

Redefining Fitness for Health and Fitness Professionals

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Every day physical educators, coaches, trainers, clinicians, the press, clients, athletes, patients and the public use the term “fitness” when they talk about health, exercise, sport, and rehabilitation. Are any of them talking about the same thing? With terms like “physical fitness”, “health-related fitness”, “muscular fitness” and many more present in the exercise lexicon, it is a difficult question to answer.

As every major health, medical, and exercise professional organization in the USA claims a link between improved fitness and health, there must be a universally accepted definition of fitness in support of this assertion, one that is time tested and precise. Most professionals would agree that this is true, but when pressed to define, in absolute terms, what fitness is, 100 professionals would likely provide 100 different definitions. As it turns out, “fitness” is a poorly defined term in the fitness and allied health professions.

In the early days of the fitness boom a simple operational definition of “physical fitness” was commonly cited:

“The ability to carry out daily tasks with vigor and alertness, without undue fatigue, and with ample energy to enjoy leisure time pursuits and meet unforeseen emergencies” [1].

This short definition was very inclusive, but it was so general as to render it difficult to measure and use in practice. You can measure fatigue, but are all types of fatigue included? “Vigor” is a difficult thing to measure, quantify, and employ in sport, fitness, or clinical practice. “Alertness” is a behavioral concept not generally measured in fitness practice. And the term “energy” has a specific physical/chemical meaning and should not be used in such a lax fashion in the sciences.

Such a general definition of “fitness” meant that virtually anything could be included under it as a component. The inclusion of psychological parameters such as “alertness” and “enjoyment” within the definition might be necessary to convey the multifactorial, diverse nature of the concept, but this degree of breadth is not satisfying or elegant in the context of a precise definition.

As the decades passed, a more elaborate, functional definition of fitness should have been developed as did our knowledge of exercise and health. It wasn't. In fact, some exercise professional groups, such as the National Strength and Conditioning Association (NSCA), did not and do not even define fitness in their standards of practice resources [2]. The United States Department of Health and Human Services (USDHHS) and the American College of Sports Medicine (ACSM) in their standards of practice doctrine trimmed the 1970's definition to an even more cursory version:

“A set of attributes that people have or achieve relating to their ability to perform physical activity” [3,4].

Physical fitness had gone from being an “ability” in 1971 to a “set of attributes” in 1996. This marks a move away from a functional definition to the enumeration of specific characteristics. The specific “attributes” to which the USDHHS and ACSM referred in 1996 were not specifically included in a definition for another 10 years:

“A multidimensional concept that has been defined as a set of attributes that people possess or achieve that relates to the ability to perform physical activity and is comprised of skill-related, health related, and physiologic components. Skill related components of physical fitness includes agility, balance, coordination, speed, power, and reaction time, and are mostly associated with sport and motor skills performance. Health related physical fitness is associated with the ability to perform daily activities with vigor, and the possession of traits and capacities that are associated with a low risk of premature development of hypokinetic diseases. Health related components of fitness include cardiovascular endurance, muscular strength and endurance, flexibility, and body composition. Physiologic fitness differs from health-related fitness in that it includes nonperformance components that relate to biological systems influenced by habitual activity. Physiologic fitness includes – (a) Metabolic Fitness: The status of metabolic systems and variables predictive of the risk for diabetes and cardiovascular disease. (b) Morphologic fitness: The status of body compositional factors such as body circumference, body fat content, and regional body fat distribution. (c) Bone integrity; The status of bone mineral density.” [5]

This rather long and convoluted definition describes several parameters, about 18 of which can be further and extensively divided, but does not provide a simple and practical definition of physical fitness. No mere listing of attributes can provide a coherent basis for understanding this important quality so pivotal to effective engagement in the tasks of life.

