

ELEVENTH EDITION

# SPORTS AND RECREATIONAL ACTIVITIES



MOOD ♦ MUSKER ♦ RINK

ELEVENTH EDITION

---

# SPORTS AND RECREATIONAL ACTIVITIES

**DALE MOOD**

Professor of Kinesiology,  
Associate Dean, College of Arts and Sciences,  
University of Colorado, Boulder

**FRANK F. MUSKER**

Formerly Professor of Physical Education,  
Boston University; Supervisor of Physical Education,  
Peabody Public Schools, Peabody, Massachusetts

**JUDITH E. RINK**

Associate Professor,  
Department of Physical Education,  
University of South Carolina,  
Columbia, South Carolina



Boston, Massachusetts Burr Ridge, Illinois Dubuque, Iowa  
Madison, Wisconsin New York, New York San Francisco, California St. Louis, Missouri

# WCB/McGraw-Hill

A Division of The McGraw-Hill Companies

*Acquisition Editor:* Vicki Malinee  
*Developmental Editor:* Christy Wells  
*Project Manager:* Mark Spann  
*Production Editor:* Elizabeth Fathman  
*Production and Editing:* Carlisle Publishers Services  
*Designer:* David Zielinski  
*Manufacturing Supervisor:* Betty Richmond

## ELEVENTH EDITION

Copyright © 1995 by Mosby-Year Book, Inc.

Previous editions copyrighted 1953, 1958, 1963, 1967, 1971, 1975, 1979, 1983, 1987, 1991

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from the publisher.

Permission to photocopy or reproduce solely for internal or personal use is permitted for libraries or other users registered with the Copyright Clearance Center, provided that the base fee of \$4.00 per chapter plus \$.10 per page is paid directly to the Copyright Clearance Center, 27 Congress Street, Salem, MA 01970. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collected works, or for resale.

Printed in the United States of America

Composition by Carlisle Communications, Ltd.

Printing/binding by Maple Vail Book Mfg. Group, Binghamton

## Library of Congress Cataloging-in-Publication Data

Mood, Dale.

Sports and recreational activities / Dale Mood,  
Frank F. Musker, Judith E. Rink. — 11th ed.

p. cm.

Includes index.

ISBN 0-8151-5955-2

1. Sports. 2. Group games. 3. Physical education and training—  
Study and teaching. I. Musker, Frank F. II. Rink, Judith.  
III. Title.

GV704.M66 1995

796'.0194—dc20

94-19503

CIP

97 98 99 / 9 8 7 6 5 4 3

---

# Contributors

## **LACROSSE**

### **Robert H. Scott**

Director of Athletics

Department of Physical Education and Athletics

Johns Hopkins University

Baltimore, Maryland

### **Polly Keener**

Vice President

Penn Monto

Hadley, Massachusetts

---

# Consultants

## **AEROBIC DANCE**

### **Lorna L. Francis, Instructor**

Department of Physical Education  
San Diego State University  
San Diego, California

## **ARCHERY**

### **Frank Thomas, Senior Lecturer**

Department of Kinesiology  
Texas A&M University  
College Station, Texas

## **BACKPACKING**

### **Jeff Steffen, Associate Professor**

Department of Physical Education  
University of Northern Colorado  
Greeley, Colorado

## **BADMINTON**

### **Donald C. Paup, Professor and Chair**

Department of Exercise Science  
George Washington University  
Washington, D.C.

## **BASKETBALL**

### **James D. LaPoint, Associate Professor**

Department of Health, Physical Education,  
and Recreation  
University of Kansas  
Lawrence, Kansas

## **BICYCLING**

### **Tom Swensen, Ph.D.**

Department of Kinesiology  
Indiana University  
Bloomington, Indiana

## **BOWLING**

### **Rosemary McMahan, Assistant Professor**

Department of Physical Education  
and Sports Studies  
University of Georgia  
Athens, Georgia

## **DANCE: CONCERT AND RECREATIONAL**

### **Cynthia Noble, Assistant Professor**

Department of Physical Education  
Springfield College  
Springfield, Massachusetts

## **FENCING**

### **Anne Klinger, Department Head**

Department of Physical Education  
Clatsop Community College  
Astoria, Oregon

## **FIELD HOCKEY**

### **Karen Weaver, Head Field Hockey Coach**

Department of Athletics  
The Ohio State University  
Columbus, Ohio

## **GOLF**

### **A. Craig Fisher, Professor**

Department of Exercise and Sport Science  
Ithaca College  
Ithaca, New York

## **GYMNASTICS**

### **Carolyn Cody, Professor and Executive Assistant to the Vice President for Academic Affairs**

University of Northern Colorado  
Greeley, Colorado

## **JOGGING**

### **Don Torok, Assistant Professor**

Department of Exercise Science and Wellness  
Florida Atlantic University  
Boca Raton, Florida

