

# Physical activity and health in children and adolescents

A guide for all adults involved  
in educating young people



MINISTERIO  
DE SANIDAD  
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***Physical Activity  
and Health  
in Children and  
Adolescents***

***A Guide for all Adults Involved  
in Educating Young People***

## ***Institutional Coordinators***

**Dr. Begoña Merino Merino, Ph. D., MD**  
Ministry of Health and Consumer Affairs

**Elena González Briones**  
Ministry of Education and Science

## ***Working Group***

**Dr. Susana Aznar-Lain**  
Lecturer in the Faculty of Sports Sciences, University of Castilla La Mancha, Toledo, Spain.  
Ph.D. in the area of Physical Activity and Health, University of Bristol, U.K.  
M.Sc. in Exercise and Health Sciences, University of Bristol, U.K.  
Health and Fitness Instructor as recognized by the American College of Sports Medicine (ACSM).

**Dr. Tony Webster**  
Ph.D. in the area of Exercise Physiology, University of Alberta, Canada.  
M.Sc. in Exercise and Health Sciences, University of Bristol, U.K.  
B.Sc. in Biochemistry, University of Bristol, U.K.

## ***Collaborator***

**Dr. Jose López Chicharro**  
Professor of Exercise Physiology, Complutense University, Madrid, Spain.  
Doctor of Medicine, Sports Medicine Specialist. Complutense University, Madrid, Spain.



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## Introduction

### 1. Why this physical activity guide?

The human body evolved to be physically active. In other words, our bodies require physical activity to remain healthy. Throughout history, survival of the human species depended on hunting or gathering our food supplies, pursuits that demanded prolonged and often strenuous physical activity. The advent of mechanization and modern technology in the last few decades has resulted in the human race becoming less physically active than ever before – and we are paying for it with our health.

Regular physical activity is associated with a healthier, longer life [1, 2]. However, the majority of adults and young people in Spain are insufficiently physically active for health benefits. The situation is similar worldwide in both developed and developing countries, with a large body of research evidence indicating declining levels of physical activity and physical fitness within all age brackets. Physical inactivity is widely recognized as a major risk factor for chronic diseases, and ranks between the second and sixth most important risk factor in contributing to the population burden of disease in western society [3-5]. Its prevalence is higher than that of all other modifiable risk factors [5]. Physical inactivity during the early years of life is currently indicated as a major contributor to the increasing levels of obesity, and other serious medical conditions, being seen in children and adolescents in Europe and elsewhere [6, 7]. The increased political, media and scientific interest in obesity since the late 1990's has placed physical activity high among current public health issues.

The nature of children's recreational pursuits has changed dramatically over the last few decades. Whereas children used to spend much of their recreational time engaged in active outdoor play, the emergence of television, computer games and the internet has meant that children are now spending much more of their free time engaged in sedentary pursuits. The importance of physical activity for the physical, mental and social health of youth is undisputed, and therefore it is critically important that efforts are made throughout the world to "reintroduce" physical activity into our youth. The purpose of this guide is to assist in this drive towards a more physically active youth in Spain. The Government of Spain is keen that all parents, teachers and



other child educators participate in improving the levels of physical activity among Spain's youth. This needs to be an urgent priority.

Unquestionably, the challenges posed by the growing issue of physical inactivity and childhood obesity can be considered to be some of the greatest challenges to public health in the 21st century. The responsibility to improve levels of childhood physical activity and other health related childhood behaviours lies with everyone in society. However, as an individual directly involved with children, you are an especially important part of the influential network. Schools, homes and the community are excellent locations to assist children in improving health related lifestyle behaviours such as physical activity.

Let's start to get Spain's kids active!

## 2. Who is this guide designed for?

This guide is designed to inform adults that work with young people about the importance of physical activity for this population and how it can be promoted effectively both within the school environment, the home environment and elsewhere within the community. It is an important information source for all people involved in education of children and adolescents, including schoolteachers, trainers, coaches, monitors, parents and health professionals. It is a relatively detailed document yet has been written in a manner that is designed to be informative both for adults with advanced knowledge of physical activity (PE teachers, monitors, trainers, health professionals, etc.) and for those who have limited knowledge of the area.

As much as possible, we have attempted to avoid excessively complicated wording. However, there is a list of key definitions and words that are used within the main text at the end of this guide in the event of confusion. In this guide, the term "young people" encompasses both children (under the age of puberty) and youth (adolescents).

## 3. Objectives of this guide

The guide has been laid out in such a manner with the major goals being:

1. To improve understanding of important concepts and issues regarding physical activity and physical fitness,
2. To provide information regarding the importance of physical activity for the health of young people, both during the younger years and also in later life,
3. To describe current physical activity recommendations for young people and how these recommendations can be achieved,

4. To provide information regarding how physical activity may be effectively promoted in young people within schools, homes and the community, and
5. To briefly describe the characteristics of a sound diet to support a physically active lifestyle in young people.

The overriding goal of this guide is to assist in improving the levels of physical activity in young people in Spain.



## Important Concepts of Physical Activity and Physical Fitness

### **Chapter objectives:**

- To introduce important concepts and terms regarding physical activity and physical fitness.
- To describe different methods for assessing intensity of physical activity.
- To describe the four most important components of physical activity for young people.
- To describe the difference between health-related and athletic performance physical fitness.

### 1. Definitions

**Physical activity** : is defined as body movement produced by muscle action that increases energy expenditure. It is an encompassing term that includes physical “exercise”.

**Physical exercise**: is a more specific term and implies planned, structured, repetitive and purposeful physical activity, often with the goal of improving or maintaining one’s physical fitness. For example, gardening or walking up stairs in one’s home may not be classed as structured “exercise”, but it is certainly physical activity.

**Physical fitness**: is a physiological state of well-being that provides the foundation for the tasks of daily living, a degree of protection against chronic disease and a basis for participation in sport. In essence, physical fitness describes a set of attributes relating to how well one performs physical activity.

**Health**: is a reflection of one’s overall physical, mental and social well-being. It is much more than simply an absence of disease. Health, as we all know, is a characteristic that is not stable in time and can vary along a continuum from near death (ill health) to optimal physiologic functioning (high level wellness) (see Figure 1).

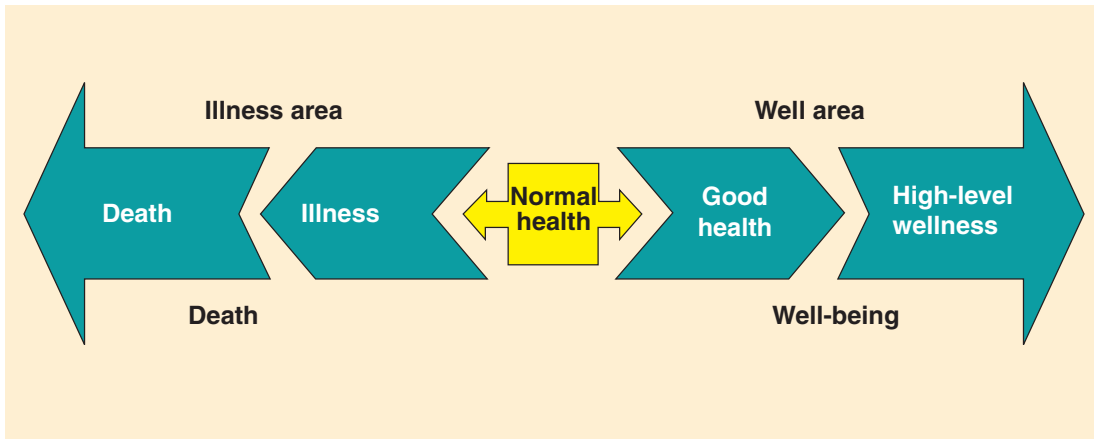


Figure 1. The health and wellness continuum.

## 2. Important descriptors of physical activity and exercise

The “dose” of physical activity that a person receives is dependent upon the factors contained within the “*F.I.T.T.*” principle:

**Frequency** (*how often*): the amount of times that one engages in physical activity (often expressed as number of times per week).

**Intensity** (*how hard*): how strenuous is the physical activity (often described as light, moderate or vigorous).

**Time** (*how long*) : the duration of the physical activity session.

**Type**: the specific mode of exercise in which one engages (eg. running, swimming, etc.).

These factors can be manipulated to vary the “dose” of physical activity. Often this dose is expressed in terms of energy expenditure (calories expended). One can appreciate that if physical activity is more intense, one can expend calories at a greater rate which may reduce the amount of time needed to burn a set amount of calories.

Other important training principles are:

**Overload**: refers to the load or amount of resistance for each exercise, providing a greater stress, or load, on the body than it is normally accustomed to in order to increase fitness.

**Progression**: is the way in which an individual should increase overload in order to stimulate continuous increases in fitness (often called progressive overload). It is a gradual increase in either frequency, intensity or time, or a combination of all three

components. Progression must be gradual to be safe. Progressing too quickly can lead to injury or unnecessary fatigue, both of which can be discouraging or prevent an individual from continuing to participate.

### 3. Clarification of moderate intensity physical activity

Of all the factors contained within the FITT principle, intensity is probably the most difficult to measure. The physical activity guidelines for both adults and young people (the latter are detailed later) make reference to the importance of exercise at least of moderate intensity. A person who is doing moderate intensity activity will usually feel:

- an increase in breathing rate, but conversation is still possible
- an increase in heart rate, to the point where it should be easily felt at the wrist, neck or chest,
- a feeling of increased warmth, possibly accompanied by sweating on hot or humid days

A bout of moderate intensity activity can be continued for many minutes and does not cause exhaustion or extreme fatigue in healthy individuals when continued for an extended period.

It is important to understand that moderate intensity is relative to each individual's fitness level. For example, a fitter individual would need to perform activity at a higher absolute intensity than an unfit individual in order to feel the similar sensations of increased breathing, heart rate and temperature that are characteristic of moderate intensity activity.

Below, various methods for assessing exercise intensity are discussed in further detail.

### 4. Further methods for gauging intensity of physical activity

There are numerous other ways of monitoring the intensity of physical activity. The most widely used are outlined below:

#### 4.1. The talk test:

The talk test method of measuring intensity is simple:

- **Light intensity:** a person who is active at a *light* intensity level should be able to sing or carry on a normal conversation while doing the activity. An example of light activity would be easy walking or cleaning.

- **Moderate intensity:** one who is active at a *moderate* intensity level should be able to carry on a conversation but with some difficulty while engaging in the activity. An example would be brisk walking, biking, or dancing.
- **Vigorous intensity:** If a person becomes winded or too out of breath to carry on a conversation easily, the activity can be considered vigorous. Examples of *vigorous* activity would include jogging or running and strenuous sports such as basketball, swimming, handball, etc.)

#### 4.2. Heart rate:

Heart rate can be measured easily either at the wrist (the radial pulse) or the neck (the carotid pulse) and should be converted into the number of beats per minute (bpm). One can measure heart rate for a full minute or one can measure for a shorter period of time (eg. 15, 20 or 30 seconds) and multiply by the relevant factor (4, 3 or 2 respectively) to convert to bpm.



Knowledge of one’s resting heart rate and maximal heart rate is needed to be able to gauge exercise intensity most effectively. Resting heart rate is best measured while an individual is truly resting, such as on awakening in the morning or after being seated quietly for a few minutes. Maximal heart rate is often roughly estimated using the simple equation “220 – age”. For example, if a child was 15 years old, their estimated maximal heart rate would be 220 – 15 = 205 bpm.

The best method to determine target heart rate ranges for monitoring intensity of physical activity is to use the technique known as the heart rate reserve (HRR) method, also known as the Karvonen method [8]. In this method, resting heart rate (RHR) is first subtracted from the maximal heart rate (MHR) to obtain HRR. For example, let us assume that the 15 year old child above had a resting heart rate of 80 bpm. The HRR of this individual is MHR (205) – RHR (80) = 125 bpm.

To calculate a heart rate range for practical purposes, one must first consult table 1 below to determine the relevant % values of HRR:

**Table 1**  
Classification of physical activity intensity using % heart rate reserve and rating of perceived exertion.

Intensity descriptor	RELATIVE INTENSITY	
	% Heart rate reserve (%HRR)	Rating of perceived exertion (RPE)*
Very light	< 20	< 10
Light	20-39	10-11
Moderate	40-59	12-13
Vigorous	60-84	14-16
Very vigorous	>85	17-19

Adapted from [9].

\* see section 4.3 below for an explanation of rating of perceived exertion.

We can see that moderate intensity corresponds to 40-59% of heart rate reserve =  $50 (0.40 \times 125) - 74 (0.59 \times 125)$ . We must now add the resting heart rate back onto each number to determine the final target heart rate range. Therefore, the corresponding heart rate range for our child for moderate intensity activity is **130** ( $50 + 80$ ) to **154** ( $74 + 80$ ) bpm.

For vigorous intensity exercise, the heart rate range for this child would be **155** to **185** using exactly the same procedure as above.

### 4.3. Rating of perceived exertion using a Borg scale:

Perceived exertion is how hard you feel that you are working based on the physical sensations you experience during exercise. An example of a Borg scale is shown below in Figure 2.

6	No exertion at all
7	
	Extremely light (7,5)
8	
9	Very light
10	
11	Light
12	
13	Somewhat hard
14	
15	Hard (heavy)
16	
17	Very hard
18	
19	Extremely hard
20	Maximal exertion

Figure 2. The Borg Scale of Rating of Perceived Exertion.

While exercising, you should look at the rating scale expressions, appraise your feelings of exertion as honestly as possible and provide the appropriate number. This is your “rating of perceived exertion” or RPE.

As can be seen in Table 1 above, moderate intensity physical activity is represented by a RPE of between 12 to 13 on the Borg scale (around the description “somewhat hard”). Light and vigorous activities fall into the ranges of 10-11 and 14-16 respectively.

### 4.4. Metabolic equivalent (MET) level:

1 metabolic equivalent (1 MET) is the amount of energy (oxygen) your body uses as you sit quietly, for example while reading a book. Intensity may be described as a multiple of this value. The harder your body works during a physical activity, the higher the MET level at which you are working.



- Any activity that burns 3-6 METs is considered moderate intensity
- Any activity that burns >6 METs is considered vigorous intensity

One can consult standard tables that define physical activities and their MET levels to ascertain roughly the intensity of the activity concerned, such as table 2 below:

**Table 2**  
Intensities and energy expenditure for common types of physical activity

Activity	Intensity	Intensity (METs)	Energy expenditure (kcal equivalent, for a person of 30kg doing the activity for 30 mins)
Ironing	Light	2.3	35
Cleaning & dusting	Light	2.5	37
Walking – strolling, 3-4 km/h	Light	2.5	37
Painting/decorating	Moderate	3.0	45
Walking – 4-6 km/h	Moderate	3.3	50
Hoovering	Moderate	3.5	53
Golf – walking, pulling clubs	Moderate	4.3	65
Badminton – social	Moderate	4.5	68
Tennis – doubles	Moderate	5.0	75
Walking – brisk, >6 km/h	Moderate	5.0	75
Mowing lawn – walking, using power mower	Moderate	5.5	83
Cycling – 16-19 km/h	Moderate	6.0	90
Aerobic dancing	Vigorous	6.5	93
Cycling – 19-22 km/h	Vigorous	8.0	120
Swimming – slow crawl, 45m per minute	Vigorous	8.0	120
Tennis – singles	Vigorous	8.0	120
Running – 9-10 km/h	Vigorous	10.0	150
Running – 10-12 km/h	Vigorous	11.5	173
Running – 12-14 km/h	Vigorous	13.5	203

Source: based on data from Ainsworth *et al.* [10].

## 5. Different components of physical activity

There are obviously many different types of physical activity that develop different aspects of physical fitness. The most important types of physical activity for health in children and adolescents are:

1. Activities involving cardiovascular (aerobic) work,
2. Activities involving strength and/or muscular endurance,
3. Activities involving flexibility, and
4. Activities involving coordination.

### 5.1. Cardiovascular (aerobic) activities:

Cardiovascular activities are also often called “cardio-respiratory” or “aerobic” activities because they require the body to transport oxygen using the heart and lungs. Cardiovascular endurance is the capacity of our body to perform tasks that require the

use of large muscle groups usually for relatively prolonged periods of time (several minutes or more). With repeated endurance exercise our hearts and lungs adapt to become more efficient at providing the working muscles with the oxygenated blood that they need to perform the task.

One can improve one's cardiovascular endurance using continuous activities such as walking, running, swimming, bicycling, paddling, dancing, *etc.*

When one performs these kinds of activities it is important to remember:

- That one must progress sensibly – if you have not done much of these kinds of activities before you must start gradually with relatively low intensity and duration and gradually build these up as you gain fitness.
- That the activity chosen should be fun and easily accessible – this will improve the likelihood that you will stay with the activity and practice it regularly. If you do not enjoy the activity, it requires a lot of expensive equipment or you must travel a long way to do it, you will be less likely to stick with it
- Safety issues – these include issues such as wearing the relevant safety equipment (*eg.* helmet when riding a bike). In addition, one must be wary of high (vigorous) intensity activities where it may be necessary for the child or adolescent concerned (if they have a medical condition) to consult a doctor or exercise specialist prior to participation.

## 5.2. Muscular strength and endurance activities:

Muscular strength is the capacity of muscle to generate tension and to overcome an opposing force. Muscle endurance is the capacity of a muscle to maintain its tension or its contractions for a prolonged period of time. These activities build and strengthen bones and muscles. We call upon muscle strength and endurance when we push, pull, lift or carry things like heavy shopping bags.

Muscular strength and endurance activities can be practiced:

- with one's own weight (rope skipping, climbing, push-ups, *etc.*)
- with the weight of a partner (wheelbarrow races, tug-of-war, wrestling with a friend, *etc.*)
- or with activities like throwing a ball, paddling, rowing, weight lifting in a gymnasium, carrying things, *etc.*

When one does muscular strength and endurance activities, one must bear in mind the following:

- That one must progress sensibly – if one is new to these kinds of activities one must start slowly and with lighter resistance to avoid excessive muscle soreness and injuries
- For strength activities it is not necessary to lift weights – there are plenty of activities that tax muscle strength without using weights. Examples include body weight activities such as push-ups, climbing, handstands, *etc.* Other very sim-

ple objects can also train muscle strength very well such as elastic tubing and bands, *etc.*

- Strength activities with excessive weight or resistance can be harmful during childhood as the body is developing and it is possible to damage growing cartilage and bones
- If one has any doubts, it is always a good idea to consult an expert such as a PE teacher, physical trainer, doctor, *etc.*

### 5.3. Flexibility activities:

Flexibility is the ability of joints to move through a full range of motion. Flexibility is specific to specific body parts and is a function of the type of joint(s) involved and the elasticity of the muscles and connective tissue (*eg.* tendons, ligaments) surrounding the joint(s). Flexibility is beneficial for all activities that involve bending, lunging, twisting, reaching and stretching.

Some activities that improve flexibility are: gentle stretching of muscles, sports such as gymnastics and karate, yoga, Pilates, and any muscle strength or endurance activities that work a muscle through a full range of motion.

When you do flexibility activities it is important to remember that:

- One must be patient. It takes time to see significant improvements in flexibility, often several weeks or sometimes months.
- One must never stretch to the point where you feel pain and movements should always be performed in a controlled manner without bouncing or jerkiness. You should NEVER push yourself to imitate someone else who is more flexible than yourself. This is asking for injury!
- You should stretch regularly (preferably several times a week or even daily). Reasons for this include the facts that you lose flexibility easily if you do not continue to work it, it assists in avoiding injury and also it tends to decrease as we get older.
- It is a good idea to start flexibility exercises at a young age (as that is when we are most flexible) and to continue them for one's lifetime
- It is best to perform stretching when muscles and joints are warm and more pliable. Therefore, good times to stretch include after a warm-up at the start of physical activity or after the physical activity is over as part of a cool-down

It is also important to know that flexibility is different between boys and girls (often superior in the latter) and also during the major growth phases of life it is common to see large decreases in flexibility as the bones often are growing faster than muscles and tendons.

