

FITNESS, CONDITIONING AND HEALTH.

1. CONCEPT.

We understand FITNESS as the result of all the physical qualities, motor skills and healthy habits which are important in our daily life, during sports performance, or even when we take part in our professional activities.

Depending upon the different development of these physical or motor capacities, we'll also find various fitness levels which are important because they will determine our possibilities to reach our objectives. Don't forget that most of our challenges demand some kind of physical or motor involvement

MINIMUM LEVEL	Below the average: unhealthy.
AVERAGE LEVEL	According to most of the people: may not be enough depending on the person.
IDEAL LEVEL	Healthy level we should wish to obtain.
SPECIAL LEVEL	Required to practice some kind of sport in an specific high level

Before moving on, we must contextualize the different meanings for FITNESS so you can improve your physical conditioning according to appropriate and realistic objectives.

HEALTH FITNESS	PERFORMANCE FITNESS
<p>A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.</p> <p>This demonstration of fitness is dynamic (we can improve it), and allows us facing unexpected demands, develop daily tasks or even enjoy during our spare time.</p>	<p>Main purposes of this type are: achievement of high standards in sports and training, accomplish elite challenges and assume very high training loads which could even be harmful to human health.</p>

HEALTH FITNESS is achievable for everybody and will make us enjoy our daily life. Developing health fitness will lead us to a healthier way of life and we will prevent further difficulties or limitations. Training or practicing sports/ games at this levels means that we don't go above our possibilities. We just need to find a certain amount of physical stress (overload) to increase physical capabilities (you will learn more about this in next courses).

HEALTH FITNESS COMPONENTS are not only physical or motor skills but a set of habits that help us feel active.

PHYSICAL QUALITIES = PHYSICAL FITNESS.	Strength, endurance, speed, flexibility.
MOTOR SKILLS = MOTOR FITNESS.	Coordination, agility, balance.
NUTRITION AND HYDRATATION	
RISK HABITS	Alcohol, drugs, etc...
HEALTHY HABITS.	Body alignment, rest, personal body cleaning, body composition, etc...

PHYSICAL FITNESS: Physical fitness refers to the capacity of an athlete to meet the varied physical demands of their sport or his daily life without reducing the athlete to a fatigued state. The components of physical fitness are the physical qualities (Davis 2000).

MOTOR FITNESS: Motor Fitness refers to the ability of an athlete to perform successfully at his sport or daily tasks that may demand coordination, agility or any motor skill. The components of motor fitness are the motor skills (Davis 2000).

PHYSICAL FITNESS (Physical Qualities) + MOTOR FITNESS (Motor Skills) +
NUTRITION/ HYDRATATION + HEALTH HABITS - RISK HABITS =
= HEALTH IMPROVABLE FACTORS.

2.- PHYSICAL QUALITIES.

2.1.- STAMINA/ ENDURANCE.

Is the basic physical attribute that allows us to do a specific type of exercise for the longest time possible without fatigue. Training stamina/ endurance makes fatigue take longer to occur and helps us with the recovery after practice.

A) Organs Involved:

- Heart.
- Lungs.

B) Types of Stamina.

- AEROBIC ENDURANCE:

You use Aerobic Stamina in a low intensity exercise which lasts for a long period of time. There is a balance between oxygen intake and consumption.

Aerobic endurance can be sub-divided as follows:

- Short aerobic - 2 minutes to 8 minutes (lactic/aerobic)
- Medium aerobic - 8 minutes to 30 minutes (mainly aerobic)
- Long aerobic - 30 minutes + (aerobic)

Heart rate sets between 120- 140 beats per minute (aerobic capacity), and could even reach 170 b/m (aerobic power).

Aerobic Capacity: exercises between 10 minutes and 2 or more hours at a low intensity (30- 50%).

Aerobic Power: exercises between 2 minutes and 10 minutes, at 60- 80% maximum intensity.

- ANAEROBIC ENDURANCE:

During anaerobic (without oxygen) work, involving maximum effort, the body is working so hard that the demands for oxygen and fuel exceed the rate of supply and the muscles have to rely on the stored reserves of fuel. The muscles, being starved of oxygen, take the body into a state known as oxygen debt and lactic(*) starts to accumulate in the muscles. There is an imbalance because oxygen intake does not meet the demand.

(*) *The lactic acid system is capable of releasing energy to resynthesize ATP without the involvement of oxygen and is called anaerobic glycolysis. When energy is required to perform exercise, it is supplied from the breakdown of Adenosine Triphosphate (ATP). The body has a limited store of about 85 grams of ATP and would use it up very quickly if we did not have ways of resynthesizing it. There are three systems that produce energy to resynthesize ATP: ATP-PC(*2), lactic acid and aerobic.*

(*2) *ATP-PC = very simple components in which nutrients break down during digestion.*

When we use directly ATP, we will call that type of anaerobic endurance: A lactic Anaerobic Endurance: short period of time (between 6" and 30").

If we produce Lactic Acid, that will be Lactic Anaerobic Endurance: between 1 and 3 minutes. Lactic acid is produced which significantly reduces the intensity of the effort and sometimes creates the need to stop the exercise (Lactic Acid unable energy production).

C) Benefits of Endurance Training.

- Increases heart volume.
- Strengthens and expands the wall of the heart.
- Reduces heart rate at rest.
- It allows for better recovery during rest periods.
- It increases blood circulation.
- Stimulates the metabolism in general.
- Contribute to energy consumption, weight loss by using fat as fuel (Aerobic Endurance).

