This paper defines a variety of fitness components, using a simple multidimensional hierarchical model that is consistent with recent definitions in the literature. It groups the definitions into two broad categories: product and process. Products refer to states of being such as physical fitness, health, and wellness. They are commonly referred to as outcomes and are frequently used as dependent measures in research. Process refers to behaviors or lifestyles, and these are frequently used as independent measures in research. First, the paper defines health-related fitness, focusing on body composition, cardiovascular fitness, flexibility, endurance, muscular endurance, and muscle strength. Next, it defines skill-related fitness, focusing on agility, balance, coordination, power, speed, and reaction time. It goes on to define physiological fitness, including metabolic fitness, morphological fitness, and bone integrity. The next section defines motor skills (non-fitness abilities that improve with practice and relate to the ability to perform specific sports and other motor tasks). The final section presents health definitions, including hypokinetic diseases or conditions, health, wellness, quality of life, healthy lifestyles or behaviors, physical activity, exercise, and leisure activity. (SM)
Research Digest

Definitions: Health, Fitness, and Physical Activity

President's Council on Physical Fitness and Sports
Definitions: Health, Fitness, and Physical Activity

A Note From the Editors

In 1993, with the special assistance of Chris Spain, Director of Research, Program Planning, and Special Projects for the Council, we brought back the President's Council on Physical Fitness and Sports Research Digest that was originally published by the Council under the editorship of H. Harrison Clarke. As young professionals we remember reading the Digest and admiring the way Dr. Clarke was able to take complex information and make it simple to understand. We also remember that Dr. Clarke would bring together information from multiple sources and synthesize it for use by practitioners.

For this first issue of the new century we decided follow Dr. Clarke's lead and draw together definitions of terms commonly used in our field. Over the past 50 years there has been considerable change in the definitions of terms such as physical fitness and even health. New terms have evolved such as wellness and metabolic fitness. We have asked Dr. Don Franks, known for his synthesizing abilities, to help us write this special issue. We dedicate this issue, as we did our first in 1993, to the memory of Dr. Clarke.

Introduction

H. Harrison Clarke was one of the first to write extensively about health related physical fitness. Indeed, we would consider him and his contemporaries such as Tom Cureton, Wilhelm Raab and Arthur Steinhaus as the leaders in changing the way we view physical fitness today. The definition of fitness in 1958, when the first national youth fitness test was developed is considerably different from our current definition of physical fitness. In addition, new terms have been developed such as metabolic fitness and wellness. Landmark documents such as the Healthy People series of national health objectives (U.S. Department of Health & Human Services, 2000; U.S. Department of Health & Human Services, 1990; U.S. Department of Health, Education, & Welfare, 1979) have helped standardize some terms as have other documents such as the two international consensus conference volumes (Bouchard, et al., 1990, 1994) and the more recent Surgeon General's Report on Physical Activity and Health (U.S. Department of Health & Human Services, 1996). We have drawn from these and other sources some common current definitions for key terms in our field. We focus on those terms that typically reoccur in the Digest from issue to issue. It is not our intent to suggest that the terms, as defined in this document, are the only definitions that are appropriate for use. Neither is it our intent to suggest that the terms defined in this issue is a comprehensive list of all relevant terms. Rather, it is our notion to define some of the most commonly used terms in the field (and commonly used in the Digest) and to use definitions that are consistent with experts in our field.

Product vs. Process

For ease of understanding, we have grouped the definitions in two broad categories: Product and Process. Products refer to states of being such as physical fitness, health and wellness. These are also commonly referred to as outcomes and they are frequently used as dependent measures in research. Process refers to behaviors or lifestyles and these are frequently used as independent measures for research purposes. Examples of processes or lifestyle behaviors are physical activity, exercise, sports, dance, etc.

Product Definitions

Product Definitions
Physical Fitness

A set of attributes that people have or achieve relating to their ability to perform physical activity (U.S. Department of Health & Human Services, 1996).