#### 5.4. Coordination activities:

Motor coordination is the capacity to use the brain and nervous system together with the locomotor system to develop smooth and precise movements.

Coordination activities include:

- Balancing activities involving the body, such as walking on a beam or balancing on one leg
- Rhythm activities, such as dancing to music
- Activities involving kinesthetic awareness and spatial coordination, such as learning how to perform a somersault or learning a new dance move
- Activities involving foot-eye coordination, eg. kicking or dribbling a ball as in football
- Activities involving hand-eye, eg. racquet sports, throwing or catching a ball

Bear in mind the following points regarding coordination activities:

- Be careful to avoid falls and other accidents as kids are often so engrossed in these activities that they lose awareness of their surroundings and other people in the vicinity
- Coordination activities are excellent for motor development, especially in young children. And most children love them!
- The learning curve for these skills is different for each child – some learn much faster than others

## 6. Health-related vs. athletic performance physical fitness

It is important to make the distinction between **health-related physical fitness** and **athletic performance physical fitness**. Health-related physical fitness refers specifically to those components of physical fitness associated with some aspect of good health and/or disease and not necessarily sports performance. For example, good aerobic fitness and a relatively low amount of body fat are important components of health related physical fitness. In this situation, the individual may not have a high level of athletic performance physical fitness but their favourable aerobic fitness and body fat confer a large amount of health-related fitness and protection against disease.

Athletic performance physical fitness is that portion of physical fitness directed towards optimizing performance in a certain sport - each sport will require a balance of different facets of fitness for optimal performance. For example, gymnastics requires a high degree of agility and flexibility whereas competitive long distance swimming requires a high degree of aerobic fitness. The adaptations within the body as a result of training for specific sports will almost always confer significant health benefits also on the athletes concerned.

Figures 3 and 4 below outlines some facets of health-related physical fitness and athletic performance physical fitness.

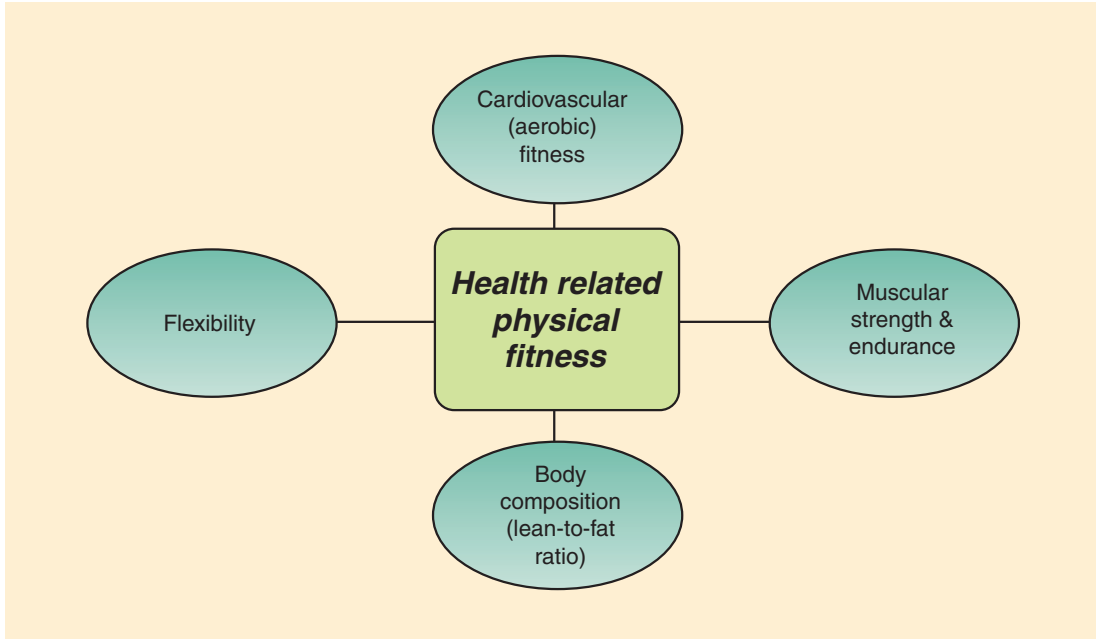


Figure 3. Aspects of health-related physical fitness.

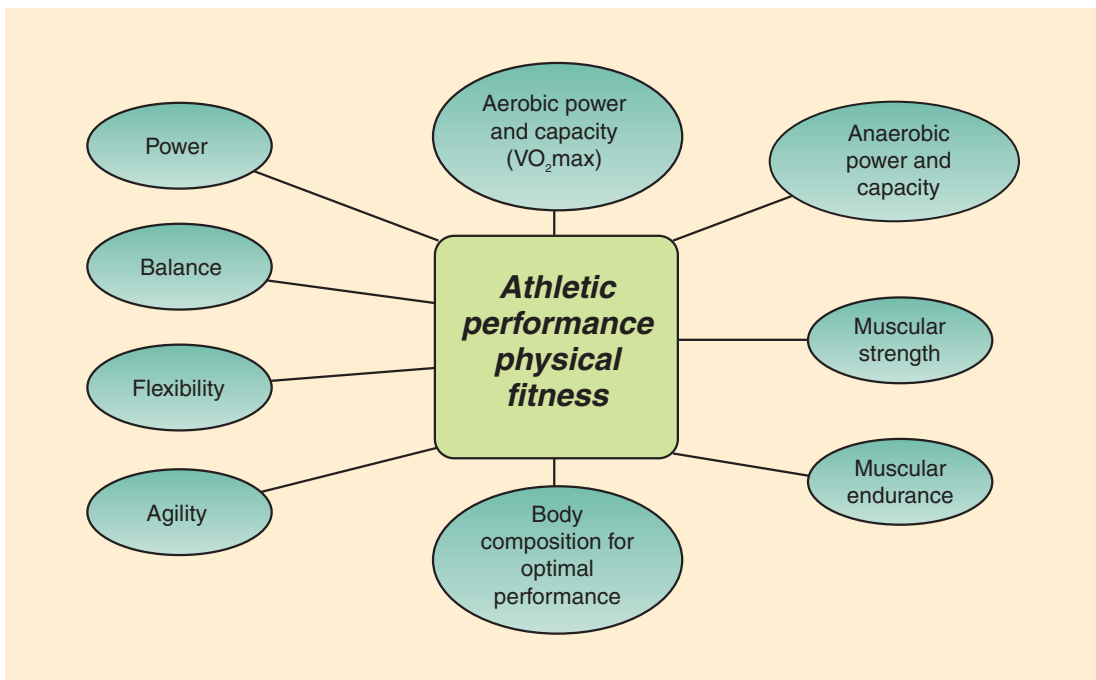


Figure 4. Aspects of athletic performance physical fitness

**Key points:**

- Physical activity is body movement produced by skeletal muscle contraction that results in energy expenditure.
- The dose (or amount) of physical activity is a combination of frequency, intensity, time and type of activity.
- For an individual to continually improve their physical fitness, there must be gradual progressive overload in the amount of physical activity.
- Intensity of physical activity can be monitored through the talk test, heart rates, rating of perceived exertion and metabolic equivalents (METs).
- The most important types of physical activity for health-related fitness in young people are cardiovascular, muscular strength/endurance, flexibility and co-ordination activities.
- Health-related physical fitness refers to those components of physical fitness associated with some aspect of good health whereas athletic performance physical fitness refers to those aspects of physical fitness required for optimal performance in sports.



## Physical Activity, Physical Fitness and the Health of young people

### **Chapter objectives:**

- To describe the relationship between dosage (amount) of physical activity performed and health status.
- To describe the health benefits of physical activity for young people.
- To provide statistics on physical activity and physical fitness in Spanish young people.
- To define and describe overweight and obesity.
- To describe the causes and consequences of childhood overweight and obesity and their relationship with physical inactivity.
- To talk about the incidence of childhood overweight and obesity in Spain.
- To briefly outline the Strategy for Nutrition, Physical Activity and Prevention of Obesity (NAOS initiative) in Spain.
- To describe safety issues related to participation in physical activity for young peoples.

### **1. Dose-response issues concerning physical activity and health**

As described in the section above, the dose (or amount) of physical activity that an individual receives is a function of the factors contained within the F.I.T.T. principle – in other words it is a function of the frequency, intensity, time and type of activity that a person undertakes. There is still doubt about the optimal amount and the minimal amount of physical activity for health benefits, and in particular the effects of intensity (eg. light vs. vigorous) on health status. However, it is clear that there is a curvilinear relationship between physical activity and health status, such that increases in physical activity and fitness will lead to additional improvements in health status [5, 11, 12] (see figure 5). Stated another way, the most physically active individuals have the lowest



risk of chronic diseases. Figure 5 also illustrates another important point – that the greatest gains in health status can be expected when the most sedentary individuals begin to become physically active. This has extremely important public health implications, both for young people and adults.

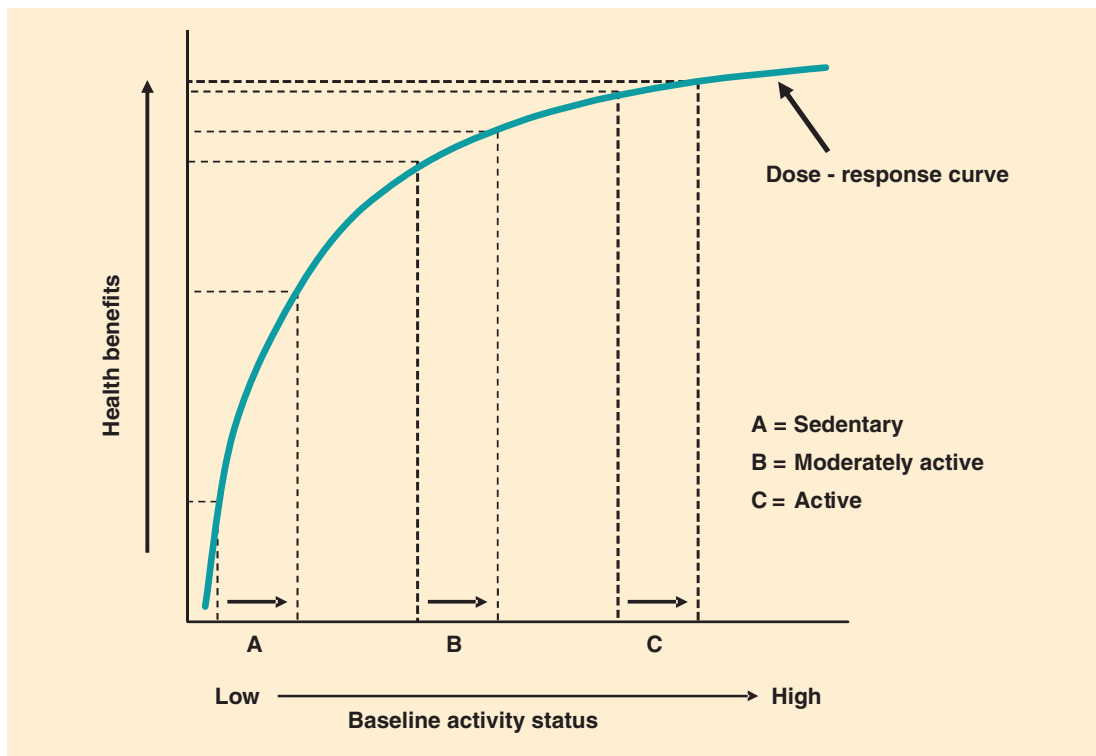


Figure 5: Relationship between amount of physical activity and health benefits

The intensity of physical activity may be a particularly important aspect of the exercise dosage, with evidence to suggest that activities of greater intensity (at least moderate-to-vigorous) are particularly beneficial in terms of health status [11, 13-16]. Also, it is important to note that physical activity should be *regular* to have a beneficial effect on health. This underlines the importance of frequency within the F.I.T.T. principle. It is a wiser practice to engage in moderate amounts of physical activity on all or most days of the week than to engage in very large amounts of physical activity on a sporadic basis.

## 2. The importance of physical activity for the health of young people

The benefits of physical activity for children and young adults are numerous and can be broadly placed into three categories (see figure 6):

1. Physical, mental and social health benefits during childhood.

2. Health benefits of childhood activity that carryover to adulthood.
3. Behavioural carryover of healthy physical activity habits into adulthood.

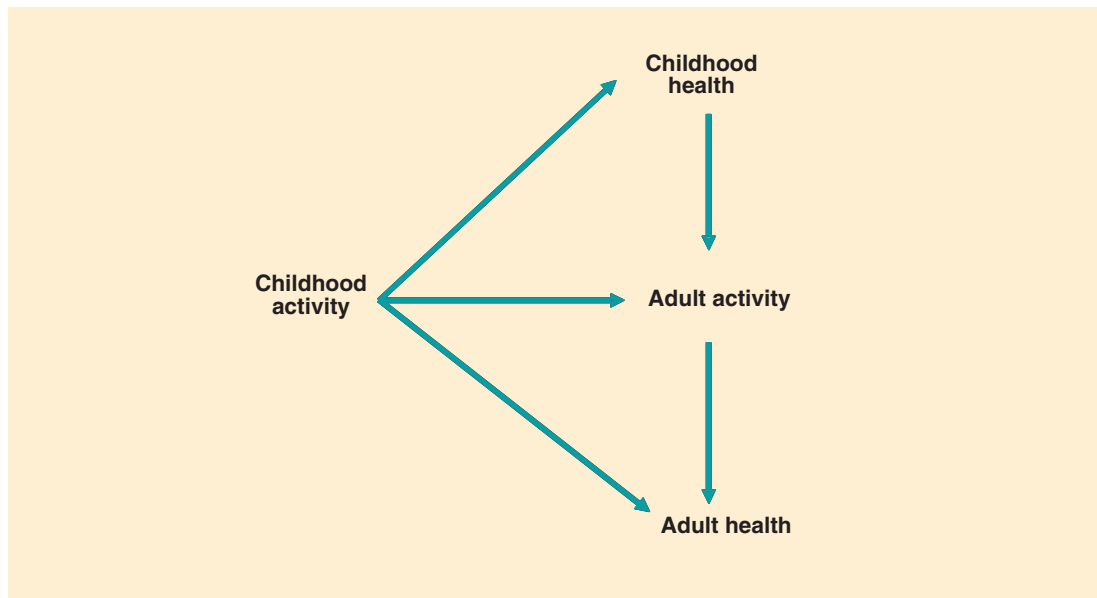


Figure 6. Interrelationships of childhood and adult activity and health.

### 2.1. Health benefits during childhood:

Physical activity in childhood has a range of benefits during childhood including healthy growth and development of the musculoskeletal and cardiorespiratory system, maintenance of energy balance and thus a healthy weight, avoidance of cardiovascular disease risk factors such as hypertension and high blood cholesterol, and the opportunity for social interaction, achievement and mental well-being.

The degree to which inactivity is contributing to the rising levels of obesity in children has not been clearly defined. However, there is strong evidence to suggest that inactive children are more likely to have excess fat [17], even as early as late infancy [18]. There is also convincing evidence that children who spend more time engaged in sedentary pursuits such as television watching and computer games are more likely to have excess fat [19, 20]. Further information on overweight and obesity can be found later in this section.

There is strong evidence that physical activity is important for children's psychological well-being [21]. Children with lower activity levels have a higher prevalence of psychological and emotional distress. Sport and exercise provides an important medium for children and teenagers to be successful and this helps to improve social well-being, self-esteem and self-perceptions of body image and competence, with a stronger effect for those already low in self-esteem. Moreover, children with higher physical activity levels are also more likely to have better cognitive functioning [22]. It is

logical to speculate also that higher levels of participation in sport and physical activity may be associated with lower levels of juvenile delinquency (eg. involvement with gangs, drug use, etc.) but the research is currently equivocal.

Generally, cardiovascular disease is not a disease of childhood, but research has shown that less physically active children and those with lower cardiovascular (aerobic) fitness are more likely to possess risk factors for this disease such as a lower levels of “good” cholesterol (high density lipoprotein cholesterol, HDL), higher blood pressure, raised insulin levels and excess fat [23, 24].

It is highly likely that physical inactivity is contributing to the increasing appearance of obesity, increased insulin resistance, disordered lipid profile and elevated blood pressure in children. This in turn is probably responsible for the increasing prevalence of type 2 diabetes in children and adolescents [25], a disease that until recently was usually only found in overweight and obese adults.

## **2.2. Childhood activity and health as an adult:**

Studies have shown that childhood obesity tracks into adulthood [26]. In fact, the risk of adult obesity is at least twice as high for obese children as for non-obese children [26]. Therefore, physical activity during childhood seems to be somewhat protective against obesity later in life. In addition, adults who were obese as children carry a risk of poorer health and increased mortality compared with adults who were not obese as children. By maintaining childhood aerobic fitness, physical activity during childhood reduces the adult risk of cardiovascular disease [27].

During the growing years (especially adolescence), boys and girls rapidly gain bone mineral density. This is important as attainment of as high a skeletal mass as possible during one’s youth reduces the chances of excessive loss of bone mass later in life (known as osteoporosis). It has been clearly shown that physical activity during early puberty, especially weight bearing activities that stress the bones to a greater extent, can result in the attainment of greater bone mass which is protective against osteoporosis in old age [28]. Examples of beneficial activities include those that involve jumping, dancing, aerobics, gymnastics, volleyball, handball, racquet sports, soccer and mountain biking. It should be noted that low-impact activities like swimming are not effective for stimulating improvements in bone mass. Peak bone mass is achieved by the age of 20-30 and so attempts to enhance it must concentrate on childhood and adolescence [28].

## **2.3. Establishment of lifetime activity patterns:**

Similar to the research that has shown that obesity tends to track from childhood into adulthood, there is also a large body of evidence that suggests that the physical activity habits established during one’s younger years also tend to track into young adulthood and later life [29-32]. It makes sense that children who emerge from their school years feeling confident about their physical skills and bodies, and who have had

positive experiences of physical activity, are more likely to be active through adulthood.

It is important to note that stronger associations between physical activity in childhood and physical activity in adulthood are found when the quality of the physical activity experience in childhood, rather than simply the quantity, is taken into account [33]. Clearly, the way exercise and sport are experienced in childhood and youth impacts on subsequent participation as an adult. Negative attitudes gained as a young person may persist into adulthood and affect people's willingness to take part in physical activities.

