



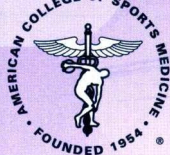
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ACSM's Health-Related Physical Fitness Assessment Manual

FIFTH EDITION



Wolters Kluwer

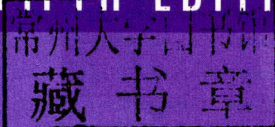


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Fifth Edition

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ACSM'S

Health-Related
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EDITOR

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The American College of Sports Medicine has long been a leader in advocating the health benefits associated with a physically active lifestyle. Recognition of the importance of performing regular physical activity took a major leap forward, in October 2008, with the release of the U.S. Department of Health and Human Services first ever Federal policy report, *Physical Activity Guidelines for Americans* (www.health.gov/PAGuidelines/). Clinicians, public health professionals, and allied health/fitness professionals can all provide tremendous benefit to their patients, communities, and clients with the expertise and knowledge of how to prescribe physical activity/exercise and how to subsequently measure the effects of these prescriptions. Therefore, this *Manual* serves as the ideal text for all lab-based fitness assessment courses in exercise science, physical therapy, and other health-related courses. Most users with a basic understanding of anatomy, physiology, and exercise physiology can find value in this *Manual* and likely realize that it will become a critical go-to text for the assessment lab.

As stated in Chapter 1 of this *Manual*, *physical fitness is the measurable outcome of a person's physical activity and exercise habits*. Thus, it is essential that exercise and health professionals are well versed in the methods of health-related physical fitness assessment outcomes and interpretations with respect to muscular strength, muscular endurance, cardiorespiratory fitness, flexibility, and body composition.

This fifth edition of *ACSM's Health-Related Physical Fitness Assessment Manual* provides important updates consistent with the most current resource information available on measuring physical fitness, and the *Manual's* intent remains to provide a comprehensive overview of why and how to perform assessments on each component of physical fitness. This *Manual* is an extension of assessment principles covered in the *ACSM's Guidelines for Exercise Testing and Prescription, Tenth Edition*, and includes many of the summary tables and figures from the *Guidelines*. After mastering the assessment procedures, the users of this *Manual* are encouraged to interpret the results with a clear understanding of the specific methodological limitations that exist for some of the procedures.

The value of physical fitness assessment results as a key health indicator is well accepted. Therefore, this *Manual* provides the foundational key concepts and methods of health-related physical fitness assessment for all exercise science and allied health professionals so that each can continue to provide valid and reliable outcome measures to their respective populations.

Features

- Reorganized and expanded information, including discussion of unique assessment principles and the major limitations of some assessment methods.
- Step-by-step instructions for assessment of health-related physical fitness and resources for interpretation of test results.
- Updated references to *ACSM's Guidelines for Exercise Testing and Prescription, Tenth Edition*.
- More than 100 boxes, tables, and figures to help the reader understand the concepts of health-related physical fitness.
- A new case study format that is integrated into each chapter, encouraging continuous application of the assessment and interpretation skills as they are presented.

Supplemental Materials

Supplemental materials for students and instructors are available at <http://thepoint.lww.com/activate>.

Instructors can access the following:

- Test Generator
- PowerPoints
- Image Bank, including all figures and tables from the text
- Data Collection Forms
- Full-Text Online

Students have access to the Data Collection Forms.

Acknowledgments

There are many individuals to acknowledge who played a role in assisting me with the completion of the fifth edition of this text. First, I want to thank and acknowledge the great work of all the previous editors of ACSM's *Health-Related Physical Fitness Assessment Manual*, as my work on this edition is nothing more than an extension of the foundation they have previously established. I want to express my appreciation and gratitude to all of the members of the American College of Sports Medicine, particularly the CCRB members, who volunteer their time and expertise to this and every other ACSM text. I also want to thank the members of the ACSM Publications Committee for entrusting me with this title, in particular, Dr. Walt Thompson, Chair of the committee at the time, and Katie Feltman, ACSM Group Publisher, both of whom are amazing, hardworking, and incredibly supportive and generous. I am grateful to Dr. Deb Riebe, Senior Editor of the tenth edition of ACSM's *Guidelines for Exercise Testing and Prescription*, for her teams' cooperation in sharing materials that are incorporated in this *Manual*, and to the talented and hardworking staff at Wolters Kluwer Health/Lippincott Williams & Wilkins, whom I have had the great pleasure of working with now on three separate ACSM book titles.

