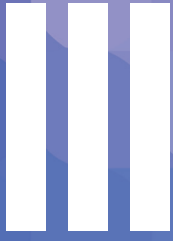


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PART



Exercise Prescription

General Principles of Exercise Prescription

INTRODUCTION

Common sense, the ancients, modern research, and practice all point toward the indisputable fact that an important part of a healthy lifestyle is physical activity. Conversely, **sedentary behaviors** are counterproductive to health. Various forms of physical activity have been shown to increase longevity as well as the quality of that increased lifespan. Countless physical and mental health benefits have been attributed to increased physical activity. Despite all the research and the increased public awareness concerning physical activity and/or exercise, millions of Americans continue to avoid regular physical activity (2). Several recent national standards emphasize the benefits of regular **aerobic** physical activity and/or exercise and encourage all of us (no matter our age) to engage in at least 20–60 minutes of these behaviors for a minimum of 3 days per week (2,6,9,11,12). In addition, it is important to consider other components of a healthy lifestyle such as resistance, **flexibility**, and neuromotor training. Most individuals can begin a formal physical activity program without consultation with a health care provider. However, high-risk individuals, specifically those with symptoms of disease, may require medical evaluation and clearance prior to initiation of physical activity.

This chapter addresses specific guidelines for physical activity and/or exercise programming. This chapter also presents the new guidelines from the American College of Sports Medicine (ACSM) as published in the 10th edition of the *ACSM's Guidelines for Exercise Testing and Prescription (GETP10)* (2).



Exercise Prescription for All

In 1975, the ACSM defined **exercise prescription** in the first edition of the *GETP* as follows (4):

Exercise prescription includes the type, intensity, duration, frequency and progression of physical activity. These five components are applicable to the development of exercise programs for persons regardless of age, functional capacity, and presence or absence of CHD [coronary heart disease] risk factors or CHD.

In the current (10th) edition of the *GETP10* (2), these five components of exercise prescription are reported as **Frequency, Intensity, Time, and Type (FITT)** with the **Volume** of exercise added along with the **Progression** component to produce the acronym **FITT-VP**. In addition, the ACSM has also added the component of the pattern of the activity to be an important consideration in exercise programming (2).

A recent PubMed search performed by the authors of this chapter using the past 40 years as a time frame and searching the term *exercise and chronic disease* returned over 18,000 research articles that have been published regarding the effects of exercise/physical activity as an intervention in the prevention of, management of, and rehabilitation for many chronic diseases (often known as *Special Populations*) since the publication of the first edition of the *GETP* (4). What much of the research in this area over the past 40+ years has elucidated is that physical activity and/or exercise plays a key role in the prevention, management, and rehabilitation of disease processes in conjunction with other healthy lifestyle behaviors. The *Domains*, as listed in Box 8.1, describe the broad realm of the involvement in achieving overall health of the whole person. Exercise programs clearly have the preponderance of their effectiveness in the Physical Health Domain, but the interactions between the components of all of the domains are undeniable. Exercise has been demonstrated to have a positive impact on many of the aspects of the domains outside of Physical Health (2,7). The exercise professional must be cognizant that an exercise program is just one element contributing to the overall health of a person. Recognition of the other domains in the development of a total program equips the exercise professional with a significant tool in knowing when to refer an individual to other health care providers for healthy lifestyle guidance that lies outside the exercise professional's scope of practice.

The development and administration of an exercise program lies within the Physical Health Domain. As characterized in Table 8.1, the Physical Health Domain consists of Health-Related, Skill-Related, and Medical-Related Components. The degree of impact and overlap of the individual components of a specific domain is greater within that domain as illustrated in Figure 8.1 for the Physical Health Domain. The evidence supporting the importance of regular physical activity and/or exercise in the prevention and treatment of chronic diseases prompted the ACSM and the American Medical Association to co-launch in 2007 the initiative *Exercise is Medicine*. This initiative has called for exercise/physical activity to be a standard part of disease prevention and medical treatment (7).

In examining the role of exercise as an intervention with Special Populations, the basic FITT-VP principle continues to apply with the caveat that the exercise professional must know the limitations

Box 8.1

The Five Domains of Health

1. Emotional Health
2. Social Health
3. Physical Health
4. Mental Health
5. Spiritual Health

Table 8.1

Examples of Individual Elements of Health-Related, Skill-Related, and Medical-Related Components

