

LECTURE 6

Principles of Fitness

By Cathal Fanning

- **Characteristics of Fitness**
- **Components of Physical Fitness**
- **Making Improvements**
- **Skill**
- **Principles of Fitness**

Characteristics of Fitness

In this lecture we will look at the characteristics of fitness. When asking a group of people what the term 'fitness' means you're likely to get many different answers, ranging from high-level sports performance through to simply the absence of disease. As such it stands to reason there are multiple facets that we can focus on. We will explore them all now.

We can define fitness in different ways...

- The ability to successfully adapt to a range of physical stressors.
- Performance of specific physical demands.
- Day-to-day task performance without excess fatigue.
- Wellness is another key aspect in defining fitness and health.

Special Characteristics

Physical Attributes

Physical fitness encompasses all the measurable attributes that we typically associate with training progressions - muscular strength, muscular endurance, flexibility, cardiovascular endurance etc. They are the aspects of fitness that relate to the ability to perform activities.

Skills

Skill-related attributes include balance, coordination, agility, power, speed etc. These can also be referred to as **motor skills**.

Medical

The definition of medical fitness would be the absence of illness and disease. This doesn't really speak to your overall fitness in an exercise setting but obviously is a desirable outcome health-wise.

Mental

A positive mental state indicates a healthy mental and emotional fitness. Mental and emotional health assist in creating a holistic fitness in mind and body.

Social

Social fitness is a very important part of your overall health and wellness. Social skills and being confident in social settings is an important part to your holistic health.

Nutritional

The consumption of a healthy diet composed of adequate macro and micronutrients to fuel the mind and body well. Remember this will also include a balance of foods rather than referring to a restrictive diet.

Obviously, personal trainers can have an impact on all aspects of fitness and health but mainly on the physical, skill-related and nutritional aspects, as per the limits of our job roles...

Components of Physical Fitness

The next thing for us to do is explore all the various components that comprise physical fitness, of which there are FIVE.

Then, how to train for improvement in each one.

Cardiovascular

Cardiovascular fitness is related to the heart and lung's ability and efficiency in delivering oxygen to the working tissues and removing carbon dioxide. It is also related to the body's ability to utilise this delivery. With continued training the efficiency improves, based on decreased resting heart rate, increased stroke volume and greater capillarisation within the tissues, which all enable the muscles to do more work.

Cardiovascular efficiency can be measured as VO2Max, which measures the volume of oxygen an individual can take in and use during training. Testing VO2Max can be done in a maximal or sub maximal setting by using any number of testing protocols, among them the bleep test, Rockport walking test and the Cooper test.

Muscular Endurance

Endurance in a muscular sense relates to the ability to repeatedly perform a task over a prolonged period. This might be in an exercise setting or it might be in an everyday setting, such as gardening or hiking or even the ability to maintain good posture throughout the day.

Muscular endurance training is associated with low weights and high reps and may result in delayed onset muscle soreness (DOMS) if the exercise is taken to fatigue.

To ascertain the client's current level of muscular endurance you could choose to perform maximal rep tests in exercises such as press-ups and sit-ups, or test the maximal weight they can achieve on exercises performing endurance-based rep ranges (12 repetitions or more).

Muscular Strength

Muscular strength can be defined as the maximal force that can be produced by a muscle or a muscle group. The main benefit is that it makes sub-maximal efforts easier to manage, hence lowering the stress of other tasks that a person faces on a day-to-day basis.

Strength can be measured or estimated using maximal or sub-maximal loads and can be trained through progressive overload with high weights and low reps.

Body Composition

Body composition is about the relationship between fat and lean body tissue. This is heavily influenced by the exercise stresses, and subsequent metabolic impact of the training. Diet and general lifestyle play a major role too. A high level of body fat will lead to lower fitness levels, decreased overall health and an increased potential for disease.

For many people the weight on the scale is an important number but it is far more important to consider the body composition. Consider someone who has a lot of muscle and low bodyfat. The scale will give a value only to their body mass - which doesn't indicate their overall health.

Flexibility & Mobility

Flexibility and mobility are related to the range of motion available around a joint. This is essential in an exercise setting if you want to gain more from your training. Consider two people squatting, one with greater depth than the other due to hamstring flexibility and hip mobility. The person with greater depth will increase the stress related to the exercise and will therefore get better results. On a more basic level, stiff muscles and restricted joints can also impact posture, and potentially, exercises such as running, which rely heavily on thoracic extension and the chest cavity being able to expand.