My professional career has been influenced by a number of wonderful colleagues who have helped me to pursue many opportunities, including this book, in particular Dr. J. Larry Durstine and Dr. Bradford Strand, who inspired me in many different ways, and I hope to continue your legacies by doing the same for others.

And finally, thank you to my best friend and wife, Heidi Bills, and our three beautiful children, Noah, Autumn, and Zoe. Being with each of you every day is all the inspiration I need to do my best.

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TABLE 1.1

Key Definitions Related to Physical Fitness*

Term	Definition
Physical Activity	“Any bodily movement produced by the contraction of skeletal muscles that increases energy expenditure above a basal level”
Exercise	“Planned, structured, repetitive and purposive in the sense that improvement or maintenance of one or more components of physical fitness is the objective”
Physical Fitness	“The ability to carry out daily tasks with vigor and alertness without undue fatigue and with ample energy to enjoy leisure-time pursuits and respond to emergencies”
HRPF	“Those specific components of physical fitness that have a relationship with good health”
SRPF	Agility, balance, coordination, power, speed, and reaction time

*Source for definitions from Reference 6

SRPF, skill related physical fitness.

specific and defined as planned, structured, repetitive, and purposive, in the sense that improvement or maintenance of one or more components of physical fitness is the objective (6).

To achieve physical fitness, an individual must engage in exercise, which is a form of physical activity. Exercise can then be directed toward skill-/sport-related physical fitness or HRPF (see Fig. 1.1). Although this manual provides the means of assessing HRPF, the *ACSM’s Guidelines for Exercise Testing and Prescription, Tenth Edition (GETP10)* provides specific guidelines for exercise training to improve HRPF.

Ultimately, physical fitness is a measurable set of characteristics largely determined by the exercise habits of an individual. Although genetics also plays a role in the level of physical fitness one can achieve, those with the highest levels of physical fitness tend to have maximized their exercise training.

Components of Health-Related Physical Fitness

The American College of Sports Medicine (ACSM) has been a leader in setting guidelines for the assessment of physical fitness, particularly HRPF. Five measurable components of HRPF are depicted in Figure 1.2.

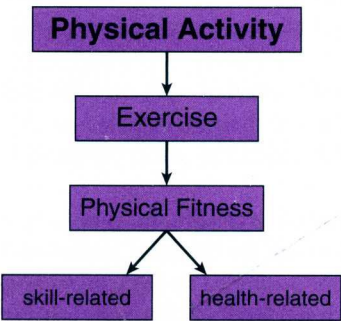


Figure 1.1 Relationships between physical activity and its subcomponents.

Cardiorespiratory endurance refers to the ability of the circulatory and the respiratory systems to supply oxygen during sustained physical activity. **Cardiorespiratory fitness** is related to the ability to perform large-muscle, dynamic, moderate-to-high intensity exercise for prolonged periods. The methods of assessment of cardiorespiratory fitness are provided in Chapters 7 and 8 of this manual.

Body composition refers to the relative amount or percentage of different types of body tissue (bone, fat, muscle) that are related to health. The most common health-related measure is that of total body fat percentage; however, it should be noted that there are no established criterion values for this measure related to health parameters. The methods used to assess body composition are provided in Chapter 4 of this manual.

Muscular strength and *muscular endurance*, although two separate components of physical fitness, are often combined into one component of HRPF termed muscular fitness.

Muscular strength is the ability of a muscle group to develop maximal contractile force against a resistance in a single contraction, and is related to the ability to perform activities that require high levels of muscular force.