## **KARATE**

### **Rick Schmidt, Associate Professor**

School of Health, Physical Education,  
and Recreation  
University of Nebraska  
Lincoln, Nebraska

## **KAYAKING AND CANOEING**

### **Peter Werner, Professor**

Department of Physical Education  
University of South Carolina  
Columbia, South Carolina

## **MOUNTAINEERING**

### **Gary Ryan**

Boulder Rock Club  
Boulder, Colorado

## **PHYSICAL FITNESS**

### **Cheryl Norton, Professor and Chair**

Department of Human Performance, Sport,  
and Leisure Studies  
Metropolitan State College  
Denver, Colorado

## **RACQUETBALL, PADDLEBALL, AND HANDBALL**

### **Gene Ezell, Professor**

Department of Exercise Science, Health,  
Leisure Studies  
University of Tennessee  
Chattanooga, Tennessee

## **RUGBY**

### **John A. W. Baker, Associate Professor**

Department of Physical Education  
Southern Illinois University  
Carbondale, Illinois

### **Warren Sean Edris, Head Coach**

Rugby Football Club  
University of Colorado  
Boulder, Colorado

## **SKIING: ALPINE**

### **Richard Rokos, Head Ski Coach**

Department of Athletics  
University of Colorado  
Boulder, Colorado

## **SKIING: CROSS-COUNTRY**

### **George Atkinson, Associate Professor**

Department of Health, Sport, and Leisure Studies  
Northeastern University  
Boston, Massachusetts

## **SKIN AND SCUBA DIVING**

### **Joe Mottashed, Owner**

Scuba Joe, Incorporated  
Boulder, Colorado

## **SOCCER**

### **March Krotee, Professor**

School of Kinesiology and Leisure Studies  
University of Minnesota  
Minneapolis, Minnesota

## **SOFTBALL**

### **Ronald F. Kirby, Professor and Chair**

Department of Physical Education  
Southeast Missouri State University  
Cape Girardeau, Missouri

## **SPEEDBALL**

### **Laura deGhetaldi, Lecturer**

Department of Kinesiology  
University of Colorado  
Boulder, Colorado

## **SPRINGBOARD DIVING**

### **Gerald DeMers, Associate Professor and Aquatic Director**

Department of Physical Education and  
Recreation Administration  
California Polytechnic State University  
San Luis Obispo, California

## **SWIMMING**

### **Joe Fischer, Head Swim Coach**

Athletic Department  
University of Vermont  
Burlington, Vermont

**TABLE TENNIS****Don Casady, Professor**

Department of Exercise Science  
University of Iowa  
Iowa City, Iowa

**TEAM HANDBALL****March L. Krotee, Professor**

School of Kinesiology and Leisure Studies  
University of Minnesota  
Minneapolis, Minnesota

**TENNIS****Randy Hyellgard, Assistant Professor**

Department of Kinesiology  
Kansas State University  
Manhattan, Kansas

**TOUCH AND FLAG FOOTBALL****Randy Bonnette, Lecturer**

Department of Health and Physical Education  
Texas A&M University  
College Station, Texas

**TRACK AND FIELD****Al McDaniels, Assistant Professor**

Department of Kinesiology  
University of Nevada  
Las Vegas, Nevada

**VOLLEYBALL****Linda Delk, Head Volleyball Coach**

Department of Athletics  
University of Northern Colorado  
Greeley, Colorado

**WATER POLO****George Weiny, Professor**

Department of Physical Education  
California State University  
San Bernardino, California

**WEIGHT TRAINING****Thomas Miller, Teacher**

L. J. Schultz Middle School  
Cape Girardeau, Missouri

**WRESTLING****Gerald Landwer, Professor**

Department of Kinesiology  
University of Nevada  
Las Vegas, Nevada

---

# Preface

## PURPOSE OF THE BOOK

The purpose of the eleventh edition of *Sports and Recreational Activities* is to provide current fundamental knowledge about a broad spectrum of physical activities. The physiological, psychological, and social benefits of participation in physical activities have long been proclaimed by physicians, physical educators, and recreation directors, and it appears that their advice is receiving the public's attention. Most evidence suggests that the number of people engaging in regular physical activity continues to increase, although it is still considerably lower than the goals set by national health agencies. For reasons of safety, enjoyment, and motivation, it is important that participants start out correctly and that they are exposed to a variety of possibilities. We believe that participation in physical activities can enrich the quality of life and that use of the basic concepts provided in this book will promote this enrichment.