**Table 3.**  
Summary of the major benefits of childhood physical activity.

<p><b>1. Health benefits during childhood:</b></p> <ul style="list-style-type: none"><li>• Maintenance of energy balance and prevention of overweight and obesity.</li><li>• Promotes healthy growth and development of the musculoskeletal and cardiovascular system.</li><li>• Reduces risk factors for:<ul style="list-style-type: none"><li>→ cardiovascular disease.</li><li>→ type 2 diabetes</li><li>→ hypertension</li><li>→ hypercholesterolemia.</li></ul></li><li>• Improves mental health and psychological well-being through:<ul style="list-style-type: none"><li>→ reduced anxiety and stress</li><li>→ reduced depression</li><li>→ higher self-esteem</li><li>→ improved cognitive function.</li></ul></li><li>• Improved social interaction.</li></ul> <p><b>2. Improved health during adulthood:</b></p> <ul style="list-style-type: none"><li>• Reduced probability of becoming obese during adulthood.</li><li>• Reduced morbidity and mortality from chronic disease during adulthood.</li><li>• Improved bone mass reduces likelihood of osteoporosis in later life.</li></ul> <p><b>3. Establishment of lifetime activity patterns:</b></p> <ul style="list-style-type: none"><li>• Improved likelihood of becoming an active adult.</li></ul>
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### 3. Physical activity, sedentary behaviour and physical fitness in Spanish young people

In the 1997 National Health Survey, statistics showed that for children 6-15 years old, only 36.7% of boys and 19.7% of girls reported doing some form of sport or physical training several times a week [34]. When boys and girls were pooled, less than 30% of young people were found to be active in their leisure time several times per week [34].

In the 2001/2002 Health Behaviour in School Aged Children (HBSC) survey (conducted every four years by the World Health Organization), it was determined that the proportion of young people in Spain that met the guidelines (outlined in further detail in Chapter 3 of this guide) of at least 60 minutes of moderate-to-vigorous physical activity on five or more days of the week was 40.5% (boys) and 27.0% (girls) in 11 year olds, 39.7% (boys) and 28.6% (girls) in 13 year olds and 38.2% (boys) and 22.7% (girls) in 15 year olds [35]. These results are somewhat consistent with those presented above and reinforce the low participation and marked gender difference in physical activity in our country.

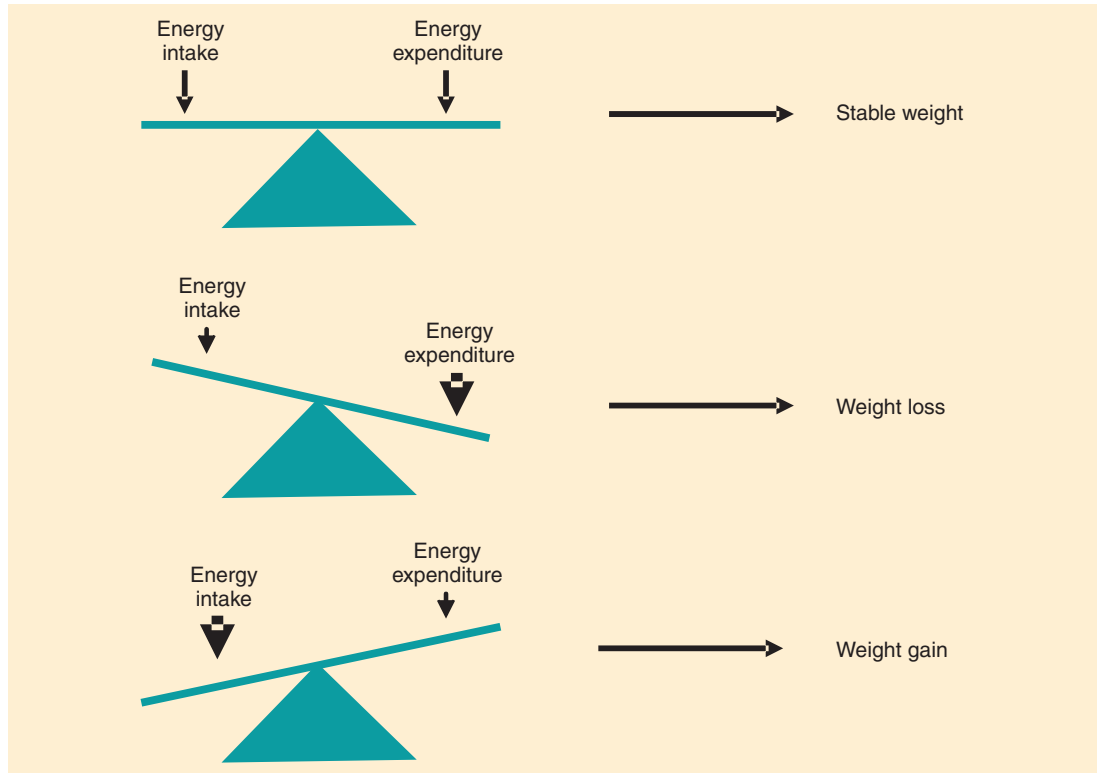
Further data from the 2001/2002 HBSC revealed sedentary behaviour patterns in Spanish young people. On weekdays, approximately 22% of Spanish 11-15 year olds watched more than four hours of television, with girls and boys demonstrating very similar values. This value doubled on weekend days with approximately 42% watching more than 4 hours of television. Regarding computer use in 11-15 year olds, a marked discrepancy was seen between boys and girls. On weekdays 6.6% of girls and 13.4% of boys reported using the computer for more than 3 hours a day. On weekends these values doubled to 14.8% and 30.1% respectively [35]. A trend is also clearly seen for greater computer use with increasing age.

Recent data has indicated that Spanish adolescents possess lower physical fitness in comparison to other countries [36], a finding almost certainly linked to low participation in physical activity. When these findings were interpreted as an indicator of future cardiovascular health, it was estimated that approximately 20% of Spanish adolescents have an increased risk for future cardiovascular disease [36]. The findings of low physical fitness and low participation in physical activity in Spanish young people should come as no surprise given that the Spanish adult population takes less physical activity than people in other countries [37]. Further research has also shown that the proportion of Spaniards with a poor attitude toward changing their level of physical activity was higher than in other countries in Europe, and Spanish citizens were less perseverant in achieving positive changes in their physical activity status [38]. Overall, it appears that Spanish young people find themselves in an environment that is not as conducive to increasing their physical activity levels as it should be. This situation can and must change.

#### 4. The linkage between physical inactivity and childhood overweight and obesity

The mechanism of obesity development is not fully understood. It is a complex multifactorial issue which means that the rising prevalence of obesity can therefore not be explained or addressed by a single factor. However, it is clear that obesity occurs when energy intake exceeds energy expenditure (see Figure 7). Genetic factors influence the susceptibility of a given child to an “obesogenic” (obesity promoting) environment. In other words, some children are more prone to obesity than others as a result of hereditary factors. In the vast majority of cases environmental factors, lifestyle pref-

ences and cultural environment are the significant factors that influence obesity. While changes in the diets of children have undoubtedly contributed to increasing global levels of pediatric overweight and obesity, most experts now believe that decreased physical activity is the major contributor.



**Figure 7.** Changes in body weight are determined by a balance of energy intake (food calories) and energy expenditure (calories burned).



When the growing problem of overweight and obesity was first recognized in the 1980's and 1990's, obesity was first viewed as a personal disorder or abnormality that required treatment. While this may be partially true, strategies to curb the obesity epidemic using this philosophy failed. Now there is more of an “ecological” approach to the problem of obesity where it is seen as a normal consequence of an increasingly abnormal (obesogenic) environment [39]. One important aspect of this abnormal environment is the changing physical activity environment, which affords progressively less opportunities for spontaneous physical activity, both in adults and young people. The key to success in tackling the problem of obesity now lies in understanding, measuring and altering this obesogenic environment.

In May 2004, a report by the International Obesity Taskforce (IOTF) to the World Health Organization (WHO) highlighted examples of problematic social trends that are believed to be contributing to the childhood obesity epidemic [40]. These included:

1. An increase in the use of motorized transport, *eg.* to school.
2. Reduced opportunities for recreational physical activity.
3. Increased sedentary recreation.
4. Multiple TV channels around the clock.
5. Greater quantities and variety of energy dense foods available.
6. Rising levels of promotion and marketing of energy-dense foods.
7. More frequent and widespread food purchasing opportunities.
8. More use of restaurants and fast food stores.
9. Larger portions of food offering better 'value' for money.
10. Increased frequency of eating occasions.
11. Rising use of soft drinks to replace water, *eg.* in schools.

Therefore, lack of sufficient physical activity (points 1-4) is strongly indicated as a contributor to the rising problem of obesity. It is now widely accepted that increasing physical activity participation and decreasing sedentary behaviour should be the major focus of strategies aimed at preventing and treating overweight and obesity in young people [41].

The IOTF report also concluded that the domination of obesity-promoting environmental factors meant that treatment would be unlikely to succeed without strategies to deal with the prevailing environment through a broad-based public health programme, and urged policy-makers to develop strong policies to address the rising problem. Spain was one of the first countries to respond to this challenge by developing a national strategy for prevention of obesity through nutrition and physical activity (the NAOS initiative, described in further detail below)..

## 5. Definition and measurement of overweight and obesity

The most basic definition of obesity is an excess of body fat that increases health risks. There are many different techniques that can be used to assess body fat, some with greater validity than others. Examples of such techniques include sophisticated laboratory techniques such as magnetic resonance imaging or dual energy X-ray absorptiometry and simpler methods such as measurement of subcutaneous fat using skinfold callipers. Unfortunately, the ideal definition of obesity based on percentage of body fat is impractical for epidemiological use. Therefore, for simplicity, population statistics regarding obesity use a measure that relates the weight of a person to their height termed the body mass index (BMI: weight [kg] / height [m<sup>2</sup>]). The major disadvantage of BMI is that, on an individual level, it may give highly misleading information regarding body composition as it is merely an expression of weight in relation to height, with no means of distinguishing fat mass from lean body mass. For example, a short young muscular male may be deemed to be overweight or even obese using BMI when in fact his body composition is perfectly healthy. On a population (or epidemio-



logical) level, however, BMI can give useful statistical information regarding prevalence of obesity.

In adults, overweight can be defined as excess weight relative to a desirable body weight (>120% of desirable weight) or, more accurately, a BMI of between 25 and 30 kg/m<sup>2</sup>. Overweight is considered to be the precursor of obesity, the latter of which is defined as a BMI of over 30 kg/m<sup>2</sup> [42]. In children overweight and obesity are more difficult to define because BMI and body composition change substantially during growth and development. Two major approaches have been taken to address this problem. The first is to define overweight and obesity in terms of percentiles of BMI for age. Using this approach, overweight and obesity have been defined as at or above the 85th percentile and at or above the 95th percentile of BMI for age, respectively [43]. The second approach is an international classification that is directly linked to the adult BMI cut off points of 25 and 30 kg/m<sup>2</sup>, with adjustments for the growth and development of children included [42]. Both techniques have been used in the research literature.

## 6. Health consequences of obesity in young people

The negative consequences of obesity during the early years of life are both physiological (medical) and psychosocial. Probably the most widespread consequences of childhood obesity are psychosocial. Obese children become targets of early and systematic discrimination and tend to develop a negative self-image that appears to persist into adulthood [44]. In addition, there are numerous health complications that become apparent during youth including [44, 45]:

1. Disturbances in blood lipids (*ie.* elevated triglycerides, elevated low-density lipoprotein (LDL) cholesterol and lowered high-density lipoprotein (HDL) cholesterol).
2. Glucose intolerance (*ie.* insulin resistance) and type 2 diabetes.
3. Atherosclerotic changes within arteries (coronary heart disease).
4. Hepatic problems such as cirrhosis.
5. Hypertension.
6. Sleep problems.
7. Orthopaedic complications, especially of the hips and lower extremities.

Those studies that have investigated the long-term effects of childhood or adolescent obesity on adult morbidity and mortality have shown greater adult all-cause mortality, coronary heart disease, atherosclerotic cerebrovascular disease, hypertension, colorectal cancer, diabetes, gout and arthritis, amongst other medical conditions. The rates of morbidity and mortality from these diseases increase with higher degrees of obesity. In addition, a large body of research evidence has shown that once a child has become obese, there is a high probability that this obesity will continue into adulthood [26]. Therefore, there is general acceptance that children should be considered



the priority population for intervention strategies aimed at treating or, ideally, preventing the onset of obesity. Physical activity must be a major component of interventions designed to prevent or treat childhood obesity.

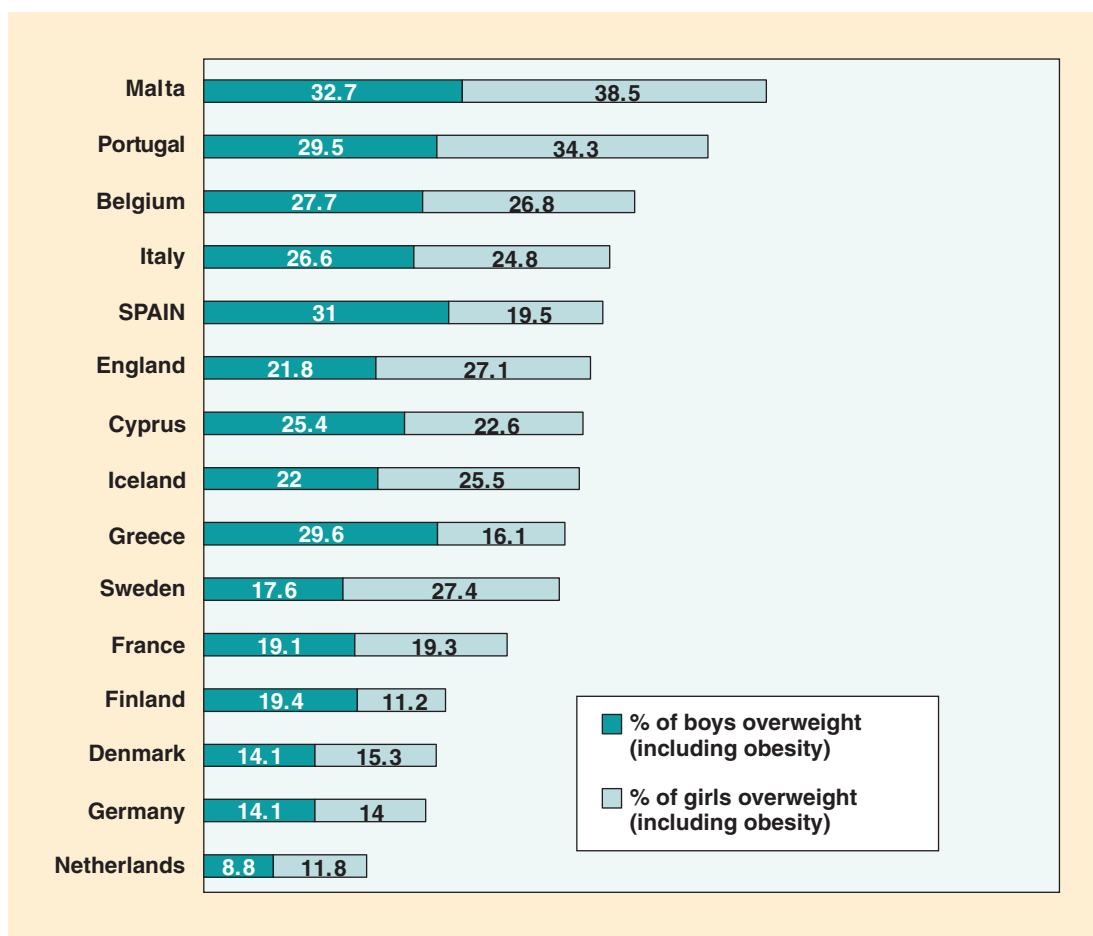
It is important to note that the distribution of body fat in young people, as in adults, is potentially a more important correlate of cardiovascular risk factors than the percentage of body fat. Studies in young people have shown that fat accumulation in the central (abdominal) region is associated with increased risk factors such as excessive blood triglycerides, low HDL cholesterol, hypertension, insulin resistance, endothelial dysfunction and arterial wall stiffness [44, 46, 47]. In comparison, fat accumulation around the lower body region (hips and thighs) is far less dangerous. Recent studies on Spanish children and adolescents [48, 49] have shown strong trends towards increased central fat distribution in this population, results that have worrying future health implications.

## 7. Overweight and obesity in Spanish young people

In Spain, research in 2003 indicated that the prevalence of overweight and obesity in the adult population was 38.5% and 14.5% respectively [50], and these values continue to increase [51]. However, of even greater concern are the statistics regarding overweight and obesity in Spanish children and adolescents. From 1998 to 2000, the prevalence of overweight and obesity was 26.3% and 13.9% respectively in this population [52] and the trend towards greater fatness in our youth shows no sign of slowing. The problem is especially pronounced in those aged 6-13 years of age. The statistics also reveal that the prevalence of overweight and obesity is higher in Spain in young males than young females (see Figure 8). From the mid 1980's to mid 1990's the incidence of obesity in those aged 6-7 years old in Spain increased from 23% to 35%, a value higher than that of the United States [53].

In comparison with other European countries, Spain is in an intermediate position in terms of adult obesity. However, our country has one of the highest rates of childhood overweight and obesity in Europe as shown below in Figure 8.

The burden of obesity-related illnesses to modern society is immense, both in terms of economic costs to health systems and, on an individual level, reduced quantity and quality of life. In Spain alone, it has been estimated that the direct and indirect costs associated with obesity comprise about 7% of total health expenditure, or approximately 2.5 billion euros per year.



**Figure 8.** Incidence of childhood overweight (including obesity) in both boys and girls within selected European countries. (data obtained from the website of the International Obesity Taskforce: <http://www.ionf.org/database/ChildhoodTablebyRegionFeb06.htm>)

## 8. Obesity and the NAOS initiative in Spain

The NAOS initiative (Strategy for Nutrition, Physical Activity and Prevention of Obesity) was launched in Spain on February 10 2005 by the Spanish Ministry of Health and Consumer Affairs in response to the WHO's request for member states to adapt the Global Strategy on Diet, Physical Activity and Health to their social and cultural environments [54]. It is the first strategy of its kind in Europe.

The NAOS initiative is anchored on the core goal of adopting a lifelong perspective in the prevention and control of obesity and encompasses recommendations for action in four fields:

1. Families and communities – action focuses on information and media campaigns, and the production and distribution of materials aimed at promoting improved eating habits and active lifestyles in children and adolescents.

2. Schools – actions comprise the inclusion of knowledge and skills related to diet, nutrition and physical activity in the academic curriculum, standards for menus served in dining rooms, and the products offered by, as well as location and advertising of, vending machines.
3. The private sector – collaboration agreements have been signed between the Ministry of Health and Consumer Affairs and the private sector.
4. The health system – actions have been designed to strengthen the leading roles played by paediatricians and other health staff in the prevention and early recognition of excessive weight gain.

More information on the NAOS initiative can be obtained from the Ministry of Health and Consumer Affairs, Madrid, Spain (<http://www.msc.es/>).

## 9. Further safety issues regarding physical activity in young people

### 9.1. Risk of traumatic or overuse injury:

A potential disadvantage of physical activity in youth is the possibility of injury. This presents several potential problems:

1. the short term negative consequences of injury for the child,
2. the possibility of injury recurrence,
3. the possibility of long term physical damage,
4. the possibility that injury sustained during sport or physical activity during childhood may leave a lasting negative impact on levels of physical activity during adulthood.

Injury usually occurs either when the activities themselves are inappropriate for the children concerned or are performed in a manner (eg. excessive intensity, lack of safe technique or equipment) that is inappropriate. From 6 to 12 years old the nature of physical activity revolves for most children around fun and joyful play. During this phase of life a child is learning about their body and about the principles of fair and safe play within sport and physical activity. It is important that these values are adhered to and that parents and teachers do not treat their children as mini adults, pushing them into competitive sports or activities that are not appropriate or enjoyable for them [55]. Excessive training or overuse injuries during this critical phase of life can compromise healthy growth and result in long term physical and psychological damage.

