Obesity Prevention through Physical Activity in School-Age Children and Adolescents

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1. INTRODUCTION

Physical activity and child obesity

Regular physical activity is associated with a healthier, longer life (1-2). However, most adults and young people in Spain are not physically active enough for health benefits. The worldwide situation is similar in both developed and developing countries, with a large body of research evidence indicating decreasing levels of physical activity and physical fitness within all age brackets (3).

Physical inactivity is widely recognized as a major risk factor for chronic diseases (4), and ranks between the second and sixth most important risk factor in contributing to the population burden of disease in western society (5-7). 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, seen in children and adolescents in Europe and elsewhere (8-11).

The increased political, media and scientific interest in obesity since the late 1990’s has placed physical activity high among current public health issues, and the Olympic Committee itself recognizes that a reduction of sedentary habits, such as computer games and social networks, would bring social and health benefits (4). Factors determining physical activity at an early age are personal, socio-cultural and environmental (12). A recent OECD study shows that infant obesity has become a pandemic, since the percentages of overweight youth has increased in developing and developed countries alike (13).
Despite of the importance of physical activity, the ignorance regarding its prescription remains high (14) even if it appears to be vital for less than 6 year old children for trying to avoid adult overweight and obesity (15).
The linkage between physical inactivity and childhood overweight and obesity

The mechanism of obesity development is not fully understood. It is a complex multi-factorial issue, which means that the rising prevalence of obesity can therefore not be explained or addressed by a single factor (16). However, it is clear that obesity occurs when energy intake exceeds energy expenditure (see Figure 2). 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 preferences, sleep time (17) and cultural environment are the significant factors that influence obesity. While changes in children’s diets have undoubtedly contributed to increasing global levels of paediatric overweight and obesity, most experts now believe that decreased physical activity is the major contributor (16, 18-20).

![Figure 2. Changes in body weight are determined by a balance of energy intake (food calories) and energy expenditure (calories burned) (16).](image-url)
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 (16). 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 (21, 22).

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. This is even more evident in children who have less and less opportunities to organize games or activities with others. Special difficulties arise from the implementation of physical activity in obese or overweight children and adolescents according to different publications (23-25).

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 (26). These included:

1. An increase in the use of motorized transport, (i.e. 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.
Increased frequency of eating occasions.
Rising use of soft drinks to replace water, (i.e. to school).

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 (27).

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.

**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 (28). In addition, there are numerous health complications that become apparent during youth including (28, 29):

1. Disturbances in blood lipids (i.e. elevated triglycerides, elevated low-density lipoprotein (LDL) cholesterol and lowered high-density lipoprotein (HDL) cholesterol)
2. Glucose intolerance (i.e. 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 vascular brain disease, hypertension, colorectal cancer, diabetes, gout and arthritis, amongst other medical conditions (16, 30-32). The rates of morbidity and mortality from these diseases increase with higher degrees of obesity (30, 33).

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 (34, 35). 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. A study on the prevalence of infant obesity among Spaniards, carried out by the Spanish Agency for Food Safety and Nutrition, called ALADINO (Alimentación, Actividad Física, Desarrollo Infantil y Obesidad) with the participation of 7,923 school children aged 6 to 10 for the 2010-2011 school year, has indicated the prevalence of a 26.3% over-weight in boys and 25.9% in girls, and a 22% obesity in boys and 16.2% in girls. Said percentages have not changed since the previous survey, enKid (1998-2000) except for girls, who show a weight increase (36).

**Definitions**

*Physical activity* is defined as body movement produced by a muscle action which increases energy expenditure. It is an encompassing term that includes physical “exercise” (16, 37).
Physical exercise is a more specific term and implies planned, structured, repetitive and purposeful physical activity, often with the goal of improving or maintaining somebody’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 (16, 37).

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 (16, 37).

Health is a reflection of somebody’s overall physical, mental and social well-being. It is much more than simply the absence of disease. Health, as it is well known, is not static over time, and can go from near death situations (ill health) to optimal physiological functioning (high level wellness) (see Figure 2) (16, 38).
**Important descriptive aspects of physical activity and exercise**

The “dose” of physical activity that a person receives is dependent upon factors contained within the “F.I.T.T.” principle (16):

- **Frequency** (how often). How often you practice physical activity (often expressed as number of times per week).

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

- **Time** (how long). The duration of the physical activity.

- **Type**. The specific kind of exercise practised (i.e., running, swimming, etc.).

These factors can be manipulated to vary the “dose” of physical activity. Often this is expressed in terms of energy expenditure (calories burned). It can be seen that the more intense the physical activity is, the greater the rate at which calories are used up which may reduce the needed time to burn a set of calories (16).

**Clarification of moderate-to-vigorous intensity physical activity (MVPA)**

Of all the factors contained within the FITT principle, intensity is probably the most difficult one to measure. The physical activity guidelines for both adults and young people (the latter is detailed further on) make reference to the importance of exercise at least of moderate intensity (39). A person who is doing moderate intensity activity will usually feel:

- Increased breath-rate, being able to have a conversation.
• Increase of heart-rate at the point in which pulse should be easily taken at wrist, neck or chest.
• Increase of warmth feeling, 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 (16).

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.

Different methods for assessing exercise intensity are discussed in further detail in the following lines.

Further methods for gauging intensity of physical activity

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

1. *The talk test* (40)

   The talk test method of measuring intensity is simple:
   • Light intensity: Active people at a light intensity level should be able to either sing or carry on a normal conversation while doing the activity. Some example of light activity would be easy walking or cleaning.
   • Moderate intensity: Active people at a moderate intensity level should be able to carry on a conversation with some difficulty while
practicing the activity. A fair example would be brisk walking, biking or dancing.

- Vigorous intensity: Getting exhausted as well as having an easy out-breathing conversation while exercising, means the activity can be considered vigorous. Examples of vigorous activity would include jogging or running and strenuous sports such as basketball, swimming, handball, etc.)

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). Heart rate measuring can be taken either in a full minute or in a shorter period of time (i.e. 15, 20 or 30 seconds) and multiply by the relevant factor (4, 3 or 2 respectively) to convert to bpm.

   Heart beat evaluating/testing at rest as well as maximal heart beating knowledge are needed to be able to gauge exercise intensity effectively. It is always better to test the heartbeat at rest when people are truly rested, such as either recently woken up 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 using the heart rate reserve (HRR) method technique, also known as the Karvonen method (41). In this method, resting heart rate (RHR) is firstly subtracted from the maximal heart rate (MHR) to obtain HRR. For example, assuming that the 15 year old child above had a resting heart rate of 80 bpm. The HRR of this person is MHR (205) – RHR (80) = 125 bpm.
For practical purposes on heart-rate-range calculating, Table 1 – shown below- must be consulted to determine the relevant % values of HRR:

Table 1. Physical activity intensity table by using % Heart Rate Reserve and Rating of Perceived Exertion.

<table>
<thead>
<tr>
<th>Intensity descriptor</th>
<th>% Heart Rate Reserve (%HRR)</th>
<th>Rating of Perceived Exertion (RPE) †</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very light</td>
<td>&lt;20</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Light</td>
<td>20-39</td>
<td>10-11</td>
</tr>
<tr>
<td>Moderate</td>
<td>40-59</td>
<td>12-13</td>
</tr>
<tr>
<td>Vigorous</td>
<td>60-84</td>
<td>14-16</td>
</tr>
<tr>
<td>Very vigorous</td>
<td>&gt;85</td>
<td>17-19</td>
</tr>
</tbody>
</table>

Adapted from ACSM (42)
†See section 3 below for an explanation of rating of perceived exertion.

It can be appreciated that moderate intensity regards to 40-59% of heart rate reserve = 50 (0.40 x 125) – 74 (0.59 x 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.

3. Rating of perceived exertion using the Borg scale:
Perceived exertion is how hard you feel you are working based on the physical sensations you experience during exercise. An example of a Borg scale is shown below in Table 2.
While exercising, you should look at the rating scale expressions, appraise your exertion feelings as honestly as possible and provide the proper number. This is your "rating of perceived exertion" or RPE.

As is shown in Table 1 (find attached previously), moderate physical activity is represented by a 12-13 Borg Scale’s RPE degree (around "somewhat hard"). Light and vigorous activities fall into the ranges of 10-11 and 14-16 respectively.

<table>
<thead>
<tr>
<th>Score</th>
<th>Level of exertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>None</td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Extremely light (7,5)</td>
</tr>
<tr>
<td>9</td>
<td>Very light</td>
</tr>
<tr>
<td>10</td>
<td>Light</td>
</tr>
<tr>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Somewhat hard</td>
</tr>
<tr>
<td>13</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Hard (heavy)</td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Very hard</td>
</tr>
<tr>
<td>17</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Extremely hard</td>
</tr>
<tr>
<td>19</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Maximum exertion</td>
</tr>
</tbody>
</table>

4. *Metabolic equivalent (MET) level:*

A metabolic equivalent (1 MET) is the amount of energy (oxygen) your body uses as you sit quietly, for instance 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 (16).
Standard tables (see Table 3) can be consulted to ascertain roughly the intensity of the activity concerned. They define physical activities and their MET levels:

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

Table 3. Intensities and energy expenditure of the most usual types of physical activity.
Source: based on data from Ainsworth et al. (43)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Intensity</th>
<th>Intensity (METS)</th>
<th>Energy expenditure (kcal equivalent, for a person of 30kg doing the activity for 30min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ironing</td>
<td>Light</td>
<td>2.3</td>
<td>35</td>
</tr>
<tr>
<td>Cleaning &amp; dusting</td>
<td>Light</td>
<td>2.5</td>
<td>37</td>
</tr>
<tr>
<td>Walking – strolling, 3-4 km/h</td>
<td>Light</td>
<td>2.5</td>
<td>37</td>
</tr>
<tr>
<td>Painting/decorating</td>
<td>Moderate</td>
<td>3.0</td>
<td>45</td>
</tr>
<tr>
<td>Walking – 4-6 km/h</td>
<td>Moderate</td>
<td>3.3</td>
<td>50</td>
</tr>
<tr>
<td>Hoovering</td>
<td>Moderate</td>
<td>3.5</td>
<td>53</td>
</tr>
<tr>
<td>Golf – walking, pulling clubs</td>
<td>Moderate</td>
<td>4.3</td>
<td>65</td>
</tr>
<tr>
<td>Badminton – social</td>
<td>Moderate</td>
<td>4.5</td>
<td>68</td>
</tr>
<tr>
<td>Tennis – doubles</td>
<td>Moderate</td>
<td>5.0</td>
<td>75</td>
</tr>
<tr>
<td>Walking – brisk, &gt;6 km/h</td>
<td>Moderate</td>
<td>5.0</td>
<td>75</td>
</tr>
<tr>
<td>Mowing lawn – walking, using power mower</td>
<td>Moderate</td>
<td>5.5</td>
<td>83</td>
</tr>
<tr>
<td>Cycling – 16-19 km/h</td>
<td>Moderate</td>
<td>6.0</td>
<td>90</td>
</tr>
<tr>
<td>Aerobic dancing</td>
<td>Vigorous</td>
<td>6.5</td>
<td>93</td>
</tr>
<tr>
<td>Cycling – 19-22 km/h</td>
<td>Vigorous</td>
<td>8.0</td>
<td>120</td>
</tr>
<tr>
<td>Swimming – slow crawl, 45m per minute</td>
<td>Vigorous</td>
<td>8.0</td>
<td>120</td>
</tr>
<tr>
<td>Tennis – singles</td>
<td>Vigorous</td>
<td>8.0</td>
<td>120</td>
</tr>
<tr>
<td>Running – 9-10 km/h</td>
<td>Vigorous</td>
<td>10.0</td>
<td>150</td>
</tr>
<tr>
<td>Running – 10-12 km/h</td>
<td>Vigorous</td>
<td>11.5</td>
<td>173</td>
</tr>
<tr>
<td>Running – 12-14 km/h</td>
<td>Vigorous</td>
<td>13.5</td>
<td>203</td>
</tr>
</tbody>
</table>
From an environmental view of the obesity problem, where the individual is both cause and effect with the environment, considered increasingly "obesogenic". Environment, physical activity proposals must be made from different environments simultaneously to achieve the best results and they must be interconnected starting from individual level (see Figure 4).