Muscular endurance is the ability of a muscle group to execute repeated contractions over a period of time sufficient to cause muscular fatigue or to maintain a specific percentage of the maximum voluntary contraction for a prolonged period of time. Chapter 5 of this manual has specific measurement information on muscular endurance.

Flexibility is the ability to move a joint through its complete range of movement. Chapter 6 of this manual has specific measurement information on flexibility. Figure 1.3 displays one type of assessment of flexibility.

Even though an individual's appearance or exercise habits may be viewed as evidence of physical fitness and/or health, these can be very misleading "criteria." Instead, because one single measure of physical fitness, or health, does not currently exist, there is a need to have a battery of valid and reliable HRPF assessments. It is not uncommon for regular exercisers to spend most of their time training only one component of physical fitness, for example, frequent long-distance running. This person, who appears thin, is also often considered "physically fit," and indeed may be in terms of cardiorespiratory fitness alone. However, this person is also likely below average in terms of muscular strength and flexibility. Likewise, someone who performs high levels of resistance training as the sole form of exercise and appears to be quite muscular will be viewed as physically fit, and indeed may be in terms of muscular fitness (strength and endurance). However, similar to the person who runs a lot, this person is also likely to be below average in certain areas of fitness, including cardiorespiratory fitness and flexibility. Thus, it is important to view HRPF as an integration of each of the five components.

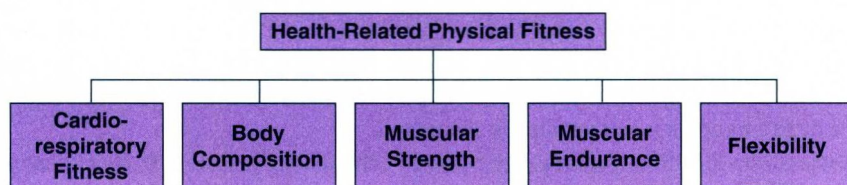


Figure 1.2 Health-related physical fitness is not a single entity but rather a sum of five measurable components.

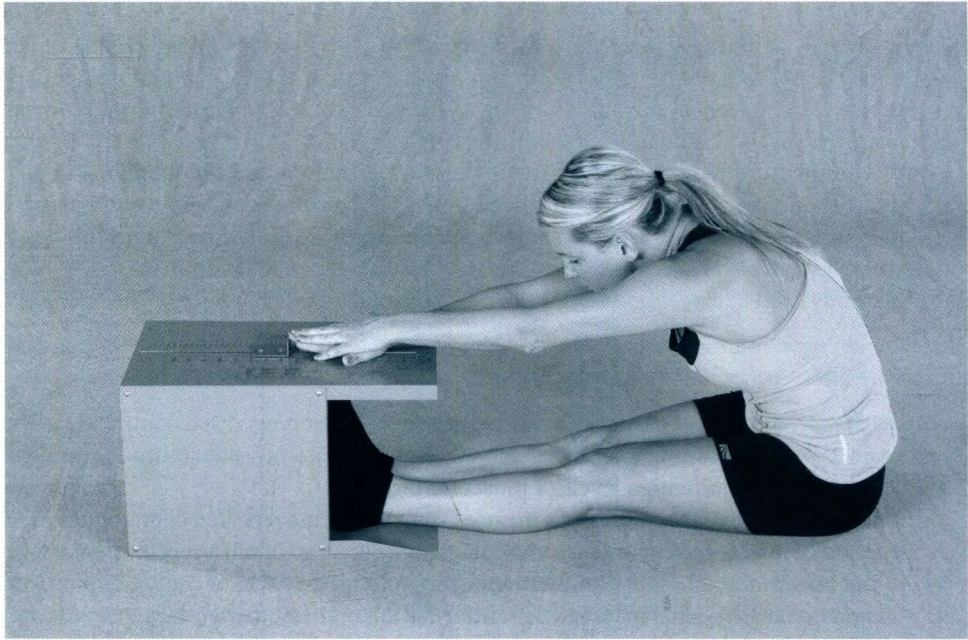


Figure 1.3 Flexibility is one of the components of health-related physical fitness.