*Sports and Recreational Activities* is written for two groups of readers—participants and instructors (or instructors-to-be). People who decide to embark on a personal program of sports and recreation can benefit from this book's excellent overview of 41 popular physical activities. Physical educators, recreation leaders, playground directors, and camp counselors, no matter how well trained, seldom have the time to learn the fundamentals of the many activities covered in this book. For these instructors or students who will become instructors, the book should serve as a valuable resource when they are called upon to teach an unfamiliar activity.

In most cases, each chapter includes a brief historical perspective of the activity, information about the selection and care of required equipment, a digest of the basic rules, a discussion of the fundamental skills and techniques required, ideas about strategies, safety concerns, a list of teaching considerations, terminology, and selected references. Armed with this knowledge both the participant and the instructor should find increased enjoyment in physical activities.

## CHANGES IN THE ELEVENTH EDITION

The revision process for this edition was extensive. Although much about sports and recreational activities remains constant over the years, there also is much that changes. For example, we have updated the text to reflect the invention of new equipment, changes in the rules, the discovery of new techniques, and the increase in available references. The increasing participation of women in sports and recreational activities has brought about many rule changes during recent years (consider basketball, for example). The conversion of various dimensions to metric units and the simple need to update photographs as new apparel becomes available are other reasons revision is necessary. Along with these updating needs, many other changes have been made in this eleventh edition to make it a more useful book.

## CHAPTER CONSISTENCY

Particular attention has been given to present this wealth of diverse material as consistently as possible from chapter to chapter. In general and where appropriate, each chapter proceeds from behavioral objectives, to history, to equipment and facilities, to rules and etiquette, to fundamental skills and techniques, to strategies, to teaching considerations, and finally to ancillary information such as a glossary, suggested readings, and audiovisual materials.

## NEW ILLUSTRATIONS

Many new photographs and drawings have been added and others replaced or modified to illustrate the latest developments in technique and instruction. If a picture is worth a thousand words, then the hundreds of illustrations in the book provide an efficient method for communicating a great deal of information. However, it is not always a simple task to obtain just the right photograph or drawing to capture the intent. A great deal of effort was spent on improving the illustrations for this edition so that the reader can truly “see” the nuances of each activity.



## NEW CHAPTER

A new chapter has been added to the eleventh edition of *Sports and Recreational Activities*. The new chapter covers lacrosse. The popularity of this activity (already well known and played extensively in the eastern United States and in Canada) is spreading across the country, warranting its inclusion in this book.

## ANNOTATED REFERENCES

Recognizing that a book such as this cannot present every facet of every activity, we present a list of suggested readings for each chapter. Beginning in the ninth edition and continuing through this edition, we have provided a short annotation for many of these references. This will allow readers who wish further details about an activity to select readings that are germane to their particular interests.

## VIDEOTAPES

New to the tenth and continuing and updated for the eleventh edition is information at the end of most chapters specifying where relevant videotapes may be found. Videotapes of talented performers and of classic events are being used for instructional purposes at an increasing rate. We hope this additional resource will continue to prove helpful.

## NEW APPENDIX MATERIAL

We have augmented, in the appendix material, the list of companies who manufacture or distribute equipment relevant to the various activities described in this book. Addresses and brief descriptions of types of equipment are provided. This should serve as a handy resource for those interested in comparing information and purchasing equipment, clothing, and other paraphernalia required to participate or teach the activities covered in this book. In addition we have listed in the appendix track and field record performances over the years and a guide for converting metric and English units.

## INSTRUCTOR'S MANUAL

An instructor's manual has been prepared for use with the eleventh edition. It includes chapter outlines, test questions, and suggestions for discussion. The chapter outlines can be used to obtain a quick synopsis of the chapter contents. They are useful for organizing class lectures and could be reproduced for students as study guides. Objective test questions (true-false, matching, and multiple choice) are provided as a source of ideas from which an instructor may build a valid examination over the factual materials presented in each chapter. The suggestions for discussion include questions that can be used either as essay questions on examinations or as stimuli for discussions. They generally require the student to demonstrate comprehension of the chapter information by applying learned material for summarizing important concepts contained in the chapter.

## ACKNOWLEDGMENTS

A book with as diverse and broad a scope as this is obviously the result of the work and ideas of many people. We wish to thank all the consultants and contributors, with a special tip of the hat to Robert Scott and Polly Keener for their contributions of the new chapter on lacrosse.

We also extend our appreciation to Raili Mood and to many of the contributors and consultants for providing the many new photographs for this edition. Special thanks go to the officials of the various sporting goods companies and publishers for giving us permission to reproduce many drawings and photographs.