This document will address each level separately.

Figure 4. Intervention proposals organized in the different areas.
2. BACKGROUND

2.1. Promotion of physical activity guidelines at an individual level

Development of the recommendations at an individual level

The American College of Sports Medicine (ACSM) launched the first consensus of physical activity recommendations for children and adolescents in 1988 (44), establishing at least 20-30 minutes of daily vigorous physical activity for both age groups.

In the early 90s the American Heart Association (AHA) updated this recommendation, emphasizing that children and adolescents had to be active in their daily living activities, as well as achieving at least 3-4 Moderate to Vigorous Physical Activity (MVPA) sessions of 30-60 minutes per week (45).

However, those early children’s and adolescents’ physical activity statements and guidelines were based primarily on the study of adults.

Finally, in 1992 an advisory committee, composed of leading scientists and representatives of primary care medical societies and appropriate government agencies, was assembled to direct the development of a consensus on physical activity guidelines for adolescents. Sallis & Patrick stated the first health-related physical activity targeted specifically to children and adolescents (46). There were two recommendations:

1. All adolescents should be physically active daily, or nearly every day, as part of play, games, sports, work, mobility, recreation, physical education, or planned exercise, in the context of family, school, and community activities.
This recommendation is based on that established by the American College of Sport Medicine (44).

2. Adolescents should engage in a minimum of three sessions per week where, at least, 30 minutes of moderate to vigorous physical activities are required. Moreover, young non-often-active people should engage in, at least, moderate daily physical activity for 20 minutes and gradually increase.

This recommendation is based on evidence that regular participation in continuous moderate to vigorous physical activity during adolescence provides numerous health benefits.

In the next four years the scientific literature (47) supported Sallis & Patrick recommendations (46). Later on recommendations were revised and the physical activity recommended time was increased till one hour a day and specific activities including muscle strength, flexibility and bone health were introduced (48).

The new recommendations included:

1. All young people should participate in a minimum of one daily hour of moderate physical activity.
2. At least twice a week, some of these activities should help to enhance and maintain muscle strength and flexibility, and bone health.

This MVPA rating was based on observation of the majority of young people that already met MVPA-30 minutes criteria and their physical activity levels were prone to decrease with age. Biddle et al. (48) proposed examples of moderate physical activity for all young people such as walking,
cycling, swimming, dancing, etc. For younger children, activities can be carried out as part of active play. Such activity may be performed in a continuous fashion or intermittently accumulated throughout the day. Given that young people have demonstrated patterns of intermittent activity, emphasising the accumulation of PA over the day seems a more practical approach. Teenagers are more likely to be active by performing structured continuous bouts of MVPA through sports, active transportation, dance or structured exercise.

Table 4. How can children and adolescents perform these recommended activity levels of activity? (16)

| Young children | Daily walk to and from school. |
|               | Daily school activity sessions (breaks and clubs). |
|               | 3-4 afternoon or evening play opportunities. |
|               | Weekend: longer walks, visits to park or swimming pool, bicycle rides, etc. |

| Adolescents | Daily walk (or cycle) to and from school. |
|            | 3-4 organized of informal midweek sports or activities. |
|            | Weekend: walks, cycling, swimming, sports activities. |

The second recommendation of Biddle et al. (48) talked about practicing some of these activities at least twice a week in order to enhance and maintain the muscular strength and flexibility, as well as bone health. Participation in strength and weight-bearing activities is positively associated with bone mineral density.

The Biddle et al. recommendations (48) are taken into account worldwide, as they are based on current scientific evidence and expert opinion in the field of physical activity and health (39). They are the minimum suggested levels in order for children and adolescents to obtain health benefits.
These recommendations have been endorsed by several international organizations, such as the British Government, the French Ministry of Health, Centres for Disease Control and Prevention (CDC: Centres for network control and prevention of diseases) of the United States and the Ministry of Health and Senior Citizens of Australia (14, 21, 26-29, 34, 39-41, 44). The latter introduced a council in terms of downtime, limiting hours of ICT (Information and Communication: TV, internet, videogames, telephone), especially during daylight hours (21, 29, 44). Scientific literature has supported said recommendations (18, 49).

As of 2001, a minimum of steps performed per day was established (50) as a parallel guideline; later youth resistance recommendations by Biddle et al. (48) were developed. Both aspects will be described immediately below.

Firstly, Tudor-Locke & Myers (50) suggested in a systematic review, that children 8 to 10 years could be expected to take between 12.000 and 16.000 steps per day. One year later, Vincent and Pangrazi (51) found evidence of the relationship between steps per day and health benefits and suggested that a reasonable minimum of physical activity may be to 11.000 steps a day for girls and 13.000 steps a day for boys. Years later, in a review of recommendations (52), Tudor-Locke & Myers established minimum of 12.000 steps for girls 6 to 12 and 15.000 steps for boys. Later on, Adams et al. (53), in a subsequent research, set the recommendation of 60 minutes MVPA daily. Twelve year old children should accumulate between 10.000 and 11.700 steps per day.

Secondly, youth resistance recommendations cited by Biddle et al. (48) began to be progressively detailed. Faigenbaum et al., in 1996 (54) had established 10-40 minutes per session (1 set of 6-15 repetitions), 2-3 times per week. Faigenbaum et al. (55) confirmed and supported the concept that muscular strength and muscular endurance can be improved.
during the childhood years, supporting the prescription of higher repetition moderate load resistance training programs during the initial adaptation period (1 set of 13 to 15 repetitions per exercise). It is very important to ensure qualified instruction and supervision, as well as an appropriate progression of the volume and intensity of training. The main aim of these programs is that children and adolescents cannot only learn advanced strength training exercises but also feel good about their performances, and have fun (56). Studies of the NSCA (National Strength and Conditioning Association) reviewed by Hass (57), suggested that child-size machines should be used whenever it is possible. A subsequent review (58) complements the training protocols already established by earlier studies, and suggests beginning the strength program including all low endurance muscle groups and emphasises a proper technique achievement. Moreover, it sets the training period at 20-30 minutes per session. Each training session should begin with a 10-15 minutes warm-up period and would finish with stretching during a cool-down period.

Finally, in 2009 these strength guidelines have been updated (59) for children and adolescents, adding the following aspects (See Document A):

1. Provide qualified instruction and supervision. Although all training sessions should be supervised by a qualified adult, additional supervision may be needed during the first few weeks of the resistance training program.
2. Ensure that exercise environment is safe and hazard-free.
3. Start each training session with a 5-10 minute dynamic warm-up period (i.e. hops, skips, jumps, and movement-based exercises for the upper and lower body).
4. Begin with relatively light loads and always focus on the correct exercise technique.
5. Perform 1–3 sets of 6–15 repetitions on a variety of upper-and lower-body strength exercises.
6. Include specific exercises that strengthen the abdominal and lower back region. Include comprehensive exercises, especially in the beginning of the program, strengthen muscle groups in each session, including specific exercises that strengthen the abdominal and lower back region.

7. Focus on symmetrical muscular development and appropriate muscle balance around joints. Also, the choice of exercises should promote muscle balance across joints and between opposite muscle groups (i.e. quads and hamstrings).

8. Perform 1–3 sets of 3–6 repetitions on a variety of upper- and lower-body power exercises.

9. Sensibly progress the training program depending on needs, goals, and abilities.

10. Increase gradually the stamina (5–10%) as strength improves.

11. Cool-down with less intense calisthenics and static stretching.

12. Listen to individual needs and concerns throughout each session.

13. Begin resistance training 2–3 times a week on non-consecutive days will allow an adequate recovery between sessions (48-72 hours between sessions) and will be effective for enhancing strength and power in children and adolescents.

14. Use individualized workout logs to monitor progress.

15. Keep the program fresh and challenge by systematically varying the training program. It can include weight machines as well as free weights, elastic bands, medicine balls, and body weight exercises, etc.

16. Optimize performance and recovery with healthy nutrition, proper hydration, and adequate sleep. In addition, educational sessions on lifestyle factors and behaviours that are conductive to high performance.

17. Support and encouragement from instructors and parents will help maintain interest.
**Recommendations at an individual level**

The Biddle et al. recommendations (48) are considered as a reference at an international level. They are based on current scientific and expert evidence and opinions in the field of physical activity and health (39) and have been endorsed by several international organizations, such as the British Health Department, Centres for Disease Control and Prevention (CDC: centres for network control and prevention of diseases) of the United States and the Ministry of Health and Senior Citizens of Australia.

There are however small changes made by certain institutions, to be explained below.

Firstly, the Australian Government Department of Health and Ageing distinguishes the achievement of physical activity guidelines between 2 groups of ages: children from 5 to 12 years old (60) and adolescents from 12 to 18 (61). They advised setting limits on the time allotted for engaging in sedentary behaviour. Children should not spend more than two hours a day using electronic media for entertainment (i.e. computer games, TV, Internet), particularly during daylight hours.

Another initiative at the institutional level was launched by Health Canada reporting that recommendations for children (aged 6-9) and for adolescents (aged 10-14) were treated in two separate documents (62, 63). The basic recommendations within these guidelines were that children and youth, independent of their current physical activity level, should increase the time they currently spend on physical activity by 30 minutes a day, and progress, over approximately 5 months, to 90 minutes a day. The key recommendations from Health Canada were:

1. Build up physical activity throughout the day in periods of at least 5 to 10 minutes.
2. Combine three types of physical activity: endurance, flexibility and strength.
3. Reduce "non active" time spent on TV, video, computer games and surfing the Internet, starting with 30 minutes less per day.
4. They eventually provide a variety of ideas to stimulate activity.

The most recent physical activity recommendations were issued by the U.S. Department of Health and Human Services (64). These "2008 Physical Activity Guidelines for Americans" are based on extensive systematic review and critical analysis of the current evidence in health of children and adolescents (65). Accordingly, children and adolescents aged 6-17 should do at least one hour physical activity every day, which should include MVPA. As part of their 60 or more minutes of daily physical activity, children and adolescents should include muscle-strengthening physical activity and bone-strengthening physical activity at least 3 days a week.

This recommendation of at least one hour of daily physical activity is quite similar to several recent U.S. and an Australian Government (60, 61) recommendation but less than the Canadian recommendation of 90 minutes physical activity a day (62, 63).

Following the advice of the US Department of Health WHO published World Recommendations for Physical Activity and Health (66). In said document they establish three pieces of advice for boys and girls between 5 and 17 years of age:

1. Children between 5 and 17 should accumulate a minimum of 60 minutes of vigorous physical activity daily.
2. Physical activity for more than 60 minutes awards additional health benefits.
3. Daily physical activity must be mainly aerobic. It is convenient to do vigorous activities, especially to strengthen muscles and bones, at least three times a week.
At any rate, it is advisable to increase activities progressively in such a way that children may find the activity pleasant (67).

A common feature of most of the recommendations has been the emphasis on the variety of physical activities included. For example, activities that involve moderate to vigorous intensity have cardio-respiratory benefits and help to maintain caloric balance in children and adolescents, whereas muscle strength activities have also good benefits on caloric balance but include bone health benefits: i.e. sessions where children and adolescents performed weight supporting physical activities that imply high physical tension in bones and joints such as: jogging, jumping, bending, ball games or physical training. Active games involving transport activities such as climbing, gymnastics and fighting will help develop and maintain muscular fitness and flexibility. This range of different types and intensities of activity provides a complete set of healthy benefits to all body systems.

Although all that stated above is valid for everyone, both male and female children and adolescents should start by adopting a more adult type of physical activity lifestyle, and therefore it is more successful to promote different activities. These activities can include daily walk to and from school, organized sports or activities, exercise classes and leisure activities such as dancing.

Children should meet recommendations with daily walking to/from school, daily school activity sessions (breaks and sport clubs), afternoon or evening play opportunities during the week and at weekend, visiting park or swimming pool, bicycle rides, etc. Adolescents should meet recommendations with daily walking (or cycling) to/from school, organized or informal midweek sports or activities, dancing or organized sports activities in weekend (16). Nevertheless, a study by Shakle et al. (68), published in 2011, affirms that organized sports, such as football, only fulfil
part (25%) of the recommended 60 minutes. It must also be noted that the level of obesity in children must be taken into account when recommending physical activities (14).