Flexibility can be measured with range of movement (ROM) tests. You may have heard of or even taken part in a sit and reach test which is a measure of the ROM in your hamstrings and low back

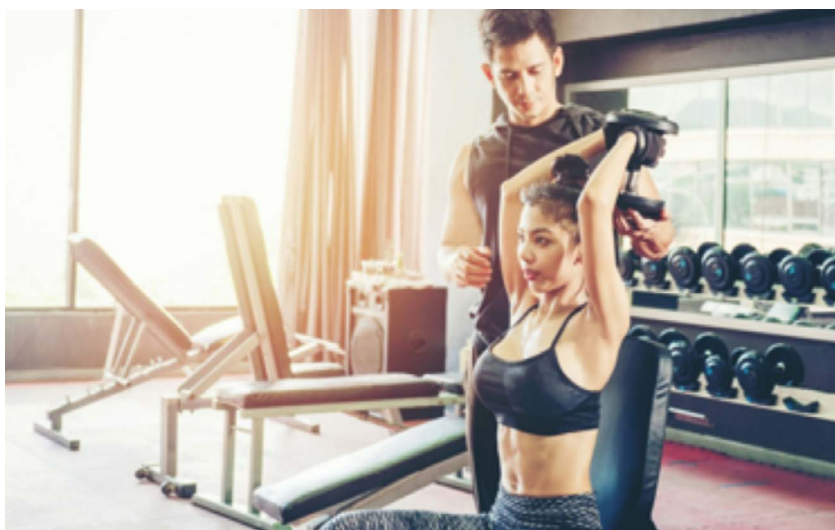
Making Improvements

Cardiovascular



The use of large muscle groups over a prolonged period of time at an intensity above rest is the best way to improve cardiovascular efficiency. Cycling, running and swimming are key examples. The idea is that as the cardiovascular system grows in efficiency its ability to achieve similar results in exercise setting can be attained at a lower relative intensity. Of course, there are more intense forms of exercise which will also train the cardiovascular system such as interval training. You should select the best method for your client based on their fitness level and experience..

Muscular Endurance



Consistent resistance training utilising higher rep ranges is one way to increase muscular endurance. This type of training largely recruits the more endurance-based Type 1 muscle fibres and will enhance their ability to perform activity for longer durations (more reps with a given resistance, or to perform the same number of reps (typically 12+ for endurance) with a higher resistance.

Muscular Strength



In order to build muscular strength and enjoy all of the benefits relating to it we must focus on higher weights and lower reps. Typically we need to utilise longer rest periods also in order that the neuromuscular system has a chance to recover between sets. Increases in strength are a result of increased muscular recruitment and synchronisation as well as increased muscle mass, and due to the higher-intensity nature of the training it should only be performed with more experienced clients who have better conditioning to resistance.

Flexibility



There are many types of stretching that we can employ to alleviate stiffness from training, elongate muscles to enjoy greater ROM, and to improve posture. Dynamic stretching – those that involve movement, should be used in the warmup of a training session, with static stretches utilised in the cooldown. There is also a subcategory of static stretching known as developmental stretching which involves holding the point of bind a little longer, and perhaps performing more than one rep of the stretch.

Composition



Enjoying a healthy relationship with exercise and food are primary factors to consider if you want to enjoy a healthy body composition. In order to reduce bodyfat to healthy levels we should aim to consume a healthy diet and exercise frequently in a variety of ways. A calorie deficit of around 100-500 calories per day from a mixture of exercise and decreased consumption is recommended if weight (and fat) loss is the goal.

Skill

Next, we can have a more in-depth look at the components of fitness related to skill.

There are seven skill-related components of fitness and they are linked to the performance of specific tasks and how well all of the body's integrated systems work together to perform tasks. We will also detail here how they can be improved.

1. Speed

This is related to the speed of movement. Consider someone sprinting or throwing a baseball - both these tasks require speed, yet their outward appearance and execution are very different. The ability to generate speed is linked to how well the nervous system coordinates the muscles, and what muscle fibre-type an individual has.

As the nervous system continues to perform the task of rapid recruitment the neural pathways will improve and the synchronisation of multiple motor units will enhance the force production that takes place...and ultimately the speed.

2. Power

Power is the expression of high force rapidly. Both strength and power are very closely linked in that they both require coordination of the nervous system and musculature, but power is expressed far faster than speed.

Let's look at the difference between a deadlift and a box jump.

Both these movements require hip and knee extension, but the deadlift expresses this slowly and has a clear end-range of motion. The box jump expresses force through the end range of motion as the person leaves the floor. This requires rapid force-production using the same joint actions as the deadlift.

A big difference in power and strength, in addition to movement speed, is the inclusion of a counter-movement. You often see a rapid counter-movement in jumping exercises. This utilises the stretch-reflex in the muscles that enables the muscles' elasticity to be utilised.

Performance of low-rep, high-speed movements is important in a programme seeking to improve power. Similar to strength training, the client must be offered adequate rest if the nervous system is to be able to perform the next set well.

3. Coordination

Coordination is the ability to move the limbs in a precise manner. In a sporting sense we see high-level examples of coordination on display. Consider a sport such as tennis in which a player may need to move their body in one direction while swinging their racquet in a different direction.