We wish to express our gratitude to Christy Wells, Mark Spann, Elizabeth Fathman, and all the other folks at Mosby-Year Book for providing feedback and guidance and for keeping us to our deadlines. Their suggestions and gentle reminders are much appreciated.

**Dale Mood**  
**Frank F. Musker**  
**Judith E. Rink**

---

# Contents

- |    |                                     |    |  |
|----|-------------------------------------|----|--|
| 1  | Introduction, 1                     | 22 | Racquetball, Paddleball, and Handball, 318 |
| 2  | Aerobic Dance, 6                    | 23 | Rugby, 330                                 |
| 3  | Archery, 16                         | 24 | Self-Defense, 342                          |
| 4  | Backpacking, 32                     | 25 | Skiing: Alpine, 352                        |
| 5  | Badminton, 43                       | 26 | Skiing: Cross-Country, 363                 |
| 6  | Basketball, 55                      | 27 | Skin and Scuba Diving, 378                 |
| 7  | Bicycling, 74                       | 28 | Soccer, 389                                |
| 8  | Bowling, 84                         | 29 | Softball, 403                              |
| 9  | Dance: Concert and Recreational, 95 | 30 | Speedball, 416                             |
| 10 | Fencing, 111                        | 31 | Springboard Diving, 424                    |
| 11 | Field Hockey, 121                   | 32 | Swimming, 439                              |
| 12 | Golf, 141                           | 33 | Table Tennis, 459                          |
| 13 | Gymnastics and Tumbling, 159        | 34 | Team Handball, 469                         |
| 14 | Jogging, 188                        | 35 | Tennis, 481                                |
| 15 | Karate, 199                         | 36 | Touch Football and Flag Football, 501      |
| 16 | Kayaking and Canoeing, 217          | 37 | Track and Field, 526                       |
| 17 | Lacrosse, 245                       | 38 | Volleyball, 550                            |
| 18 | Mountaineering, 275                 | 39 | Water Polo, 561                            |
| 19 | Orienteering, 289                   | 40 | Weight Training, 573                       |
| 20 | Paddle and Platform Tennis, 301     | 41 | Wrestling, 591                             |
| 21 | Physical Fitness, 306               |    |  |

**Appendix A** Miscellaneous Field and Court Dimensions, 616

**Appendix B** Equipment Manufacturers and Distributors, 619

**Appendix C** Metric and English Equivalents, 623

**Credits**, 625

## Introduction

**T**here is almost unanimous agreement that optimum health is our most prized possession. Schopenhauer, the German philosopher, expressed this idea when he remarked, "The greatest of follies is to neglect one's health for any other advantage of life."

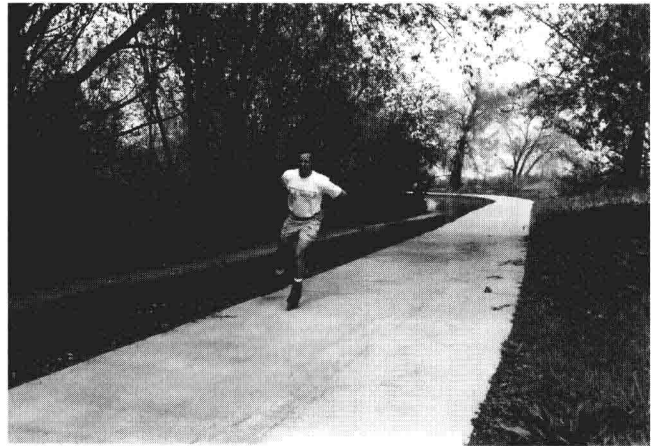
To improve and maintain optimum health, it is necessary for people of all ages to participate in physical exercise. However, there is wide variation in the types of exercises recommended for different age groups.

A good example of the importance of exercise in maintaining health is the emphasis placed on it in the health regimen of presidents of the United States. Recent White House physicians have included such exercises as walking, jogging, hiking, golfing, swimming, and horse-back riding, in addition to close medical supervision, in the presidents' conditioning programs.

In addition to the value of exercise in maintaining optimum health, there are often social and recreational benefits as well. In this age of increased leisure time these benefits are becoming even more important than in the past.

Although in many high schools, colleges, and universities students are required to participate in physical education classes, several institutions have eliminated this requirement and instituted an elective program. In a large percentage of these cases the number of students taking physical activity classes has remained constant or even increased.