Finally, WHO (World Health Organization) is nowadays developing the final stages of global physical activity recommendations (65). Before concluding, three relevant physical activities recommendations for children will be mentioned:

1. Practicing some activity is always better than no activity.
2. Many health benefits increase with the increase of the intensity, frequency and/or duration of activity (although health benefits are better documented in adults than in children).
3. The health benefits of physical activity greatly outweigh the health risks and health benefits are largely independent of gender, race and ethnicity.
2.2. Promotion of physical activity guidelines from family environment

Family environment

The family is the foremost development environment since we are children. Studies show that the family has a great impact on children's behaviour and therefore helps children to maintain an adequate weight (4, 69, 70-72), fomenting healthy and active lifestyles (15).

Lifestyle has changed with the advent of new technology. Most people have cars, television, computers and digital entertainment devices. Thus, the automobile is used for everything, homework is always done sitting at the computer, etc. All of these have become habits acquired during childhood. There is a preference for either watching TV over playing games in a park with friends (16), and going to/from school by car rather than walking. In this respect, the debate opened around the possible use of some interactive videogames based on physical activity for health improvement is interesting. Nevertheless, the educational advantages of said proposals are uncertain (73).

Eating habits have been also modified. Formerly, meals were usually cooked at home with fresh ingredients, although nowadays the consumption of frozen meals, pastries and anything that allows us to spend the least time possible has increased. As a consequence of this, we have not kept the energy balance between our diets and daily energy expenditure, giving rise to some bad eating habits, which have to be treated so as to globally broach the problem of excess weight (74).

It must be remembered that obesity is not only a cosmetic problem but is also detrimental to health and self esteem. In the short term, being
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BACKGROUND: Promotion of physical activity guidelines from family environment

Overweight may prevent a child from playing normally with his friends, using the clothes that he likes, or having to endure the ridicule of other children. In the long term, obesity is associated with increased risk of heart disease, type 2 diabetes, increased blood pressure, high cholesterol, certain cancers and other chronic diseases. A child with overweight or obesity is likely to become an obese adult (16, 72), many of the habits that are learned in childhood tend to consolidate during adolescence and may become routine when adult (75). It is important to note that there is a greater relationship established between physical activity in childhood and adulthood activity when assessing the quality of childhood experience than when attention is focused only to quantity (16). Studies such as those carried out by Villagrán Pérez et al. in 2010 (76) al substantiate the fact that family history and lifestyles can have an effect on the development and maintenance of infantile obesity.

Nevertheless, treatment of overweight families or overweight parents has still not been researched sufficiently. At the time of writing there is a prevention program in progress called “Early Stop, (Stockholm Obesity prevention Program), which has as an objective the evaluation of early obesity prevention in overweight Swedish families. This program is pioneering the fight against behavior which leads to obesity, such as diet imbalance, absence of physical activity and sleep alterations, from the age of one to six. All the above may require the intervention of health specialists such as diet experts, physiotherapists and nurses, since the effects can be seen during the first years of a child’s life (70).

For these reasons, the relevance of parents providing support to children must be considered. They may prevent obesity and promote healthy living. Children see their parents as role models, so if parents are eating properly and do regular physical activity. They are creating those same habits and attitudes in their children (69, 71, 72, 77-80). With simple things like setting a time to exercise together, deciding to eat vegetables for
dinner, having available fruit available when hungry... and in general, being able to gradually change bad habits.

Another habit that can be modified to improve our health is setting out to make more journeys on foot. The bus can be taken one or two stops away from home or got off earlier to finish the journey on foot. If bored at home, people can go out to the playground instead of staring at television, after dinner a short walk can be taken, shopping can be a family affair, and healthy food can also be also bought (72). Children’s behaviour it is always reinforced when parents show they like the ideas they are promoting (75).

The family can enhance life skills among its members. As mentioned above, the first step is for parents to make regular physical activity an example for their children. Parents' associations can promote extra-curricular activities within the school, finding school a safe place where children can do different sports. These activities may appear very attractive to children because they are performed in a familiar place and with friends (79, 81).

When setting out physical activity for children and adolescents, their personality and preferences have to be taken into account. It is important to create the routine of exercising at least one hour a day (71, 77). Some people prefer a leisure environment while others prefer competitive sports. In the latter case we must be cautious in situations of failure or stress that may lead a child to want to stop the activity. Enhancing child motivation as well as supporting them while practicing active habits will be very important to keep them interested (79, 81). If they are not particularly interested in physical activity, it must be gradually integrated within daily activities or games (75).

If parents show interest in their physical education classes at school or in some specific activity, they are encouraging children and adolescents...
to perform physical activity by themselves. In addition to this, it is important not to focus on his performance and this must be taught to compare only to themselves (75).

Studies allow us to know why children do or don’t do physical activity (75). Below is a list of motivating and de-motivating factors:

<table>
<thead>
<tr>
<th>MOTIVATING</th>
<th>DEMOTIVATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having fun</td>
<td>Giving more importance to winning than to playing</td>
</tr>
<tr>
<td>Sharing experiences with their family</td>
<td>Not progressing. Not having been helped on skills-improvement.</td>
</tr>
<tr>
<td>Well-advising from an enthusiastic person in physical activity</td>
<td>Performing the same thing over and over again</td>
</tr>
<tr>
<td>Feeling that activity is a personal choice</td>
<td>Feeling pressure to play</td>
</tr>
<tr>
<td>Feeling competent and fit</td>
<td>Injuries</td>
</tr>
<tr>
<td>Playing with peers</td>
<td>Feeling ridiculed</td>
</tr>
<tr>
<td>Experiencing a variety of activities and movements</td>
<td>The external imposition of the activity taking place</td>
</tr>
</tbody>
</table>

Figure 5. Motivating and de-motivating activities.

Benefits acquired from the practice of physical should be included within children’s and adolescents’ education. Thus, teaching them to have an active life provides them with the following things (16, 72, 75):

- It keeps them healthy.
- It maintains weight.
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- It strengthens their muscular-skeletal system (muscles and bones). Increased bone mineralization.
- It develops their strength and endurance.
- It improves the motor nervous system maturation and increases motor skills.
- It helps them to release stress.
- It helps them to sleep better.
- It promotes mental health.
- It helps them to feel better about themselves.
- It helps them to improve their academic performance and sociability.
- It is a hobby to be practiced when bored.
- It's fun to share these activities with family and friends.

Nevertheless, we must not forget that knowledge of the benefits of physical activities, and being aware of the inconveniences of obesity, do not in themselves guarantee that children will have the expected healthy habits (78).

Nor can we forget that growing tastes and preferences change, so the time spent in physical activity may decrease. Parents can help them, finding activities that are among their interests, reminding them of the importance and benefits of active people, avoiding reducing everything to winning or losing. If they consider they do not have enough time for sports, parents could perhaps help them to organize their schedule. Moreover, if parents held an active lifestyle, their friends would probably do so, providing them with a proper active environment (16, 75).
**Recommendations at a family level**

It is proposed that the family should proceed as follows:

1. **Being a role model and serving as an example (69, 71, 72, 77-80).** This influence includes:
   - Practicing physical activity with the children
   - Being physically active

2. **Paying attention and giving support (70, 75, 78, 80).** This type of influence is the “non visual” one and includes:
   - Being concerned about school physical education, showing interest in their physical activity
   - Guiding them into a based-on-self-interested physical activity
   - Helping them to progress in different activities, not allowing them to give up when they are not competent
   - Trying to avoid their feeling ridiculous when they have difficulties in physical activities
   - Respecting their abilities and preferences
   - Not forcing them to become elite sportspeople
   - Teaching them to be their own role model
   - Encouraging them to avoid dropping out

3. **Providing opportunities and facilities (16, 71, 75, 77, 79, 81).** This type of influence is the “tangible support”, including:
   - Giving them leisure and sports material to encourage play
   - Helping them to organize their schedule, including time for

**BACKGROUND**: Promotion of physical activity guidelines from family environment
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outstanding activities: meals, homework, reading and physical activity

Try to get them to use the stairs instead of the elevator

• Going to the park or other safe places to actively play and/or practice their sport

• Dressing them in comfortable clothes that allow them to play freely without having to worry about getting soiled

• Finding out about the possibilities of practising recreational physical activities and sports in the neighbourhood

• Facilitating their enrolment and regular attendance at physical activity programs
2.3. Promotion of physical activity guidelines from school environment

Physical activity in a healthy school environment

Although one aim of the school is tackling childhood obesity (82-84), it has huge contradictions in relation to physical activity. Firstly, there is not a balance between practice and competition. Secondly physical education (PE) has become marginalized in the school context just when we need to resolve the problem of childhood obesity (85) and regular physical activity becomes a requirement (86). Changing PE curriculum by giving more PE hours will let students increase the time allotted to moderate or vigorous physical activity (MVPA) (82, 87).

The need to increase physical activity in school and being physically active is an important aim to stop the spectacular increase in obesity (88). These data were shown by the World Health Organization Regional Office for Europe (WHO) (88, 89). It recommends for children and adolescents more and better opportunities for physical activity, such as a minimum of 60 minutes of varied physical activity. Due to the fact that our society has changed habits of movement (children and young people prefer spending most of their leisure time watching computer and TV at home rather than playing actively in the street), our environment provides fewer opportunities for spontaneous physical activity for children and young people. Although government has to keep on seeking new solutions it is also true that everyone is equally responsible and forced to rediscover the potential of sport education, active play and physical activity in order to counter sedentary practices.

Physical Education will be among the objectives of the International Council for Health, Physical Education, Recreation, Sport and Dance (ICHPER) for school, and any standards as the Standard 3: Health-
Enforcing Fitness (Achieve and maintain a health-enhancing level of fitness) and the Standard 4: Physically Active Lifestyle (Exhibit a physically active lifestyle) (90).

Physical Education has never had priority in the curriculum. A piece of evidence is that the PE hours have being reduced (91). Families were usually not aware of the need for a minimum of physical activity daily, so they did not complement the shortcomings of movement seen in the schooling of their children with an additional practice schedule. Nowadays, parents are becoming aware of their children’s motion deficit and lack of healthy physical activity and are paying for sport and physical activity outside school hours, but this depends on the economic status of each family. Sport and physical activity must be part of the social life (86) but always depending on cultural circumstances (49).

The UNESCO’s International Charter on Sport emphasizes that Physical Education is a fundamental right for everyone (92). It means we must assure universal practice through the enhancement of physical education programs and adequate sports education. Physical Education and sports should be recognized as an integral part of quality education and should be a national priority (93). International guidelines are ignored and Physical Education and sport continue being, in some occasions, a privilege for children and young people (94) although they should be an essential part of every educational project. Everyone talks about tackling both obesity and inactivity in children and young people, extending the habits and sports activities among the citizenry. However, if we do not want the Physical Education curriculum to disappear, we need to ensure current credit hours for PE.

School is the key to develop, implement and maintain policies that promote a healthy lifestyle for everyone (82, 95-97). Due to the fact that children and adolescents spend almost half of their wakeful hours in school
should serve as a vehicle to reinforce healthy habits over time (89, 98, 99). We highly recommend the usage of individualized plans to promote such attitudes (100). Therefore, the school must strengthen physical education and physical activity (88).

Active and healthy programs have to involve the entire school community in order to reduce the chances of chronic diseases, increase students' knowledge about diet, nutrition and physical activity (16). It also improves the care and attitude of pupils in classes (101) and cognitive performance (102, 103) (i.e. increasing to 5 the number of weekly Physical Education sessions) (104). It seems that girls benefit most from participation in sports. A recent study indicates that girls who practice athletics improve their academic results, the effects being seen even in their adult years (105, 106).