C) Methods of Training.

- Continuous Training: also known as steady state training. Improves athlete endurance. It involves the athlete training at a steady pace over a long distance. The intensity should be moderate over a long distance and time (more than 30 min). Some of the disadvantages include a higher risk of injury, it can be boring and the sport specific benefits are small.

- Fartlek: designed to improve athlete endurance although may also use anaerobic energy systems. Varies intensity by varying terrain and athlete requirements.

- Interval Training: improves anaerobic endurance components and aerobic endurance. Involves alternate periods of high intensity work with periods of rest (no work or low intensity). We should consider: number of intervals (sets), intensity of work and rest and duration of work and rest.

2.2.- **SPEED.**

Is defined as the ability to perform one or several movements in the shortest time possible. Speed is influenced by mobility, special strength, endurance strength and technique.

Energy for absolute speed is supplied by the anaerobic lactic pathway.

A) Types of Speed.

- **REACTION TIME**: the time it takes for a muscle to contract in response to a stimulus.

- **CONTRACTILE SPEED**: is the ability of the muscle fibre to contract in the shortest time possible.

- **TRAVEL SPEED**: is the ability to cover a short distance in the least time possible. It is an example of the nervous and muscular systems working together.

B) Benefits of Speed Training.

- Increases Strength.
- Improves efficiency in oxygen delivery to your muscles.
- Improves technical performance.
- Develops muscle memory so we can increase our agility and cope with unexpected situations.

C) Methods of Training.

- Interval Training.
- Parachute runs.
- Hill sprints.
- Ladders and hurdles.

2.3.- FLEXIBILITY.

Is defined as the maximum possible range of a specific joint during a movement. Is influenced by:

- Internal influences
 - the type of joint
 - bony structures which limit movement
 - the temperature of the joint and associated tissues
 - the elasticity of muscle tissue, tendons, ligaments and skin
 - the ability of a muscle to relax and contract to achieve the greatest range of movement
- External influences
 - the temperature of the place where one is training (a warmer temperature is more conducive to increased flexibility)
 - the time of day (most people are more flexible in the afternoon than in the morning)
 - age (pre-adolescents are generally more flexible than adults)
 - gender (females are generally more flexible than males)

B) Benefits of Flexibility Training.

- Helps technical development.
- Assist in the prevention of injuries.

C) Methods of Training.

- Static stretching

Static stretching involves gradually easing into the stretch position and holding the position. The amount of time a static stretch is held depends on your objectives. If it is part of your cool down then stretches should be held for 10 seconds, if it is to improve your range of mobility then hold the stretch for 30 seconds. Often in static stretching, you are advised to move further into the stretch position as the stretch sensation subsides.

- Ballistic stretching

Ballistic stretching uses the momentum of a moving body in an attempt to force it beyond its normal range of motion.

2.3.- **STRENGTH.**

It is the capacity to overcome a load or resistance by using muscular force. As we read about flexibility it may be influenced by:

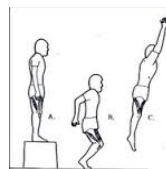
- Coordination.
- Muscle Temperature.
- Gender (strength is the most hormonal determined quality, testosterone is the most important hormone for strength development).
- Type of muscles fibers (fast or slow).
- The thickness and length of muscle fiber. The thicker they are the stronger they become. The process by which muscles fibers increase their size is called Hypertrophy.
- The type of contraction:

a) Isotonic contraction (lowest level of maximum strength): we are able to overcome the load or resistance. There is joint mobility and the muscle shortens (lifting a weight by flexing the elbow).

b) Eccentric contraction (maximum level of strength): the load or resistance beats us. The muscle lengthens as the joint moves (lowering a weight by extending the elbow)

c) Isometric contraction (intermediate degree): we are not able to overcome the load but it doesn't beat us. There is no joint mobility. Holding a weight or pushing a wall are good examples.

d) Plyometric contraction: takes the muscle through an eccentric muscle action before a powerful muscle action.



A) Types of strength.

- Maximum Strength: the ability to generate maximum muscular tension without taking time into account (weight lifting....)

- Explosive Strength: the ability to move a non-maximum load at maximum speed (throwing, jumping....)

- Strength endurance: the ability of a muscle or a group of muscles to contract during a prolonged period of time without feeling tired (rowing, swimming....).

- Absolute Strength: is the total amount of strength we can develop without considering our body weight.

- Relative Strength: we will calculate this type dividing the absolute strength among our body weight. That means that we also need to make our body moves. Think of a "Chin Up" exercise, it is a very good example of Relative Strength.

B) Benefits of Strength Training.

- Improves reaction ability.

- Prevents joint injuries.

- Last researches are showing the benefits of Strength Training in rejuvenating and revitalizing.

C) Methods of Training.

- Resistance machines.

- Free weights: dumb bells, barbells, kettle bells etc...

- Medicine balls.

- Circuit Training: a number of different exercises are organized in rotation.

To increase the progression and overload, the individual may wish to:

1.- decrease the rest period.

2.- Increase the number of stations.

- 3.- Increase the number of circuits.
- 4.- Increase the time spent at each station.

(* This notes were created by Laura Moreno Miguel, Eduardo Serrano Ginés and Antonio Vera Gómez.