There is little doubt that, in addition to students on college campuses, the number of adults participating in sports and recreational activities in the United States has increased dramatically in recent years. However, this number is still far short of goals set by national health agencies. Ironically, the number of children being exposed to high-quality, daily physical activity in physical education programs in the public schools has been decreasing recently. Local economic shortfalls are the primary cause for this phenomenon, and the trend has public health officials concerned. A reasonable amount of evidence is now available to demonstrate that early and continued



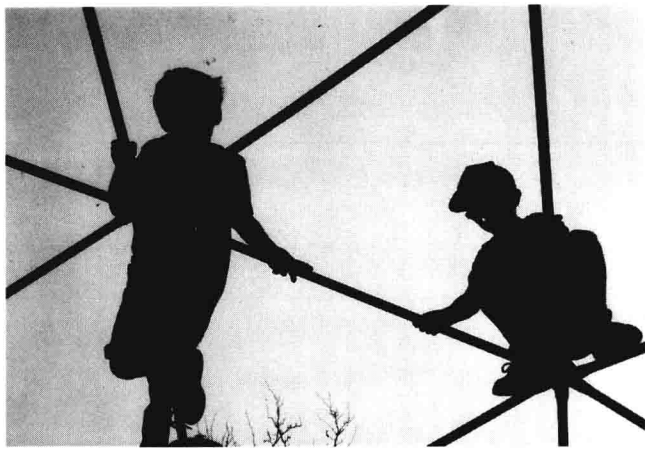
**Fig. 1-1.** One of the newest forms of physical activity is rollerblading.

exposure to physical activity could significantly impact the overall health of this country. The mechanism to provide this exposure (physical education in the public schools) is available but is currently being curtailed. This may prove to be very shortsighted in the long run.

The increase in activity participation noted among adults can be attributed to an increase in the amount of leisure time available to most Americans. We have shorter work weeks and more and longer vacations than in the past. In addition, sports and recreational facilities have become increasingly abundant and accessible to larger and more diverse segments of the population.

The increased leisure time, however, does not explain why Americans choose to use this time engaged in sports and recreational activities; it merely provides the opportunity to do so. Likewise, increased facilities reflect only that larger segments of the population choose to participate, but they do not supply a reason for this choice.

A great number of theories have been proposed by educators, sociologists, medical personnel, and others to explain why we engage in physical activity. These theories are diverse yet contain many overlapping ideas. The



**Fig. 1-2.** Using up some excess energy.

satisfaction of creative desires, expression of inherent animal instincts, use of excess energy, preparation for other types of life situations, and exposure to risk to provide excitement are a few of the concepts that have been proposed.

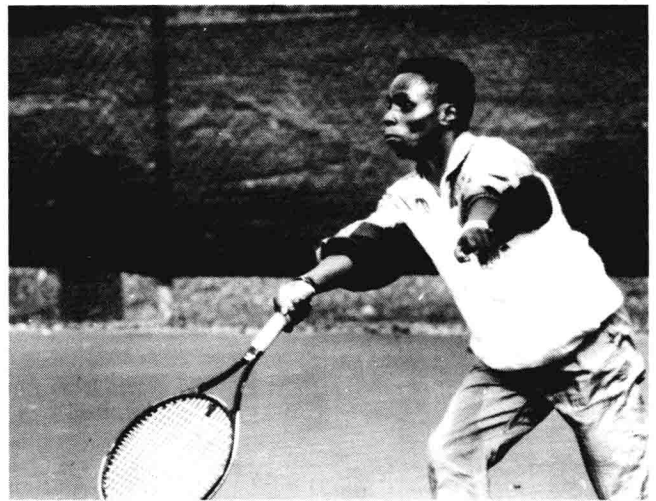
People have become increasingly aware of several benefits of physical activity, particularly in the physiological and health areas. Some of these benefits and relevant considerations are presented in the Physical Fitness chapter. In addition to the physiological benefits, the following are other areas believed to be affected positively by participation in sports and recreational activities.

### PSYCHOLOGICAL FACTORS

Many life situations are conducive to producing tension and emotional stress, resulting in worry, anxiety, fear, frustration, and the like. Although the evidence is not as definite because the factors involved are more difficult to measure, there is some indication that exercise under the proper conditions can be helpful in improving emotional stability and mental fitness, just as it aids in developing physical fitness. Participation in an interesting sport takes the mind off other things and prevents it from dwelling on problems. Exercise also helps release emotions through socially approved channels. It is a means of satisfying certain primitive urges that all people have, and it provides for self-expression. Experiencing success in developing skills and participating in a physical activity are excellent means of developing confidence and reaping satisfaction that comes from successful accomplishment. Through individual activities such as archery, bowling, running, swimming, gymnastics, and golf, it is possible to compete against oneself as well as against others.

### KNOWLEDGE

A dominant factor in the American way of life is the ability of the average citizen to know about and understand sports, if not as a participant, then as a spectator. There-



**Fig. 1-3.** Relieving stress on the tennis court.

fore, it is beneficial to learn the rules and strategies of various sports. In addition, knowledge of etiquette, safety, equipment, history, values, techniques, and other factors can enhance the enjoyment of watching or participating in team, dual, or individual activities.