THE IMPORTANCE OF MEASURING HEALTH-RELATED PHYSICAL FITNESS

The Relationship of Physical Fitness to Health

Throughout history, humans have broadly recognized the relationship between physical fitness and health. In ancient China, records of organized exercise as a means of health promotion date from 2500 B.C., and there is much evidence that the ancient Greeks “emphasized the importance of physical well-being, fitness and a healthy lifestyle” (2). Yet, systematic investigation and research of this relationship did not begin until the early 1900s, and from that time forward, scientific literature has firmly established the relationship between physical activity and health.

This new body of research resulted in the 1996 release of the U.S. Surgeon General Report (SGR) titled *Physical Activity and Health* (8), which provided an extensive review of research demonstrating various health-related benefits obtained from physical activity. The SGR also emphasized what is termed the *dose-response* relationship, where *dose* refers to the amount of physical activity and/or exercise, and *response* refers to the resultant health outcome. Although the evidence is quite clear that exercise doses result in many health benefits (as noted in Box 1.1), the exact minimal dose of physical activity and/or exercise required to produce health benefits is not yet clearly discerned.

Subsequent to the 1996 SGR was the release of the *2008 Physical Activity Guidelines for Americans*, which represents a more recent comprehensive report based on major research findings regarding the relationship between physical activity and health (7). The *2008 Guidelines* is an essential resource for all exercise professionals and provides the following summary suggestions regarding duration and intensity of physical activity:

Box 1.1 Some Benefits of Regular Physical Activity and/or Exercise**Improvement in Cardiovascular and Respiratory Function**

- Increased maximal oxygen uptake, resulting from both central and peripheral adaptations
- Decreased heart rate and blood pressure at a given submaximal intensity

Reduction in Cardiovascular Disease Risk Factors

- Reduced resting systolic/diastolic pressures
- Increased serum high-density lipoprotein cholesterol and decreased serum triglycerides

Decreased Morbidity and Mortality

- Higher activity and/or fitness levels are associated with lower incidence rates for combined cardiovascular diseases, coronary artery disease, stroke, and many other chronic diseases

Other Benefits

- Decreased anxiety and depression
- Improved cognitive function

A more complete listing of benefits is provided in *GETP10* Box 1.4.

- All adults should avoid inactivity. Some physical activity is better than none.
- Both aerobic (endurance) and muscle-strengthening (resistance) physical activities are beneficial.
- For substantial health benefits, adults should do at least 150 min (2 h and 30 min) a week of moderate intensity or 75 min (1 h and 15 min) a week of vigorous intensity aerobic physical activity, or an equivalent combination of moderate and vigorous intensity aerobic activity.
- For additional and more extensive health benefits, adults should increase their aerobic physical activity to 300 min (5 h) a week of moderate intensity or 150 min (2 h and 30 min) a week of vigorous intensity aerobic physical activity, or an equivalent combination of moderate and vigorous intensity aerobic physical activity.
- Adults should also do muscle-strengthening activities that are moderate or high intensity and involve all major muscle groups on 2 or more days a week, because these activities provide additional health benefits.

Additionally, in 2011, the ACSM published a revised position stand “to provide scientific evidence-based recommendations to health and fitness professionals in the development of individualized exercise prescriptions for apparently healthy adults of all ages” (1). Given that it is exercise that promotes the maintenance or improvement in physical fitness, and physical fitness is the measurable outcome of a person’s physical activity and exercise habits, therein lies a need for measuring HRPF. Among the important reasons for assessing HRPF are the following:

- *Educating participants about their present health-related fitness status relative to health-related standards and age- and sex-matched norms.* Good health care for an individual includes knowing important personal health-related information, such as one’s cholesterol level and blood pressure. Similarly, knowledge of HRPF measurements would support optimizing personal health.