From 12 to 18 years of age, children's focus within sports and physical activity often shifts more towards competitive sports and situations. Sports injuries during this phase of life are usually due to the behaviour of the children themselves and are often due to inadequate or inappropriate education from 6 – 12 years. Therefore, it is

important that at an early age children are made aware of their risky behaviours (eg. dangerous tackling in football, failing to wear a helmet while biking or skating, etc.) and that they take personal responsibility to reduce the risk during their teenage years. If good values are taught at a younger age, when sport is still more about play than competition, sportsmanship and safe play in adolescence will represent a natural progression.

Fear of the risk of injury should never be a factor preventing a child from being physically active. In fact, the risk in **not** performing physical activity during one's youth far outweighs the risk of injury from participation in appropriate sports and physical pursuits. Sports and exercise injuries are, for the most part, entirely avoidable through attention towards the behaviour and attitudes of children and the adults who influence them [56]. The responsibility for instituting this change lies with parents, trainers, coaches, teachers and health professionals involved with physically active youth.

### 9.2. Risk of heat or cold injuries:

In Spain during the hotter months there is a real possibility of heat injury in children during outdoor play time. Such injuries include dehydration, heat exhaustion and sun burn. Common sense regarding the provision of sufficient fluids and water to children and also use of sun creams, protective clothing and hats can help to reduce the risks involved. Similarly, provision of sufficient clothing for children during outdoor play in winter time will reduce the possibility of cold injuries such as hypothermia.

### 9.3. Risk of drowning and other water injuries:

Given the high proportion of young people who engage in water-based leisure activities, especially during the summer months, this represents a real risk in terms of drowning, near drowning or other forms of injury related to play in or near water. Close adult supervision of children in an aquatic environment is obviously of critical importance.

#### **Key points:**

- There is an almost linear relationship between amount of physical activity performed and health status such that those who perform the most physical activity have the lowest risk of chronic disease.
- Activities of greater intensity (at least moderate intensity) may be particularly beneficial for health.
- Physical activity is critical for the health of young people as: (i) it enhances physical, mental and social health during childhood, (ii) there are health benefits of childhood activity that carryover to adulthood, and (iii) physical activity habits established during childhood tend to carryover into adulthood.

- Spanish young people, especially girls, are insufficiently physically active for health benefits and possess lower physical fitness in comparison to young people in other countries.
- Decreased physical activity is probably the major contributor to increasing levels of obesity in young people both in Spain and worldwide.
- Slowing or stopping the growing levels of childhood obesity within society will require broad-based public health changes that result in major changes in young people's physical activity and nutritional environments.
- Body mass index (BMI: weight [kg] / height [m<sup>2</sup>]) is the most widely used method of estimating overweight and obesity in the population. It is not a good method of assessing body composition on an individual level.
- Obesity is defined as an excess of body fat that increases health risks. During childhood, obesity is associated with negative psychosocial health and increased risk factors for cardiovascular diseases, some cancers, diabetes and arthritis, amongst other medical conditions.
- Overweight is excess weight relative to a desirable body weight. It is often viewed as the precursor to obesity.
- Overweight and obesity are difficult to define precisely in young people because large changes in body weight, height and composition occur as a normal consequence of healthy growth and development.
- Spain currently has one of the highest rates of childhood and adolescent obesity in Europe.
- The NAOS initiative (Strategy for Nutrition, Physical Activity and Prevention of Obesity) in Spain was launched in 2005 to combat the rising levels of obesity in our country.
- If physical activity is performed responsibly in young people, there are minimal injury or safety concerns. The risk of young people not participating in physical activity far outweighs the risk associated with participation.

## Physical Activity Recommendations for Young People

### *Chapter objectives:*

- To describe current guidelines for physical activity for young people and how they can successfully achieve them.
- To introduce the Exercise and Physical Activity Pyramid.
- To briefly describe the different methods of measuring physical activity in young people.
- To discuss the reasons why young people are less active in today's society.
- To discuss trends in physical activity participation during the transition from childhood to young adulthood.
- To outline strategies for the prevention of inactivity during adolescence.
- To describe the major influences on young people's physical activity behaviour.
- To briefly describe tactics for changing physical activity behaviour in young people.
- To describe gender differences in physical activity in children and adolescents.
- To describe issues related to social inequality regarding physical activity in young people.

### 1. Physical activity recommendations for children and adolescents

The current recommendations are:

1. **That young people should be accumulating at least 60 minutes (and up to several hours) of moderate-to-vigorous intensity physical activity on all or most days of the week.**
2. **At least twice a week this should include activities to improve bone health, muscle strength and flexibility.**

These are international consensus guidelines produced by experts worldwide in the field of physical activity and health [57]. These guidelines have been adopted by governmental public health bodies in several countries including the United Kingdom (Department of Health), the United States (Centers for Disease Control and Prevention) and Australia (Department of Health and Ageing).

## 2. How can children and adolescents achieve the physical activity recommendations?

It is important to understand that these physical activity guidelines are the *minimum* levels recommended for young people for health. As described previously, increases in physical activity above those recommended will result in further health gains for the vast majority of children and adolescents as there appears to be a graded linear relation between the amount of physical activity and health status.

Younger children can achieve the 60-minute target through the accumulation of bouts of activity of varying duration throughout the day. This can include short intermittent bouts of physical activity, as well as longer bouts such as when taking part in sports. This reflects young children's natural activity patterns, which include spontaneous play during breaks at school or close to home, walking to and from school, and programmed activity such as PE, sport, swimming or games.

It is important to stress that, at this age, *variety* of activity is important. For example, activities involving moderate to vigorous intensity activity will provide cardiorespiratory benefit. On the other hand, *all* movement that involves carrying body weight – such as walking – will help children and young people to maintain energy balance. For bone health, it is especially important for children to engage in bouts of weight-bearing activities that produce high physical stresses on the bones and joints – such as running, jumping, skipping, ball games or gymnastics. Active play involving carrying, climbing, and rough and tumble will help develop and maintain muscular fitness and flexibility. Such a range of different modes and intensities of activity will provide a full range of health benefits across all body systems.

While much of the above still holds for older children, adolescents will begin to adopt adult-like activity patterns and are likely to achieve the recommended activity levels through a different profile of activities. These might include walking to and from school, organized sports and games, a delivery round, exercise classes, and recreational activities such as dancing.

The activity patterns described above will promote a full range of health benefits. In order to make lifetime activity an attractive prospect to young people, it is critical that educational programmes help children and young people to experience enjoyment in a range of activities, to feel confident about their physical skills and their bodies, and to appreciate the importance and benefits of activity for health.

**Table 4.**  
How children and teenagers can achieve the recommended levels of activity.

Person	Activities
Young child	<ul style="list-style-type: none"> <li>– Daily walk to and from school.</li> <li>– Daily school activity sessions (breaks and clubs).</li> <li>– 3-4 afternoon or evening play opportunities.</li> <li>– Weekend: longer walks, visits to park or swimming pool, bike rides, etc.</li> </ul>
Teenager	<ul style="list-style-type: none"> <li>– Daily walk (or cycle) to and from school.</li> <li>– 3-4 organized or informal midweek sports or activities.</li> <li>– Weekend: walks, biking swimming, sports activities.</li> </ul>

Source: adapted from [58].

Below in Table 5 we describe five increasing “levels” of physical activity (including the recommended level), the typical activity pattern needed to achieve that level, and the health benefits that each level offers. The typical activity pattern for each level includes personal transport, and school-related and recreational activities. For any physical activity pattern, the resultant “level” is a composite measure of the activities performed, how often, how hard and for how long (type, frequency, intensity and time).

**Table 5.**  
Levels of physical activity

Level	Descriptor	Typical activity pattern	Health benefits
1	<b>Inactive</b>	<ul style="list-style-type: none"> <li>– Always driven to school or takes public transport.</li> <li>– Does very little PE or active play at school.</li> <li>– Spends a lot of time watching TV, surfing internet or playing video games at home.</li> <li>– No active recreation.</li> </ul>	Nil.
2	<b>Lightly active</b>	<p><i>Will do one or more of:</i></p> <ul style="list-style-type: none"> <li>– Some active commuting to school by foot or bike.</li> <li>– Some PE or active play at school (&lt;1 hour/day).</li> <li>– Some undemanding activities at home, such as sweeping, cleaning or garden activities.</li> <li>– Some active recreation at light intensity (&lt;1 hour/day).</li> </ul>	Some protection against chronic disease. Can be considered a «stepping stone» to the recommended level (level 3).
3	<b>Moderately active (recommended)</b>	<p><i>Will do one or more of:</i></p> <ul style="list-style-type: none"> <li>– Regular active commuting to school by foot or bike.</li> <li>– Active at school in PE or playtime (&gt;1 hour/day).</li> <li>– Regular household or garden activities.</li> <li>– Regular active recreation or sport at moderate intensity.</li> </ul>	High level of protection against chronic disease. Minimal risk of injury or adverse health effects.

### 3. The Physical Activity Pyramids for children and teens

Corbin’s Physical Activity Pyramids for children and teens [59, 60] (see figures 9 and 10) are useful tools for teaching young people how to weigh each component of health-related fitness as well as inactivity.



**Table 5. (Continued).**  
Levels of physical activity.

Level	Descriptor	Typical activity pattern	Health benefits
4	<b>Very active</b>	<p><i>Will do most of:</i></p> <ul style="list-style-type: none"> <li>Regular active commuting to school by foot or bike.</li> <li>Very active at school in PE or playtime (&gt;1 hour/day).</li> <li>Regular household or garden activities.</li> <li>Regular active recreation or sport at vigorous intensity.</li> </ul>	Maximal protection against chronic disease. Slight increase in risk of injury and possibly some other adverse health effects.
5	<b>Highly active</b>	<ul style="list-style-type: none"> <li>Performs high amounts of vigorous or very vigorous sports or training.</li> </ul>	Maximal protection against chronic disease. Increased risk of injury and possibly some other adverse health effects..

Source: Adapted from [58].



**Figure 9.** The Physical Activity Pyramid for children (From C.B. Corbin and R. Lindsey, 2007, *Fitness for Life*, Updated 5th ed, page 64. © 2007 by Charles B. Corbin and Ruth Lindsey. Reprinted with permission from Human Kinetics [Champaign, IL]).



Figure 10. The Physical Activity Pyramid for teens (From C.B. Corbin and R. Lindsey, 2007, Fitness for Life, Updated 5th ed, page 64. © 2007 by Charles B. Corbin and Ruth Lindsey. Reprinted with permission from Human Kinetics [Champaign, IL]).

## 4. Measurement of physical activity in young people

Levels of physical activity may be measured in young people in a number of different ways, each with their own strengths and limitations. The most accurate techniques for measuring physical activity include the use of doubly labelled water (a laboratory technique) and direct observation of physical activity. Both these techniques are highly objective and provide valid results. However, the former is very expensive and thus unsuitable for large studies. The latter requires the use of trained observers and is also unsuitable for large numbers of subjects.

Various other objective techniques can be used including measurement of heart rates (using a heart rate monitor strapped to the chest), accelerometry (small motion sensors usually attached to the waist) and pedometers (devices that measure steps taken). These techniques can be used on large numbers of subjects but all suffer from the drawbacks of requiring significant subject compliance (inconvenient for subjects). Accelerometers and pedometers also are unable to adequately measure several types of physical activity (eg. cycling or swimming).

Finally, various subjective techniques such as self-report, questionnaires, interviews and diaries can be used. They have the advantage of being relatively inexpensive and easy to use on large samples but all suffer from the problems related to recall errors and the subjective nature of self reporting. Children, in particular, have difficulty accurately recalling how active they were in previous days or weeks.

## 5. Why are children less active now?

It has been estimated that children today expend approximately 600 kcals per day less than their counterparts 50 years ago [23]. The reasons for this are likely multifactorial and probably include the following:

1. More sedentary recreational pursuits such as television, computer games and internet which have replaced outdoor play time.
2. Less physical education in schools.
3. Decreased opportunities for active recreational pursuits.
4. Increased motorized transport (eg. cars), especially to school.
5. Increased urbanization of towns and cities which are not conducive to safe active transport such as walking or cycling.
6. Increased mechanization within society (elevators, escalators, *etc.*).
7. Overprotective parenting and excessive concern about children's outdoor safety (eg. heavy traffic or fear of strangers).
8. An environment (home, school, society) that does not support physical activity (eg. obese, inactive parents).

## 6. Physical activity levels during the lifespan

Physical activity levels tend to decline as we get older [61]. The exact reasons for the decline in activity with age are unclear but there is probably a combination of biological, psychosocial and cultural factors. Biological factors include changes in the body with aging that may make exercise more difficult, unpleasant or uncomfortable. Probably a major reason for the declining physical activity with age, however, is one's changing attitudes towards exercise. In general, most young children have a

very positive attitude towards physical activity and exercise. However, as they grow older, their perception of exercise as a positive experience seems to become more ambiguous and the result is often reduced participation in physical activities. A major goal of current public health promotion strategies must be to work towards improving attitudes towards physical activity and exercise throughout the lifespan.

Data from many studies has shown that the steepest decline in physical activity during the lifespan tends to occur between the ages of 13 to 18 years [61]. Data on Spanish young people has indicated that the age at which physical activity begins to plateau or decrease may be earlier – around 11 years of age [34]. It has been estimated that depending on the type of physical activity assessment methodology used, there could be between 1.8% and 2.7% per year decline in reported physical activity among boys between 10 and 17 years old [62]. Estimated declines for girls were much more severe, ranging from 2.6% to 7.4% per year, depending on the method used to assess activity [62]. Therefore, we must be targeting individuals, especially girls, early in their lives (less than 10 years old) to ensure that their perceptions of physical activity remain positive and their participation continues into young adulthood and beyond. As outlined above, active youngsters are more likely to remain active adults.

## 7. Prevention of inactivity during adolescence

As discussed above, adolescence is a period of life where typically we see a rapid decline in participation in physical activity, especially in girls. One of the most important issues in addressing this problem is to ensure that prior to adolescence all children have established sound physical activity habits and that they have a positive attitude towards physical activity. If children have been pushed into certain sports or activities against their will, they will be more likely to reject those activities (and perhaps also the adults concerned) during adolescence when they want to demonstrate independence. Undoubtedly, adolescence is a period of life when significant developmental and social changes are occurring and these have the potential to interfere with the maintenance of physical activity. Adolescents typically report more barriers towards exercise and physical activity such as time constraints, lack of interest or desire or energy or motivation, unsuitable weather, having a girlfriend or boyfriend, barriers related to self-image and barriers related to other social factors [63-68]. These barriers must be understood in order to construct the best intervention strategies for this population for adoption or maintenance of physical activity.

Though the physical activity guidelines for children and adolescents are essentially the same, it should be obvious that the types of activities will change as we progress through childhood and into adolescence and young adulthood. Adolescents are more likely to adopt adult-like activity patterns and are likely to achieve the recommended activity levels through a different profile of activities than young children. As mentioned previously, such activities might include walking to and from school, organised sports and games, a delivery round, exercise classes, and recreational activities such as dancing.

Below in Table 6 is a list of issues/problems regarding physical activity in adolescents together with some suggestions for parents and other adults on how to help overcome these problems (adapted from [69]).

**Table 6.**  
Issues related to physical activity in adolescents and suggestions for adults

Issue/problem	What adults can do to help
1. Interests change with age. In childhood physical activity revolves around joyful play, with most games requiring movement. With the arrival of adolescence, they lose interest as other leisure-time alternatives become apparent.	1. Continue motivating adolescents to find physical activities that match their changing preferences.
2. Physical activities and sports often lose their appeal to adolescents. In childhood, physical activity is usually about non-competitive play. With the arrival of adolescence, competition within sports and physical activity becomes more common and physical activity or fitness goals may be perceived as unrealistic or irrelevant. Many adolescents will be put off by these factors and choose to spend their free time on inactive pursuits.	2. Teach them that physical activity and sport is an excellent way of occupying their free time, enjoying themselves, feeling good, making new friends and improving their health. Teach them that winning or being the best is not the most important thing, but that being an active person is very important.
3. Many more options are available to adolescents during their free time. Adolescence marks the onset of adulthood and new types of “adult” activities become possible that were previously forbidden or did not hold any interest. Many of these alternatives are often sedentary and unhealthy (eg. smoking, drinking, late night parties, etc)	3. There are strong socio-cultural pressures on adolescents regarding how to spend their free time. Adults have an important role to play in showing them that there are healthy alternatives. Although it may appear that they do not pay attention to us, they value our opinion.
4. Time conflicts start to appear. Usually schoolwork increases. Maybe a part time job. Also sometimes adolescents are called upon to help more with household or work tasks. In addition, in adolescence, there is often a greater desire to spend time with peers and relationships between the sexes begin.	4. In most cases there is no real lack of time, it is just a question of organizing it better. Help them to organize their timetables. Adults should involve themselves in what adolescents do in their free time and help them to find time to practice some form of physical activity.
5. Parents and teachers start to lose influence over adolescents while friends, peers and the social circle gain greater importance.	5. In many cases, what adolescents do in their free time will depend on what their peers do. If we have taught them about and followed an active lifestyle, it is more probable that they will maintain this in their daily lives.
6. Quite often parents and teachers consciously or subconsciously contribute to reduced adolescent participation in physical activity. Frequently adults do not encourage participation in extra-curricular activities so adolescents can dedicate more time to studying. On occasions, adults show less interest in the physical activity pastimes of adolescents, especially adolescent girls.	6. «Lack of time» for physical activity is usually a consequence of bad time management. Physical activity is necessary for adolescent health and may improve mental performance. A healthy perspective is needed here: if adolescents do not find the time for physical activity, they will sooner or later have to find the time for illness or disease. By not promoting physical activity, we are doing their health a disservice.
7. There may be little social value in physical activity. There is little social conscience that transmits the message that physical inactivity is unhealthy and unproductive (unlike obesity, smoking or drinking). This problem is especially pronounced in the case of girls, which likely contributes to their especially rapid decline in participation compared to boys.	7. If we are active ourselves, we set an excellent example to adolescents which they will be more likely to imitate. If we are not active role models, we should demonstrate that we are concerned about and value physical activity habits in adolescents.



## 8. Influences on childrens' and adolescents' physical activity behaviour

Why are some young people more physically active than others? This is an important question to ponder but unfortunately there is no simple answer as a number of influences are involved. Some of these influences are non-modifiable but most are modifiable to some degree. These are summarized in figure 11 below:

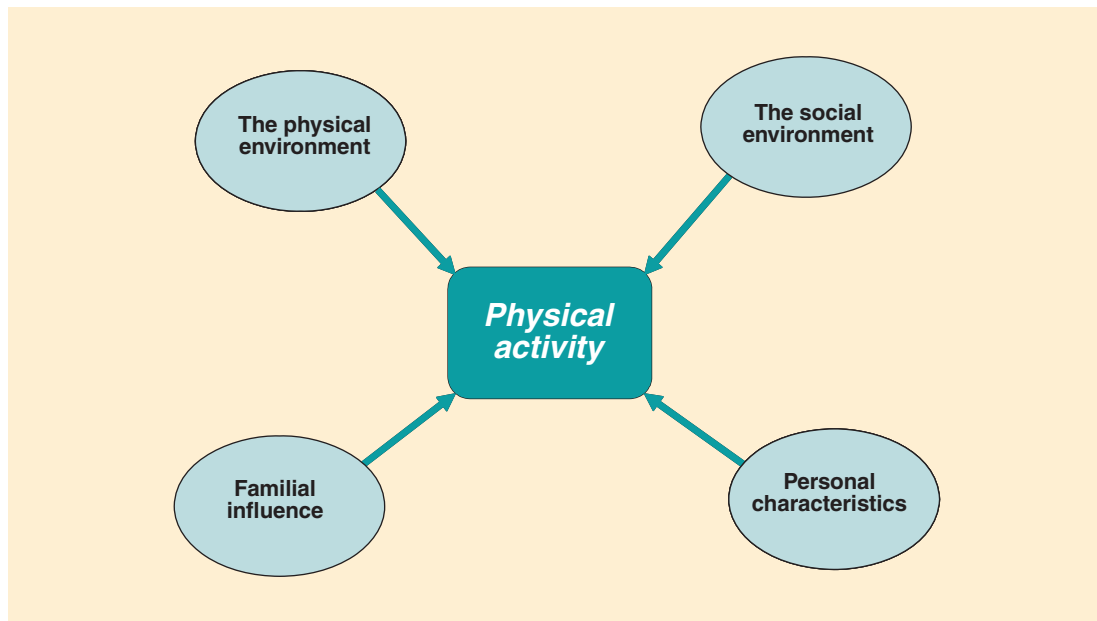


Figure 11. Influences on young people's physical activity behaviour.