### SOCIAL VALUES

One important aspect of education is the provision of a program of activities to help in the socialization of the individual. Because we are living in an age of great social conflict, it is highly important that teachers use every means possible to instill positive social habits in their students. A program of physical activities offers unlimited opportunities for developing broad social understandings. In fact, initial contacts between previously distant cultures or societies are sometimes made through a common interest in sports.

One facet of common social interests of Americans is shown by the wide publicity given to sports through radio and television, sports pages of newspapers, magazines, and discussions between individuals of all ages. There is possibly no better way to learn how to get along with and to live with others than through participation in sports. In sports the individual must show the same qualities that are necessary for successful and happy living in a democratic society. To be most successful, courtesy, self-control, initiative, cooperation, and loyalty must be acquired. The experience of being both a follower and a leader can be gained. Successful participation in sports implies that the participant must learn to be a good sport and to give credit where it is due, regardless of who wins or loses. Participation in team games, particularly, teaches the individual to work with others to the best advantage of the team and to control emotions.

People are often motivated by the social instinct of belonging. One way the desire to associate with others can be satisfied is through participation in sports. The



**Fig. 1-4.** Physical activity can provide bountiful opportunities for people of various ages to explore and socialize while becoming fit.



**Fig. 1-5.** Out for a jog.

congenial atmosphere of sports presents the opportunity to develop friendships that may have lasting value.

## RECREATION

Technology has liberated us from much physical work, and recreation has assumed an important place in modern life as a result of the increasing amount of leisure time available to all.

It is evident that people can use leisure time constructively or destructively. One of the aims of a physical activities program is to teach the wise use of leisure time. People should be made aware of the vital place that wholesome recreation, and especially sports, can play in the full enjoyment of life.

Recreation, to be helpful, need not be elaborate or expensive. Many of the simple forms of recreation available to all are the most satisfying and of the greatest help in maintaining physical, mental, and emotional health.

## FACTORS ASSOCIATED WITH A PHYSICAL ACTIVITY PROGRAM

To profit most from participation in sports and physical activities, a number of things should be considered.

### Training and conditioning

Some physical educators and sports directors make a distinction between “conditioning” and “training.” Conditioning is usually considered to be related to such things as proper eating, resting, relaxing, sleeping, and exercising regularly, as well as working toward the improvement of skills in a particular activity. Training, on the other hand, is considered by some to be the practice of certain movements by constant repetition until a skill is established or mastered. An example of this would be attempting to improve—and master to the greatest possible extent—

skills required in such sports as swimming, golf, tennis, or track. The meanings of the words “training” and “conditioning” overlap, for gains in one generally lead to increases in the other.

Recent evidence suggests that the amount of physical activity required to enjoy **health** benefits may be less than originally believed. To improve and maintain a reasonably modest level of physical fitness, it is necessary to participate in vigorous physical activities at regular intervals. It is generally recommended by the American College of Sports Medicine that at a minimum one should participate in a moderately intense physical activity for 30 minutes at least three times per week. To reach this state, it is best to begin with mild exercise and to increase the intensity gradually during subsequent periods. This is recommended to prevent undue stress and strain on muscles. The duration of exercise periods should be governed by the response of the individual to exercise and past training periods. Other factors, such as age and physical condition, will dictate the initial intensity and duration of exercise periods. To develop the greatest overall muscular efficiency, one should participate in activities that require some use of all the major muscles of the body. Many sports require repeated use of a limited set of muscles; thus, it is best to take part in a wide variety of sports.

However, epidemiologists examining the health benefits of physical activity (defined mainly as living longer and with a higher quality of life) have determined that even modest participation is valuable. The value of an activity as simple as taking a brisk walk periodically has been determined to be an important predictor of improved health. It is unwise to engage in any strenuous activity before the body is in condition for it. To **improve** the condition of the body requires application of a stress or



overload. However, to **maintain** a particular state of physical condition requires less intense activity than is required to get to that level. It is also generally accepted that if participation is discontinued the degree of physical condition will decline at about the same rate required to build it.

Good physical condition is sufficient for participation in most sports. However, it must be kept in mind that certain sports require special training. Age makes a difference in conditioning and training; younger people can train and condition more rapidly than older people.

A well-chosen sequence of conditioning exercises is valuable in developing flexibility and should involve exercises for the (1) shoulders, chest, and back, (2) arms and shoulders, (3) neck, (4) lateral trunk, (5) back and buttocks, (6) legs and buttocks, (7) abdomen, (8) lower back and buttocks, (9) chest and arms, and (10) legs, ankles, and feet.

