practicing Safe Fitness 249

How can you prevent injuries? 249

What types of injuries might occur in an exercise program? 250

Treatment and management of injuries, 255

What exercises should be avoided? 255

What precautions should you take when exercising in hot or cold environments? 259

Physical activity during pregnancy, 260

Summary, 263

Epilogue Now Do You See Why You Should Care About Getting Fit? E-1

Appendix Food Composition Table A-1

Index I-1

Getting Fit Why Should You Care?

Objectives

After completing this chapter, you should be able to do the following:

- Give several reasons why being fit should be important to you.
- Discuss the physical, social, and psychological benefits of being fit.
- List the component parts of physical fitness.
- Determine your reasons for wanting to become physically fit.

So, you've finally decided it's time to get fit. Why is that? People have many different reasons and motivations for beginning a physical activity program. Are you interested in improving your overall health and well-being? Are you concerned about the way you look to your friends? Are you tired of being a couch potato? Are you interested in fitness primarily because you are required to take this fitness class? Whatever your motivation happens to be, consistently engaging in physical activities can make you physically fit, and can have many positive benefits on your style of living.

WHY SHOULD YOU CARE ABOUT BEING PHYSICALLY ACTIVE?

Have you noticed that it is virtually impossible to go through a day without being exposed to something involving **physical fitness** or wellness? We eat, sleep, go to class, and some of us even try to include some form of exercise in our

busy schedules. Fitness information comes from many sources. "Experts" give advice on television or radio and in magazines, books, and newspapers. Even our friends and classmates are willing to give opinions on the best ways to work out or on how to lose weight. Furthermore, the image of the attractive, healthy,

KEY TERMS

<i>physical fitness</i>	<i>caloric intake</i>
<i>wellness</i>	<i>caloric expenditure</i>
<i>health-related</i>	<i>skill-related</i>
<i>components</i>	<i>components</i>
<i>cardiorespiratory</i>	<i>speed</i>
<i>endurance</i>	<i>power</i>
<i>muscular strength</i>	<i>coordination</i>
<i>muscular endurance</i>	<i>balance</i>
<i>flexibility</i>	<i>agility</i>
<i>body composition</i>	<i>reaction time</i>
<i>atherosclerosis</i>	

physically active person is used to market everything—clothing, food, cosmetics, health care products, sports equipment, weight loss programs—the list goes on. People of all ages and backgrounds are deciding to take responsibility for their own physical and emotional well-being by becoming physically active and paying attention to lifestyle habits.

Our society is characterized by a fast-paced lifestyle, with obligations and stresses that affect our physical and emotional fitness. One of the most obvious reasons for becoming physically active is the benefit you may derive from a healthy lifestyle that includes proper exercise and nutrition.

Physical fitness is not entirely dependent on exercise. Desirable health practices also play an important role. Physical fitness affects the total person, including intellect, emotional stability, physical conditioning, and stress levels. The road to achieving a healthy lifestyle includes proper medical care, eating the right foods in the right amounts, appropriate physical activity that is adapted to individual needs and physical limitations, satisfying work, healthy play and recreation, and proper amounts of rest and relaxation.

Engaging in physical activity to get yourself fit allows you to satisfy your needs regarding mental and emotional stability, social consciousness and adaptability, spiritual and moral fiber, and physical health consistent with your heredity. This is the definition of the term **wellness**. Being fit means that the various systems of your body are healthy and function efficiently

to enable you to engage in activities of daily living, as well as recreational pursuits and leisure activities, without unreasonable fatigue.

THE PHYSICAL BENEFITS OF BEING PHYSICALLY ACTIVE

Human beings are designed to be active creatures. Although changes in civilization have resulted in a decrease in the amount of activity needed to accomplish the basic tasks associated with living, the human body has not changed. Therefore, it is important to be aware of the requirements for good health and recognize the importance of vigorous physical activity in your life. If you do not, your health, productivity, and effectiveness are likely to suffer. The Health Link Box 1-1 lists 10 physical benefits associated with physical activity.

THE SOCIAL REWARDS OF BEING PHYSICALLY ACTIVE

If you are not willing to participate in physical activities that help keep you fit, you may be depriving yourself of the social outlets, companionship, and feelings inherent in such activities. Participation in physical activity provides an opportunity for socializing. Physical fitness affects the entire person, and rich dividends come to the person who concentrates on the development of the body as well as the mind.

physical fitness: the various systems of your body are healthy and function efficiently to enable you to engage in activities of daily living, as well as recreational pursuits and leisure activities, without unreasonable fatigue

wellness: Satisfying your needs regarding mental and emotional stability, social consciousness and adaptability, spiritual and moral fiber, and physical health consistent with your heredity