### 8.1. Personal characteristics (individual and demographic factors)

Every child and adolescent possesses unique physical, developmental and psychological characteristics. It is important that each individual selects types of physical activity that are compatible with these characteristics. Some of the most basic personal characteristics are age and gender of the individual. The influence of age and gender on physical activity levels of young people are discussed in further detail elsewhere in this guide. Some activities are far more suited for girls vs. boys or for young children vs. adolescents (and vice-versa). In addition, some children will be motivated by organized sports whereas others will be far more suited to unstructured free play (boys and girls often differ in this respect) [55]. Some children may also have physical disabilities or other health conditions that influence the types of activities most suitable to them (also briefly discussed elsewhere in this guide). Ultimately, the most important factor is that children and adolescents feel competent at and enjoy the activities they do, which will increase the likelihood that they will continue to organize their lives so regular involvement occurs throughout the lifespan [70].

## 8.2. The familial environment

The immediate family environment (mother, father and siblings) is a strong influence on the physical activity levels of children and other health-related behaviours [65, 71-75]. If parents have a positive attitude towards physical activity they are more likely to provide motivational support for their children who are then more likely to become physically active [76]. Studies that have used objective methods (such as accelerometry) to measure children's physical activity and parent's physical activity have found significant associations between the two [74, 77, 78] indicating that parental modelling is also important.

## 8.3. The physical environment

There is a large body of research evidence that shows that the physical environment in which we live (and how we perceive it) can have a significant influence on levels of activity [70, 79-81]. For children and adolescents, some of the more important environmental factors associated with involvement in physical activity are access to facilities and equipment, competing attentions of television and computers, the season of the year and safety issues [70]. In the case of access to facilities and equipment, the school is a critical factor. Nearly all young people attend school, and therefore if schools promote physical activity and physical education to a greater degree, involvement will likely increase [82]. In adolescents, research has shown that there is a marked and significant impact of participation in school physical education and community recreation programs on their physical activity patterns [81]. Parents can also assist in promoting access to facilities and equipment during recreational time by purchasing sporting or physical activity equipment or providing transport to appropriate facilities. If children are placed into situations where they have the opportunity to be active, they often will become active. If children are taken outdoors or away from the home environment, they will also have less time available to engage in sedentary activities such as television viewing and surfing the internet. In addition to increasing time available for active pursuits, a reduction in television viewing time may be particularly beneficial given its association with the consumption of energy dense foods that may contribute to obesity [83].

It has been consistently shown that children are less active in the winter than in summer, probably because they are less inclined to go outside and consequently more likely to watch TV or use the computer [70]. Therefore, in winter greater efforts must be made to encourage both outdoor and indoor activities.

Given that time outdoors is strongly related to physical activity [84, 85], an increasingly important environmental determinant of physical activity is the physical safety of the surroundings and environment. Reduced safety or perception of safety in the environment (including school) can be a significant barrier to physical activity, either by parental decision or control or by the children themselves. This is especially apparent regarding the issue of active transportation to school. The number of children who walk or cycle to school has reduced because of concerns surrounding pedestrian

or road safety. The issue of reduced perception of personal safety is one that affects all society, and will require efforts from many areas to address.

Research has also shown that gender has a significant impact on how conducive the environment is seen to be to physical activity [80]. Therefore, interventions designed to increase physical activity by improving perceptions of the environment will probably need to be different for boys and girls.

#### 8.4. The social environment

In addition to familial influence, other social influences on physical activity behaviour among children and adolescents include peer pressure (*ie.* influence of friends), influence of other adults (*eg.* teachers or coaches) or other role modelling (*eg.* professional athletes) [70, 86]. Peer influences for physical activity behaviour among adolescents may actually replace the substantial parental influences observed in younger children. In a study of adolescents, influences of a best friend were more highly associated with physical activity behaviour than influences of parents [87]. Peer influences also appear to be quite important with respect to participation in organized sports [88], a large and growing source of physical activity among children and adolescents. Moreover, such peer influences may be more available to boys than to girls, thus pushing boys to be more active than girls. This may help to explain the much more rapid decline in physical activity participation among girls as they move into adolescence.

As mentioned above, the school is a critical part of the social environment for children and adolescents as they spend a large amount of their time there and it contains a number of important influences, including friends, teachers and opportunities (*eg.* facilities and physical education) for physical activity.

Table 7 summarizes some important motivating factors and demotivating factors regarding physical activity in children and adolescents:

**Table 7**  
Motivational and demotivational factors regarding physical activity in young people.

**Motivational factors:**

- Enjoyment.
- Supportive familial environment and parental role modelling.
- Direct involvement with other enthusiastic adults who act as role models (*eg.* teachers, coaches, *etc.*).
- Indirect role modelling (*eg.* professional athlete).
- Peer involvement.
- Easy accessibility to facilities and equipment.
- Feelings of safety and security.
- Feelings of competence (self-efficacy) and improvement.
- Feelings of being in good physical condition (*eg.* not overweight).
- Feeling that the activity chosen is a personal choice (no coercion).
- Experimenting with a variety of activities and movements.
- Good weather.



**Table 7 (Continued).**  
Motivational and demotivational factors regarding physical activity in young people.

**Demotivational factors:**

- Lack of enjoyment.
- Unsupportive familial environment with no parental modelling.
- Lack of other adult role models.
- Unsupportive social environment (peers, teachers, *etc.*).
- Access to facilities or equipment is difficult.
- Perception that personal safety is at risk or frequent injuries.
- Perception that skills are unattainable (too difficult).
- Feelings of incompetence (lack of self-efficacy) and lack of improvement
- Feelings of embarrassment (*eg.* overweight children).
- Lack of choice or feeling pressure to play or compete.
- Activity is “forced”, *eg.* used as punishment.
- Continually doing the same activity over and over again (repetition).
- Placing more importance on winning than playing.
- Bad weather.

## 9. Changing physical activity behaviour in young people

Behaviour change takes time and effort, regardless of the population involved. Numerous cognitive behaviour models have been used to study behavioural choices and behavioural change in regards to physical activity [89]. All are rooted upon the assumption that individuals decide what to do based on the extent to which they expect that their choices will produce results that they value. Probably the most important factors to consider when attempting to change physical activity behaviour are motivations and barriers to physical activity, physical activity-related beliefs, attitudes and self-efficacy, and formulation of self-perceptions and identity towards physical activity [90]. Knowledge of these factors allows one to better understand the individual(s) concerned and therefore optimize the chances that they will embark on, and adhere to, physical activity.

Recently, Welk [91] proposed a model (see Figure 12) to specifically predict physical activity behaviour in youth that incorporates the influences discussed above, together with two domains related to psychological issues (“Am I able?” and “Is it worth it?”). The Youth Physical Activity Promotion Model is a promising tool for explaining and predicting physical activity behaviour in young people and can be used to provide guidance for more effective promotion of physical activity in this population.

In the section of this guide devoted to practical recommendations for promoting physical activity, some simple and practical information is provided regarding how to promote behaviour change of children and adolescents.

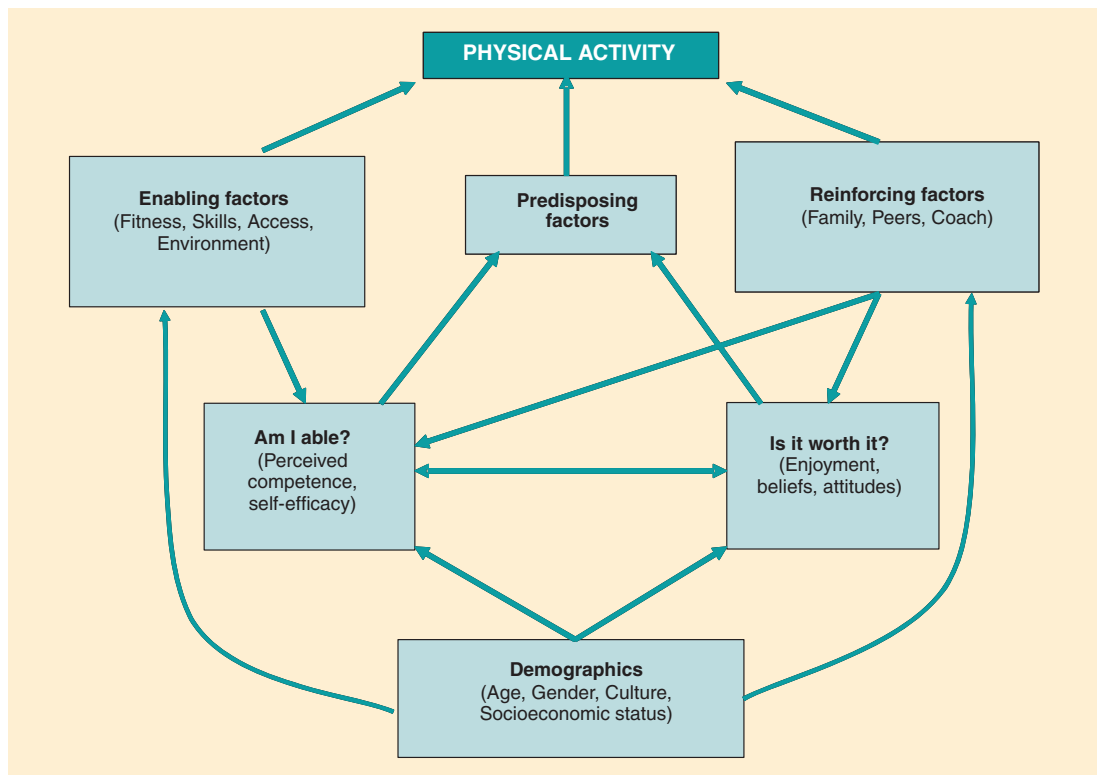


Figure 12. The Youth Physical Activity Promotion Model [91]

## 10. Physical activity in young people and gender inequality

In Spain and in many other countries, girls have been found to be less physically active than boys, especially during adolescence [34, 66, 92, 93]. It has been reported that aerobic (cardiorespiratory) fitness relative to body mass remains stable from age 6 to 16 in males, but for females it declines about 2% each year and that, overall, school aged males are about 25% fitter than females [62]. This gender difference is almost certainly linked to the greater decline in participation of girls in physical activity during the school age years (approximately 7.4% per year) in comparison to boys (approximately 2.7% per year) [62].

The logical question is why is there such a discrepancy between boys and girls in levels of physical activity during the school age years? The answer is likely to be multifactorial, with a complex interplay of developmental, environmental and social issues. Possible mechanisms that have been proposed include differential development of motor skills, differences in body composition during growth and maturation and greater socialization towards sports and physical activity [70]. The latter may be due to a subconscious gender bias whereby boys are inadvertently encouraged more by parents and teachers in matters relating to physical activity. Unfortunately, embedded deep in the psyche of many adults is the notion that physical activity is more of a masculine pastime. This bias is often difficult for the adults themselves to detect. However, it is important that these biases are detected, so that young girls can be equally en-

couraged to adopt and maintain physical activity. If this can be accomplished with young girls (less than 10 years old), there is a greater chance that these individuals will continue their physical activity into adolescence and young adulthood, with the concomitant health benefits.

Below are some questions that were developed for physical education teachers but may be useful for all child educators to review regarding gender equity in class (adapted from [94]):

- Is your physical education curriculum gender inclusive?
- Do students participate in gender-integrated classes?
- Are teaching styles varied to accommodate different learning styles and preferences?
- Is gender inclusive language used?
- Do instructional materials portray both genders as active participants in a variety of activities?
- [Do you give] equal attention to boys and girls during classroom practices such as questioning, demonstration and feedback?
- Are local community resources used to help erode gender barriers to sport participation?
- Is time consistently reserved for gender dialogue?
- Do you hold high expectations for both boys and girls?
- Is gender equity a pervasive schoolwide goal?

The barriers to physical activity in girls (especially adolescent girls) are often quite distinct from those of boys of the same age bracket [63, 65-68, 95, 96]. Girls often report more body-related and social barriers towards physical activity. Therefore, it is very important that interventions designed to increase levels of physical activity in young people are sensitive to this fact. Interventions targeted at younger populations that disregard these gender differences will, at best, be partially successful.

Below in table 8 are various issues and problems related to physical activity equality between young male and female children and suggestions for adults (adapted from [69]). This list was originally developed for parents but is useful for all child educators to review.

**Table 8**  
Issues related to physical activity gender equality in children

Issue/Problem	What adults can do to help
1. We tend to encourage young boys more than young girls to be active.	1. The health benefits are similar for both genders. Encourage them equally.
2. The most popular and accessible sports and games tend to be those that appeal to boys more than girls (eg. football, basketball, etc.).	2. Ask those responsible in schools and the community that there are activities suitable for and that appeal to girls as well. Find out the interests of your daughter and value her needs.

**Table 8 (Continued).**  
Issues related to physical activity gender equality in children

Issue/Problem	What adults can do to help
3. The way in which we tend to clothe girls and boys affects their ease of movement. Much of the clothing typically used for girls is not the most appropriate for free movement.	3. Dress them daily with comfortable clothes, which allow them to play freely without excessive concern about dirtying or damaging the clothes.
4. Boys often value activities involving motor skills. In girls, the aesthetic aspects of physical activity are often more important (being pretty or graceful).	4. Ensure that they know that you value their activities, whatever they are.
5. The majority of physical activities and sports are associated with one gender or the other. The idea still exists that there are masculine activities and feminine activities, and often the masculine activities are more numerous and accessible.	5. Don't treat sports or games stereotypically - it's no problem if girls play football or boys play with a skipping rope.
6. Girls frequently have less free time to play than boys, because they are often required to help with household chores.	6. Many domestic activities are physical activities of a moderate intensity, suitable for health, although they can be boring. Make sure everyone in the home is involved in these tasks, including the boys!
7. Girls are often bought less sporting material than boys by their parents. Girls' gifts often reinforce involvement with inactive games or pastimes.	7. Buy or provide them with sporting equipment such as balls, tennis racquets, skates, etc., just as you would the boys.
8. Elite female athletes are often valued less than their elite male counterparts. TV and other media outlets do not devote the same attention to the women.	8. When they are old enough to understand, discuss these things with them. Compensate for this by highlighting the importance of female athletes.
9. There are less female than male athlete role models for physical activity.	9. Try to compensate for this with your own encouragement and role modelling to practice physical activity and sports habitually.
10. The result of this differential treatment is that in all ages and social groups, women behave in a less active manner than men.	10. Educate all children about an active lifestyle. Do physical activity with them as often as you can. As they grow up, encourage them to stick with healthy activity habits!

## 11. Physical activity in young people and social inequality

A large body of research exists regarding the effect of social factors such as educational status, socioeconomic status and cultural background (ethnicity) on various health related behaviours and characteristics (such as physical activity and obesity). In general, it has been shown that those children from lower socioeconomic families and minority ethnic groups tend to have a higher incidence of health damaging behaviours such as physical inactivity and that these behaviours are then more likely to track into adulthood [97-102]. The reasons for these findings are probably a complex mix of factors. Common barriers that are reported towards physical activity in young people from low income families or ethnic minorities are related to the physical environment or neighbourhood where they live [102]. These include unsafe streets, dilapidated parks and play areas and a lack of facilities.

There has been little published research in Spain on the topic of physical activity in young people from lower income and ethnic minority families. Research has shown, however, that obesity is more prevalent among those with the lowest socioeconomic and educational levels in Spain [52], which implies that physical activity in this population is probably lower. It is important that interventions aimed at schools, homes and communities that are designed to increase physical activity in young people are sensitive to the challenges faced by children from different cultural groups and families of lower socioeconomic status. The beliefs and values of the diverse cultures represented in a community need to be integrated into physical activity interventions to foster family and community empowerment and ownership. The avenues that hold the greatest potential for success in these communities include improving the social and physical environment and also increasing education and awareness of the importance of physical activity for the health of children and adolescents [102]. These communities are the most in need of education and assistance on the issue of physical activity in young people and it is essential that they are treated as a priority population in this respect.

**Key points:**

- Current recommendations state that young people should accumulate at least 60 minutes of moderate-to-vigorous intensity physical activity on all or most days of the week. At least twice a week this should include activities that improve bone health, muscle strength and flexibility.
- These physical activity guidelines are the minimum levels recommended for young people for health – more physical activity will lead to greater health benefits.
- In young children, these guidelines can be met through accumulation of shorter bouts of daily physical activity (eg. unstructured spontaneous play), walking to and from school, and other programmed activities, etc. A wide variety of physical activities is especially important in this age group.
- In older children and adolescents, the guidelines can be met through activity patterns that are more adult-like in nature, such as walking to and from school, organized sports and games, and other recreational activities.
- Physical activity can be measured in several different ways, both objectively and subjectively, each with their own strengths and limitations
- Modern children are less physically active than ever before due to changes in our physical and social environment that have discouraged physical activity.
- Physical activity levels tend to decline with age with the steepest decline occurring during adolescence, especially in girls.
- Special efforts must be made to ensure that physical activity is maintained during adolescence in both girls and boys.

- The major influences on levels of physical activity in young people are: (i) personal characteristics, (ii) the familial environment, (iii) the physical environment, and (iv) the social environment.
- In order to effectively change the physical activity behaviour of young people adults must understand young peoples' motivations and barriers to physical activity and their beliefs, attitudes, self-efficacy and self-perceptions towards physical activity. These factors are age- and gender-sensitive.
- Adults must strive to ensure that gender equality exists regarding physical activity. Girls and boys must be equally encouraged to be physically active.
- Young people from low socioeconomic families or ethnic minorities may be especially prone to physical inactivity and obesity. Special efforts must be made to ensure that physical activity is promoted in these groups with sensitivity towards cultural values and beliefs.



## Practical Suggestions for the promotion of Physical Activity in young People

### *Chapter objectives:*

- To outline some practical suggestions for encouraging lifelong physical activity among young people for parents, guardians, teachers, athletic coaches, camp / activity monitors, school administrators, community sports / recreation supervisors, health professionals and others.
- To discuss some important factors to consider regarding physical activity selection in young people.
- To outline a five step process for encouraging behaviour change in young people regarding physical activity.
- To suggest ideas for classroom-based projects and activities that may be used to promote physical activity.
- To describe some “real life” approaches that have been used by instructors of different subjects and in different settings to promote physical activity.
- To discuss the importance of inclusion of all young people in physical education and physical activity with emphasis on the categories of students with disabilities, gender, cultural inclusion, ability, very low fitness or obesity and asthma.

