

PHYSICAL ACTIVITY AND OVERALL DEVELOPMENT OF THE CHILD AND ADOLESCENT POPULATION. BENEFITS AND RECOMMENDATIONS

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Abstract: The regular practice of physical activity in childhood and adolescence is a necessary and obligatory habit as it constitutes an essential factor in the overall development of both boys and girls. The benefits provided by physical activity at these ages transcend the physical environment, positively affecting cognitive, psychological, and social dimensions. In addition, these benefits continue into adulthood in the form of disease prevention and maintenance of healthy habits. At present, there are minimum recommendations available for physical activity, which are established according to the age of the boys and girls, and whether they are able to walk. Compliance with the minimum physical activity recommendations is very low in the child and adolescent population in Spain, which constitutes a major public health problem.

Keywords: physical activity, overall development, childhood and adolescence, recommendations.

ACTIVIDAD FÍSICA Y DESARROLLO INTEGRAL DE LA POBLACIÓN INFANTOJUVENIL. BENEFICIOS Y RECOMENDACIONES

Resumen: La práctica regular de actividad física durante la edad infantojuvenil es un hábito necesario y obligatorio al representar un factor primordial en el desarrollo integral de niños y niñas. Los beneficios proporcionados por la actividad física en estas edades trascienden el ámbito físico, afectando positivamente a las dimensiones cognitivas, psicológicas y sociales. Además, estos beneficios se extienden a la edad adulta en forma de prevención de enfermedades y de mantenimiento de hábitos saludables. En la actualidad, existen recomendaciones mínimas de actividad física, establecidas en función de la edad de los niños y niñas, y de si caminan o no. El cumplimiento de las recomendaciones mínimas de actividad física es muy bajo en la población infantojuvenil española, representando un problema de salud pública de primer orden.

Palabras clave: actividad física, desarrollo integral, edad infantojuvenil, recomendaciones.

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ATIVIDADE FÍSICA E DESENVOLVIMENTO INTEGRAL DA POPULAÇÃO INFANTOJUVENIL. BENEFÍCIOS E RECOMENDAÇÕES

Resumo: A prática regular de atividade física durante a idade infantojuvenil é um hábito necessário e obrigatório, pois representa um fator fundamental no desenvolvimento integral das crianças. Os benefícios proporcionados pela atividade física nestas idades transcendem o ambiente físico e afetam positivamente as dimensões cognitivas, psicológicas e sociais. Além disso, estes benefícios estendem-se à idade adulta sob a forma de prevenção de doenças e manutenção de hábitos saudáveis. Atualmente, existem recomendações mínimas de atividade física, estabelecidas de acordo com a idade das crianças e com o facto de estas andarem ou não. O cumprimento das recomendações mínimas de atividade física é muito baixo na população infantojuvenil espanhola, representando um problema de saúde pública de primeira ordem.

Palavras-chave: atividade física, desenvolvimento integral, idade infantojuvenil, recomendações.

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INTRODUCTION

At present, the scientific evidence available has shown that regular practice of physical and sporting activities during childhood and adolescence: generates great benefits in the short, medium and long term; is a source of physical and psychological well-being; contributes to the overall development of the relevant section of the population; improves school performance and social skills; is associated with more positive health indicators; and acts as a protective factor against other unhealthy habits. In addition, it also helps maintain a healthy weight and, if the habit is acquired in childhood, the habit is more likely to consolidate later in life, thus reducing the risk of developing various diseases in adulthood (Donnelly et al., 2016; Fiuza-Luces, Garatachea, Berger, & Lucia, 2013; García-Artero et al., 2007; Janz et al., 2010; Labayen, Ortega, Sjostrom, & Ruiz, 2009; Labayen et al., 2011; Physical Activity Guidelines Advisory Committee, 2018; Yu, Burnett, & Sit, 2018)

Physical activity may be defined as any bodily movement produced by skeletal muscles that results in an increase in energy expenditure over expenditure at rest (i.e. to maintain vital functions: breathing, blood circulation, etc.). In general terms, physical activity includes physical exercise, sports, physical activities carried out as part of daily life, occupation, leisure, and active transport (Caspersen, Powell, & Christenson, 1985; Garber et al., 2011; Thivel et al., 2018).