Sports authorities handling physical activity and health in the school should be aware that children are more active during free time in schools with sufficient playing areas, facilities and sports equipment, where supervision is an important factor (107). Innovative playground markings in schools can increase total energy expenditure, rate of energy expenditure and duration of physical activity (108). Therefore many school playgrounds should improve their sports facilities in order to avoid having games and sports practices dropping off (88). An interesting proposal appears in a 2010 document for the Let’s move program, in which students practice sports during their recess breaks, as well as during maths, language and other courses (109).

**Effective school physical education**

School should offer a at least 20 to 30 minutes of moderate to vigorous physical activity (MVPA) each day (16, 46, 110) which should gradually increase until at least one physical practice time MVPA weekly
BACKGROUND: Promotion of physical activity guidelines from school environment

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(16, 97, 111-114) where a couple of sessions weekly will be dedicated to working muscle strength (59), flexibility (39, 88) and bone-mass (16, 39, 48, 64, 75, 115, 116). Some authors raise the minimum to 90 minutes (117).

On a physical activity five-levelled-scale (118): inactive, slightly active, moderately active, very active and extremely active, we would ensure the daily hour of physical practice as recommended for all children and youth. That means that, at least, it is necessary to have the moderately active profile, because they are achieving a high level of protection from chronic diseases resulting from physical inactivity, and the risk of injury is the lowest. Thus, at school, the student appropriately uses the Physical Education hours and supply of other complementary practices but also performs some systematic curricular activities sports, recreational or of moderate intensity.

The equivalent of this moderately active profile in the Physical Activity Pyramid Corbin for children (118) and adolescent (119) would reach the level-2 covering physical activities of daily living (i.e. taking the stairs instead of the elevator) (120, 121) and also active games and aerobic activities, sports or recreation (i.e. bicycle riding).

Nowadays, compulsory Physical Education classes should ensure 2 hours, and in the longer term, 3 hours a week in all educational levels of direct practice (93). Allowing 150 minutes for elementary schools and 225 minutes for secondary schools (97, 122), but not mandatory in preschool (3-6 years) where it is recommended to be active at least 3 hours a day (123) and also the age group (16-18) (112) making this practice universal (124). WHO (88) explains the need to include physical activity in school legislation in the same line of UNESCO (125), which thinks that all Member States should include the Physical Education and Sport (PES) curricula in their education systems, and make compulsory the PE and sports in the
curriculum (126, 127) this will ensure a minimum daily amount of physical activity as part of academic curriculum covering basic needs of motion (128, 129) because the active lifestyle and the practice of PES is a right for all students (92). In this sense, a recent study of Fernandes and Sturm, 8.246 boys and girls from 970 US schools were reviewed, verifying that body mass was reduced is those following the physical activity recommendations (130).

The school Physical Education curriculum must uphold the minimum competence to adopt and maintain an active lifestyle (16, 49, 89, 97, 111, 113, 114, 131, 132). In addition to improving motor competence of students, Physical Education will get them to feel competent. Therefore, PE must foment new skills, must master new abilities, and must increase children and youth’s self-confidence (88). Girls will especially need to feel competent and supported in PE and more variety of non-traditional sports and activities should be included in their classes.

In general, Physical Education for an active lifestyle must be offered to everyone (133) and programs must cover individual and social needs (92). All in all, PE is where children and youth learn how to be active so that they feel confident and motivated to undertake, on their own, physical activity outside of PE class (133). Half of the PE program should be devoted to MVPA and half to developing skills (16, 110, 134).

Physical Education focused on MVPA increases the fitness of children and young people (135) and simultaneously tries to improve their autonomy in the physical practice and their responsibility for an active and healthy lifestyle. For example, 3-6 years: 10-15 minutes of daily moderate activity (136); 7-12 years: several 10-15 minute activities with 5 or more minute breaks throughout the day (136) with active game or new games as throwball; 13-18 years: aerobic work are combined work strength into three or more sessions a week, longer earlier stages (136) with dancing, yoga,
games, traditional sports, organized sports and another physical, recreation or expressive activities.

We must ensure the carrying-out of PE programs (16, 97, 110) without any interference of other more sedentary subjects (96). Focusing on Physical Education programs we can collect some interventions to cope with curriculum, policy and environmental strategies (62, 64, 71, 77) because they are more effective than curriculum-only approaches (137). This would allow PES programs to be qualitatively assessed and accredited (125) and that PE teachers could be a skilled-qualified professionals (16, 92, 93, 110). We must not forget youth in correctional institutions, since they have fewer opportunities for physical activities and are consequently less active (138).

**Extracurricular physical activity**

Specific physical fitness programs as extracurricular activity can decrease the risk of obesity (139). Extracurricular physical activity is very important (16, 110, 127) as a supplement to the school because of the shortage of Physical Education hours. This practice, before and after the school, is one of the best predictors of fitness and fatness in children’s physical activity pattern (84, 98, 134).

The school sport facilities must be opened as long as possible within a safe environment (16, 91, 93, 96, 111, 114) and provide students with the most varied range extracurricular physical activities, in collaboration with parents' associations. These activities must take into account the needs and interests and be attractive to the majority of students (16, 49, 91, 97, 111, 114). Championships should be organized among schools as well (112, 127) paying close attention to girls (88, 100, 112), who should be offered less competitive activities (15).
All these physical activities, active games and healthy sports should respect the principles of fair play, sportsmanship and inclusion. Positive experiences will be the result of the creation of healthy practice habits in the medium term.

The school must ensure the methodology (112), sensitization (96), and update training in fitness and health of the staff to assist in organizing of these physical activities (16, 93, 111, 114, 131, 140) materials or in the evaluation criteria (127). Coordination and training, as well as teachers, are essential to national implementation (100), regardless of the dispensed subject matter or area which is covered (97, 112).

On the other hand, families could be informed about the best physical activities for their children or how to prevent and avoid injuries (30). Injuries are a potential barrier which must be assumed. The real danger is the maintenance of sedentary behaviour and habits from childhood (84, 134). Nevertheless, the ways in which we can reduce the possible risks of physical activity, active play and healthy sport are:

- Respecting the needs and interests of children and youths in the choice of activity, considering as well it´s appropriateness for them as well (141).
- Reporting, from the school to families concerning how to reduce risk behaviour and measures for the prevention of more basic injuries.
- Monitoring and assessing student participation in programs which the school is involved in, especially those that either add some new activity or have some kind of limitation or disability that be recommended.
- Advising the practice towards other activities with less impact or more appropriate, especially when detecting chances of chronic injuries.
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- Improving attitudes toward the practice of physical activity and exercise for children and mainly young people.
- Rejecting the use of physical activity as punishment.
- Using places, spaces and facilities which are adequate and safe.

School will maintain an Evaluation Plan to monitor and carry out appropriate control of the level of participation in the different intervention programs that promote physical activity and sports in the center (16, 111, 114, 125).

The school will work with parents' associations (88), with networks or with local sports agencies, recreational, social or health organizations (111, 142) and make their participation easier in physical activity programs developed at school. Participation and attitude improvement of the families toward the practice and exercise taking place at school is an essential element in programs that seek to increase physical activity in children and young students.

**Additional school physical activity**

School should promote the practice of physical activity by providing space and time to students who want to actively participate in recreational, institutional or traditional sports, dance or any healthy practice, individually or collectively, to avoid a sedentary lifestyle (16, 111, 114, 142). In addition to this, they must also encourage educative sports competitions to enrol the participation of all students (131), promoting different levels, incorporating offsets to maintain the interest of competition with the aim of the maximum possible participation.

It is important to include children and adolescents especially for the design, development and evaluation of physical activity programs. School, within this culture of participation, may request the collaboration of
students as coordinators, referees, judges, and organizers of the activities offered to younger children.

School should support, promote and spread a culture of wellness in general, and voluntary physical practice, in particular, for all members of the education community, in addition to the students, faculty, another staff and families (16, 82, 97, 100, 111, 114). In this sense, it is important to limit the use of candy and snack machines within the sports facilities (143).

Recess is a good time to offset the sedentary lifestyle that involves the processes of teaching and learning of most subjects in the curriculum (132). Recess will last approximately 30 minutes (16, 110) for every 3 continuous hours. In this period it is advisable to organize expressive activities, recreational or sports activities that help to develop habits that result in an adequate use of leisure and free time conducive to a healthy lifestyle (49). All in all, this period of time should increase the physical activity of the less active children during breaks at school (especially girls in intermediate schools) (89).

**School transportation**

Attending school is a good opportunity for physical activity and only half of the children often use active transport to and from school (i.e. walking, bicycling, skateboarding or other more active ways) (144). Active transport gives an opportunity for children's physical abilities to regulate the amount of physical activity they perform. (i.e. coming and going to school results in an increase of over 1000 in the number of steps taken each day of the week) (145).

Reasons given by parents and caregivers to avoid having their children go and come walking to school were: living too far away from school, traffic
hazard such as moving traffic or crossing a road, lack of time, weather... (137, 144).

School should encourage active movement of the members of their community, especially children and youth within a secure environment (16, 111, 113, 114) for cyclists and pedestrians (97) because many students are going by bus or by car to school instead of walking or riding a bike (89, 97). (i.e. car-free zones, by reducing the speed limit to 30 km/h or putting speed humps) (88).

Another interesting initiative are the Walking-buses where children walk to school in groups being watched by adults (88), establishing and promoting multiple safe routes of these small groups of students to school (16, 96, 110). This way it is possible increase physical activity, improve pedestrian safety of children who walk or bike to school, adding more minutes of physical activity throughout the day (146).

Adolescents whose parents live in a safe, accessibly and aesthetically pleasing neighbourhood, are more likely to walk or cycle (147). Where measures have been put in place to slow down or reduce traffic, more children are allowed to walk or ride to school on their own (148). Results across various studies show that children’s participation in physical activity is positively associated with the transport infrastructure (i.e. sidewalks, controlled intersections and access to public transport) (149).
**Recommendations at school level**

After reviewing the scientific literature and current reality of schools, it is proposed that school administrators act as follows:

- Claiming health education and daily physical activity for all students (87).
- Ensuring that physical education and extracurricular programs offer a combination of recreational activities, fitness, competitive and non-competitive sports which can be practiced during all one’s life (88, 89).
- Providing time during the day (i.e. playtime, active school transport) for unstructured physical activities (i.e. walking or cycling to school, games during playtime, etc.) (16, 111, 114, 142).
- Hiring qualified physical activity professionals (16, 92, 93, 110).
- Providing internal training for teachers in the promotion of physical activity (97, 112).
- Providing programs to promote health for school staff (16).
- Establishing a link with health professionals in order to track the situation of children overweight/obesity (111, 142).
- Establishing a link with physical activity programs offered in the community for the information of these programs to come to school and parents (16).
- Involving families and community organizations in school physical activity programs (16).
- Promoting a school environment that encourages physical activity by means of opening sports facilities during non-school or evening hours, weekends and holidays (4, 108).
- Working together with companies and other community groups for children and adolescents with lower incomes to have transportation and appropriate equipment to participate in physical activity programs (92, 133).
• Ensuring that facilities for physical activity meet or even exceed safety criteria (88).
• Not using physical activity as punishment, neither by prohibition (playtime, games) nor by obligation of doing it (push-ups, extra exercises, etc.).
• Increasing the students' knowledge on how to be physically active (16).
• Encouraging positive feelings about physical activity.
• Working for school staff to make physical activity fun and interesting (16, 49, 91, 97, 111, 114).
2.4. Promotion of physical activity guidelines from local government

Introduction

Nowadays in the majority of communities, the opportunities for children and adolescents to be physically active have been dramatically curtailed, where they are not active enough to reach health recommendations and the trend is toward less activity (91).

Both the drop in physical activity and the rise of obesity need to be urgently tackled, and cities are playing an important role in this. To strengthen health policies governments also need to support further research that quantifies the causal links between both physical activity and health. Some changes are also needed in social environments, as well as some evaluations of local policies and programmes to cover these issues (91).

In the 21st century, promoting physical activity should be seen as a requirement where sport and physical activity must more than ever become part of social life (86, 150). On a large scale, action should be coherent and consistent across different government levels and sectors, because physical activity is not only a public health issue but also promotes the well-being of communities and the protection of the environment and comprises an investment in future generations (89). In this way, young people have a fundamental role to play not only in the formulation of health and environmental policies but also in the decision-making processes and a healthier-and-more-sustainable-building world (91).