This chapter provides some practical ideas about how physical activity can be promoted within classrooms and elsewhere in the community. As an individual involved with young people, you probably already have many ideas of your own. The purpose is to stimulate further conversation and interest about physical activity in young people and to get them to try new things that will make them more active. The goal is to increase their exposure to the need for physical activity and its importance to their overall health and development in an effort to increase their activity and reduce non-active pursuits.

There are numerous activities that young people can do. Perhaps you could incorporate some of them in your normal teaching or instructional routines. You could



encourage a physical activity project for a week or even a month to build momentum for the ideas. Recognizing that learning takes many forms, we are suggesting that you build physical activity into a number of lessons so that the information is repeated and reinforced over a series of classes.

There is no doubt that behaviour change takes effort. We will provide you with some basic information regarding behaviour change in young people and also provide you with some stories from other teachers who have used these steps successfully. These stories show that teacher's efforts do not need to be complicated and they do work!

Let's help to build physical activity into the daily lives of Spain's young people. By doing so, you may help to create a pattern that will stay with them for the rest of their lives.

## 1. Practical suggestions for encouraging lifelong physical activity among young people

The levels of physical activity and physical fitness among Spain's young people must be improved. It is the responsibility of all adults in our society to assist children in including physical activity in their daily routines. If you are a parent, guardian, teacher, athletic coach, camp / activity monitor, school administrator, community sports / recreation supervisor, health professional or anyone else who cares about the health of young people, some practical suggestions are provided below (adapted from [93] and [103]):

*Everyone can:*

- advocate for convenient, safe and adequate places for young people to play and take part in physical activity programs;
- encourage school administrators and board members to support daily physical activity and other school programs that promote lifelong physical activity, not just competitive sports;
- set a good example by being physically active, making healthy nutrition choices, and not smoking;
- tell young people about sports and recreation programs in their community; and
- discourage the use of physical activity as punishment.

*Parents or guardians can:*

- encourage your children to be physically active;
- learn what your children want from physical activity programs and help them choose appropriate activities;

- volunteer to help your children's sports teams and recreation programs;
- play and be physically active with your children; and
- teach your children safety rules and make sure that they have the clothing and equipment necessary for safe participation in physical activity
- teach your children the principles of fair play and sportsmanship within sports and physical activity.

*Teachers, coaches and camp / activity monitors can:*

- use curricula that follow the national standards for physical education and health education;
- keep students moving during physical education classes;
- ensure that young people know safety rules and use appropriate protective clothing and equipment;
- ensure your children understand the principles of fair play and sportsmanship within sports and physical activity;
- emphasize participation, activity and enjoyment over competition;
- expose students to a number of different choices of sports and physical activities;
- help students become competent in many motor and behavioural skills;
- involve families and community organizations in physical activity programs; and
- avoid using physical activity, such as doing push-ups or doing extra laps, as punishment.

*School administrators can:*

- require health education and daily physical activity for all students;
- ensure that physical education and extracurricular programs offer lifelong activities such as walking and dancing;
- provide time during the day, such as recess, for unstructured physical activity such as walking, jumping rope or playing in playgrounds;
- hire physical activity specialists and qualified coaches;
- ensure that school facilities are clean, safe, and open to students during non-school hours and vacations;
- provide health promotion programs for staff members; and
- provide teachers with in-service training in physical activity promotion.

*Community sports / recreation supervisors can:*

- provide a mix of competitive team sports and non-competitive, lifelong fitness and recreation activities;
- increase the availability of parks, public swimming pools, hiking and biking trails, and other places for physical activity;
- ensure that physical facilities meet or exceed safety standards;
- ensure that coaches have appropriate coaching competencies; and
- work with schools, businesses, and community groups to ensure that low-income young people have transportation and appropriate equipment for physical activity programs.

*Health professionals (such as doctors, physiotherapists, dieticians, fitness experts, etc.) can:*

- Provide assessments of children's physical activity levels
- Screen children for overweight/obesity status, non-insulin dependent diabetes mellitus, and other diseases or risk factors.
- Refer children to high quality school or community physical activity programs whenever appropriate.
- Advocate for school environments that are conducive to physical activity.
- Advocate for community environments that are conducive to physical activity.
- Advocate and create home environments that are conducive to physical activity.
- Counsel children on how and why they should be physically active.
- Understand and be sensitive to cultural practices or beliefs that may interfere with physical activity.
- Promote physical activities and programs that do not offend or ignore cultural beliefs.
- Set reasonable, attainable short-term and long-term physical activity goals.

## 2. Selecting appropriate physical activities for young people

There are countless different types of physical activities that young people can do. It is impractical to list them all here. Certain types of activities may be more appropriate than others depending on the characteristics of the individual concerned such as age, gender, body type, personality traits, cultural background, etc. It is important that young children are exposed to a number of different physical activities and sports so that they have a chance to discover what activities they enjoy and in which they are proficient as these are factors that influence how likely they are to stick with the activity.

In addition, exposure to numerous different sports while growing up will probably result in more complete physical and skill development as different facets of physical fitness and motor development are taxed.

To enhance the probability of a child or adolescent sticking with a certain sport or activity, the characteristics of that activity should favour the characteristics of the individual. For example, some children may be competitive in nature and therefore will probably be more suited to competitive vs. non-competitive activities. Another important consideration is the issue of team vs. individual sports. More extrovert and sociable children may feel more comfortable in team sports scenarios (eg. rugby or handball) whereas other less sociable or shy children may prefer individual sports or activities (eg. skating or jogging). Some children with natural hand-eye or foot-eye coordination will likely be attracted to sports requiring those traits (eg. racquet sports or football) whereas those lacking these skills may become easily frustrated or discouraged. Some young people will be attracted to activities that are highly structured (eg. rules-based sports and games) whereas others will prefer less structured activities with minimal rules or restrictions. The level of perceived risk or uncertainty in an activity (eg. wall/rock climbing or surfing) may be a motivational factor for some bolder young people whereas others will gravitate towards predictable activities where they perceive minimal risk. More adventurous young people may need a higher level of stimulation to keep them challenged and therefore may be more likely to be attracted to activities such as waterslides in swimming pools, assault or high ropes courses, paintball or other adventurous pursuits. Ultimately, there are numerous possible ways of classifying activities – the most important factor is that children are provided with variety and choice and that adults are sensitive to their abilities and wishes. The bottom line is that activities should be fun and interesting for young people so that they take a positive attitude towards physical activity into adolescence and adulthood.

Parents and other adults must ensure that they do not pressure children and adolescents to take part in certain sports or activities as discussed previously [55]. It is also important to remember that a child's physical activity preferences often change as they progress into adolescence. As long as adolescents remain physically active, the choice of physical activity is of secondary importance.

Adults must remember that young people have rights when it comes towards sports and physical activity which include [104]:

- The right to participate.
- The right to participate at a level compatible with each individual's maturity and ability.
- The right to have qualified adult leadership.
- The right to play as a child and not as an adult.
- The right to share in the leadership and decision-making of their physical activity participation.
- The right to participate in safe and healthy environments.

- The right to proper preparation for participation in sports and physical activity.
- The right to equal opportunity to strive for success.
- The right to be treated with dignity.
- The right to have fun in sports and physical activity.

### 3. How to encourage behaviour change in young people

The following five step process can be used by teachers to assist in promoting physical activity in young people [105]:

**1. Develop awareness:** involve children and adolescents in the process. They will be far more motivated if they play an active part in the decision making process and are not just passive recipients of instruction. Talk to them about the benefits of physical activity and discuss possible barriers. Discuss different types of physical activity and help them become aware of how much activity they do now and how inactive they may be. This helps them pay attention to what they do with their time, which is essential to the next step.

**2. Set goals:** goal setting is a part of any change process and helps young people monitor themselves and measure their own progress. In a classroom situation this may include a class goal to which all the students in the class can contribute. Encourage small incremental steps. Try to reach the goal, assess, revise, reset and try again. With adolescents in particular, one can help them negotiate their own goals so that they are involved in making suggestions and revisions to their plans. Examples of goals may be using a pedometer to walk 2,000 more steps than normal each day of the week or trying one new activity every two months, *etc.*

**3. Give specific feedback and praise:** Provide helpful, specific feedback about activities tried and goals set on a regular basis. Praise and reward small steps. For example, provide T-shirts after achieving a significant goal, or social recognition within the class environment, *etc.*

**4. Get them to commit:** Talk about activity goals frequently and publicly (with the whole class) to encourage them to do what they said they would do. A log of physical activities may be kept in a diary, for example, to assist them in committing to their goals.

**5. Reward and recognize change:** Reinforce new behaviour and celebrate successes through rewards and recognition. For example, at the end of the school year a party may be held with prizes for achievement of physical activity goals.

The most important ideas to emphasize in the classroom are:

- Physical activity is fun. Every child, no matter their age, height, weight, natural abilities or skills needs to learn that physical activity is fun and it does not have to be competitive. While participation in sports is encouraged, children and adolescents need to know that sports are not the only way to stay active. Not all children enjoy competition. For these children, physical activity alternatives such as walking to school, household chores, biking, skating, dancing, climbing and other activities are essential.
- Everyone needs physical activity to be healthy and strong.
- Take a first step! Try something new!
- Children and adolescents also need moderate-to-vigorous activity for healthy growth and development. That is, activity that makes their heart beat faster, makes them breathe deeper and their bodies sweat/perspire.

## 4. Some important things for older children and adolescents to know

### 1. *Only approximately one third of young people in Spain are active enough for healthy growth and development.*

- Ask the class why they think this is true. Discuss with them what they do with their time and how much of their day is devoted to physical activities.
- Ask the class what types of physical activity they like and why they like those particular activities.
- Ask the class what has changed in their generation to make them less active than their parents were at the same age. This will probably start a discussion about television, computers, *etc.*
- Ask them about problems or barriers regarding adopting or maintaining physical activity. Probably many of them will raise the issue of a “lack of time.” How can they overcome these barriers?

### 2. *Health benefits come from doing the right variety of physical activities*

- Ask the class what types of activities they should be doing. Start a chart with each type of activity as a heading at the top of a column.
- Ask them what these activities are like and what effect they have on the body. Add these notes to the chart under the appropriate heading.
- You can use the information provided earlier in this guide that breaks down physical activities into aerobic (cardiovascular endurance), strength, flexibility and coordination activities.

**3. There are many good activities from which to choose.**

- Sports are great but there are many other kinds of non-competitive, unstructured physical activities.
- Ask the class to help you build a list. Add all the suggestions to the chart you have started, putting each activity in the correct column. The list may include the activities below in Table 9.

**4. Tell them the physical activity guidelines for young people.**

- Tell them they can accumulate time throughout the day with smaller chunks of activity.
- Talk to them about what is meant by “moderate-to-vigorous” physical activity.

**Table 9.**  
List of possible physical activities in young children and adolescents

Young children (<10 years)	Older children/adolescents (>10 years)
<ul style="list-style-type: none"> <li><input type="checkbox"/> Walking to school</li> <li><input type="checkbox"/> Walking with parents</li> <li><input type="checkbox"/> Using stairs</li> <li><input type="checkbox"/> Running</li> <li><input type="checkbox"/> Dancing</li> <li><input type="checkbox"/> Carrying shopping bags</li> <li><input type="checkbox"/> Playing hide and seek or tag</li> <li><input type="checkbox"/> Playing in playground</li> <li><input type="checkbox"/> Playing at the beach</li> <li><input type="checkbox"/> Climbing trees</li> <li><input type="checkbox"/> Skipping rope</li> <li><input type="checkbox"/> Playing football</li> <li><input type="checkbox"/> Throwing and catching</li> <li><input type="checkbox"/> Riding bicycle</li> <li><input type="checkbox"/> Playing with friends or parents</li> <li><input type="checkbox"/> Treasure hunt</li> <li><input type="checkbox"/> Skating</li> <li><input type="checkbox"/> Swimming</li> <li><input type="checkbox"/> Skiing</li> <li><input type="checkbox"/> Helping in garden</li> <li><input type="checkbox"/> Treasure hunt</li> <li><input type="checkbox"/> Playing with frisbee</li> <li><input type="checkbox"/> Etc.</li> </ul>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Walking or cycling to school</li> <li><input type="checkbox"/> Walking the dog</li> <li><input type="checkbox"/> Using stairs</li> <li><input type="checkbox"/> Running</li> <li><input type="checkbox"/> Hiking</li> <li><input type="checkbox"/> Cycling</li> <li><input type="checkbox"/> Swimming</li> <li><input type="checkbox"/> Jogging</li> <li><input type="checkbox"/> Activities with friends</li> <li><input type="checkbox"/> Horseriding</li> <li><input type="checkbox"/> Gymnastics</li> <li><input type="checkbox"/> Athletics</li> <li><input type="checkbox"/> Ice skating</li> <li><input type="checkbox"/> Climbing</li> <li><input type="checkbox"/> Skiing</li> <li><input type="checkbox"/> Snowboarding</li> <li><input type="checkbox"/> Surfing</li> <li><input type="checkbox"/> Sailing or windsurfing</li> <li><input type="checkbox"/> Basketball</li> <li><input type="checkbox"/> Volleyball</li> <li><input type="checkbox"/> In-line skating</li> <li><input type="checkbox"/> Football</li> <li><input type="checkbox"/> Tennis</li> <li><input type="checkbox"/> Padel</li> <li><input type="checkbox"/> Badminton</li> <li><input type="checkbox"/> Dancing</li> <li><input type="checkbox"/> Martial arts</li> <li><input type="checkbox"/> Yoga</li> <li><input type="checkbox"/> Skateboarding</li> <li><input type="checkbox"/> Paintball</li> <li><input type="checkbox"/> Etc.</li> </ul>



- Ask them about their sedentary activities such as watching the television and playing on the computer. Do they spend more than two hours a day doing these activities? Can they reduce this sedentary time?
- Do they think that the physical activity guidelines are achievable?

## 5. Possible classroom projects for children and adolescents

1. From discussions held in class, estimate how much physical activity is done by the class on a daily basis. Set a class goal to reach by the end of the week and month.
2. Challenge another class from the same age group to see which class can make the biggest improvement. Put up a chart so that the kids can fill in their activities and the amount of time every day when they get to school. Celebrate the improvements.
3. Take the class for a nature walk or a treasure hunt.
4. Encourage the more active youth to help those who are less active to try new things. This will serve two purposes. It will increase the physical activity levels of the non-active youth and it will increase the more active youth's efforts.
5. Encourage young people to sign up for the physical activity opportunities in your school – house leagues, after-school sports, physical education class, *etc.*
6. Create bulletin boards and display pictures and stories with an activity theme. For example, display pictures of school athletes and school teams, *etc.*
7. Celebrate physical activity with theme days such as “walk to school days”.

## 6. Ideas tried by instructors for promotion of physical activity in school classes and elsewhere in the community

Below are examples of how instructors of various different subjects and in various different settings have successfully promoted physical activity in their classes, while simultaneously ensuring that pupils are learning and having fun (adapted from [105]). These scenarios are purely examples of what other instructors have tried with some success. There are countless methods that can be used – creativity is the key.

### 6.1. To introduce physical activity *Eva started a class week project*

Eva is a maths teacher. She was concerned about the physical inactivity problem in young people in Spain and decided to contribute through her maths classes. She spoke to the PE teacher at the school and together they developed a plan for increasing awareness of physical activity issues. Students had to register all the physical



activities they perform in a week and that data was then used in her maths classes. For example, students calculated the energy expenditure of walking 15 minutes to school, calculated how many minutes per week they walked or engaged in recreational activities, calculated how many steps they performed in a typical day, etc. These data were then discussed in class to raise awareness of whether students achieved the recommended physical activity guidelines for health.

### **6.2. Pedro asked the kids in his summer camp to build equipment for physical activity**

Pedro is a monitor in a summer camp for 12-14 year olds that lasts all of July. He decided to dedicate some of his craftwork sessions with the kids (one hour a day) towards promoting physical activity. He challenged them to design and build items of sports equipment that they could then use for activities within the camp. He talked to the people in charge of the camp who were very supportive of his idea and they also provided some suggestions that helped him improve his idea. The students were extremely creative and made items such as dumbbells, hockey sticks, lacrosse sticks, goal posts, basketball hoops, etc. using materials such as wooden sticks, old plastic bottles and sand.

### **6.3. Gonzalo's class was learning about their bodies. He decided to incorporate the importance of physical activity in his biology classes**

When they were learning about the heart and lungs, Gonzalo borrowed a stethoscope from his friend who was a doctor and decided to let the children hear their own heartbeats before and after vigorous physical activity. He showed them how their hearts beat faster when they do activities that make them warm. He pointed out that this kind of activity also makes their lungs work harder as they breathe more deeply.

He asked the kids to help him make a large wall chart of activities that they do to work their heart and lungs. He put up a poster of the human body. Each lesson became an opportunity to discuss how physical activity contributed to the healthy development of muscles, organs and bones. As part of this work, he asked the kids each day what they had done to work their hearts and muscles, and he ticked those off on the poster.

Throughout his lessons on the body was the message that physical activity makes the body work better. Each day, the children were asked to try an activity that would work the part of the body that was being discussed. The next day they would report back on how the activity felt and Gonzalo would tick off the activity on the wall chart.

### **6.4. Pepa promotes the health benefits of physical activity in her**

### **swimming classes at the community pool**

Pepa works as a monitor at the community swimming pool. She teaches children aged 9 to 11 years old how to swim. She decided to include in her classes new activities to promote the health benefits of exercise. One day she collected all the flutter boards and stuck a plastic card with the name of a physical activity benefit onto each board. The messages on the boards were things such as: alleviates depression, increases sense of well-being, increases strength, helps the heart to beat stronger, etc. She threw all the boards in the swimming pool such that the messages were upside down and could not be seen by the kids. She asked the kids to swim to get one board and then each pupil would have to explain how swimming could help for that specific health benefit. Another day, the kids were required to give an example of a totally different exercise in the water that could develop a component of physical fitness. For example, for muscle strength, the students came up with an exercise in the pool that involved walking with straight legs as if they were robots!

### **6.5. Teacher builds physical activity lesson into English class**

Soledad had been reading about the problem of physical inactivity in Spain's youth. She became concerned when she learned that only about one third of Spain's children and youth were not active enough for healthy growth and development. She decided to do something about it. As she was an English teacher, not a physical education teacher, she felt she could help by building some awareness and understanding. She found some articles for her students to read, and decided that she would give her students an assignment on the topic. She gave the students material about physical activity and asked them to take it home to read. Her goal was to get every child in her class thinking about the importance of physical activity as well as doing their writing and presentation assignments for English class. She developed a series of assignments that would be done over a couple of months. She also picked up some books on physical activity from the library for the kids to use for reference.

The writing assignments included these titles:

- What I did to be active yesterday.
- I like football (or another favourite activity) because...
- Physical activity and my body.
- I am trying new things to increase my physical activity by at least 30 minutes a day. Here's what I tried...
- Describe the physical activities you did in the past week.
- I tried these new activities and I feel...

For the class presentations, the students were asked to describe how to do their favourite physical activity. They could use props if they wished!

Soledad also suggested to the students that they keep a journal to record their

physical activity efforts. She told them to record their non-physical activities as well. After a couple of months she asked the class if they were doing more physical activity now than when they started working on their assignments. Most of the students said yes. Then she asked them if they were spending less time on non-active pursuits like watching TV or computers. Many of her students had not increased their activity level by much, but they were working on it. Most of them had reduced their sedentary activities by very little. Their results showed that they could find time in their day to be more physically active if they tried.

Based on the increases they had achieved for the previous month, each class member set a new goal for the next month and wrote it in their journals. The teacher would ask them periodically how they were doing to remind them about the importance of physical activity to their health.