How should physical fitness be defined? Scientists have always been interested in what makes an organism fit. Major scientific and philosophical theories deal specifically with fitness and its role in adaptation. Darwin provided a crucial insight into the adaptive mechanism, and a better understanding of the organism’s relationship to its environment over time [6]. Claude Bernard, the father of scientific method, was quoted to say “It is the fixity of the milieu interieur (internal environment) which is the condition of free and independent life, all the vital mechanisms, however varied they may be, have only one object, that of preserving constant the conditions of life in the internal environment” [7]. Essentially, it is how well the body tolerates the physiological consequences of external stress and at what rate the homeostatic condition can be regained after exposure to it that defines fitness. Humans now live in a completely different environment than that in which human biology evolved, and the concept of fitness must reflect the reality that we are physiologically *normal* only when that ages-gone environment to which we are still adapted is simulated with exercise and diet.

An elegant definition of fitness should possess as its basis – as the biological sciences that strive to define it do – an appreciation for the phenotypic expression of the

human genotype, its evolutionary origins, and how the concept of fitness relates to the functional expression of that genome. Human survival, during the time in which our genome was developed, depended on being able to perform a variety of physical tasks at a moment's notice. If we consider the physical abilities required to effectively function within the spectrum of life tasks with which the average human was and still is presented, we can divide them into three basic component areas: (1) strength, (2) endurance, and (3) mobility.

Strength, the ability to move the body under load, is the most important thing in life as it is a physical certainty that gravity will act on the human body and every item it moves, from lifting a fork to pushing a stalled car. If we fail to conquer gravity, as in even the simplest of tasks involving our own bodyweight as we age, we reduce our quality of life and our ability to survive.

Strength, within the context of physical fitness, relates to the ability to generate force across a spectrum of movement speeds, as life is a variable-speed endeavor. One must be able to be strong at slow speeds, medium speeds, and fast speeds to overcome the variety of daily resistances we encounter. This description is obviously inadequate for sports performance, as power is a better indicator of fitness for sports performance, but within the general context of fitness it is descriptive of the component.

Endurance, the ability to sustain a task over time, is actually the least important, but since many things we do in life require repetitive or sustained activity; from walking in the mall to carrying groceries up an inconveniently long flight of stairs, it is an important factor in the ability to cope with these tasks. It is important to note that if you do not have enough strength to lift and carry the bag of groceries, endurance is irrelevant to your ability to complete the task.

It is a common practice in the exercise science and fitness arenas to consider cardio-respiratory and muscular endurance separately. In fact, the ACSM considers them to be separate attributes of physical fitness. But, muscular function during repeated or sustained effort is dependent on cardio-respiratory efficiency. Muscular endurance, by metabolic necessity, is aerobic. It is thus both limited and facilitated by cardiovascular function. You cannot separate these two entities as they are mutually dependent and their integration forms the crux of endurance. Muscles consume the oxygen and substrates delivered to them by the cardio-respiratory system.

Mobility, the ability to move in a variety of directions and carry out both simple and complex motor tasks is crucial and dependent on the other two component areas. Whether it is pulling a wrench on a bolt that's over, down, and under the fan housing, walking over a stretch of scabble leading up to a long face you want to climb, performing the perfect paso doble, swerving to avoid a collision with an inattentive driver, or catching a bottle your friend just tossed at you, stable, controlled, and coordinated movement within an unstable and unpredictable environment is important for a healthy and happy life, and for survival under more primitive circumstances.

Given these assumptions, the definition for physical fitness we propose here is simple, functional and measurable:

Possession of adequate levels of strength, endurance, and mobility to provide for successful participation in occupational effort, recreational pursuits, familial obligations, and that is consistent with a functional phenotypic expression of the human genotype.

This definition applies to the general population, but can be extended to sporting populations, as sport has goals and specializations that merely emphasize or deemphasize to varying degrees specific components of physical fitness. In a clinical setting, this definition also works well since the goal of rehabilitation is to return a patient to function. Strength, endurance, and mobility as defined here all are part of normal daily function and should be the goal of rehabilitation.