BENEFITS OF REGULAR PHYSICAL ACTIVITY IN CHILDHOOD AND ADOLESCENCE

The benefits that the regular practice of physical activity provides in childhood and adolescence are not limited to the reduction of risk factors and the prevention of diseases, they also transcend these dimensions and reach into the physical, psychological, and social spheres (Donnelly et al., 2016; Janz et al., 2010; World Health Organization, 2010; Yu et al., 2018).

In the field of health, the benefits of physical activity in the child population may be broadly classified into 3 categories (Table 1. (Spanish Ministry of Health and Consumer Affairs; Spanish Ministry of Education and Science, 2006).

1. The physical, mental, and social health benefits during childhood and adolescence.
2. The health benefits of physical activity in childhood which are transferred into adulthood.
3. The resultant habit of practicing a healthy physical activity that is maintained into adulthood.

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Table 1. Summary of the main benefits of physical activity in childhood and adolescence

<p>Health benefits during childhood</p>	<ol style="list-style-type: none"> 1. Improvement and maintenance of physical shape. 2. Maintaining energy balance and preventing overweightness and obesity. 3. Promotion of healthy growth and development of cardiovascular and musculoskeletal systems. 4. Reduction of risk factors related to: <ol style="list-style-type: none"> a) Cardiovascular diseases. b) Type 2 diabetes mellitus. c) High blood pressure. d) Hypercholesterolemia. 5. Improvement of mental health and psychological well-being through: <ol style="list-style-type: none"> a) The reduction of anxiety and stress. b) The reduction of depression. c) Improving self-esteem. d) The improvement of cognitive function. 6. Improvement of social interactions, by providing opportunities for socialising and learning new skills. 7. Increases concentration and contributes to a better academic performance. 8. Improves motor skills, posture, and balance.
<p>Improved health during adulthood</p>	<ol style="list-style-type: none"> 1. Decreased development of risk factors associated with chronic conditions in adult life, such as heart disease, high blood pressure, type 2 diabetes, hypercholesterolemia (high cholesterol), obesity, and osteoporosis, as many of these factors may unfold in the early stages of life. 2. Reduced likelihood of becoming obese during adulthood. 3. Reduced morbidity and mortality from chronic diseases in adulthood. 4. Improved bone mass, thus reducing the likelihood of suffering from osteoporosis later in life.
<p>Establishment of life-long physical activity models</p>	<ol style="list-style-type: none"> 1. Increased likelihood of becoming a physically active adult, with all the benefits this entails for health, quality of life, and overall well-being.

Source: Spanish Ministry of Health and Consumer Affairs; Spanish Ministry of Education and Science. (2006). *Actividad Física y Salud en la Infancia y la Adolescencia. Guía para todas las personas que participan en su educación* [Physical Activity and Health in Children and Adolescents. A guide for all those who participate in their education].

MINIMUM PHYSICAL ACTIVITY RECOMMENDATIONS FOR THE CHILD AND ADOLESCENT POPULATION

In the past, children used to spend much of their leisure time playing outdoors. The new habits brought about by technological development, the advent of television, computer games, the Internet, and mobile telephones are causing the child and adolescent population not to reach the levels of physical activity recommended for obtaining an optimal development in all the capacities and dimensions of the human being.

Today, both scientific societies and public bodies have undertaken numerous efforts to establish and specify recommendations for physical activity for the school-age population based on scientific evidence (Table 2. Summary of minimum physical activity recommendations for the child and adolescent population.) (Spanish Ministry of Health, Social Services and Equality, 2015; World Health Organization, 2010; Physical Activity Guidelines Advisory Committee, 2018).

The recommendations for this population group, as each boy and girl develops differently, are established according to age and whether they walk or not (Spanish Ministry of Health, Social Services and Equality, 2015).

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Table 2. Summary of minimum physical activity recommendations for the child and adolescent population.