### Physical examination

No one should participate in prolonged and strenuous physical activity without first having a complete medical examination by a physician. A medical examination including an exercise stress test is so important that it cannot be overemphasized, especially after the age of 40, and regular examinations should be repeated periodically throughout life. The results of medical examinations show that most people do not need to restrict physical activity; however, if certain defects are present, such as a defective heart, participation in unrestricted strenuous exercise can be very damaging.

### Precautions

It should be apparent that an exercise program needs to be structured to fit each individual. Beginning level of fitness, medical condition, interests, age, and availability of facilities are examples of factors to be considered.

Before one engages in strenuous physical activity, common sense dictates that there should be a period of gradual **warming up** and stretching of the muscles to eliminate some of the danger of muscle injury. Large-muscle groups, including the arms, legs, and trunk, should be warmed up first. In fact, they should receive major attention throughout the warming-up and limbering-up period.

It is usually recommended that vigorous and strenuous physical activity be tapered off. Sudden and complete relaxation after vigorous exertion without tapering off can cause dizziness, nausea, and even fainting if the exercise has been particularly strenuous. Giving the body processes a chance to slow down gradually is a precautionary measure observed by practically all champion athletes.

There are good reasons for **tapering off** following vigorous or strenuous exercise. During exercise the heart rate speeds up to keep the muscles supplied with sufficient oxygen and nutrients. The increased heart rate sends

the arterial blood into the veins. Because the venous system has no forceful mechanism like the heart to help move blood back to the heart, the action of muscles must be depended on to help the return flow of blood. When the veins fill with blood, the pressure of contracting muscles produces a pumping action on the thin-walled veins to propel the blood back toward the center of the body. If vigorous exercise ends abruptly, the heart continues for a time to send extra amounts of arterial blood to the muscles. Because the muscles are suddenly inactive, there is not sufficient force for returning the extra blood to the heart. Consequently, the extra blood tends to pool in the muscles, and the imbalance may leave some organs with an inadequate supply of blood. During the tapering-off process following strenuous exercise, the muscles continue to squeeze blood from the extremities of the body back into the main circulation.

Regardless of the care taken in beginning training and conditioning for sports, muscles may become sore and stiff. Mild exercise, in cases of this sort, helps the pumping action of the heart that is necessary to bring blood to the sore muscle and thereby speeds up the carrying away of waste products.

Another precaution is **avoidance of overexertion**. Excess emotional stress can greatly add to the seriousness of overexertion. The ability to recuperate after strenuous exercise is a good guide at any age to the amount and extent of exercise to participate in at one time. The recovery should be reasonably prompt. However, if the breathing and heart rate are still greatly accelerated 10 minutes after exercise, and if there is marked fatigue or weakness after a few hours of rest or a sense of definite fatigue the day following, the exercise likely has been too severe or prolonged.

As a last precaution following strenuous exercise, an adequate **cooling-off period** should follow the tapering-off process. From 3 to 6 minutes should elapse between tapering off and entering the shower. Otherwise, the warm water will prevent loss of heat from the body and it will continue to perspire. Heavy perspiration following a shower and dressing may cause chilling, with the same results as chilling after being drenched by a cold rain.

Of course, local and environmental conditions may require other precautions. For example, physical activity in very warm temperatures requires attention to fluid replacement and core body temperature. Acclimation to unusually high altitudes may be required before engaging in strenuous physical activity. In most cases, common sense should be used to prevent discomfort or injury.

### Rest and sleep

Sufficient rest and sleep are necessary for maintenance of good physical, mental, and emotional health. Although it

is thought that the average person needs 8 to 9 hours of sleep each night, the amount varies with the individual and with age. Growing children require more sleep than adults. Some people require more sleep than others who have similar activity levels. Regularity in rest and sleep is very important. If one is not getting sufficient rest and sleep, participation in strenuous and vigorous physical activities can be more harmful than helpful. It is recommended that each individual learn to judge the amount of sleep and rest necessary to maintain physical and mental alertness and a feeling of well-being.

### **Diet and nutrition**

A balanced diet is necessary for maintenance of good nutrition. Nutrition is basic to physical, mental, and emotional health. Those who participate in physical activity usually require more food than those who lead sedentary lives. Participation in physical activities requires energy, and food is the main source of energy for the body.

It is usually best not to eat heavy meals before strenuous physical activity, especially if emotional stress is present, as in a competitive activity. It is difficult for the body to digest and assimilate food under such circumstances.

Finally, together with exercise, diet is a controlling factor in body weight. Exercise is sometimes helpful in weight reduction; however, the number of calories eliminated through exercise is minimal when compared with the number of calories that can be eliminated through a sensible diet. If the overweight person uses exercise to reduce weight and then refrains from overeating, the exercise can be helpful.