Comment: The above definition from Physical Activity and Health: A Report of the Surgeon General is the most common currently used definition of physical fitness. It was originally used by Caspersen, et al. (1985) and has been used extensively by Pate et al (1995) and Howley and Franks (1997). An alternative definition that provides additional descriptive information is also included here. Physical fitness is a state of well-being with low risk of premature health problems and energy to participate in a variety of physical activities (Howley & Franks, 1997). While either is a good definition, most experts agree that physical fitness is both multidimensional and hierarchical (Corbin, 1991). Bouchard, Shephard, and Stephens (1994) presented a comprehensive model for physical fitness that includes morphological fitness, bone strength, muscular fitness, flexibility, motor fitness, cardiovascular fitness, and metabolic fitness. In this paper we define each of these fitness components but use a simple multidimensional hierarchical model (see Figure 1) that is consistent with recent definitions in the literature (ACSM, 1998; USDHHS, 1996; USDHHS, 2000).

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Figure 1. Common Physical Fitness and Fitness Related Terms

Health-Related Physical Fitness

Health-related physical fitness consists of those components of physical fitness that have a relationship with good health. The components are commonly defined as body composition, cardiovascular fitness, flexibility, muscular endurance, and strength.

Comment: Prior to the last 40 years the distinction between health-related physical fitness and skill-related physical fitness was not typically made. When tests of physical fitness are administered in school, medical and other settings it is typically health-related fitness components that are measured. Typically lab and field tests of health-related fitness involve some type of performance such as running, stretching, or doing a specific muscle exercise. Because body composition (also referred to as relative leanness) is not a performance measure, some question its inclusion as a component of health-related physical fitness. Possessing good health-related fitness is related to lower risk of illness and improved quality of life.

Body Composition

A health-related component of physical fitness that relates to the relative amounts of muscle, fat, bone and other vital parts of the body. (From Surgeon General’s Report on Physical Activity and Health, USDHHS, 1996 as adapted from Corbin and Lindsey, 1994).

Comment: This component of physical fitness is measured in the laboratory using such measures as underwater weighing and in the field using skinfold calipers. There are a variety of other methods of assessing body composition; also referred to as relative leanness (Howley and Franks, 1997). As noted previously body composition is the only non-performance measure among the health-related physical fitness components.
Cardiovascular Fitness

A health-related component of physical fitness that relates to ability of the circulatory and respiratory systems to supply oxygen during sustained physical activity. (From Surgeon General's Report on Physical Activity and Health, USDHHS, 1996 as adapted from Corbin and Lindsey, 1994).

Comment: Cardiovascular fitness is also referred to as cardiovascular endurance, aerobic fitness and cardiorespiratory fitness. A Max V-O2 test in the laboratory setting is considered to be the best measure of cardiovascular fitness. Commonly administered field tests include the mile run, the 12 minute run, the 1 mile run, the mile walk, the PACER run for children and various bicycle, step, and treadmill tests.

Flexibility

A health-related component of physical fitness that relates to the range of motion available at a joint. (From Surgeon General's Report on Physical Activity and Health, USDHHS, 1996 as adapted from Wilmore and Costill, 1994).

Comment: Some experts specify that flexibility requires range of motion without discomfort or pain (Howley and Franks, 1997). Flexibility is specific to each joint of the body, thus there is no general measurement of flexibility as there is for cardiovascular fitness. Flexibility is typically measured in the lab using measurement devices such as a goniometer, flexometer and in the field with tests such as the sit and reach and the zipper.

Muscular Endurance

A health-related component of physical fitness that relates to the muscle's ability to continue to perform without fatigue. (From Surgeon General's Report on Physical Activity and Health, USDHHS, 1996 as adapted from Wilmore and Costill, 1994).

Comment: Like flexibility, muscular endurance is specific in nature. For true assessment of muscular endurance it would be necessary to test each major muscle group of the body. Lab and field tests of muscular endurance are similar and are based on the number of repetitions that can be performed by the specific muscle group being tested (example: repetitions of push-ups or abdominal curls). Muscular endurance can be measured isometrically (static contractions) or isotonically (dynamic contractions).

Strength

A health-related component of physical fitness that relates to the ability of the muscle to exert force. (From Surgeon General's Report on Physical Activity and Health, USDHHS, 1996 as adapted from Wilmore and Costill, 1994).

Comment: Like flexibility and muscular endurance, strength is specific in nature. For true assessment it would be necessary to test each major muscle group of the body. Lab and field tests are similar and involve the assessment of one repetition maximum (the maximum amount of resistance you can overcome one time). 1RM tests are typically conducted on resistance machines. Strength can also be assessed using dynamometers. Strength can be measured isometrically (static contractions) or isotonically (dynamic contractions).