HEALTH LINK

Benefits of Being Physically Active

1. Regular, vigorous activity increases muscle size, strength, and power and develops endurance for sustaining work and resisting fatigue.
2. Exercise strengthens the heart muscle and improves the efficiency of the vascular system in delivering oxygenated blood to the working tissues and in using it.
3. Exercise improves the functioning of the lungs by deepening the respiration process.
4. Exercise helps to keep the digestive and excretory organs in good condition.
5. Muscular exercise enhances nerve-muscle coordination.
6. Exercise helps a person to maintain a healthy body weight by reducing the percentage of total body weight that is made up of fat tissue.
7. Exercise contributes to improved posture and appearance through the development of proper muscle tone, greater joint flexibility, and a feeling of well-being.
8. Physical activity generates more energy and thus contributes to greater individual productivity for both physical and mental tasks.
9. The person who is fit has more strength, energy, and stamina; an improved sense of well-being; better protection from injury (because strong, well-developed muscles safeguard bones, internal organs, and joints and keep moving parts limber); and improved cardiorespiratory function.
10. It is often the case that people who become physically active will pay more attention to such things as proper nutrition, rest, and relaxation and may also drink less alcohol and stop smoking because they do not want to undo the benefits gained through physical activity. They are likely to be committed to engaging in health-promoting, rather than health-harming, behavior.

www.health.gov/healthypeople/

THE PSYCHOLOGICAL BENEFITS OF BEING PHYSICALLY ACTIVE

Many people use regular exercise, especially of a recreational nature, as a means of mental relaxation. Exercise can play a significant role in reducing stress. It diverts attention from stress-producing thoughts to a more relaxing and positive focus. Exercise may also help us to feel better about ourselves and to feel that we are more capable of handling potential stress-producing situations. Some people say that engaging in physical activity gives them an “exercise high.” It is true that exercise causes the release of chemicals called endorphins in

the brain that can positively affect your attitude and outlook.

THE BENEFITS OF EXERCISE IN THE AGING PROCESS

For the traditional student, at this point in your life it is likely that your physical health is fine. However, a fact that we wish we could change, but unfortunately cannot, is that aging begins immediately at birth and involves a lifelong series of changes in physiological and performance capabilities. These capabilities increase as a function of the growth process throughout adolescence, peak sometime between

the ages of 18 and 30 years, then steadily decline with increasing age. Interestingly, this decline may be caused by the sociological constraints of aging as much as by biological effects. It is possible for you to maintain a relatively high level of physical function if you maintain an active lifestyle.

In most cases, after age 30, qualities such as muscular endurance, coordination, and strength begin to decrease. Furthermore, as we age, recovery from vigorous exercise requires a longer amount of time. Regular physical activity, however, tends to delay and in some cases prevent the appearance of certain degenerative processes. If you were active as a child, became fit as a teenager, and continue to stay fit throughout your life, it is very likely that you will have greater strength, flexibility, and cardiorespiratory health and a lower percentage of body fat than if you chose a more sedentary lifestyle.

HEALTHY PEOPLE 2010 OBJECTIVES

Healthy People 2010 is a set of health objectives for the nation to achieve over the first decade of the new century. It can be used by many different people, states, communities, professional organizations, and others to help them develop programs to improve health. Healthy People 2010 builds on initiatives pursued over the past 2 decades. The 1979 surgeon general's report, *Healthy People*, and *Healthy People 2000: National Health Promotion and Disease Prevention Objectives* both established national health objectives and served as the basis for the development of state and community plans. Like its predecessors, Healthy People 2010 was developed through a broad consultation process, built on the best scientific knowledge and designed to measure programs over time. The 28 focus areas of Healthy People 2010 were developed by leading federal agencies with the most relevant scientific expertise. Additionally, through a series of regional and national meetings and an interactive website,

more than 11,000 public comments on the draft objectives were received. The Secretary's Council on National Health Promotion and Disease Prevention Objectives for 2010 also provided leadership and advice in the development of national health objectives.

The leading health indicators will be used to measure the health of the nation over the next 10 years. Each of the 10 leading health indicators has one or more objectives from Healthy People 2010 associated with it. As a group, the leading health indicators reflect the major health concerns in the United States at the beginning of the 21st century. The leading health indicators were selected on the basis of their ability to motivate action, the availability of data to measure progress, and their importance as public health issues. The leading health indicators are:

- Physical activity
- Overweight and obesity
- Tobacco use
- Substance abuse
- Responsible sexual behavior
- Mental health
- Injury and violence
- Environmental quality
- Immunization
- Access to health care

Healthy People 2010 offers a simple but powerful idea: Provide health objectives in a format that enables diverse groups to combine their efforts and work as a team. It is a road map to better health for all. The initiative has partners from all sectors.

WHAT COMPONENTS OF FITNESS ARE IMPORTANT TO YOU?