### **6.6. Geography teacher builds physical activity into classroom as students walk the Camino de Santiago de Compostela**

In September, Ricardo decided to modify his unit on “Exploring Europe” and use it to increase the physical activity levels of his 14-year-old students. The plan was for the whole year. He got a large map and posted it on the wall. He marked the entire Santiago de Compostela Trail on the map and told his class that they were going to walk the equivalent of across Europe and learn about the geography of the continent as they travelled.

Every day, students would walk for 10, 20 or 30 minutes and put their total up on a chart. Ricardo would then plot the distance the class had travelled on the map as if they were actually walking the trail. Each time they had geography class, Ricardo would have pictures or videos of the virtual ground they had covered and they would talk about the terrain and landscapes they had passed along the way. Their ‘travels’ were accumulating on the map and the kids were busy building up more distance every day. By the time three months had past, some of the students were able to run instead of walk. Ricardo calculated how much further they could run in 10, 20, or 30 minutes so that the extra kilometers would show up on the map. Some of the students extended their walk to 60 minutes. The class was determined to cover the whole trail by the end of the year. Ricardo helped them to calculate how much walking or running they needed to do to reach their goal.

This approach to geography interested the students a great deal and, at the same time, Ricardo was helping them to increase their physical activity levels.

### **6.7. Pablo was responsible for implementing various strategies for promotion of walking and cycling in the community**

Pablo works as a community recreation manager. He was aware of the growing problems of inactivity in children and adults and its relationship with obesity. He wanted to organize some community wide events to promote reduced use of the car and

greater physical activity for families. He came up with the idea of “car-free” days for families on Sundays and other celebration days. His idea was to promote walking and cycling on these days through posters in recreation centres, swimming pools and elsewhere in the community. These posters were informative about the importance of extra physical activity in our lives and how much money could be saved and pollution could be avoided if a family were to avoid using the car on these days of the year. His boss thought this was an excellent idea and also suggested that money could be provided to involve local media (newspapers and television) in the process also for extra publicity.

After one year the drive had been a success, with many families in the community reporting that they had taken part. Local bicycle stores had reported greater business during this time period and so he organized a community event called the “Day of the Bike”, to be held every year on the first Sunday in September, whereby a 15km circuit of roads through the most scenic parts of the city and community were closed entirely for cyclists for the day. This has now become a large event within the community every year, with significant publicity. The community became recognized nationally for its efforts to promote cycling and walking and funding was made available for the construction of extra bike paths throughout the area. The idea was so successful that the community of Madrid also adopted the idea of the “Day of the Bike”!

## 7. Including everyone

Physical activity is for everyone, regardless of age or ability. Everyone has unique physical and mental characteristics and there are physical activities suitable for all types of individuals. It is important that classes are structured so that all students are included in an appropriate manner and that all can reach their maximum potential. There are a number of areas in which it is important to ensure inclusion in classes related to physical activity:

### 7.1. Students with special needs

Those with physical or mental disabilities will be especially in need of support, care and enthusiasm in order to feel involved with physical activities. This support should be evident in the familial, school and community environments. As for able bodied individuals, physical activity can provide a crucial means by which these individuals can interact with their peers and their environment, and improve both physical and mental well-being.

When teaching individuals with a disability it is best to focus on the individual rather than the disability. Look at what the child can do, instead of assuming that he or she cannot do an activity. You may need to alter your instructional methods by altering the rules of an activity, the learning environment or the equipment in order to fully include those with special needs.

One must keep in mind that:

- The types and levels of disability can vary widely.
- In many cases, it is important that these individuals work together with the school and with other professionals.
- It is especially important to emphasize *participation* rather than *results*.
- Try to discover the activities where they perform well and praise their successes.
- Feel free to challenge them but ensure the challenges are attainable.
- Be sensitive to their fears and anxieties.
- Help them to discover appropriate activities both within the school environment and the community.

## 7.2. Gender inclusion

Remember, as adults, the vast majority of physical activity opportunities are not gender segregated and women and men participate together. If you separate genders for activities during childhood or adolescence, ensure that the activities are reasonably equivalent and not stereotypical. It is suggested that you try not to separate girls and boys if at all possible [106], but in some isolated situations this may be necessary (such as in situations where privacy, size or strength are important issues).

Often, boys and girls are inadvertently treated differently in physical activity situations, in both the familial and school environment [107]. For example, boys are more likely to receive positive specific feedback (eg. “you paced your run very evenly”, “try to keep your upper body still”) whereas girls may receive only general feedback (eg. “good job”, or “try again”). Also boys are more likely to be pushed to complete a task, whereas girls may be allowed to quit at an earlier stage. These very subtle communication differences are often picked up by the girls which may contribute to them feeling as though physical activities and sports are more suitable for boys than girls.

## 7.3. Cultural inclusion

Cultural influences can greatly affect what an individual is interested in learning and doing and schoolteachers must respect the diversity of cultural values within their classes. For example, teachers may try to incorporate the physical activities, games, holidays, traditions and music of other cultures. Situations may arise where students or their parents do not elect to take advantage of equal opportunity in the classroom (eg. clothing restrictions due to religious beliefs) which may necessitate some flexibility on behalf of the teacher.

#### 7.4. Ability inclusion

Some students are either extremely talented or extremely challenged. In the case of those who are very talented, teachers must be careful not to neglect them and must continue to challenge them to explore advanced participation in physical activity.

The physically awkward child is one that has particular difficulty with motor coordination. Many of these children become discouraged with traditional skill-based forms of physical education and drop out. These students may need extra practice time, instruction or encouragement. It is important for them to succeed and have fun and this may require some flexibility and choice within classes to entice these children to persist with physical activity. With a teacher's help, these students may discover different forms of activity in which they can excel which involve less hand-eye coordination, such as running, cycling or climbing.

#### 7.5. Very low fitness or obesity

It is important to keep in mind that the low-fit or obese child is not necessarily a lazy child, though lack of activity may certainly be a contributory factor to their condition. The younger obese or low-fit child often tries hard with physical activity but has poor results. With continued failure or discouragement, this child will often turn into a very self-conscious obese adolescent who may avoid physical activity entirely. Therefore, it is important that one deals with overweight individuals very sensitively, to ensure they too have a positive experience. A range of physical activities, including non weight bearing and low impact activities, is often a sound tactic. These children may be suited to activities where strength and size are important (eg. weight lifting). In the case of severe overweight or obesity, it is prudent that these children obtain medical clearance before starting a physical activity program. For these individuals, physical activity will likely play a major role (together with nutrition) in their weight loss regime. The success of this physical activity program may be a critical determinant of whether they turn into an obese young adult, the implications of which have been discussed previously.

Overweight and obese children can have significant barriers to physical activity which are important to understand [95, 108]. Overweight children, and especially overweight girls, are particularly vulnerable to body-related barriers and reducing such barriers may serve as one of the more relevant physical activity intervention points for this population [63, 95]. In addition, children who are targets of weight criticism are more likely to have negative attitudes towards sports and tend to report lower physical activity levels [108].

Some guidelines are provided below regarding physical activity for overweight or obese young people [107, 109]:

- Treat pupils as individuals, not comparing and contrasting them.
- Encourage a range of physical activities, including non-weight bearing exercises, such as swimming, exercise in water and cycling.



- Attempt to find activities in which these individuals may have an advantage over others so that they feel competent eg. weight lifting (favour bigger individuals) or swimming (favours those who float better).
- Encourage low-impact activities, such as walking and provide low-impact alternatives (such as brisk walking) to high-impact exercises (such as jogging).
- Schedule rest periods to allow recovery from activity.
- Ensure correct exercise technique to minimize the risk of injury.
- Permit a choice of exercise clothing that reduces embarrassment.
- Ensure the wearing of supportive footwear during weight-bearing activities, and use soft surfaces, rather than hard surfaces (such as concrete) where possible.
- Provide differentiated tasks to cater to a wide range of abilities, including low-level, easier tasks.
- Be aware of potential problems, such as breathing difficulties, movement restriction, oedema (fluid retention resulting in swelling), chafing, excessive sweating and discomfort during exercise.
- Encourage routine activity around the home and school
- Where possible, provide opportunities for overweight and obese children to be active in a private, rather than a public, context.
- Enable obese children to follow an individually designed exercise programme, based on their particular needs and capabilities.
- Encourage guidance and support from school, family and friends
- Always provide positive feedback and constant encouragement.

## 7.6. Asthma

Many children suffer from exercise-induced asthma. Asthma can also be triggered by other factors such as allergens, irritants, weather changes, viral infections, emotions, *etc.* The usual symptoms of asthma include wheezing, coughing, tightness of the chest and breathlessness. If asthma is well controlled, physical activity is an excellent means of improving the quality of life of these children and reducing the severity of asthma attacks. Below are some guidelines for children with asthma [107, 109]:

- Encourage the use of a bronchodilator inhaler 5 to 10 minutes before exercise.
- Encourage children to have a spare inhaler readily available for use.
- A child arriving for activity with evidence of airway constriction should be excused from participation in that session.
- Allow a gradual warm-up of at least 10 minutes.
- Permit and encourage intermittent bursts of activity interspersed with reduced intensity exercise.
- Permit lower intensity (easier) activity.

- Encourage swimming – the environmental temperature and humidity of an indoor pool are generally well tolerated by people with asthma.
- In cold dry weather conditions encourage the wearing of a scarf or exercise face mask over the mouth and nose in the open air.
- Encourage breathing through the nose during light exercise - this warms and humidifies the air.
- Do not permit children with asthma to exercise when they have a cold or viral infection.
- Where appropriate, advise children with severe asthma to avoid outdoor exercise during conditions that may initiate an asthma attack (eg. very cold or significant airborne pollution or during periods of airborne high pollen).
- If asthmatic symptoms occur, ask the child to stop exercising, and encourage them to use an inhaler and rest until recovery is complete.
- In the case of a severe asthma attack, send for medical help, contact the child's parents, give medicine promptly and correctly, remain calm, encourage slow breathing and ensure that the child is in a comfortable position.

**Key points:**

- Everyone can play a role in encouraging lifelong physical activity in young people, including parents, guardians, teachers, athletic coaches, camp / activity monitors, school administrators, community sports / recreation supervisors and health professionals.
- Young people must be exposed to a variety of different physical activities so they may discover those which they enjoy the most and in which they are competent.
- Adults must not pressure young people into certain sports or activities.
- Behaviour change in young people can be encouraged by: (i) developing awareness, (ii) setting attainable goals, (iii) giving specific feedback and praise, (iv) encouraging commitment, and (v) rewarding and recognizing change.
- Physical activity can be promoted by all teachers and instructors using a variety of different creative approaches.
- Special efforts must be made to ensure that everyone is included in physical activity, regardless of age, ability or any other characteristics.





## Physical Activity in the School Environment and the Community

### **Chapter objectives:**

- To briefly describe how our changing society is influencing the effect of schools on the behaviour of modern day children.
- To describe the strengths and limitations of school-based approaches for the promotion of physical activity.
- To describe the importance of physical education in schools and outline the differences between the “traditional” approach to physical education and the more effective “modern” approach.
- To discuss adult perceptions of physical education and physical activity for young people.
- To discuss various further methods of promoting physical activity within schools and the community.
- To outline recommendations for promoting physical activity in young people in schools, communities and home settings.

### **1. The changing influence of schools on behaviour of modern day children**

It is important to understand that changes in modern day society have changed the roles that schools have in shaping the attitudes, beliefs and behaviour of school-children, including their levels of physical activity. Many believe that much of the traditional authority of schools and education has been eroded by the increasing influence of the media, marketing, television and the internet on our children. In essence, schools are now competing for the hearts and minds of young people against an increasingly powerful corporate-media culture. Therefore, for governments and schools to continue to play the most effective role in shaping the attitudes and beliefs of pupils, they must attempt to understand the current forces influencing modern youth and

adapt to our changing socio-cultural environment. Stubbornly sticking to old principles will likely result in failure.

An interesting example is that of computer and internet use in youngsters. Though having been indicated as a contributor to physical inactivity and obesity in children, this medium, if used responsibly by young people, may ironically end up helping to curb the problem in the future. Internet websites have been developed with the goal of educating children and adolescents about issues relating to physical activity and nutrition that are designed to be fun and informative for this population (for examples, see [110-119]). Young people will not be prevented from using computers, so we must work with this new feature of modern day life and attempt to turn it to our advantage in the fight against physical inactivity.

Within the school curriculum, physical activity and physical education has an advantage in comparison to more traditional classroom pursuits. This advantage is that it is well placed to offer pleasure, and pleasure is at the core of the current consumer culture with which schools are competing. If physical activity offers more pleasure to children, more will likely take part.

## 2. Strengths and limitations of school-based approaches for the promotion of physical activity

Schools present unique opportunities for physical activity for young people. The strengths of school-based approaches for promotion of physical activity include [107, 120]:

- schools contain people at ages where change is most likely to occur,
- children and adolescents spend a large portion of their time in this environment,
- schoolwide strategies should enable virtually all members of an age cohort to be targeted,
- most young people are likely to see teachers as credible sources of information,
- schools provide access to the facilities, infrastructure and support required for physical activity,
- a delivery structure (through physical education, other curriculum areas and school practices) is already in place, and
- schools are the workplace of skilled educators.

Possible limitations of school-based interventions include [120]:

- those students who like school the least are the most likely to engage in health-compromising behaviours and the least likely to be influenced by school-based programs,

- there are about 20 more hours per week available for physical activity outside schools hours than during school hours,
- enormous demands are already being made on schools,
- many teachers may have low levels of perceived competence in teaching concepts related to physical activity, and
- opportunities for being active at school may not be consistent with how and when students prefer to be active.

It must be pointed out that most of these limitations can be reduced by many of the physical activity promotion strategies suggested in this guide. The broad classroom-based approach, for example, is designed to educate children and adolescents about the nature and importance of physical activity and that a “lifestyle” approach towards activity, one that does not necessarily involve competitive or organized sports, is often the most effective way of adopting and maintaining physical activity during one’s youth and adulthood. This approach does not require great expertise on behalf of the schoolteacher, is designed to be fun, and has the core goal of assisting youngsters in discovering the types of physical activity that they like and motivating them to participate both within and outside school. A critically important point is that this process is done without any form of coercion – the pupils are encouraged to participate of their own volition.

As a schoolteacher, you will likely find that this process may be very educational for you too and if this encourages you to become more physically active and become a role model for your students then everyone wins!

### 3. The importance of physical education in schools

There have been growing concerns about the declining availability of physical education and participation in physical education in schools worldwide. Very few countries offer at least two hours per week of physical education in both primary and secondary schools and even this amount is far from the current recommendations of daily physical education classes for young people [93]. In Spain, current law regarding primary education stresses the importance of “valuing health and hygiene, accepting your own body and those of others, respecting differences and use of physical education and sport as methods for encouraging personal and social development” (Spanish Law 3<sup>rd</sup> May 2006; published in BOE 4<sup>th</sup> May 2006). For secondary education, the law states that schools should “reinforce habits associated with bodily health and incorporate physical education and sports practices to encourage personal and social development”. At the time of publication of this guide, the national Physical Education Curriculum required a minimum of two hours a week in both primary and secondary education respectively. The new national curriculum of physical education may be modified before the 31 December 2006, as stated in the governmental files (Real Decreto 806/2006, June 30; published in BOE 14<sup>th</sup> July 2006).

In a recent meta-analysis of interventions designed to increase physical activity, school-based physical education was found to be effective [82]. In other words, *meas-*

ures designed to increase the amount of time students spend in moderate or vigorous activity while in physical education classes are successful in improving levels of physical activity and improving physical fitness. Therefore, physical education must remain an important tool within schools for promotion of physical activity and physical fitness.

There is a perception in some circles that the time spent in physical education classes in school may harm academic performance or would be better spent on other academic pursuits. However, there is no evidence in the literature for such a claim. In fact, the opposite may even be true. There is evidence that a substantial increase in the amount of school time devoted to health related physical education does not have detrimental effects on students' academic performance, and confers significant health benefits [121]. In addition, research has shown that children with higher physical activity levels are more likely to have better cognitive functioning. A meta-analysis of 44 studies concluded that there is a significant positive relationship between physical activity and cognitive functioning in children, with a mean effect size of 0.32 (standard deviation of 0.27) [22]. Similarly, regular participation in sport does not appear to compromise academic achievement [122].

Therefore, overall, the research literature indicates that increased physical education, physical activity or physical fitness is more likely to have a positive, rather than negative, influence on academic performance in young people.

#### 4. “Traditional” vs. “modern” physical education

Modern physical education classes must be different from the older, more traditional approach. Physical education teachers have usually grown up with the traditional emphasis on team sports, skills and competition but must be sensitive to the fact that their interests may be very different from their current students' needs. Modern physical education must be [93, 107]:

- Educational – students must learn *why* physical activity is important and *how* it is beneficial. The traditional approach told students *what* to do, but not *why*.
- Health oriented – health-related physical fitness must be emphasized in addition to the skill-related focus of traditional programs.
- Individualized – students must be helped at their own ability levels for optimal personal improvement. The traditional approach provided the same instruction for all students at the same time.
- Fair – students are assessed based on personal improvement and assisted in goal setting for improvement of health-related fitness. The traditional approach used fitness test scores to determine grades and awards.
- Enjoyable – students must enjoy the physical education experience and be provided with variety and choices whenever possible. The traditional approach used the same drills and games regardless of student interest, offering little choice. In addition, physical activities were often used as a form of punishment.

- Realistic – students must be encouraged to explore different ways to be physically active and improve health-related fitness for optimal transfer to real-life settings. Traditional physical education offered a narrow curriculum, often repeating the same activities with the goal of achieving basic performance competence.

Health-related physical fitness education focuses on the process of having students assume progressively more responsibility for their own health, fitness and well-being [107]. The “stairway to fitness” shown in figure 13 outlines the process through which students must be guided to achieve this goal. Of course, the level of dependency will likely be related to the age of the student. The younger the student is, the more likely he/she will be on a lower, more dependent step. The older the student, the more he/she needs to be operating on a higher step and the teachers involved must be responsible for facilitating this.

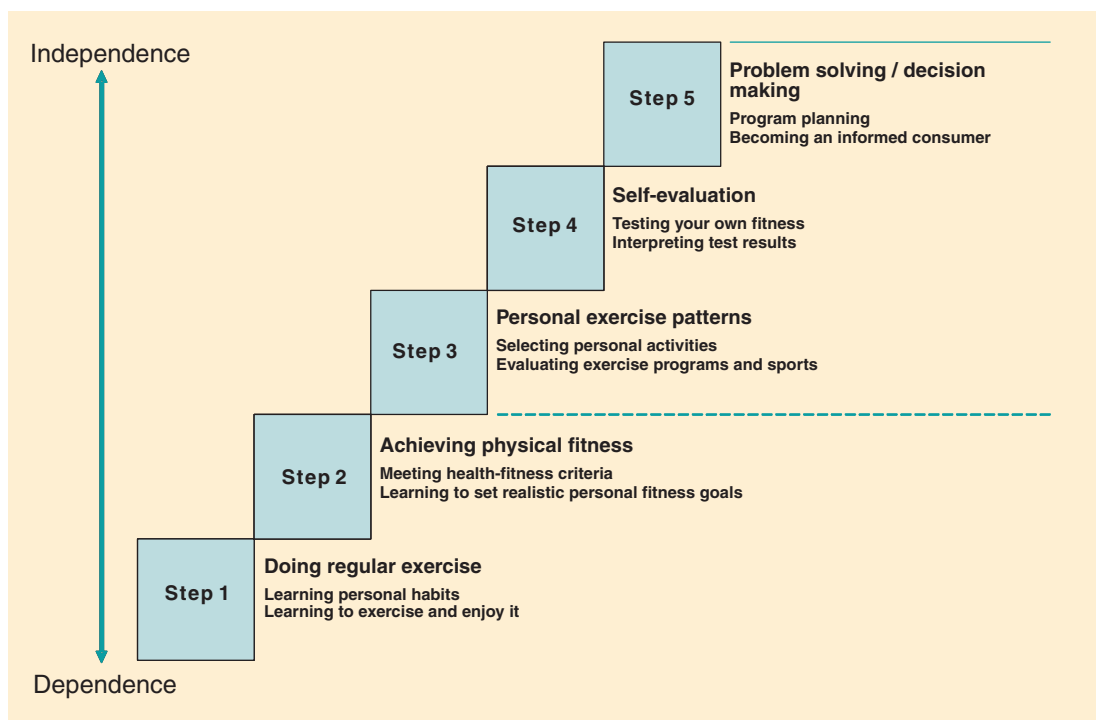


Figure 13. Stairway to fitness

## 5. Adult perceptions of physical education and physical activity

The irony of physical education in schools is that most adults (parents, teachers, etc.) would probably agree that physical activity, physical fitness and learning new motor skills are important for children. Yet many adults seem sceptical as to whether physical education in schools is contributing usefully to these goals [107].