Skill-related Physical Fitness

Skill-related physical fitness consists of those components of physical fitness that have a relationship with enhanced performance in sports and motor skills. The components are commonly defined as agility, balance, coordination, power, speed and reaction time.

Comment: With the changing focus to health-related physical fitness those components of fitness previously included in fitness tests that are not directly related to improved health were designated as skill-related physical fitness components. Possession of skill-related fitness abilities enhances ability to perform in sports and games but only has an indirect connection with health. The skill-related components of fitness are considered to be agility, balance, coordination, power, speed, and reaction time though some experts feel that other abilities such as visual tracking should be included. It is assumed that people who possess skill-related fitness will be more likely to engage in regular activity and for this reason will have enhanced health-related fitness and a lower risk of hypokinetic diseases and condition (see later definition). Skill-related fitness components are assessed with
performance measures. Such components as reaction time and speed are considered by some to be more related to heredity than healthy lifestyles, especially in children.

Agility

A skill-related component of physical fitness that relates to the ability to rapidly change the position of the entire body in space with speed and accuracy. (From Surgeon General's Report on Physical Activity and Health, USDHHS, 1996 as adapted from Corbin and Lindsey, 1994).

Comment: Agility is typically measured using a shuttle or zig-zag run. Tests of agility are common as screening tests among sports teams.

Balance

A skill-related component of physical fitness that relates to the maintenance of equilibrium while stationary or moving. (From Surgeon General's Report on Physical Activity and Health, USDHHS, 1996 as adapted from Corbin and Lindsey, 1994).

Comment: Balance is typically measured using a balance beam or tests that require holding a stationary posture after changing body positions. Balance is generally considered to be of two types: static and dynamic.

Coordination

A skill-related component of physical fitness that relates to the ability to use the senses, such as sight and hearing, together with body parts in performing motor tasks smoothly and accurately. (From Surgeon General's Report on Physical Activity and Health, USDHHS, 1996 as adapted from Corbin and Lindsey, 1994).

Comment: Coordination is typically assessed using measures of hand-eye or foot-eye coordination such as juggling, dribbling a ball or hitting an object. There are, however, many different types of coordination and total assessment of coordination would require many different tests.

Power

A skill-related component of physical fitness that relates to the ability to the rate at which one can perform work. (From Surgeon General's Report on Physical Activity and Health, USDHHS, 1996.)

Comment: Power is considered to be a combination of strength and speed. It has also been defined as the ability to exert muscle force quickly (Howley and Franks). For this reason some consider it to be a combination of skill and health-related physical fitness. Examples of power include putting the shot and vertical jumping. There are, however, many different types of power and total assessment would require many different tests.

Speed

A skill-related component of physical fitness that relates to the ability to perform a movement within a short period of time. (From Surgeon General's Report on Physical Activity and Health, USDHHS, 1996 as adapted from Corbin and Lindsey, 1994).

Comment: There are many different types of speed such as running speed, swimming speed, speed of hand or foot movement to name but a few. Among athletes a 40 yard dash is often used to measure speed. There are a wide variety of laboratory measures of speed that are highly specific to different body parts and different human movement activities.

Reaction Time

A skill-related component of physical fitness that relates to the time elapsed between stimulation and the beginning of the reaction to it. (From Surgeon General's Report on Physical Activity and Health, USDHHS, 1996 as adapted from Corbin and Lindsey, 1994).

Comment: An example of reaction time is moving your foot from the accelerator to the brake pedal when
reacting to a situation that requires a person to stop a car. This example illustrates the fact that in many cases, the total response time is the more important variable. Total response time includes stimulus to beginning of movement (reaction time) to end of movement (movement time). Like other measures of skill-related fitness there are many different types of reaction time and total assessment of reaction time would require many different tests. Sophisticated timing devices are used to measure total response time in the lab. Like speed, reaction time is considered to be a component of fitness that is greatly influenced by heredity. Note: The authors of this paper, not Bouchard, et al. (1990) have classified these as subcomponents of physiological fitness.

**Physiological Fitness**

Physiological fitness includes non-performance components of physical fitness that relate to biological systems that are influenced by one's level of habitual physical activity. (adapted from Bouchard, et al., 1990).