AGE GROUPS		PHYSICAL ACTIVITY RECOMMENDATIONS	COMMENTS
Under 5 years of age	When they still cannot walk	To encourage them to engage in physical activity in safe environments several times a day, particularly by playing floor games or participating in supervised activities in the water (whether in swimming pools or at home during bathing).	To encourage movement, active play, and enjoyment
	When they are able to walk	To encourage them to be physically active for at least 180 minutes a day (3 hours), distributed throughout the day, including all types of physical activities: <ul style="list-style-type: none"> • Structured activities and free play. • Outdoor and indoor activities. • Activities of any level of intensity. As boys and girls grow up, it is necessary to gradually increase the intensity of physical activity.	To carry out activities and games that develop basic motor skills (running, jumping, climbing, throwing, swimming, etc.) in different environments (at home, in the park, in the swimming pool, etc.).
From 5 to 17 years old		<ol style="list-style-type: none"> 1. To perform physical activity of moderate* to vigorous** intensity at least 60 minutes a day. These 60 minutes may also be accomplished by accumulating shorter periods of time throughout the day. 2. To include vigorous activities, as well as muscle-strengthening and bone mass enhancement activities that involve large muscle groups, at least 3 days a week. 	<p>TAKING INTO ACCOUNT THE FOLLOWING:</p> <p>If they do not comply with the recommendations, gradually increase their activity in such a way that they learn to enjoy physical activity. A simple way to start is to incorporate physical activity into their everyday life.</p> <p>If they comply with the recommendations, reinforce continued physical activity or try to increase daily activity.</p> <p>Scientific evidence suggests that physical activity above the recommended minimums provides additional health benefits.</p> <p>If they exceed the recommendations, maintain their level of activity and try to combine several types of physical activity.</p>
<p>* Aerobic physical activity of moderate intensity: The sensation of heat increases and one begins to sweat lightly; the heart rate and breathing rate also increase but one can speak without feeling short of breath. Examples: walking briskly (more than 6 km/h) or riding a bicycle (16-19 km/h).</p> <p>** Aerobic physical activity of vigorous intensity: The sensation of heat and sweating are stronger. The heart rate is higher and breathing is more strenuous, so it is very difficult to talk while exercising. For example, running or cycling while pedaling quickly (19-22 km/h).</p>			

Source: Spanish Ministry of Health, Social Services and Equality. (2015). *Actividad física para la salud y reducción del sedentarismo. Recomendaciones para la población* [Physical activity for a healthy lifestyle and a reduced sedentary life. Recommendations for the population]

With regard to these minimum recommendations, it may be interesting to also take into account the following observations made by the World Health Organization (2010):

1. These guidelines are relevant to all children aged 5-17 years unless specific medical conditions indicate to the contrary.
2. Children and youths should be encouraged to participate in a variety of physical activities that support the natural development and are enjoyable and safe.
3. Whenever possible, children and youths with disabilities should meet these recommendations. However, they should work with their health care provider to understand the types and amounts of physical activity appropriate for them considering their disability.
4. These recommendations are applicable for all children and youth irrespective of gender, race, ethnicity, or income level.
5. The recommended levels of physical activity for children and youths included in this section, should be achieved above and beyond the physical activity accumulated in the course of normal daily non-recreational activities.

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6. All children and youths should be physically active daily as part of play, games, sports, transportation, recreation, physical education, or planned exercise, in the context of family, school, and community activities.
7. For inactive children and youths, a progressive increase in activity to eventually achieve the specific target is recommended.
8. It is appropriate to start with smaller amounts of physical activity and gradually increase duration, frequency, and intensity over time. It should also be noted that if children are currently doing no physical activity, doing amounts below the recommended levels will bring more benefits than doing none at all. (World Health Organization, 2010)

How many boys and girls achieve the minimum physical activity recommendations?

Today, the modification of the lifestyle of children and adolescents to a more “inactive and sedentary” lifestyle involves a calorie expenditure of approximately 600 kcal per day, less than 50 years ago (Boreham & Riddoch, 2001).