This is probably in large part due to negative recollections by many of these adults towards their own experiences with physical education who unfortunately associate it with feelings such as embarrassment, pain, boredom, triviality and irrelevance. Adults' perceptions of physical education need to change if physical education is to survive within the school system and thus contribute meaningfully to the health of our children.

As discussed earlier, the attitudes of adults towards physical activity are an important influence on the levels of participation of children and adolescents. Those adults with a positive attitude towards physical activity or those that are active themselves will have a positive influence on the young people with which they associate. Therefore, improving the attitudes of adults towards exercise and physical activity and adult participation is an important component of the drive towards more physically active young people in society.

## 6. Other methods of promoting physical activity in schools and communities

So far two major techniques have been covered regarding promotion of physical activity: physical education and classroom based approaches in schools. Schools can also promote physical activity in other ways. One of the most important things schools must ensure is that young people have convenient access to safe play spaces and time to engage in unstructured, spontaneous play and activity outside of the classroom [93]. Recess breaks between classes and lunch breaks are logical times during the day when children should be allowed to play outside, and if facilities are readily available (such as playgrounds, basketball hoops, etc.) then the probability is greater that the children will be active.

In the case of older children and adolescents, schools should also make it possible for pupils to assume responsibility for organizing, motivating and being resource persons for other pupils in order to stimulate them to become more physically active. For example, students may form and run sports or physical activity clubs for their peers.

It is essential that communities are involved in the drive towards greater physical activity because most physical in young people occurs outside the school setting [123, 124]. Schools should therefore develop enhanced relationships with sports clubs, outdoor life organizations, summer camps and other groups or businesses within the community so that young people and their families are exposed to physical activity to a greater degree and are given easy and ready access to opportunities that will result in more physical activity. Those schools that possess excellent facilities and sports equipment could make these available to the community outside of normal school hours (*eg.* after school hours, on weekends and during vacations).

Given the importance of the home environment in the physical activity habits of young people, many schools should involve parents to a greater degree. Ensuring that

parents are kept abreast of physical activity promotion efforts in school and also informed of important issues regarding the health behaviours of their children (through a regular newsletter or meetings, for example) would promote a sense of “togetherness” and mutual involvement in improving their children’s health. Parents may even be motivated to become more physically active themselves which could only be beneficial to all parties.

Schools and other community programs may also provide health promotion programs for staff members. By enabling teachers to participate in physical activity and other healthy behaviours, this will help them serve as role models for students. School-based health promotion programs have been effective in improving teachers’ participation in vigorous exercise, which in turn has improved their physical fitness, body composition, blood pressure, general well-being, and ability to handle job stress [93]. In addition, participants in school-based health promotion programs may be less likely than non-participants to be absent from work [93].

Schools and other locations within the community can also launch drives to encourage more active staff and youngsters such as poster campaigns, physical activity challenges and environmental changes that promote stair use (instead of elevators, for example) or active transportation [82, 125].

Efforts to promote physical activity in schools should ideally be part of a comprehensive overall school health program. Such a program could include health education, physical education, health services, school counselling and social services, nutrition services, the psychosocial and physical environment and faculty and staff health promotion [103]. Also, increased physical activity in young people will be best achieved through programs that integrate the efforts of schools, families and communities. These programs have the potential to improve both the health and the educational prospects of young people and also to raise awareness of healthful lifestyle behaviours among the adult population.

## 7. Recommendations for promoting physical activity in young people in school, community and home settings

Communication among schools, community organizations and individuals is critical to the success of any effort to improve levels of physical activity in young people on a large scale. Below is a list of practical tips and suggestions that can be used within the school, community and home environments to increase physical activity of children and youth (adapted from [103]). For further detail, readers are encouraged to consult the *Guidelines for School and Community Programs to Promote Lifelong Physical Activity for Young People* [103] published by the Centers for Disease Control and Prevention in the USA.



## A. School

- Advocate for high quality physical education in schools.
- Include a physical activity component in health education classes.
- Advocate for the incorporation of short physical activity breaks into the school day.
- Encourage children to walk or ride their bike to school.
- Establish a volunteer network of parents that take turns as chaperones for children walking or cycling to school.
- Advocate for increased access to school facilities on nights, weekends, and holidays.
- Advocate for sports and physical activity programs for all children - not just the most talented.
- Discourage the practice of withholding physical activity (recess, free play) as punishment or using physical activity (laps, push-ups) as a punishment.
- Develop children's motor skills related to lifelong physical activities.
- Develop children's use of behavioural skills that will help them maintain a physically active lifestyle (goal setting, self-monitoring, decision making).
- Increase children's knowledge about HOW to be physically active.
- Encourage positive beliefs and attitudes towards physical activity.
- Encourage school personnel to MAKE PHYSICAL ACTIVITY FUN AND INTERESTING.

## B. Community

- Advocate for a bicycle friendly community.
- Advocate for a pedestrian friendly community.
- Promote provision and use of community physical activity facilities.
- Advocate for increased access to community physical activity facilities.
- Volunteer to coach or organize community sports programs.
- Organize activity events in the community (eg. car-free days).
- Focus on enjoyable participation in recreational sports, not winning.
- Make children aware of all programs available through community organizations.
- Encourage community providers to MAKE PHYSICAL ACTIVITY FUN AND INTERESTING.

### C. Home

- Make physical activity equipment and clothing available to children.
- Limit children's amount of “screen time” (watching television or video tapes, video games, computer use).
- Encourage children to play outside whenever possible.
- Encourage children to be physically active or play sports.
- Be a positive role model by being physically active yourself.
- Plan physical activities that involve the entire family.
- Pay fees and purchase equipment needed for sport and activity programs.
- Provide transportation to practices, games, or activities.
- Encourage children to play sports or be physically active with friends and neighbours.
- Praise and tangibly reward children for being physically active.
- Focus on the positive accomplishments in sports and physical activities, NOT the setbacks or failures.
- MAKE PHYSICAL ACTIVITY FUN AND INTERESTING.

#### **Key points:**

- The increasing influence of the media, marketing, television and the internet on our children has resulted in a reduced influence of schools on the behaviour of young people. Health promotion strategies must adapt to these changes and not resist them.
- Physical activity is well placed to compete with corporate-media influences on children as it can provide what young people are looking for: pleasure.
- School-based approaches for the promotion of physical activity (such as increased physical education) can be very effective at increasing levels of physical activity in young people without negatively affecting, and possibly positively influencing, academic performance.
- Modern physical education must be different from the traditional sports- and performance-based style of which most adults have negative recollections.
- Improving the attitudes of adults towards exercise and physical activity and increasing their participation is an important aspect of the drive towards more physically active young people in society.
- There are numerous ways that physical activity can be promoted within homes, schools and communities. Greater communication and relationships between all three is a key factor.



## Healthy Nutrition to support a Physically Active Lifestyle

### **Chapter objectives:**

- To describe the major characteristics of a diet that is associated with health in young people and that will adequately support a physically active lifestyle.

In addition to physical activity for the improvement and maintenance of health, young people require a healthy and balanced diet to ensure energy intake adequately balances energy expenditure and to provide the energy and building blocks for healthy growth and development. A poor diet will at best prevent a child from achieving his or her physical best and at worst may harm their current and future health.

The primary goals of a healthy diet are threefold:

1. To provide a variety of different foods
2. To supply all the nutrients in adequate amounts, and
3. To supply sufficient energy (calories) to maintain an ideal body mass

We have so many choices of foods today that we must learn how to make healthy food choices. Note that there are no “good” or “bad” foods, only a good or bad overall diet.

A healthy diet for young people should consist of the following food groups and amounts:

- ❑ 2-3 daily servings of dairy products (*eg.* milk, yogurt, cheese, *etc.*).
- ❑ 2-3 daily servings of protein-rich foods (*eg.* meat, poultry, fish, dry beans, eggs or nuts).

- ❑ 6-11 servings of unrefined complex carbohydrate-rich foods (eg. breads, cereals, rice or pasta).
- ❑ 2-4 daily servings of fruit.
- ❑ 3-5 daily servings of vegetables.
- ❑ At least 2-3 litres of liquids.
- ❑ Fats, oils, salt and refined sugars should be consumed sparingly.

A good rule of thumb is to try and consume primarily unrefined and unprocessed foods as much as possible as part of your staple diet. It is important to vary the types of foods that one consumes within each food group to ensure that one has a rounded intake of micronutrients such as vitamins and minerals. The amounts of each food group that should be consumed depend on the age, weight and activity level of the young person involved, with older, larger and more active children needing greater amounts of each food group. Vitamin and mineral supplements, though useful in some cases, should not be necessary if the quality and quantity of the diet is adequate.

Research has shown that breakfast is a particularly important meal of the day for young people in terms of their health status [52, 126, 127]. It is very important that a healthy and complete breakfast is consumed which will provide energy throughout the day and allow more efficient performance at school. Eating a healthy and adequate breakfast has been linked in some studies with higher levels of physical activity in young people [126] and failure to eat breakfast has been linked to childhood and adolescent obesity [52, 127]. Breakfast should contain some dairy products, bread or cereal products (preferably whole grain with minimal refined sugar) and fruit.

Sweets and candies (that contain high levels of refined sugar) and foods containing high levels of salt (eg. potato crisps) should be eaten only occasionally. These energy-dense products usually contain minimal nutritional value (“empty calories”) and if consumed excessively they may contribute to obesity while simultaneously resulting in loss of appetite for consumption of healthier alternatives. Also, foods high in sugar promote dental caries and poor oral health.

Adequate consumption of fluids is very important for young people, especially in a warm climate such as Spain. At least 2-3 litres of water should be consumed daily, and possibly more if physical activity is high. There are worrying levels of consumption of soft drinks (sugar sweetened beverages and carbonated beverages that often contain caffeine) within young people and strong evidence that links the consumption of these drinks with poor health status [128-130]. More specifically, high intake of soft drinks is associated with (i) overweight or obesity due to the additional calorie intake, (ii) increased risk of osteoporosis due to displacement of milk consumption, resulting in calcium deficiency and bone loss, and (iii) increased risk of dental caries and enamel erosion. Electrolyte “sports drinks” are often marketed as being superior to carbonated soft drinks and, although they may be useful for fluid and energy provision during strenuous or prolonged physical activity, they must not become the drink of choice for young people. Fluids should be taken primarily in the form of water or natural juices.

It is normal that children and adolescents experience periods of reduced appetite during growth and development. If one follows the nutritional guidelines above, their diets will likely be more than adequate for the support of healthy growth and development and an active lifestyle.

Finally, in addition to healthy nutrition children and adolescents need sufficient quantities of sleep on a daily basis, usually between 8 to 10 hours. Sleep is an important part of the day during which physical regeneration and growth occurs and it also is important for mental rejuvenation.

**Key points:**

- A healthy diet is necessary if the full benefits of a physically active lifestyle are to be realized.
- Consumption of a variety of primarily non-processed foods from the different food groups in the quantities recommended should provide the young person with all the energy and nutrients that they require for healthy growth and development.
- Older, larger and more active young people must consume greater amounts of food to satisfy energy demands.
- Consumption of a healthy breakfast is very important for young people.
- Foods that contain high levels of sugar or salt should be eaten sparingly.
- Fluid intake should be primarily in the form of water, natural juices and milk. Consumption of soft drinks and electrolyte sports drinks should be limited.
- Young people need sufficient sleep for physical and mental rejuvenation: between 8 to 10 hours daily.



## Where do we go from here?

Modern society has conspired to reduce the amount of physical activity that we all do, yet our bodies still require it for health. The challenge in the 21st century will be to identify and implement strategies for insuring that our children engage in the physical activity that they require for development into fit and healthy adults. Effective promotion of physical activity in young people will require a broad-based adoption of policies and practices that change the social and physical components of the “physical activity environment” in which our children grow up. Many school-based intervention programs have been effective in promoting physical activity in young people, but this alone will be insufficient to increase physical activity of young people to those levels needed for health. Further knowledge is needed concerning the ways in which physical activity can be more effectively promoted in all environments including homes, schools and communities.

All adults, including schoolteachers, trainers, coaches, monitors, parents and health care professionals have a responsibility to promote physical activity for young people as fun, interesting and worthwhile. This will enhance the likelihood that today’s youngsters grow up to become active and healthy adults. Everyone within society is in a position to advocate for enhanced physical activity opportunities for children and adolescents. The health of the next generation demands that we work together to get Spain’s kids active!





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## Definitions

**Accelerometers:** small motion sensor devices, usually strapped to the waist of an individual, that allow measurement of physical activity.

**Aerobic power:** sometimes called  $VO_2$ max: the maximum rate at which the body can take in, transport and use oxygen. It is the best measure of aerobic fitness.

**Atherosclerosis:** the process whereby arteries become narrowed and hardened due to deposition of fatty material on the inside walls. When this occurs in the arteries supplying the heart muscle, this is referred to a coronary heart disease.

**Athletic performance physical fitness:** that portion of physical fitness directed towards optimizing performance in a certain sport.

**Barriers:** actual or perceived obstacles (eg. towards adopting a physically active lifestyle).

**Body mass index (BMI):** a simple measure used in population (epidemiological) studies to ascertain levels of overweight and obesity. Defined as weight (kg) / height ( $m^2$ ).

**Borg Scale:** a numbered scale with written verbal descriptors from 6 (“no exertion at all”) to 20 (“maximal exertion”). It is a valid measure of exercise intensity.

**Calisthenics:** Exercises performed without weights or other equipment, often using one’s own body weight, that are intended to increase body strength and/or flexibility.

**Cardiovascular activities:** also called cardiorespiratory or aerobic activities. Prolonged activities that require the body to increase heart rate and breathing rate to supply the working muscles with oxygen.

**Child:** young human being below the age of puberty.

**Endothelial dysfunction:** is an abnormality in the functioning of the cells (endothelial cells) that line the inner walls of blood vessels. This has been linked with atherosclerosis and vascular diseases.

**Epidemiology:** the study of the patterns, causes and control of disease in groups of people.

**Exercise:** A type of physical activity that is planned, structured, and repetitive body movement done to improve or maintain one or more components of physical fitness.

**FITT principle:** frequency, intensity, time and type of physical activity. Components that are manipulated to vary the dose (or amount) of physical activity.

**Flexibility:** the ability of joints to move through a full range of motion. Related to the type of joint(s) and the elasticity of the muscles and connective tissue surrounding the joint(s).

**Frequency:** the amount of times that one engages in physical activity (often expressed as number of times per week).

**HDL:** high-density lipoprotein cholesterol within the bloodstream. Often referred to as “good” cholesterol because it exerts a protective effect against cardiovascular disease.

**Health:** a reflection of one’s overall physical, mental and social well-being, and not simply an absence of disease.

**Health-related physical fitness:** those components of physical fitness associated with some aspect of good health.

**Heart rate:** the number of beats per minute (bpm) of the heart, normally measured manually at the wrist or neck or by devices such as a heart rate monitor.

**Heart rate reserve:** the difference between resting heart rate and maximal heart rate. Used in the Karvonen method to calculate target heart rate ranges for physical activity.

**Hepatic:** related to the liver.

**Hypertension:** high blood pressure that imposes chronic strain on the cardiovascular system.

**Insulin:** a hormone produced by the pancreas that is responsible for regulating blood sugar levels.

**Insulin resistance:** a condition whereby body tissues fail to respond normally to insulin within the bloodstream resulting in high blood sugar. A feature of adult-onset (Type 2) diabetes.

**Intensity:** how strenuous is the physical activity. Often described as light, moderate or vigorous. May also be expressed in the form of heart rate, as a rating of perceived exertion or as a MET level, amongst other methods.

**LDL:** low density lipoprotein cholesterol within the bloodstream. Often referred to as “bad” cholesterol because it may promote deposition of fatty material onto the walls of arteries (atherosclerosis) – the first stages of cardiovascular disease.

**Maximal heart rate:** the maximum beats per minute of a person's heart. This value typically decreases as a person ages. Can be assessed directly by means of an incremental exercise test to maximum exertion, or estimated indirectly through the use of the equation  $220 - \text{age}$  (in years).

**Metabolic Equivalent (METs):** A measure of energy expenditure equivalent to 1.2 kcal/kg/hr. Resting energy expenditure is considered 1 MET. Therefore, a 3 MET activity would require energy expenditure at a level equal to three times resting.

**Moderate to Vigorous Physical Activity (MVPA):** Physical activity performed at an intensity level equal to or greater than 3 METS; roughly equivalent to brisk walking.

**Muscular endurance:** the capacity of a muscle to maintain its tension or its contractions for a prolonged period of time.

**Muscular strength:** the capacity of a muscle to generate force.

**NAOS initiative:** Spain's Strategy for Nutrition, Physical Activity and Prevention of Obesity, launched in 2005.

**Obesity:** an excess of body fat that increases health risks. In epidemiological studies, defined as a BMI over 30 kg/m<sup>2</sup>.

**Obesogenic:** obesity promoting (as in "an obesogenic environment").

**Orthopaedic:** related to the bones.

**Overload:** the load or amount of resistance for an exercise, providing a greater stress, or load, on the body than it is normally accustomed to in order to increase fitness.

**Overweight:** the precursor to obesity. Defined as a BMI of between 25 and 30 kg/m<sup>2</sup>.

**Pedometers:** small devices that measure steps taken.

**Physical Activity:** Bodily movement produced by skeletal muscle contraction that results in energy expenditure.

**Physical Fitness:** A set of attributes that persons have or achieve that relates to the ability to perform physical activity. Health-related components of fitness include body composition, cardio-respiratory endurance, flexibility, and muscular strength/endurance.

**Progression:** is the way in which overload is increased to stimulate continuous increases in fitness. It should be a *gradual* increase in either frequency, intensity or time, or a combination of all three components.

**Rating of perceived exertion (RPE):** the number or descriptor given when an individual uses a Borg scale to ascertain exercise intensity.

**Talk test:** a simple test of exercise intensity that rates the ease with which a person can talk while exercising.

**Triglycerides:** the major storage form in fat cells. They can also be found in the bloodstream.

**Vigorous Physical Activity (VPA):** Physical activity performed at an intensity level of 6 METS or greater; roughly equivalent to jogging.

**Young People:** Collective term for both children and youth.

**Youth:** Period between childhood and adult age; adolescent.

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