Engaging in physical activities can have a positive effect on many different physical attributes. For the vast majority of people in our society, regardless of age, the focus should be on those components of fitness that are concerned with

the development of qualities necessary to function efficiently physically and to maintain a healthy lifestyle. Those fitness components include cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition. Collectively, they are referred to as **health-related components**. The Fit List Box 1-1 summarizes the fitness components.

Cardiorespiratory endurance is the ability to persist in a physical activity requiring oxygen for physical exertion without experiencing undue fatigue (Figure 1-1). If you go out and run 2 miles or swim 2,000 yards, you are displaying cardiorespiratory endurance. The functioning of the heart, lungs, and blood vessels is essential for distribution of oxygen and nutrients and removal of wastes from the body. For performance of vigorous activities, efficient functioning of the heart and lungs is necessary. The more efficiently they function, the easier it is to walk, run, work, and concentrate for longer periods. Exercise of this nature involves the heart, the vessels supplying blood to all parts of the body, and the oxygen-carrying capacity of the blood.

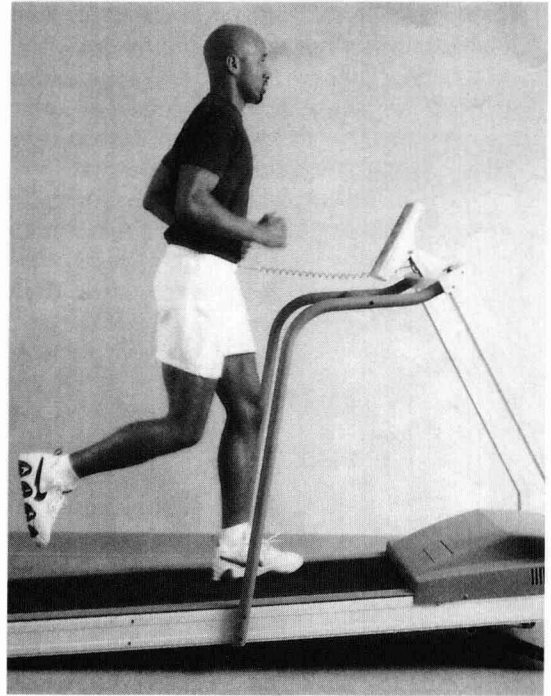


FIGURE 1-1. CARDIORESPIRATORY ENDURANCE.

Perhaps the most essential fitness component for both good health and skill-related performance.

FIT LIST 1-1

Fitness Components

Health-related Components

- Cardiorespiratory endurance
- Flexibility
- Muscular strength
- Muscular endurance
- Body composition

Skill-related Components

- Speed
- Power
- Agility
- Coordination
- Balance
- Reaction time

Muscular strength is the ability or capacity of a muscle or muscle group to exert force against resistance (Figure 1-2). It refers to a

health-related components: components of a healthy lifestyle, including muscular strength, muscular endurance, cardiorespiratory endurance, flexibility, and body composition

cardiorespiratory endurance: the ability to persist in a physical activity requiring oxygen for physical exertion without experiencing undue fatigue

muscular strength: the ability or capacity of a muscle or muscle group to exert force against resistance

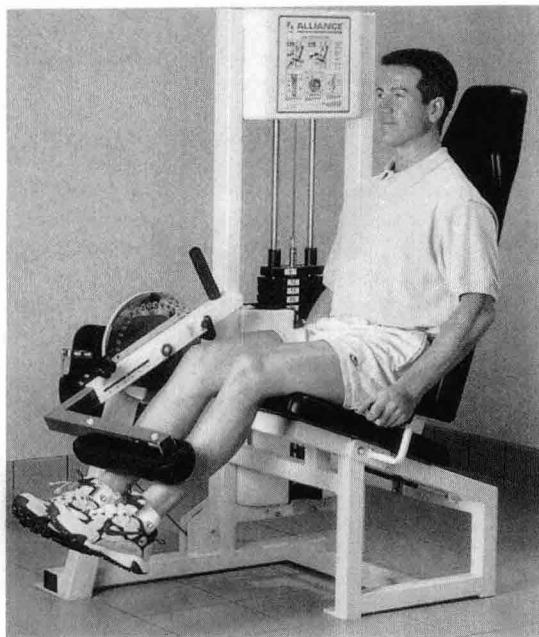


FIGURE 1-2. MUSCULAR STRENGTH.

The ability to generate force against resistance.

muscle's ability to exert maximal force in a single effort. Strength is needed in all kinds of work and in physical activity, and strong muscles provide better protection of body joints, resulting in fewer sprains, strains, and muscular difficulties. Furthermore, muscle strength helps in maintaining proper posture and provides greater endurance, power, and resistance to fatigue.