Globally, between 2005-2006 and 2009-2010, 80% of adolescents aged 13-15 did not meet the minimum physical activity recommendations. This percentage was even higher in the European Union of 28 member states, where 83% of children aged 11 to 15 were estimated to be insufficiently active (Figure 1. Percentages of boys and girls in the EU-28 who are insufficiently active). In other words, they did not meet the minimum recommendations established for this population group (Centre for Economics and Business Research, International Sport and Culture Association, 2015; Hallal et al., 2012).

Figure 1. Percentages of boys and girls in the EU-28 who are insufficiently active.

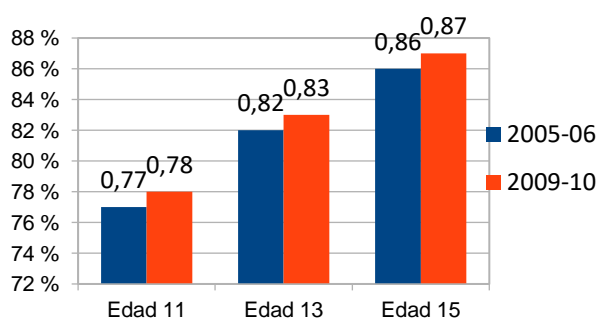


Figure 1. Percentages of boys and girls in the EU-28 who are insufficiently active

Drawing on data from different studies carried out using different measurement methods in populations aged between 9 and 18 years old, it has been estimated that between 60-79% of children and adolescents in Spain do not comply with the minimum recommendations for physical activity (Fundación para la Investigación Nutricional, 2016). It should be noted that, in all these studies, only compliance with the first point of the recommendations has been assessed or analysed, namely “to perform physical activity of moderate to vigorous intensity at least 60 minutes a day.” The other point of the recommendations has not been assessed (i.e. “to include vigorous activities, as well as muscle-strengthening and bone mass enhancement activities that

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involve large muscle groups, at least 3 days a week.”). This is a relevant issue, as current scientific evidence shows the importance of physical activity for muscle strengthening in the overall development of boys and girls of these ages (García-Artero et al., 2007; García-Hermoso, Esteban-Cornejo, Olloquequi, & Ramírez-Vélez, 2017; Jiménez-Pavón et al., 2012; Marson, Delevatti, Prado, Netto, & Kruehl, 2016; Ortega, Ruiz, & Castillo, 2013; Shultz et al., 2015).

How can boys and girls achieve minimum physical activity recommendations?

It should be kept in mind that the recommendations on physical activity are the minimum levels necessary so that the child and adolescent population obtain benefits for their health and for their overall development. Increased levels of physical activity above recommended levels will generate additional health benefits, since a progressive linear relationship between the amount of physical activity and health status has been observed. It must be stressed that, at this age, the variety of physical activity is paramount.

Table 3. Summary of the main alternatives for children to achieve the minimum physical activity recommendations.) summarises some alternatives for children to achieve the minimum physical activity recommendations.

Table 3. Summary of the main alternatives for children to achieve the minimum physical activity recommendations.

AGE GROUP	ACTIVITIES
Childhood	<ul style="list-style-type: none"> • Daily walking to and from the educational institution. • Daily sessions of physical activity at the educational institution (during recess and at activity clubs). • 3 or 4 chances to play games in the afternoons. • Weekends: taking longer walks, visits to the park or the swimming pool, cycling, etc.
Adolescence	<ul style="list-style-type: none"> • Daily walk (or bike ride) to and from the educational institution. • 3 or 4 days, organised or informal sports or activities from Monday to Friday. • Weekends: walks, cycling, swimming, sporting activities.