4. Reactions

Your reaction time is the ability to respond to a stimulus. Again, we see this at a high level in sports all the time.

There are situations such as in a sprint where we see the athletes respond to the starter's pistol. There are also other examples in sports that are more unpredictable where we see great examples of reaction times also. Let's look at football where we may have a defender and an attacker. The attacker will at some point make a move to go past the defender, which will require a fast response.

5. Proprioception

Proprioception relates to your understanding of your body in space. For example, once you have attained good technique in a squat you can replicate this time after time. Your ability to understand your range of motion, depth and where the body is in space all lead to success in this exercise. You will be able to perform this task based on your feel rather than conscious consideration.

Repetition is an important factor in improvement of proprioception as it relates to the person's familiarity with movement patterns. Taking the example of the squat again, it is likely to be far easier to perform when you have regular exposure to the exercise.

6. Balance

Balance is the ability to maintain equilibrium. Many sports require high levels of balance, such as gymnastics. Also, many fitness disciplines such as yoga utilise balance in their practice. It is also important for older adults to maintain good balance to lower the risk of falls.

Unilateral movements are a useful inclusion in fitness programmes for those seeking to improve balance. This can be performed in a wide range of different ways and doesn't need to be advanced.

7. Agility

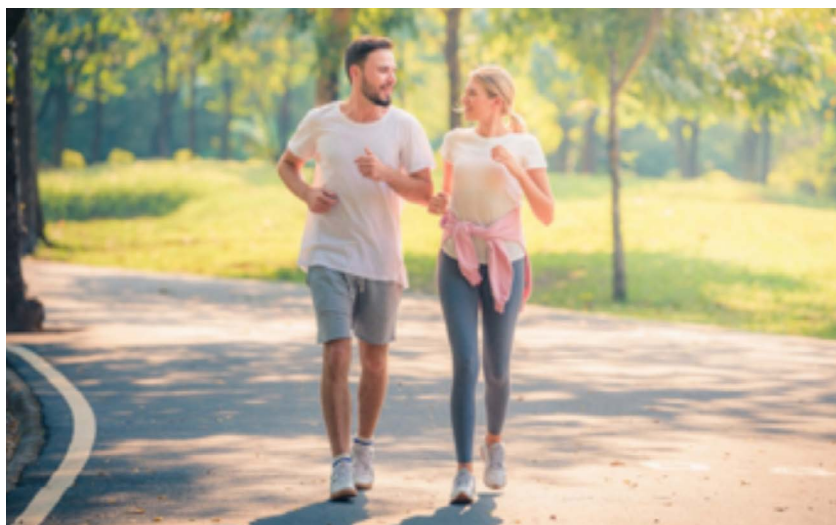
The ability to rapidly change direction at speed. Again this is something we see in a sporting setting often.

Using tools such as speed ladders and cones are a good way to improve agility in training.

Principles of Fitness

It is important to understand the various components, and the principles of fitness so that you are prepared to assist your clients in the development of exercise programmes that will provide maximum benefits.

Specificity



For the body to adapt in a specific manner it needs to be given the correct stimulus. You need to consider muscles involved and the fibre types etc that will be recruited. This can also be seen in cardiovascular exercise. If you want to be a better runner you need to run. You can run on the treadmill and experience some progression in your cardiovascular system but it won't make you a better swimmer.

Adaptability



Linked to specificity, the principle of adaptability is centred around the fact that the body will adapt to the specific demands placed upon it. If you focus on certain muscle groups or types of exercise, then you will experience progression in these specific areas. The prior example of the CV benefits of running not overlapping into your swimming performance is a good example here too.

Overload



The body will experience a fitness plateau unless the exercise stimulus is progressed periodically. The body needs to experience overloaded stimulus over time to continue to progress. Too much overload will result in soreness and potentially injury. We must work to offer our clients the chance to exceed their prior limits by a little in order to progress well.

Individuality



This principle speaks to the fact that every person needs an element of unique exercise prescription. We cannot expect every person to respond in the same way to the same exercises. Some people will respond fantastically to deadlifts, but aren't very good at squatting for example. The same stands for their rate of progression within the framework of the **FITT** principle. (Remember: **F**requency, **I**ntensity, **T**ime and **T**ype).

You need to consider this when programming for clients.

Recovery Time



Rest holds just as much value to a well-structured exercise programme as the actual training does. You cannot work hard in the gym every day without recovery. The value of the sessions will drop and with it you may find your clients showing signs of overtraining. There are lots of factors to consider when assigning rest to the overall training schedule but we must consider rest as a very important addition.

Reversibility



The principle of reversibility is that regression is absolutely possible based on periods of inactivity. We cannot expect to maintain all of our fitness progressions if we don't maintain them with consistent training stimulus and adequate nutrition. For example, if you have added muscle to your frame and stop weight training it should be expected that your muscle mass will diminish slightly over time.