Muscular endurance is the ability of muscles to perform or sustain a muscle contraction repeatedly over a period of time (Figure 1-3). Muscular endurance is closely related to muscular strength. If you are strong, you will be

muscular endurance: the ability of muscles to perform or sustain a muscle contraction repeatedly over a period of time

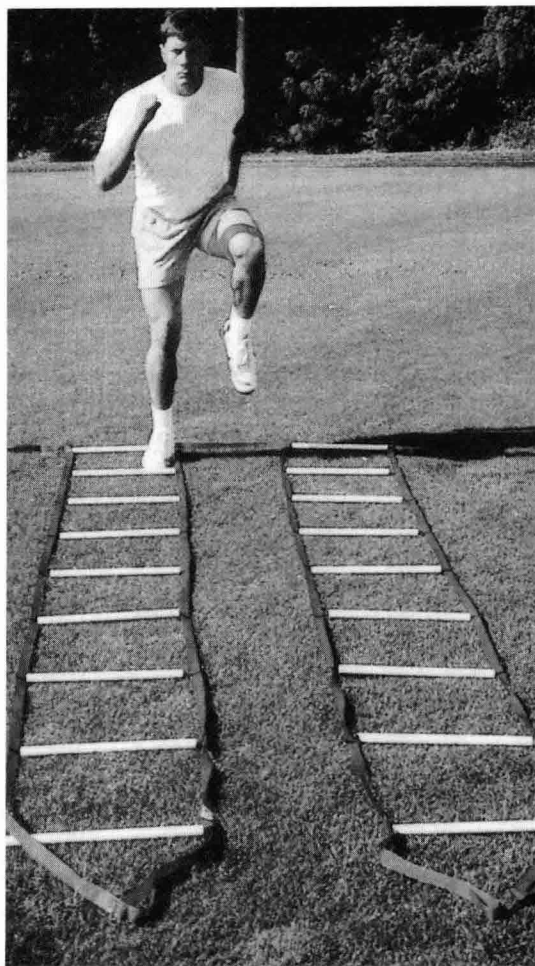


FIGURE 1-3. MUSCULAR ENDURANCE.

The ability to perform muscular contractions repeatedly over a period of time.

more resistant to fatigue because relatively less effort will be required to produce repeated muscular contraction.

Flexibility is the ability to move the joints in your arms, legs, and trunk freely through-

flexibility: the ability to move your arms, legs, and trunk freely throughout a full, nonrestricted, pain-free range of motion

out a full, nonrestricted, pain-free range of motion (Figure 1-4). It may be improved by engaging regularly in stretching. Flexibility is important for performance in most active sports; it is also important for maintaining good posture. Flexibility is also essential in carrying on many daily activities and can help to prevent muscle strain and muscular problems such as backaches.

Body composition refers to the different types of tissues that make up your body. These primarily include bones, muscles, tendons, ligaments, skin, and fat (Figure 1-5). Body composition particularly refers to the percentage of fat in the body relative to the percentage of all the other tissues. An excess of fat in the body is unhealthy because it causes the body to expend more energy for movement, and it may reflect a diet in which an individual is consuming more calories than he or she needs. The demand on the cardiorespiratory system is greater when the percent body fat is high. Furthermore, it is believed that obesity contributes to degenerative diseases such as high blood pressure and **atherosclerosis**. It has also been linked to diabetes and certain cancers. Obesity can also result in psychological maladjustments and may shorten life. A balance between caloric intake and caloric expenditure is necessary to maintain proper body fat con-

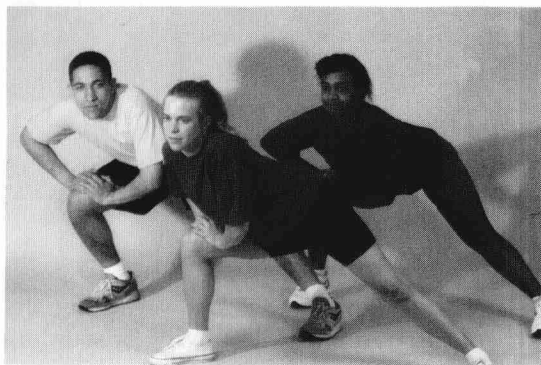


FIGURE 1-4. FLEXIBILITY.

The ability to move freely through a full range of motion.



FIGURE 1-5. MEASURING BODY COMPOSITION.

Exercise can reduce the percentage of total body weight that is fat tissue.

tent. Adequate exercise, therefore, is effective in controlling body fat. **Caloric intake** is the total number of calories consumed in a 24-hour period regardless of the type of foods ingested. **Caloric expenditure** is the number of calories burned off in a 24-hour period from basal metabolism and exercise.

body composition: the percentage of fat in the body relative to the percentage of all the other tissues

atherosclerosis: a process by which fatty plaques are deposited along arterial walls

caloric intake: the number of calories consumed in the diet

caloric expenditure: the number of calories expended through basal metabolism and exercise