Local governments –along with jurisdiction over many aspects of land use, food marketing, community planning, education, transportation, health and nutrition programs, and other community issue- are strongly positioned to promote behavior that will help children and adolescents reach and
maintain healthy weights. Promoting children’s healthy eating and activity will require the involvement of an array of government officials, including mayors and commissioners or other leaders from counties, cities or townships (91, 151, 152). Many departments, including those responsible for public health, public works, transportation, parks and recreation, public safety, planning, economic, development, and housing will also need to be involved.

Local level initiatives have the greatest potential to encourage physical activity. Consequently, mobilizing and supporting local governments and local communities to develop this potential will be a key to success (88). However, it must be politically, technically and economically supported by regional and national authorities. If necessary, new technical and economic support mechanisms should be established and adapted to local needs (88). For these policies to be successful, they must be implemented at a national level (143).

The health sector has a major role to play in promoting and coordinating action to support physical activity in each level, and this should invite and motivate different sectors and stakeholders to collaborate in promoting physical activity. In this way, local communities should cooperate with health services to facilitate, and provide individual information to people who have been recommended by health professionals to practise physical activity as preventive treatment (88).

It is quite clear that no single organization can be expected to deal with all of the aspects of physical activity and sport. The overall objectives identified herein may be global, but the strategies must necessarily be regional, supported by national commitment, and the implementation of specific programmes must be normally local (86, 88). A close cooperation should be established between regional/provincial and local governments in order to implement and follow up on work (88, 96).
Community involvement and evaluation are vital to tackle childhood obesity. It is critical for local government officials and staff to involve constituents in local needs and identifying top priorities. Engaging community members in the process will help to identify local assets, focus resources, and improve implementation plans. As obesity prevention actions are being implemented, they will need to be evaluated in order to provide important information on what does and does not work (151).

The vision is towards shaping societies where healthy lifestyles related to diet and physical activity are the norm, where healthy goals are aligned with those related to the economy, society and culture and where healthy choices are made more accessible and easy for individuals (153).

**Barriers**

The social reasons for the non-practice of physical activity are (88, 89, 91, 96, 127, 144, 154-156):

- The quality of the neighbourhood affects the residents’ own free will to have physically active use of common spaces.
- Parents are quite reluctant to let children play outside or letting them go playground on their own due to traffic road fears and/or crime.
- Children and adolescents are given a lift in home-school journeys because of the distance and/or road safety concerns.
- Even if there are safety routes such as back alleys and cycle lanes, tracks and paths, children may choose not to use them, especially if they are in isolated areas. Children may prefer to be in places where they can be seen and where they can see other people.
- Competitive sports programmes may be one reason that young people are particularly likely to drop out of sports.
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- Suburbs with wide streets, long blocks, few sidewalks and a lack of mixed land use leave children and young people with “nowhere to go” and may have contributed to the increase in passive indoor recreational activities such as computer gaming and watching television.
- Different socioeconomic groups also show inequalities. Poorer people have less free time and worse access to leisure facilities, or live in non-physical-activity-supported environments.
- Scant financial resources.

Evidence suggests that environment –where people live, work, learn and play– influences both the simple and complex factors involved in physical activity (91, 157, 158).

In adopting policies and practices tailored to raising healthy children, local communities have an opportunity to achieve equity. The equal distribution of health resources among all population groups, regardless of their social standing, poverty, poor housing, racial segregation, lack of access to quality education, and limited access to health care contribute to the uneven well-being of some groups of people, especially those who live in poor communities (151).

**Recommendations at a local level**

Actions to improve our community and increase physical activity in children and adolescents:

1. *Urban Environment:*

   - Provide a framework through regional health authorities to create healthy communities (88, 122, 159).
• Identify opportunities and challenges to improve the community surroundings (160).

• Communities can be designed to encourage activities, such as walking, biking, or sports games (88, 96, 153, 160, 161).

• Adequate space and sports facilities (88, 89, 150, 155, 162).

• To make access easier to outdoor recreational facilities (88, 89, 96, 97, 126, 127, 133, 150, 153, 155, 163, 164).

• To make access easier for the practice of physical activity in children and adolescents with disabilities and chronic illnesses (91).

• Build or enhance infrastructures to support more walking and cycling (97, 153, 163, 165, 166).

• Adopt pedestrian and cycling, learning to develop a long-term vision for walking and cycling in the community, and guide its implementation (151, 161, 162).

• Plan, build, and maintain a network of sidewalks and street crossing that create a safe and sound walking environment and schools, parks, and other destinations (91, 151, 158, 161, 162, 165, 166).

• Enhance safety traffic in areas where people are or could be physically active (97, 158, 162, 163).

• Plan, build, and retrofit streets to reduce speed limit, accommodate cyclists, and improve the walking environment (91, 151).

• Plan, build, and maintain a well-connected network of off-street trails and paths for pedestrians and cyclists (91, 126, 133, 151, 164).
• Provide on and off-leash walking areas for dog owners within walking distance of areas where older people, families and people with disabilities live (91).

• Increase destinations within walking and cycling distance (151, 153).

• Create safety areas to park bicycles in recreational areas (162).

• Collaborate with school districts and developers to build new schools in central locations close to residential areas and away from moving traffic roads (97, 151, 163).

2. Programs for walking and cycling:

• Foment active transportation (50, 88, 91, 114, 122, 127, 144, 145, 150, 153, 162, 167, 168).

• Adopt community policing strategies that improve safety and security of streets, especially in higher crime neighborhoods (151, 169).

• Collaborate with schools to develop and implement safe routes to school in order to increase the number of children safely walking and cycling to schools (91, 110, 126, 127, 151, 153, 158).

• Affordable bicycles, helmets, and equipment for lower-income families (122, 151).

• Reduce fares for children, families and students in order to promote use and improvement of school services, parks, recreation centers, and other family destinations (88, 151).
• Implement a traffic enforcement program to improve safety for pedestrian and cyclists (131, 151).

3. Recreational physical activity:

• Build and maintain safe and attractive parks and playgrounds nearby residential areas and schools (91, 96, 104, 126, 133, 151, 158, 160, 170).

• Adopt community policing strategies that improve safety and security for park use, especially in high crime neighborhoods (151, 169).

• Improve access to public and private recreational facilities in communities with a shortage of recreational options through cost cuts, increased cooperating hours, and development of appropriate cultural activities (122, 151, 162).

• Increase the frequency and intensity of physical activity in order to engage children and adolescents during-and-after-school (152).

• Create after-school programs and other publicly or privately supported active recreation (151).

• Encourage the use of stairs versus elevator (165, 166).

• Collaborate with school districts and other organizations to establish facilities agreements allowing fields, playgrounds, and recreation centers to be used by community residents when schools are closed; adopting if necessary, regulatory and legislative policies to handle liability issues that might block implementation (4, 49, 96, 133, 151).
• Create and promote youth athletic leagues and increased access to fields, with special emphasis on income and gender equity (126, 151).

• Build and provide incentives to build recreation centers in neighborhoods (151).

4. **Routine physical activity:**
   • Institute regulatory policies about play space, physical equipment, and duration of play in preschool, after-school, and child-care programs (151).
   
   • Create incentives for remote parking and drop-off zones and/or dis-incentivate nearby parking and drop-off zones at schools, public facilities, shopping malls and other destinations (151).
   
   • Improve stairway access, especially in places frequented by children (151).

5. **Schools:**
   • Adopt strategies to facilitate regional and international cooperation among specialists of physical education sciences, institutions and countries (125).
   
   • Develop structures for team research on physical education sciences thematic (125).
   
   • Establishing a Technical Working Group to monitor standards for quality PES and to ensure sustainability of regional initiatives (125).
   
   • Work with schools in order to promote daily and high quality physical education at all levels (91).
   
   • Create healthy school policy that includes management practices, decision-making processes, rules, procedures and
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policies at all levels that promote health and well-being, and shape a respectful, welcoming and caring school environment (91, 171).

- Maximize the opportunities for action in the fields of physical activity and sport, including the creation of appropriate legislative frameworks, adequate public and private funding, education and research (86, 172).
- Support the employment relationship within schools (staff and students) and among schools (171).
- Encourage and provide schools with safe and appropriate spaces and facilities in order students to spend their time actively (91, 127).
- Create safety areas to either store or park bicycles in schools (162).
- Increase opportunities to do physical activity during school focusing on frequency and intensity (152).
- Offer physical activity programs and sports for children and youth out of school competition calendar (173).
- Talk with schools about increasing physical activity through classroom lessons that have movement activities (160).
- Promote financial resources for the promotion of physical activity extracurricular (131).
- Provide a range of extracurricular programs in schools to meet the needs and interests of specific children and adolescent populations, such as racial and ethnic minority groups, people with disabilities, and low-income groups (174, 175).
• Provide access to school buildings that enable safe participation in physical activity (174).

• Working with schools, educational system, parents, police and local officials to provide active and safe routes to go to schools and teach children to ride safely through these pathways (91).

• Encourage schools' administrations to promote and support the implementation of activities related to health promotion for school staff (127).

• Provide funds for in-service training and some incentives for teachers to participate in additional training (114, 127).

• Maintain an active school health council and designate a school health coordinator to promote physical activity and healthy eating (176, 177).

• Strengthen the school's nutrition and physical activity polices (176).

• Develop, implement, and evaluate innovative pilot programs for both staffing and teaching about wellness, healthful eating, and physical activity (114, 152, 167).

6. Healthcare:

• Primary care interventions are needed to promote physical activity, including advice about reducing television time (89).

• Establish a relationship between the surgery and school (111).

• Work in collaboration with the Primary Care Trusts and general practitioners to establish programs and formation of the association and members of the schools (178).
• Work with pediatric services for children, leisure services and partnerships for physical activity and sport (91, 178).

7. *Transport:*

• Proper transport settings can provide excellent opportunities to achieve the recommended daily amount of moderate physical activity for general health benefits (88).

• Promote active transport as “the walking school bus” (50, 88, 91, 114, 122, 127, 144, 145, 162, 167, 168, 179).

• More research should be done not only to evaluate the effectiveness of interventions that promote physically active transport but also to determine the best combination of measures that can support a cultural paradigm shift towards physically active transport (88).

• Improve access to public transportation (91, 97, 161, 163).

• More cycling and walking will reduce air pollution, noise and traffic congestion, and they will create safer neighborhoods. Investing in physically active transport reduces the need for expensive road construction and maintenance, and is highly cost-effective when health benefits are taken into account (88).

8. *Media and social marketing:*

• Provide a mechanism for sharing data on active living, for example on the health costs of inactivity and pedestrian travel and safety patterns, across government departments and with the non-governmental private sector (91).

• Provide clear and consistent media messages on physical education and sport practices and their positive influences (88, 92, 152).
• Implement a communication strategy that show the benefits of physical activity and active transport, how to overcome barriers to being active and how to get involved in active living in one’s neighborhood, city and the surrounding areas (91).

• Develop advertising campaigns, (mass media, radio, internet, television, other promotional materials) using consistent messages to promote physical activity (88, 151).

• Create advertising campaigns to show the general public about the walking and cycling benefits (127).

• Provide a knowledge of physical activity for families through sport events (162).

• Design an advertising campaign that establishes physical activity as a health equity issue and reframes obesity as a consequence of environmental inequities and not just the result of poor personal choices (151).

• Develop advertising campaigns to prevent sedentary activities, tobacco and alcohol (84, 151).

• Adjust the physical activity level to the characteristics and needs of the population (165, 166).

9. Organizations:

• Enrol in partnerships with community agencies, voluntary organizations, religious organizations and sport clubs to promote and enable active living for children and youth, and disable people (91).

• Build or grow a community group to prevent childhood overweight and obesity (160).
BACKGROUND: Promotion of physical activity guidelines from local government

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- Provide a range of programs in community recreation centers to find the needs and interests of specific adolescent and young adult populations, such as racial and ethnic minority groups, disable people, and low-income groups (174, 175, 178).

- Provide access to community facilities that enable safety participation in physical activity (174).