The development of strength for fitness and athletics is a question that requires some consideration. How do you build strength? The approach taken should be dependent on the training status of the individual. The beginning exerciser needs to develop a base of strength using just a few multi-joint exercises. Exercises like the squat, bench press, deadlift, press, and power clean are recommended. These movements provide for the development of strength, either dynamic or static, around virtually every mobile joint in the body. They also provide for strength gains throughout a spectrum of movement speeds (deadlift is slow and power clean is fast, for example). After a beginner has trained for sufficient time to develop some functional strength, there will be a transition to the intermediate stage of training. The intermediate trainee will have an adequate foundation of strength to benefit from adding a variety of other exercises: different barbell exercises, bodyweight exercises with gymnastic elements (rope climbs, pull-ups, etc.), and other resisted movements (sled pulls, weighted throws, etc.). They will also benefit from some variation in periodicity of training loads and frequencies. Most people that exercise regularly, casual athlete or serious fitness enthusiast, will never progress past the level of an intermediate strength trainee. Progress past this level of training to the advanced and elite stages of strength training will by definition be associated with some type of sport or performance goals involving the barbell sports, and are thus outside the scope of this discussion.

The question of endurance for fitness also merits careful consideration. The ability to "endure" a mixture of durations and intensities of sustained effort is desirable. The term "aerobic" describes essentially any continuous activity that lasts longer than 90 seconds. It is not just running a mile or a marathon that is aerobic; any activity that can be sustained through the use of primarily oxidative metabolic pathways can be considered "aerobic". The beginner who is aerobically unfit can use walking as an entry level exercise, then progress with added distance, and then increase the intensity to jogging in order to develop a baseline of endurance. The intermediate aerobic trainee, as with the intermediate strength trainee, will benefit from a variety of aerobic exercise modalities (running, cycling, rowing, etc.) and will also be ready to reap the endurance benefits of interval training. It is important to have interval training strongly represented

in the training of the intermediate in order to assist in driving and maximizing the aerobic adaptations resulting from longer duration and continuous activities, and incorporating a variety of distances and speeds of movement. Variation in distances and speeds (1) represents the varied aerobic demands of life and (2) their use in training promotes the development of the body's ability to extract, transport, and utilize oxygen during exercise (VO_{2max}) in a variety of conditions. Running or riding the same route at the same speed every training session cannot improve endurance. The basic tenets of exercise physiology strongly support this concept. And as with strength, most endurance trainees will never progress, or need to progress, past the intermediate level of training organization.

Mobility can be developed through the intelligent selection of both strength and endurance activities. The squat, bench press, deadlift, press, and power clean strongly develop balance, coordination, and range of motion around most joints of the body in the beginner if these exercises are taught correctly and correct technique is enforced in all training sessions. Similarly, mobility in beginners can be enhanced initially by simply walking or jogging over a variety of terrains during endurance training. As in strength training, the trainee needs to be taught correct technique in the endurance exercises; injuries from poor training methods here are far more common than injuries during strength training. For intermediates, introducing exercises that challenge proprioception are needed to enhance mobility. For strength, this could be the aforementioned barbell and bodyweight exercises with gymnastic elements, the Olympic lifts, or asymmetric work with kettlebells and dumbbells. For endurance, this could be the introduction of work in unstable environments like swimming, rowing, biking, or free running. Contrary to contemporary trends and exercise fashion, there is little need to spend significant time on "agility" and "balance" drills unless they make a specific contribution towards strength or endurance enhancement. Unless the trainee has the goal of being a gymnast or decathlete, training organizations beyond the intermediate level will not be required for most trainees.

It should be apparent that in order to improve physical fitness one must know what fitness is and what it is not. Physical fitness is functional. Physical fitness is comprised of strength, endurance, and mobility. Physical fitness gains are dependent on progressive strength and endurance training that force an adaptation to occur. Physical fitness is not a set of variables that cannot be directly measured and that do not manifest themselves in outward physical performance. Physical fitness is not an abstract concept or set of intangible feelings. When a trainee becomes more physically fit, their ability to function within their own circumstances improves. As a result, they will "feel" better about themselves, a change in self-perception that is driven by seeing tangible increases in performance in the gym that transfers to function at work and at home. When we as professionals promise to improve an individual's "fitness" we must be able to deliver something of substance and value to the trainee. If we channel our professional efforts through this new and progressive definition of physical fitness, our practices and our trainees will benefit. If we understand and use this new and progressive definition, the public, medical professionals, the media, and lawmakers will gain understanding into what fitness professionals do and why it is important.

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