Comment: The concept of physiological fitness was introduced in a publication of the first international consensus statement of current knowledge of physical activity (Bouchard, et al., 1990). It differentiated health-related (primarily performance measures) from non-performance measures. Some of these measures are defined below. Some of the sub-components of physiological fitness that have gained acceptance are metabolic fitness, morphological fitness, and bone integrity.

**Metabolic Fitness**

The state of metabolic systems and variables predictive of the risk for diabetes and cardiovascular disease which can be favorably altered by increased physical activity or regular endurance exercise without the requirement of a training-related increase in VO2max. (Adapted from the American College of Sports Medicine, 1998).

Comment: Though Depres, et al. (1990, 1991) are first credited with using the term metabolic fitness it was first used widely after it was described in the proceedings of the second International Consensus Conference on Physical Activity, Fitness and Health (Bouchard, et al., 1994). The use of the term metabolic fitness in the recent position statement describing the quality and quantity of physical activity needed to attain health-related benefits (ACSM, 1998) establishes it as a major fitness component. The International Consensus statement noted that metabolic fitness included such sub-components as blood sugar levels, blood lipid levels, and blood hormone levels. The reason for the identification of metabolic fitness as a separate component of fitness is because "...it is now clear that lower levels of physical activity (particularly intensity) than recommended (by this position stand) may reduce the risk for certain chronic degenerative diseases and improve metabolic fitness and yet may not be of sufficient quantity or quality to improve VO2max. (ACSM, 1998)."

**Morphological Fitness**

A non-performance component of fitness related to body composition factors such as body circumferences, body fat content, and regional body fat distribution (adapted from Bouchard, et al., 1994).

Comment: Morphological fitness measures are often related to metabolic fitness components. As noted earlier body composition is often included as a component of health-related fitness but is also appropriately considered a component of morphological fitness. Those measures used to assess body composition are also used to assess morphological fitness as are measures such as body mass index, waist circumference, and waist to hip ratio.

**Bone Integrity (Bone Strength)**

A non-performance component of fitness related to bone mineral density.

Comment: Bone strength was identified as a component of physical fitness in the first International Consensus Statement (Bouchard, 1990). Because measurement is expensive and requires special instrumentation and a high degree of expertise, there are no currently used field measures that are used extensively. There is general consensus, however, that bone integrity is related to habitual physical activity.

**Motor Skills**

Motor skills are non-fitness abilities that improve with practice (learning) and relate to one's ability to perform...
specific sports and other motor tasks.

Comment: Though motor skills are not considered to be part of physical fitness, they are related to successful performance in physical activity. Motor skills are sometimes confused with skill-related fitness abilities. In fact, they are quite different. Skill-related fitness components enhance one's ability to learn sports and motor skills quickly and are related to one's ability to achieve high level performance. Examples of motor skills are a tennis serve, shooting a basketball, and kicking a football. A line (See Figure 1) is used to indicate the fact that motor skills are not components of physical fitness. There are many different kinds of motor skills—only those associated with sports are included in Figure 1.

Health Definitions

Hypokinetic Diseases or Conditions

Hypokinetic diseases are conditions related to inactivity or low levels of habitual activity.

Comment: The term "hypokinetic" was coined by Kraus and Raab in their book Hypokinetic Disease (Kraus & Raab, 1961). This term is now widely accepted and can be used to describe many of the diseases and conditions associated with inactivity and poor fitness such as those conditions outlined in Physical Activity and Health: A Report of the Surgeon General (USDHSS, 1996).

Health

Health is a state of being associated with freedom from disease and illness that also includes a positive component (wellness) that is associated with a quality of life and positive well-being. (Adapted from Corbin, Lindsey, & Welk, 2000; Bouchard, et al., 1990).

Comment: More than 50 years ago the World Health Organization defined health as more than freedom from illness, disease, and debilitating conditions. Recent public health documents (USDHHS, 2000) have acknowledged the positive component of health (wellness).

Wellness

Wellness is a state of being describing a state of positive health in the individual and comprising biological and psychological well-being as exemplified by quality of life and a sense of well-being. (Adapted from Corbin, Lindsey, & Welk, 2000; Bouchard, et al., 1990; USDHHS, 2000).

Comment: The suggestion by the World Health Organization that health had a positive component led to the use of the term wellness. The term wellness is now widely used to describe the state of being representing the positive component of health (Corbin, Lindsey & Welk, 2000; USDHHS, 2000). The Health Goals for the Nation for the Year 2010 (USDHHS, 2000) uses quality of life measures such as self-rated health, a healthy days index, and an activity days indicators of health and wellness. Other wellness or quality of life indicators include vitality, hardiness, and vigor. For more information on the assessment of health and wellness the reader is referred to Caspersen, et al., 1995).