- Provide opportunities for healthy food and physical activity in community programs, particularly for high-risk population (48, 128, 152).

- Participate in community coalitions or partnerships to tackle obesity (97, 163).

- Support the employment relationship between schools and other community organizations as well as representing groups (171).

10. Screen time:

- Implement school-based interventions to reduce children’s screen time (152).

- Adopt regulatory policies cutting screen time in preschool and after-school programs (151).

Although a number of organizations, companies, institutions, and agencies must be involved in designing and implementing changes, efforts cannot succeed unless they also engage the families, schools, and communities that create the environment in which children live and are brought up (88, 152).
International non-governmental agencies, national and local sports bodies can contribute to the process of motivation of young people to enrol them in recreational sport.
2.5. Promotion of physical activity guidelines from non-governmental organizations

**Introduction**

Childhood and adolescent obesity is not only a responsibility for country administrations and public health agencies. Non-governmental organizations (i.e., sports clubs, community youth associations, etc.) play an important role in proposing and/or developing policies to prevent and to treat obesity and their related disorders (165, 166). These associations can support advocacy efforts to improve the quantity but also the quality of the physical activity that every child performs daily. Non-governmental organizations complement school curricula, and help to create the culture of physical activity by partnering with schools and supporting families (126). In addition, these partners can assist in creating awareness, publicity and visibility for healthy behaviors and contribute by collaborating and co-sponsoring programs for young people (127). These kinds of programs have been developed with satisfactory results for children and adolescents (180). For these reasons, government policies should be implemented to provide economical support, spaces and encouragement to non-governmental organizations to get broader physical activities and to reach new groups of children (91, 181, 182).

**The role of sports organizations: Olympic Committees, Sports Federations and other international organizations (TAFISA)**

Sports Federations play a central role in the practice and promotion of sport. In addition, they should pay special attention in sports to education of young athletes, their psychological balance and health, especially supporting amateur athletes by facilitating their access and training, and protecting their health. As indicated by the EU legislation...
"sports Federations should promote different levels of practice, from recreational to high-level sport" (183).

With regard to National Olympic Committees (NOC), the Olympic Charter, article 28, says their task within each country is to "promote the spirit of Olympism, ensure compliance with the Olympic Charter, promote ethics and development of sport" (184).

There are numerous examples of programs sponsored by these organizations to promote youth sports. These programs have increased recently due to the great concern over the current issues surrounding youth: lack of values, drugs and obesity, among others. It is in this point where the IOC Commission of Sport for All is situated. It was created by the IOC in 1983 and its most important goal is to promote, support and spread out health and social improvements obtained from a regular practice of physical activity, by means of cooperation of International Sports Federations (ISF), National Olympic Committees (NOCs) and national sports organizations (185).

The IOC focused the theme of the 12th World Sport for All Congress in the study and promotion of a healthy and active life. The motto of this Congress, held in Malaysia in 2008, was “Sport for All - Sport for Life”. Its aim was to find solutions to avoid the increasing trend of physical inactivity. One of the key findings of the Congress was that sport and physical activity should be a key element in health policies and particularly in relation to obesity (186).

In the same way, the Spanish Olympic Committee has recently welcomed (in March 2010) the meeting of the Spanish NOC Commission for Nutrition and Healthy Habits in Sports, chaired by the Minister of Health and Social Policy, Trinidad Jimenez, accompanied by the president of the Spanish NOC, Alejandro Blanco, and the president of the Commission,
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Carmelo Paniagua. An the event were the director of the National Agency for Anti-doping, the Deputy Minister of Sports in Madrid, members of the National Sports Council, presidents of the Spanish Federations, directors of sports institutes, representatives of universities, professionals and media. This represents a very good example of coordination and teamwork of the different governmental, non-governmental, local, public and private agencies (187).

Regarding the International Federations, an interesting example can be found in the International Football Federation (FIFA) and its new initiative “Football for Health”. It has been elaborated under the Medical Assessment and Research Centre of the FIFA (F-MARC) in close cooperation with African doctors and organizations such as AMREF (African Medical & Research Foundation). It aims, under the "Win in Africa with Africa" program, to provide to all players and fans of the continent the most important victory of all: health (188).

Another example in this area is the British Athletics Federation (UK Athletics), which is working with the insurance company Aviva and the UK Health Department to implement the project “Change4Life” that promotes healthy lifestyle habits, especially among youth. Aviva is the main sponsor of the Federation and has a number of programs for grass roots activities in UK Athletics, and around all of them the company implements collaboration with the project "Change4Life" (189).

In addition to sports Federations and Olympic Committees, other international organizations also promote, through hard work, the practice of physical activity, sport for all and traditional games for health. Among all, Trim & Fitness International Sport for All Association (TAFISA) stands out as the leading one. Its main objective is to promote “Sport for All” around the world, address to different groups and bring them upon practice of physical activity and sport. TAFISA programs include events with a longstanding
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tradition and record such as the “World Challenge Day”, the “World Walking Day” and the “World Festival of Traditional Sports”. At the same time, TAFISA is currently developing new activities such as Certified Leadership Courses in Sport for All and the “Active Cities” program. The last one will be launched in the near future (190).

Although there are examples of the efforts these organizations are already making and also of recent projects, it is important to increase and accelerate these projects and implement other ones in order to promote physical activity and sport as the best tool for a healthy life.

**Family as collaborator of NGO**

The influence of the family setting on the children’s physical activity behavior has been discussed previously. However, the participation of parents and other members of the family in sports organizations or community associations may be essential for child physical activity after school hours (191). These associations are non-profit organizations composed primarily by members of the community. Hence, the initiative of family to begin or to take part in these organizations allows the existence and well running of programs aimed to increase extracurricular physical activity. The family may have a great influence on their child’s participation by simply being involved with the team or organization in some capacity (133). Other possible action of the parents is within the neighborhood since it may be a site for the implementation of policies to target overweight and obesity in children. Parents could work ensuring that neighborhoods are safe and have an infrastructure for physical activity (169).

**Extracurricular exercise to reach physical activity recommendations**

As suggested previously, schools play a key role in setting kids and adolescents on the path to moving more, primarily by increasing the time of
Physical Education in the curricula (192). However, it is complex for children and adolescents to meet the recommended levels of physical activity with only the time spent in the Physical Education classes. Nowadays, even in the countries with best Physical Education programs, it does not provide adequate amounts of physical activity for children (193). Apart from schools, sports clubs and community-based organizations provide the most typical scenarios for sport and physical activity during after-school hours (4, 194). These non-governmental associations with a heterogeneous nature (parents associations, sports clubs, youth associations, etc.) aid to complement the quantity of physical activity obtained in formal Physical Education classes, to achieve the 60-90 min. of daily exercise recommended (48, 127, 128). Additional benefits of extracurricular activities include the participation of students in a wider variety of activities and increased opportunities for cooperation between schools, students, parents and the community (160).

**Environmental models for physical activity**

There is a strong correlation between children’s physical activity and the amount of time they spend outdoors (195). Non-governmental interventions to promote physical activity in childhood and adolescence should be a goal to provide supportive environments for children and adolescents of all ages, based on the ecological models of health behavior (48). These models assert that health and physical activity behaviors are strongly influenced by intrapersonal, social and physical environment variables. Thus, effective interventions for the prevention and treatment of obesity should be those involving multiple levels of influence (196). Under this background, parks, sport fields, playgrounds and cycling and jogging paths are necessary to create a “behavior” that enhances structured and informal physical activity, in opposition to other buildings (i.e. stores, shops or theaters) that promote sedentaryness (48). It is essential that national, regional and local governments finance and create attractive environments.
and facilities for the development of exercise and physical activity (126). Additionally, it is necessary to promote and support the use of natural environments (beaches, hills, etc.) and facilities (i.e. public parks) for sports classes or youth associations meetings (97, 127). This ecological model will allow taking up programs under sport clubs’ or non-governmental bodies’ organization.

**Schools open after hours**

Following an ecological conception of physical activity, not only the existence of spaces and facilities but also its availability is essential to promote physical activity during childhood. For example, most schools have indoor and outdoor facilities especially designed for physical activity and equipped for the performance of a variety of sports. However, schools in most countries usually have policies that forbid or limit the use of these facilities during evenings or weekends. These rules lead to the actual situation, in which schools have one of the most prepared facilities for physical activity but they are also the least available for extracurricular activities (89).

A special recommendation of the present report is to encourage schools and education agencies to change their policies (4) and to establish partnerships with sports clubs and associations (127). This will provide spaces and material for extracurricular exercise programs during after-school hours and weekends, and it will also be supported by others (97, 163). Local governments may reach an agreement with schools, in order to set up partnerships with community-based organizations and to allow the use of school facilities for physical activity programs (97, 127, 167). Standards and plans should be developed to ensure easy access to attractive recreational areas with supportive infrastructure and affordable facilities (88, 89).
**How to promote children’s participation**

Childhood obesity is due to a positive energy imbalance in which daily energy intake exceeds energy expenditure (197). However, extracurricular activities scheduled in sports clubs and community associations should not be considered as a “math formula” focusing only on increasing energy expenditure. Exercise and sports activities must be fun, having flexibility of scheduling and combining numerous activities and games in order to both promote participation (198) and reach the psychosocial benefits which come from exercise. Moreover, activities performed in their own free will enlarge the benefits from exercise which lead to body weight reduction, in comparison to strictly programmed activities (199). Thus, to promote the highest children’s and adolescents’ participation in clubs and sports organizations, a variety of competitive and non-competitive activities, and both individual and team activities should be offered (126, 127, 133).

This wide offer of exercise activities will reach the maximum number of students' needs, interests and abilities and it will help students to have access to adequate physical activity (127, 131). On the other hand, exercise programs with a low impact on the childhood physical activity behavior are characterized by restriction to athletes or fit children, offered for a part of the year, infrequent meetings for development of activities and/or include low physical training (48).

**Activities for fun**

It is important that associations report to children and youth people about the several benefits of being physically active beyond just a healthy body weight and a good shape (133). However, although physical activity results in many health benefits, these advantages do not motivate children and young people to be physically active. On the other hand, they are prone to participate in physical activities for fun, enjoyment, and for social reasons (200). Sport organizations (leagues, clubs, teams, etc.) should offer a
variety of sport opportunities, such as multi-sport programs that meet the needs of children and youth with varying abilities, interests and skill sets. Offering special events for playing, or organized new activities will encourage greater participation in sport and physical activity. Associations should work with schools and families to offer after-school physical activity programming with the maximal scope (113). Finally, not only non-governmental organizations but also schools should help in promoting the organization of inter-schools sport competitions (127), in addition to the physical activity scheduled during Physical Education lessons.

**Peer influence and team sports**

Another aspect to be taken into account when planning physical activity programs during adolescence is peer influence in youth boys and girls. Physical activity during adolescence is very much a social activity and peer group may influence youths when they want to take up a new activity. Moreover, adolescents influence each other, meaning that active adolescents have also active friends (201). For these reasons, community-based programs should emphasize activities that allow interaction among participants, in order to promote interrelationship and friendship. It is relevant to mention the role that team sports may have in recreation among the physical activities developed by clubs and organizations, especially for the treatment of adolescent obesity. Team sports activities allow adolescents to enhance their physical skills, to develop healthy behaviour within defined roles, to learn a range of social skills and to build up a social identity (48). These benefits are summarized in adolescents when playing with partners versus individual sports. All these benefits are added to those obtained intrinsically by the performance of the sport activity (133).

To summarize, sport clubs and community-based organizations should be taken into account as ways of tackling childhood and youth obesity. They should be the promoting-exercise tools for after schools-hours, in order to
meet the physical activity criteria for children and adolescents. However, it will work out if there are government funds, the existence and availability of facilities and outdoor spaces, and collaboration with schools.