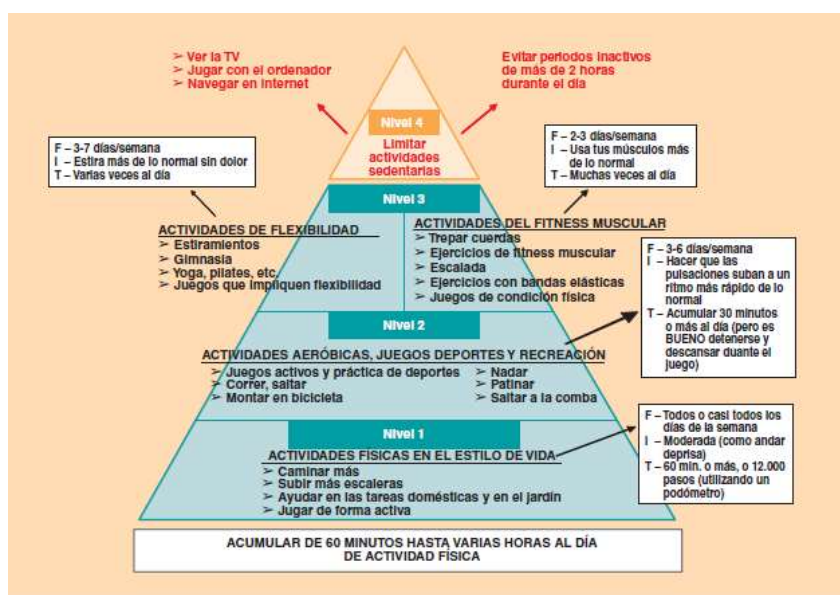
Source: Spanish Ministry of Health and Consumer Affairs; Spanish Ministry of Education and Science. (2006). *Actividad Física y Salud en la Infancia y la Adolescencia. Guía para todas las personas que participan en su educación* [Physical Activity and Health in Children and Adolescents. A guide for all those who participate in their education].

To ensure that physical activity becomes attractive and a lifelong behaviour for children and adolescents of both sexes, it is essential that interventions help them enjoy a wide range of activities, feel confident about their bodies and physical abilities, and appreciate the importance of physical activity and its benefits for health.

In order to broaden and complement the information presented above, two pyramids are presented below: the physical activity pyramid for children and the physical activity pyramid for adolescents. These pyramids (Figure 2. The Physical Activity Pyramid for Children.) (Figure 3. The Physical Activity Pyramid for Adolescents.) provide valuable information on types of physical activity, intensities, periods of time, as well as the physical abilities developed with each activity.

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Figure 2. The Physical Activity Pyramid for Children.



Source: Spanish Ministry of Health and Consumer Affairs; Spanish Ministry of Education and Science. (2006). *Actividad Física y Salud en la Infancia y la Adolescencia. Guía para todas las personas que participan en su educación* [Physical Activity and Health in Children and Adolescents. A guide for all those who participate in their education].

Table 4. Figure 2. The Physical Activity Pyramid for Children translation.