### **Clothing and cleanliness**

Proper clothing is important when participating in sports. It is essential to change from street clothes to sports clothing when participating in vigorous activities that will cause perspiration and body odor. Even sports clothing can become so soiled by dirt and perspiration that they become objectionable to others. Therefore, it is important to have sufficient sports clothing and to keep it as clean as possible. It is particularly important that shoes and socks be selected properly. Gymnasium or other sports shoes should fit properly to safeguard the feet. Blisters form easily if shoes or socks do not fit properly. Clothing that

fits too tightly or that may hinder performance should be avoided.

A shower should be taken after participation in vigorous physical activity for both hygienic and social reasons. Showers not only cleanse the skin, but also reduce chances of infection. Some people like a warm shower followed by a short, cold shower; others prefer that water temperature be tapered from warm to comfortably cool. Prolonged hot showers are not recommended because they interfere with the body's ability to recover from the changes in blood flow brought on by the exercise.

### **Injuries and illness**

People often ask whether they should participate in physical activities during or following periods of mild illness, such as colds, flu, and other infectious diseases. In most cases it is best to refrain from participation in physical activities during any illness caused by infection.

Care should be given to even slight injuries received while participating in physical activities. Small scratches and cuts should be treated as soon as possible. Any cut or scratch that seems to have become infected should have the attention of a physician immediately. Various infections can be contracted in gymnasiums and shower rooms. Participants should be careful in taking showers and drying in the dressing rooms to avoid "athlete's foot." Serious sprains and bruises should be treated with immediate first aid and then examined by a physician.

### **Safety**

Sports and physical activities should be as safe as possible. Participants should take every precaution to prevent injury to themselves and to others. Equipment and rules and regulations of games and sports generally are designed to protect players as much as possible. Some sports (e.g., football) and activities require special protective equipment, and playing them without protective equipment risks serious injury.

The beginner in certain sports should recognize that some advanced activities may be dangerous to attempt. For example, a beginner attempting advanced tumbling stunts would be in danger of injury because of a lack of skill. Everyone should give attention to safety, because a high percentage of the injuries and deaths from accidents can be prevented.



## Aerobic Dance

Completion of this chapter should enable the reader to:

- Recognize the benefits associated with regular participation in aerobic dance
- Organize and design a safe and effective aerobic dance program, including the sequencing of activities
- Select appropriate music, movement patterns, and exercises for an aerobic dance program

### HISTORY

Aerobic dance, defined as continuous and rhythmic movement to music, was introduced by Jackie Sorenson in 1969. The combination of vigorous dance steps and exercises performed to popular music in a group setting soon became one of the fastest growing leisure activities in the United States. Today more than 25 million exercise enthusiasts participate in this multimillion dollar industry. Virtually every community offers some form of aerobic dance class. Even home exercisers can participate in this physically demanding activity by following popular aerobic dance leaders on television programs and videotapes.

Aerobic dance has evolved from rigidly choreographed dance routines intended for female participants to freestyle routines that incorporate random combinations of dance, sport, and exercise movements designed to attract men and women. To further challenge enthusiasts, creative instructors have developed innovative aerobic dance programs that include water aerobics, bench stepping, sports conditioning, and interval and circuit training.

Professional aerobic dance associations are helping meet the demand for qualified instructors. Organizations such as the International Dance Exercise Association (IDEA) and the Aerobic and Fitness Association of America (AFAA) provide their members with services that include subscriptions to exercise journals, access to aerobic dance conventions and workshops, and opportunities to become certified as an aerobic dance instructor.

### BENEFITS OF AEROBIC DANCE

Aerobic dance is an excellent activity for developing overall physical fitness. Balancing the health-related components of fitness, aerobic dance can improve a participant's flexibility, strength, cardiovascular fitness, and body composition. The rhythmic movements performed to music also help develop coordination and balance. In addition, exercising in a group setting provides opportunities for social interactions not afforded by many other aerobic activities (Fig. 2-1).

### FACILITY

The ideal aerobic dance setting includes:

1. Good ventilation with a room temperature of 60° to 70° F.
2. A floor that will absorb shock while controlling lateral motions of the foot and providing adequate traction. A hardwood sprung floor is an ideal aerobic dance surface.
3. Space for each participant to move comfortably. A good guide is enough space for each participant, with arms outspread, to take two large steps in any direction without touching anyone.
4. Acoustics that will allow the instructor's voice to be heard over the music.
5. For large groups, a raised platform for the instructor.
6. Mirrors to help participants observe and correct their posture and exercise positions.