**Recommendations at a non-governmental level**

After reviewing the scientific literature and the current reality at a non-governmental level we propose:

- All sports Federations should promote sport for all, regardless of participants level. They must implement educational programs, with special emphasis on health care (183).
- Olympic Committees, as warranters of health promotion through the practice of physical activity and sport, should take the initiative to encourage and promote projects, especially targeting youth, so that said projects could be implemented later by sports institutions (185).
- Encouraging family participation, especially of girls (15), in sports activities promoted by NGOs in order to ensure greater consistency shown by children in the practice of such activities (133, 169, 191).
- Sports clubs and NGOs should provide physical activity programs after school (127).
- Sports clubs and NGOs should be provided with the use of school facilities in out-of-school hours (89, 97, 163).
2.6. Promotion of physical activity guidelines at a governmental level

Introduction

Physical activity is not just a public issue; it is a fundamental means of improving people's physical and mental health (202). Additionally, it is essential to the healthy growth and development of children and youth, and it also provides social and behavioral benefits (91). Therefore it must be a priority of social and health agendas (86). Regular physical activity goes far beyond losing weight. Physical activity, when coupled with a healthy balanced diet, or preventing weight gain, can also prevent demonstrated health problems (i.e. physical and emotional) (202) associated with obesity (152).

To our concern, promoting physical activity is not a luxury, it is a necessity. Countries need to change their tendency towards inactivity, and the good news is that said trend can be reversed. A call to action includes different levels of government and different sectors (86, 88, 202) and must be based on a number of key principles defined by the WHO/Europe and the HEPA (202):

- Taking a healthy approach to population
- Using a broad definition of physical activity
- Engaging multiple sectors
- Improving the environment for physical activity
- Working at multiple levels
- Basing programs on the stated needs of the population
- Applying multifaceted, comprehensive and effective approaches
• Improving equity
• Using the best available and sustainable evidence.

National action is needed to introduce strategies and coordinated approaches that can lead to gradual increases in physical activity to counteract obesity (88, 153). Public authorities are responsible and are in charge of facing the challenge of making physical activity attractive by the implementation of several means (86, 92, 131) and by linking partnerships among all stakeholders (153, 203).

It is also important to set as a priority in the fight against obesity during the first stages of life when habits and behaviors are formed, often enduring after several years (152). Therefore, a special target is childhood obesity, which is considered the onset of adult obesity, since obese children are more likely to become obese adults (15, 161) or at least most of them will probably deal with weight-related issues for the rest of their lives (200).

In the fight against obesity, different sectors and interventions must be coordinated and taken into consideration since the root of the problem lies in many modifiable factors (i.e. family, school, urban design, etc.) and non modifiable factors (i.e. genetic factors). Efforts cannot succeed unless they engage all the actors (86, 153).

Creating a special agency could promote and coordinate actions to develop, support and enhance efforts to tackle obesity. This agency could lead five major areas:

• Making physical activity part of primary prevention
• Documenting effective interventions and disseminating research
• Showing the economic benefit of investing in physical activity
• Connecting relevant policies and actions between ministries and sectors

BACKGROUND: Promotion of physical activity guidelines at governmental level
• Advocating and exchanging information

[Adapted from HEPA (202)]

National and international clinical organisms are welcome to submit proposals to improve health care providers’ and professionals’ training and education on health promotion, physical activity and exercise prescription as well as on overweight and obesity management. These courses should be included in their academic curricula. In addition to this, universities can play an important role in prescribing and assessing exercise, and specific arrangements could be made (131, 167).

To achieve marked progress in public health with regards to physical activity, national policies should reduce the prevalence of physical inactivity (88). In fact, sedentary behavior is an important health factor that is distinct from physical activity (204) and the goal now is not to remove it, keeping sedentary activities at a reasonable level (200).

An example of national policy is what the National Sports Council has recently launched in Spain in 2010. In order to promote universal access to high-quality sport for the whole population, the National Sports Council, in close cooperation with Autonomous Regions, local authorities, universities and other government bodies, together with the private sector, has launched a series of actions that give form to the “National Physical Activity and Sport Plan” to be developed during the next 10 years (112).

In the same way, we can find:
• The USA Healthy People National Plan (Healthy People 2010) where obesity, overweight and physical activity were included as work areas (205).
• The Mexican National Health Program 2007-2012, “for a healthy Mexico: building alliances for better health” (206).
• The French National Nutrition and Health Program (PNNS) (207).
• The Spanish NAOS Strategy (Strategy for Nutrition, Physical Activity and Obesity Prevention) from 2005 (208).
• The Chilean EGO Plan (Global Strategy to fight against Obesity) launched in 2006 (209).
• In Taiwan, the program to promote health in schools, coordinated by the Ministries of Education and Health (DHO) (210).
• The program "Guadagnare Salute" of the Italian Health Ministry started up in 2007, given support by the Italian Olympic Committee in 2011 (211).

And many others following WHO guidelines to fight against obesity through physical activity.

International cooperation to deal with obesity is needed, as many key measures are cross-border and many countries have already developed their own national physical activity policies and action plans (153, 167). We must learn from these experiences and coordinate actions.

It would be desirable to create an international research network to study, at short-term, factors related to childhood obesity, and at long-term, to lead interventional policies (128). These research groups could work on nutrition and physical activity as an effective tool to collect data and implement both physical and biological actions, and to monitor the effectiveness of interventions (152, 161).

Public information is defined as “the provision of information and other communications strategies to encourage people and groups to adopt positive health practices throughout the life cycle, not only to develop the skills they need to be healthy but also support others in healthy lifestyle decisions” (122). Media play a critical role and must be aware of their responsibility to provide information and foster public awareness, and support public health policies (153, 212).
Public information on sedentary lifestyles and obesity and their consequences, as well as special campaigns to improve knowledge and encourage children and adolescents to move towards healthier lifestyles, should be highly recommended (128, 167). Working groups where members of food companies, consumers, media and health agencies are represented could try to promote and stimulate healthy lifestyles (213, 214). In this respect, developing or improving national food guidelines and guidelines for physical activity, and advertise them could be helpful to promote healthy lifestyles among the population (92, 152, 153, 160).

The majority of children and youth do not value the long-term health benefits of physical activity, and many of these health benefits may not be evident for years. Messages for children and youth must be informative (focusing on the immediate and short-term benefits of physical activity), relative (stressing things that are important for this age group), and persuasive (215). It is not these benefits which motivate them to be physically active, since they are prone to participate and engage in physical activity for fun, enjoyment and to socialize (91, 200).

Developing a mechanism to limit the impact or the advertising pressure for energy-dense food and beverages, and regulate foods and beverage products that can be sold in schools and vicinities (127, 160, 163) could be helpful for creating responsible marketing and advertising practices. Special attention needs to be paid to children and adolescents, whose inexperience or credulity should not be exploited by commercial activities and interests (153). Although different interests may exist between private sector and government’s public health interests, it is important to recognize possible meeting points (127).
**Education: school curriculum**

If governments shared the responsibility for children’s physical activity between health and education departments, optimal outcomes in both health and learning could be more likely achieved (216).

There are no standards in physical education curricula, therefore governments could be encouraged to develop, implement or strengthen a national school curriculum that includes relevant information on healthy diets and physical activity and information on media and marketing literacy (113, 127, 160, 167) that provides students with the knowledge to take physical activity and diet based-on informed decisions (healthy lifestyles) but this information does not only concern physical education, because health is a transversal issue.

Governments should also consider the development of a national curriculum framework for physical education lessons (93, 114, 125) where the physical and/or sports education subject would be included as mandatory in schools during the school year (93, 125, 127) being therefore part of the core of the curriculum (125, 126) and ensuring a certain amount of physical activity (114, 161). A physical education curriculum for preschool and even pre-kindergarten should be considered (93, 217). Increasing the number of these lessons is one of the most direct ways to increase students’ physical activity (127, 165) but also hiring physical education specialists (92, 93, 111, 125, 171) in order for them to lead physical education lessons and curricula, which has been shown to increase students’ levels of vigorous physical activity in class (171). Programs must be qualitatively assessed and accredited (125). Lessons should be well planned, offer a variety of creative, enjoyable learning opportunities throughout the year (126) and include more variety of nontraditional sports and activities as well as adapted instruction in order to reach different students’ preferences and needs (114, 133, 160).
On the one hand, these classes should focus on a general skills development in a variety of activities and exercise to increase the amount of time students engage in physical activity during class, instead of focusing only on the development of specific skills (171). The goal is learning how to be active, making students feel confident, to help them in knowledge-developing, attitudes and motivate them to undertake physical activity on their own outside the school (16, 86, 114, 133, 160).

On the other hand, it is important to be aware of school’s real power. Schools play a critical role because they reach every child (regardless of age, ability, gender, culture or socio-economic background) (200) but it cannot provide all the physical activity that they need (192). In fact physical education lessons often do not meet the recommended levels for children and adolescents (193). It is important to add physical activity obtained from formal classes.

Physical education teachers’ training should also be an important topic (93, 110, 112). Providing funds for training and incentives for teachers to participate in additional training programs may be desirable as well as encouraging schools’ administrations to implement facilitate and support activities related to health promotion. It is important for them to be aware and responsible for the messages they give (112-114, 127). Creating strategies and a network for cooperation and knowledge - sharing for the specialists of physical education and the professionals at university level researching on the physical education scope should be desirable (93, 125).

The Health System

Physical activity and health are unquestionably related. Taking that into account governments should ensure promotion of physical activity as a priority in their health policies, being also an efficient component of prevention and primary care (218). Likewise, Governments should facilitate
coordination between health and other related sectors to ensure public policies to improve physical activity opportunities (219).

Examples of these practices can be found in Sweden. The Swedish Institute of Health Sciences (Vardalinstitutet) includes on its website (220) a section named Elderly health, how can we promote it?, which provides information on the promotion and preventive care for the elderly, including physical activity, diet, culture, environment, etc.

In Denmark, it is recommended that family doctors prescribe physical activity as a prevention of lifestyle-related diseases, whether they have already been diagnosed or to prevent their occurrence. They are expected to talk once a year to their patients about lifestyle and health (219).

An interesting challenge, already underway in some countries, is to create physical activity programs in primary care by means of interdisciplinary action. Such programs should be specific to each person and designed by professionals of Physical Activity and Sport Sciences, in cooperation with medical staff. So far, there has been some uncertainty about who is the agent responsible for guiding physical activity prescribed by health system. However, it seems obvious that the design of such programs should be carried out by both fields (221).

We can find examples of multidisciplinary work among different sectors, for instance in Spain. The Program for Developing Community Health and Education (222) is included within the framework of the Community Activities in Primary Care Program (PACAP) and the program of the Society of Primary Care Nursing in Madrid (SEMAP) (223). All of them are training programs for healthcare professionals to be qualified to encourage the practice of healthy physical exercise programs from primary care.
**Policies / economy / tax**

Government and national parliaments should ensure consistency and sustainability through regulatory action, including legislation of all the actions. Other important tools include policy reformulation, fiscal and public investment policies, capacity-building and partnership, research, planning and monitoring (214). Establishing public/private partnerships with public health objectives should be encouraged (153).

Actions would include measures to promote and ensure access to and availability of healthier food (manufactures are called to reduce the fat, free sugars and salt content and include adequate nutritional labeling), including fruit and vegetables; economic measures that facilitate healthier food choices even to the lower population groups who find and face more difficulties for making healthy options (153, 163, 212). Affordable prices for fruits and vegetables through cooperation between the department of health and the agriculture sector, even having pieces of fruit for free in schools and holiday centers and facilities (167) or creating “health foods outlets” (212, 224). Incentives could be provided to produce, distribute and procure products from local farms (164).

On the side of physical activity, governments must invest to offer affordable recreational/exercise, both building and natural facilities (including adaptations for socially disadvantaged groups) (225) to create opportunities and stimulate daily physical activity, providing the benefits from increased physical activity (86, 92, 113, 153, 162, 163, 165). Physical activity – related outlets could be developed to encourage physical activity even for those with lower incomes (for membership and non-membership, health clubs, spas, fitness facilities, dance studios, etc.) (212). When designing urban spaces and transport policies, governments are encouraged to promote cycling and walking (113, 153, 163, 165) especially for routes to and from school (127) and are encouraged to locate schools within walking distance of residential areas (113, 163, 165). Parents’ action to encourage
active lifestyles walking or cycling to school is essential (226). Governments are also asked to improve access to public transport (163). It is also important to set strategies to evaluate and monitor the impact of these campaigns (133, 153).