Quality of Life

A term that connotes an overall sense of well being. (USDHHS, 2000).

Comment: Kaplan and Bush (1982) introduced the term health-related quality of life (HRQL). However, for public health use, two types of global quality of life are identified: health-related quality of life and quality of life (not health related). Health related quality of life is limited to those aspects that can clearly be shown to affect mental or physical health. Examples include functional status and well-being. Non-health related quality of life includes such factors as happiness and life satisfaction. Individual quality of life is identified as related to specific people or individuals. Community quality of life relates to groups of people or communities (USDHHS, 2000).
Healthy Lifestyles or Behaviors

There are many healthy lifestyles or behaviors that contribute to fitness, health and wellness. In this paper the processes or healthy lifestyles that are defined relate only to one healthy lifestyle: physical activity. The importance of other healthy lifestyles such as nutrition and stress management is acknowledged but is beyond the scope of this paper.

Physical Activity

Bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure. (Adapted from USDHHS, 1996; Bouchard, et al., 1990).

Comment: The first International Consensus statement on physical activity, fitness and health suggested that physical activity was an umbrella term (see Figure 2) that was that had multiple dimensions. Forms of physical activity such as exercise, sports, dance (among others) are considered as sub-categories of physical activity. Only selected forms of physical activity, including those defined in the first international consensus statement are defined here.


**Figure 2. The sub-categories of physical Activity**

Exercise (training)

Exercise is leisure time physical activity conducted with the intention of developing physical fitness. (Adapted from Bouchard, et al., 1990).

Comment: Since the first International Consensus statement on physical activity, fitness and health the distinction has been made between physical activity and exercise noting that exercise is a specific form of physical activity dedicated to improving physical fitness. Physical training is another term that is used as a synonym for exercise.

Leisure Activity

Leisure activity is physical activity undertaken during discretionary time. (Adapted from Bouchard, et al., 1990).

Comment: Research in physical activity often separates leisure physical activity from vocational activity. Leisure activity includes exercise but all forms of leisure activities are not exercise.
Concluding Comments

Our purpose in preparing of this issue of the Digest was to define some of the key terms of our field. We learned in the closing years of the past century that new terms have evolved. In this issue of the Digest we draw on several of the most recent public documents relating to health and physical activity to come up with a compendium of terms that can be used by practitioners. Figure 3 is included here because it helps to tie together several of the terms defined in this paper.

The model adapted from the first consensus on physical activity, fitness and health shows the link between product and process, as well as the link between fitness and health and wellness. It also illustrates the fact that physical activity is not the only factor that influences fitness, health and wellness. Clearly fitness, health and wellness are greatly influenced by factors other than physical activity, such as heredity (Bouchard, et al., 1990). Figure 3 also illustrates that other processes (lifestyles or behaviors) also have an impact on fitness health and wellness, as do environmental factors and personal attributes. It is our hope that this synthesis of information will be helpful in your efforts to promote physical activity and other healthy lifestyles as a means of improving fitness, health and wellness in the years ahead.

The President's Council on Physical Fitness and Sports Research Digest is now available on-line at http://www.indiana.edu/~preschal.

Please note that the appropriate language for the citation of this resource is: The President's Council on Physical Fitness and Sports Research Digest.

Physical Activity and Fitness Quote

"Physical activity is a healthy lifestyle that is among the most important for promoting physical fitness, health and wellness."

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The President's Council on Physical Fitness and Sports

The President's Council on Physical Fitness and Sports (PCPFS) was established in 1956 through an Executive Order by President Dwight D. Eisenhower as part of a national campaign to help shape up America's younger generation. Today, the PCPFS serves as an advisory council to the President and Secretary of the Department of Health & Human Services on matters involving physical activity, fitness and sports to enhance and improve the health of Americans of all ages.

The PCPFS enlists the active support and assistance of individual citizens, civic groups, private enterprise, and voluntary organizations to promote and improve the physical activity and fitness of all Americans and to inform the public of the important link which exists between regular activity and good health.

Twenty (20) individuals from the sports, fitness and health fields are appointed by the President to serve as members of the Council. They are:

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