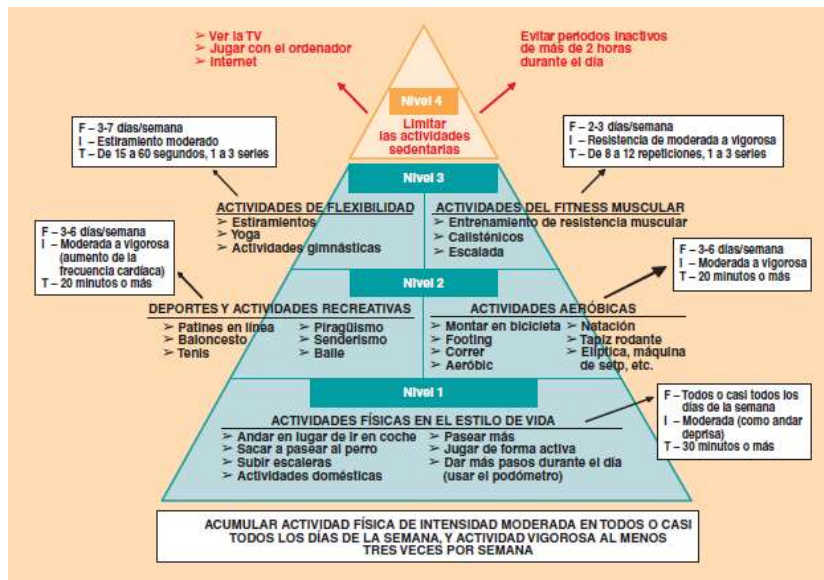
Spanish	English
ACUMULAR DE 60 MINUTOS HASTA VARIAS HORAS AL DÍA DE ACTIVIDAD FÍSICA	ACCUMULATE FROM 60 MINUTES TO SEVERAL HOURS OF PHYSICAL ACTIVITY PER DAY
Nivel 1	Level 1
ACTIVIDADES FÍSICAS EN EL ESTILO DE VIDA	PHYSICAL ACTIVITIES IN LIFESTYLE
<ul style="list-style-type: none"> - Caminar más - Subir más escaleras - Ayudar en las tareas domésticas y en el jardín - Jugar de forma activa 	<ul style="list-style-type: none"> - Walking more frequently - Climbing more stairs - Helping with housework and gardening - Playing actively
F – Todos o casi todos los días de la semana I – Moderada (como andar deprisa) T – 60 min. o más, o 12.000 pasos (utilizando un podómetro)	F – Every day or almost every day of the week I – Moderate (such as walking briskly) T – 60 minutes or more, or 12,000 steps (using a pedometer).
Nivel 2	Level 2
ACTIVIDADES AERÓBICAS, JUEGOS, DEPORTES Y RECREACIÓN	AEROBIC ACTIVITIES, GAMES, SPORTS, AND LEISURE
<ul style="list-style-type: none"> - Juegos activos y práctica de deportes - Correr, saltar - Montar en bicicleta - Nadar - Patinar - Saltar a la comba 	<ul style="list-style-type: none"> - Active games and practising sports - Running, jumping - Cycling - Swimming - Roller-skating - Skipping
F – 3/6 días a la semana I – Hacer que las pulsaciones suban a un ritmo más rápido de lo normal T – Acumular 30 minutos o más al día (pero es BUENO detenerse y descansar durante el juego)	F – 3/6 days a week I – Make the heart beat at a faster rate than usual T – Accumulate 30 minutes or more per day (but it is GOOD to stop and rest during play).

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Nivel 3	Level 3
ACTIVIDADES DE FLEXIBILIDAD	FLEXIBILITY ACTIVITIES
<ul style="list-style-type: none"> - Estiramientos - Gimnasia - Yoga, pilates, etc. - Juegos que impliquen flexibilidad 	<ul style="list-style-type: none"> - Stretching - Gymnastics - Yoga, pilates, etc. - Games involving flexibility.
F – 3/7 días a la semana I – Estira más de lo normal sin dolor T – Varias veces al día	F – 3/7 days a week I – Stretching more than usual without pain T – Several times a day
ACTIVIDADES DEL FITNESS MUSCULAR	MUSCLE FITNESS ACTIVITIES
<ul style="list-style-type: none"> - Trepar cuerdas - Ejercicios de fitness muscular - Escalada - Ejercicios con bandas elásticas - Juegos de condición física 	<ul style="list-style-type: none"> - Climbing ropes - Muscle fitness exercises - Climbing - Resistance band exercises - Games to improve physical condition
F – 2/3 días a la semana I – Usa tus músculos más de lo normal T – Muchas veces al día	F – 2/3 days a week I – Using your muscles more than usual T – Many times a day
Nivel 4	Level 4
<ul style="list-style-type: none"> - Limitar actividades sedentarias - Evitar periodos inactivos de más de 2 horas al día - Ver la TV - Jugar con el ordenador - Navegar en internet 	<ul style="list-style-type: none"> - Limiting sedentary activities - Avoiding inactive periods of time of more than 2 hours a day - Watching TV - Playing with the computer - Surfing the Internet

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Figure 3. The Physical Activity Pyramid for Adolescents.



Source: Spanish Ministry of Health and Consumer Affairs; Spanish Ministry of Education and Science (2006). *Actividad Física y Salud en la Infancia y la Adolescencia. Guía para todas las personas que participan en su educación* [Physical Activity and Health in Children and Adolescents. A guide for all those who participate in their education].