Taxes and subsidies could be used to modify the relative prices of less healthy food and beverages, which would probably reduce their consumption (212). However, people seem to oppose tax-based regulations (227, 228). Perhaps other types of tax regulations could be proposed, such as the Canadian Federal Children’s Fitness. It allows promoting physical fitness to claim a tax credit per child of up to 500$ per year and child (under 16 years old), for parents who register their children in programs (122).

**Recommendations at a governmental level**

After reviewing the scientific literature and the current reality at a governmental level we propose the following:

- Promoting public information campaigns on sedentary lifestyles, obesity and its consequences, as well as special campaigns aimed at raising awareness of children and young people and encouraging them to adopt healthier lifestyles (153, 212).
- Promoting working groups which include representatives of the food industry, consumers, media and health agencies, to encourage healthier lifestyles (92, 152, 153, 160, 213).
- Governments should develop national educational curricula that include relevant information on healthy diet and physical activity (113, 127, 160, 167).
- Governments should also develop a planned curriculum framework for physical education classes, in which the subject is
compulsory, and increase the number of physical education hours. They should also propose a physical education curriculum for kindergarten (93, 114, 125).

- Governments should promote the creation of multidisciplinary groups to encourage physical activity within the health system (219, 220).
- Governments should promote tax policies that reward healthy lifestyles (122, 214).
3. METHODOLOGY

A synthesis research has been performed for this current study. The main worldwide organizations linked -directly or not- with obesity and physical activity, as well as scientific works related to the main aim of this study, have been included as documentary sources.

Regarding organizations, both national and international official documents from different organizations have been reviewed. The most important ones among them appear on the following table.

Table 5. National and International reviewed organizations

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<tr>
<td>UNESCO (UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION)</td>
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<td>WHO (WORLD HEALTH ORGANIZATION)</td>
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<td>HEPA EUROPE (HEALTH-ENHANCING PHYSICAL ACTIVITY)</td>
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<td>FRENCH NATIONAL PROGRAM</td>
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<td>HEALTH CANADA</td>
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<tr>
<td>GoFPEP (GLOBAL FORUM FOR PHYSICAL EDUCATION PEDAGOGY)</td>
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<td>GAISF (GENERAL ASSOCIATION OF INTERNATIONAL SPORTS FEDERATIONS)</td>
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<td>TAFISA (TRIM &amp; FITNESS INTERNATIONAL SPORT FOR ALL ASSOCIATION)</td>
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<td>SPORT FOR ALL CONGRESSES (IOC)</td>
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Documentation has been obtained after making a strip-search of the web pages from all mentioned organizations. From all the documents found, only those relating to both young children and adolescents have been used. After making a first qualitative selection phase, a content analysis has been carried out through an expert committee, arriving at the final verified conclusions.

This synthesis has been supported by the conclusions taken from scientific reviews.

Concerning these latter documents, research has been carried out by hand and with computers, including the following criteria: physical activity, physical education, obesity, children, and prevention.

Different aspects have been considered as inclusion/exclusion criteria for the selected studies: size sample, publishing journal impact, publishing date, author relevance, etc.

Different groups of collaborators have been established in order not only to perform the systematic literature review but also the selection and creation each section of the document -along with their own references-.

Finally, an expert committee has been created to establish the final conclusions within the different targeting areas of the study (such as individual, family, school, local, governmental and non-governmental...
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environments). This mentioned committee has reviewed the final conclusions and the drafting of the current study “Obesity Prevention through Physical Activity in School-Age Children and Adolescents”.

METHODOLOGY
4. CONCLUSIONS (physical activity charter)

PHYSICAL ACTIVITY GUIDELINES AND GOOD PRACTICES TO PREVENT CHILDHOOD OBESITY

The findings from the research conducted by Camilo José Cela University are listed below. Sixteen basic points constitute a declaration of intent, addressing the world, from the family to national and international policies, going for actions in other areas such as school, community or local and regional corporations.

Last minute scientific contributions, worldwide recommendations on obesity prevention through physical activity in children and young people in grade school, have been included and taken into account in this updated compendium of seventeenth essential conclusions to fight obesity worldwide.

**Individual level**

1. **Physical activity for children and adolescents recommended for health maintenance and improvement.** Regarding Biddle et al. (48), we support that:

- Young people should be practicing at least 60 minutes (30 minutes for sedentary people) of moderate-to-vigorous intensity physical activity per day.

- Being practiced at least twice a week, these guidelines should help to improve bone health, muscle strength and flexibility.
CONCLUSIONS

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

Age and gender should be taken into account in order to help children to achieve these aims, considering a wide range of activity suggestions to suit children’s and adolescent’s needs and preferences.

**Young children:**
- Walking to and from school daily.
- Daily school activity sessions (breaks and clubs).
- 3-4 afternoon or evening play opportunities.
- Weekend: longer walks, visits to park or swimming pool, bike rides, etc.

**Teenager:**
- Walk or cycle to school and back daily.
- 3-4 organized or informal midweek sports or activities.
- Weekend: walks, biking, swimming, sports activities

2. **A special emphasis will be made in proposing physical activities based on muscular strength, to avoid and treat obesity as well as improving bone health.** It is important to ensure a good instruction and a qualified supervision to implement these programs. We suggest following Faigenbaum et al. (59) recommendations.
**CONCLUSIONS**

3. **Parents can exert a good role modelling influence on physical activity** (practising physical activities on their own), **social influence** (showing interest in child’s physical activities) and **supportive influence** (providing transportation from/to the sport facility, giving presents related to physical activity, encouragement, positive feedback, etc.). Parents should be provided with training to be aware of these types of influences.

4. **The Family must pass on healthy habits to their children.** Parents are the first to raise their children, so it must be they who can work shaping children’s attitudes and behaviour regarding diet, sleep, entertainment, television, exercise, etc. We propose:
   - Creating healthy eating habits in children, deciding on home food eating.
   - Encouraging children to do at least one daily hour of physical activity, being aware that it is advisable
   - Sharing activities with their children. It constitutes a role model as well as a learning context to follow guidelines
   - Encouraging and facilitating the practice of physical activity as recreation, both in childhood and adolescence.
   - Encouraging walking, trying to reduce car use for short journeys.
   - Controlling the time that children spend in sedentary activities such as watching television or playing with the computer. Reducing it is as important as increasing the practice of physical activity. According to the Canadian Paediatric Society and the American Academy of Paediatrics, children should not exceed two daily hours in sedentary activities.
5. **Avoiding the use of physical activity as a punishment as well as not pressuring young people into certain sports or activities, is essential.** It is recommended to increase the exposure to pleasant and positive physical activity experiences, putting quality before quantity.

**School level**

6. **School setting must ensure a minimum of compulsory physical practice a week** (120-150 minutes in primary school and 150-225 minutes in high school).

7. **The importance of Physical Education must be recognized as compulsory within the school curriculum.** It must be educational, health oriented, individualized, fair (individual goal setting), enjoyable and realistic, to promote a greater autonomy focused on the process of having students more responsible for their own health, fitness and well-being. Modern Physical Education must be different from the traditional sports-and-performance-based style, of which most adults have negative recollections. **Classes should be designed and led by professionals** in order to satisfy students’ preferences and needs, offering a wide range of attractive and varied physical activities, so that young people may discover those which they enjoy the most and which ones they are competent in (students should also get involved in designing and developing physical activity programs in the school setting); they should be focused on learning how to be active, making students feel confident, helping them develop the knowledge and attitudes, and motivating them to undertake active lifestyles outside school environment.
At a Local level

8. Local governments should promote cooperation and relations among communities, schools, health centers and families. 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 staff for health promotion, parents, coaches, monitors... Everyone can play a role in encouraging lifelong physical activity in young people. The school should monitor the effectiveness of such programs and make the appropriate changes to improve them. Health promotion activities and continuing additional training for teachers should be implemented and encouraged.

9. Local governments should promote and encourage the use of sports resources (already built sports facilities, clubs and schools) for the practice of recreational physical activities by citizens outside regular hours of use. Sports clubs and community-based organizations should be taken into account as key factors on developing strategies to reduce childhood and youth obesity. They should be the executants of exercise during after schools-hours to meet the physical activity criteria for children and adolescents.

10. It is essential to create policies to promote easy ways and safe environments to practice physical activity and healthy lifestyles, where citizens can actively move (walking or riding) in both urban and natural environments. Thus encouraging active transportation within communities.
At a Non-Governmental level

11. Sports organizations, sports Federations and Olympic Committees should propose programs of physical activity and sport for all, regardless of age, ability or other personal characteristics. For example, physical activity and adapted sport classes, sports for grandparents and grandchildren, family days for physical activity and sport, etc.

12. Improving adults’ physical activity attitudes (school teachers, parents/guardians, general practitioners –GPs–, etc.) towards exercise and physical activity through education (guides of physical activity, educational seminars...) and increasing NGOs participation with sport for all programs (physical activity classes for teachers or professionals) are important aspects of the drive towards more physically active young people in society.

13. Young people from low socioeconomic levels 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.

At a Governmental level

14. Sedentary life should become a “conscious” term. Once this concept is acquired, it will be possible to reduce its impact. The increasing influence of the Mass Media, marketing, television and Internet on children means the increase of this mentioned sedentary life. Health promotion strategies must adapt to these changes and not resist them. This position encourages providing information, fostering public awareness and supporting public health policies.
through Mass Media. They are called to be specially cautious and responsible in their marketing and advertising campaigns when targeting children and youth. What we could call “fair–marketing and advertising”. Likewise, children and adolescents must set their sedentary time (new technology programmes) during daylight hours, and propose alternative leisure activities.

15. Creating multidisciplinary working groups (medical staff, physical education and sport professionals, physical therapists, nurses, nutritionists) where Physical Activity and Sport graduates will have an important role in the creation of specific physical activity programs and also in training health professionals.

16. Tax regulation and subsidies could be used to reward both a healthy diet and healthy physical habits.

17. Creating National Obesity Prevention Agencies is a desirable initiative to coordinate local, regional and national physical activity promotion campaigns for the prevention and treatment of obesity. Communication between agencies from all over the world would be a good way to create worldwide policies to fight against child obesity through physical activity.
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Children and adolescents should meet a minimum of 20 to 30 minutes of vigorous physical activity every day.

1. Adolescents should be active every day within activities of daily living.
2. They should achieve 3 to 4 sessions of a minimum 30 to 60 minutes of Moderate to Vigorous Physical Activity (MVPA) per week.

1. All adolescents should be physically active daily, or nearly every day, as part of play, games, sports, work, transportation, recreation, physical education, or planned exercise, in the context of family, school, and community activities.
2. Adolescents should engage in 3 or more sessions per week of activities that last 20 minutes or more at a time and that require MVPA. Moreover, young people who currently do little activity should participate in MVPA for at least half an hour per day.

1. All young people should participate in MVPA for one hour per day, all or most days of the week.
2. At least twice a week, some of these activities should help to enhance and maintain muscular strength and flexibility, and bone health.
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1. Provide qualified instruction and supervision.
2. Ensure the exercise environment is safe and free of hazards.
3. Start each training session with a 5- to 10-minute dynamic warm-up period.
4. Begin with relatively light loads and always focus on the correct exercise technique.
5. Perform 1-3 sets of 6-15 repetitions on a variety of upper- and lower-body strength exercises.
6. Include specific exercises that strengthen the abdominal and lower back region.
7. Focus on symmetrical muscular development and appropriate muscle balance around joints.
8. Perform 1-3 sets of 3-6 repetitions on a variety of upper- and lower-body power exercises.
9. Sensibly progress the training program depending on needs, goals, and abilities.
10. Increase the resistance gradually (5-10%) as strength improves.
11. Cool-down with less intense calisthenics and static stretching.
12. Listen to individual needs and concerns throughout each session.
13. Begin resistance training 2-3 times per week on nonconsecutive days.
14. Use individualized workout logs to monitor progress.
15. Keep the program fresh and challenging by systematically varying the training program.
16. Optimize performance and recovery with healthy nutrition, proper hydration, and adequate sleep.
17. Support and encouragement from instructors and parents will help maintain interest.