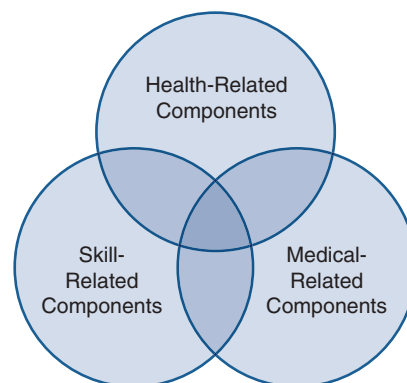
Health-Related Components	Skill-Related Components	Medical-Related Components
Cardiorespiratory Muscular strength Muscular endurance Body composition Flexibility	Agility Balance Coordination Power Speed Reaction time	Integumentary Musculoskeletal Cardiovascular/lymphatic Respiratory Neurologic Endocrine Digestive/excretory/urinary Immune Reproductive

and contraindications of exercise within each population. The aspects of an exercise program have historically been divided into targeting exercises that address Health-Related and/or Skill-Related Components of the Physical Health Domain. Program designs for the general population typically prioritize targeting the Health-Related Components of Physical Health Domain. The broad spectrum of target components in developing a total program requires the exercise professional to prioritize the specific components of Physical Health that should be the focus of the patient's exercise program. Although focusing on exercises that address the Health-Related Components have been demonstrated to benefit many of the high-profile chronic diseases, some of the Special Populations may benefit to a greater degree by equally prioritizing some of the Skill-Related Components, such as balance and coordination, with the Health-Related Components in the development of their exercise programs. The following chapters in this book can serve as a guide to the exercise professional in deciding which exercises to incorporate and prioritize for a number of individual Special Populations.

This chapter serves as a guide for general evidenced-based principles in designing exercise prescriptions for all populations. The foundation to developing an effective exercise prescription is the exercise professional's knowledge of the indications and contraindications of exercise for the intended population and the appropriate use of the "common thread" principles of FITT-VP.

Physical activity is considered to be any bodily movement, whereas **exercise** is a subset of physical activity that is both regular and structured. Perhaps, the difference between physical activity and exercise is best viewed on an individual-by-individual basis. One individual may find the term *physical activity* more appealing, whereas another is more interested in increasing exercise. Physical activity can also be thought of as a continuum from light to moderate to vigorous (1).

FIGURE 8.1. The interactions of health-related, skill-related, and medical-related components.





Current FITT-VP Recommendations from the American College of Sports Medicine

Physical activity and/or exercise recommendations in the United States have been on the national scene since the 1950s. An exercise professional should be aware of and stay current with the evolving nature of these recommendations. It is important to remember that a comprehensive program that supports a healthy lifestyle through physical activity and/or exercise is the overall goal. A summary of the most recent aerobic, resistance, flexibility, and neuromotor training guidelines from the ACSM published in 2018 can be found in Table 8.2 (2,7).

The traditional, structured approach to exercise prescription described by the ACSM involves specific recommendations regarding mode or type, frequency, intensity and time, or duration of activity often known as the *FITT* components. The variables of volume of exercise and the progression of the program are also important to the whole exercise prescription process. Addressing the components of muscular fitness, flexibility, and neuromotor training contributes to the whole program.

As a way to involve more individuals who are sedentary, recent physical activity recommendations have adopted a lifestyle approach to increasing physical activity. This newer approach to exercise prescription is sometimes referred to as the *public health approach* (9). In essence, the concept used with the progression of exercise (“start low and go slow”) can be applied to the overall program when working with a patient who may be deconditioned from years of inactivity and is at an early stage of change that has significant barriers and obstacles to initiating an exercise program.

Overall, the ACSM considers the following five points (2):

1. All individuals should engage in at least 20–60 minutes of aerobic physical activity of at least a moderate intensity on at least 5 days per week.
2. Additional health and fitness benefits can be achieved by adding more time in moderate-intensity activity or by substituting more vigorous activity.
3. Previously inactive men and women and people at risk for heart, metabolic (diabetes), and renal diseases should first consult a health care provider before initiating a program of vigorous physical activity to which they are unaccustomed.
4. Persons with symptomatic heart, diabetes, or renal disease who would like to increase their physical activity should be evaluated by a health care provider and provided an exercise program appropriate for their clinical status.
5. Muscular strength–developing activities (resistance training) should be performed at a minimum of two times per week. Also, flexibility and neuromotor exercises should be included in a prudent overall program.

Note: Points 3 and 4 were previously discussed in Chapter 2.



Aerobic Frequency

Frequency of exercise (*i.e.*, the number of days per week) is an important contributor to health/fitness benefits that result from an aerobic program. Aerobic exercise is recommended on 3–5 days per week for most adults, with the frequency varying with the **intensity** of exercise. Improvements in **cardiorespiratory fitness** (CRF) are lessened with exercise frequencies less than 3 days per week and plateau in improvement with exercise performed greater than 5 days per week. Vigorous-intensity exercise performed greater than 5 days per week might increase the incidence of musculoskeletal injury, so this amount of vigorous-intensity exercise is not recommended for