Table 5. Figure 3. The Physical Activity Pyramid for Adolescents translation.

Spanish	English
ACUMULAR ACTIVIDAD FÍSICA DE INTENSIDAD MODERADA EN TODOS O CASI TODOS LOS DÍAS DE LA SEMANA, Y ACTIVIDAD VIGOROSA AL MENOS TRES VECES POR SEMANA	ACCUMULATE MODERATE-INTENSITY PHYSICAL ACTIVITY ON ALL OR MOST DAYS OF THE WEEK, AS WELL AS VIGOROUS ACTIVITY AT LEAST THREE TIMES A WEEK
Nivel 1	Level 1
ACTIVIDADES FÍSICAS EN EL ESTILO DE VIDA	PHYSICAL ACTIVITIES IN LIFESTYLE
<ul style="list-style-type: none"> - Andar en lugar de ir en coche - Sacar a pasear al perro - Subir escaleras - Actividades domésticas - Pasear más - Jugar de forma activa - Dar más pasos durante el día (usar el podómetro) 	<ul style="list-style-type: none"> - Walking instead of going by car - Taking the dog for a walk - Climbing stairs - Playing actively - Walking more frequently - Playing actively - Taking more steps during the day (using the pedometer)
F – Todos o casi todos los días de la semana I – Moderada (como andar deprisa) T – 30 minutos o más	F – Every day or almost every day of the week I – Moderate (such as walking briskly) T – 30 minutes or more.
Nivel 2	Level 2
DEPORTES Y ACTIVIDADES RECREATIVAS	SPORTS AND RECREATIONAL ACTIVITIES.
<ul style="list-style-type: none"> - Patines en línea - Baloncesto - Tenis - Piragüismo - Senderismo 	<ul style="list-style-type: none"> - Roller-skating - Basketball - Tennis - Canoeing - Hiking

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- Baile	- Dancing.
F – 3-6 días/semana I – Moderada a vigorosa (aumento de la frecuencia cardíaca) T – 20 minutos o más	F- 3-6 days a week I – Moderate to vigorous (increased heart rate) T – 20 minutes or more.
ACTIVIDADES AERÓBICAS	AEROBIC ACTIVITIES.
- Montar en bicicleta - Footing - Correr - Aeróbic - Natación - Tapiz rodante - Elíptica, máquina de step, etc.	- Cycling - Jogging - Running - Aerobics - Swimming - Treadmill - Elliptical trainer, stepper, etc.
F – 3-6 días/semana I – Moderada a vigorosa T – 20 minutos o más	F- 3-6 days a week I – Moderate to vigorous T – 20 minutes or more.
Nivel 3	Level 3
ACTIVIDADES DE FLEXIBILIDAD	FLEXIBILITY ACTIVITIES
- Estiramientos - Yoga - Actividades gimnásticas	- Stretching - Yoga - Gymnastic activities
F – 3-7 días/semana I – Estiramiento moderado T – De 15 a 60 segundos, 1 a 3 series	F – 3-7 days a week I – Moderate stretching T – From 15 to 60 seconds, from 1 to 3 series.
ACTIVIDADES DEL FITNESS MUSCULAR	MUSCLE FITNESS ACTIVITIES
- Entrenamiento de Resistencia muscular - Calisténicos - Escalada	- Muscle resistance training - Callisthenics - Climbing
F – 2-3 días/semana I – Resistencia de moderada a vigorosa T – De 8 a 12 repeticiones, 1 a 3 series	F – 2-3 days a week I – Moderate to vigorous resistance T – From 8 to 12 repetitions, from 1 to 3 series
Nivel 4	Level 4
- Limitar actividades sedentarias - Evitar periodos inactivos de más de 2 horas durante el día - Ver la TV - Jugar con el ordenador - Internet	- Limiting sedentary activities - Avoiding inactive periods of time of more than 2 hours a day - Watching TV - Playing with the computer - Surfing the Internet.

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The two main orientations of the RINSAD magazine are:

- a) Researchers related to childhood and health.
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