REPORT 03

Food and Sports

GOOD NUTRITION AND PHYSICAL ACTIVITY – A PERFECT COMBINATION FOR OUR HEALTH

ALETHEIA
IL SEGRETO DEL BUON VIVERE

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Abstract

An extensive and consolidated amount of scientific literature has certified the well-known importance of physical activity and nutrition for our physical and mental wellbeing. In fact, food and sports are the crucial factors that can improve the quality of life, reduce the risk of chronic diseases and mental disorders and promote better physical fitness.

Although medical indications increasingly push us to adopt healthy eating habits and exercise through regular physical activity to live a balanced and healthy life, with regard to physical movement in the last 10 years, the situation has worsened globally with an increase of 5 percentage points of inactive people, from 26% in 2010 to 31% in 2020. If this trend continues, global levels of physical inactivity will reach 35% by 2030. Furthermore, according to the WHO, globally, in 2020 on average 1 in 3 adults (31.3%) did not reach the recommended levels of physical activity and in 2016, 81% of the adolescent population aged between 11 and 17 years was found to be insufficiently physically active.

This alarming data highlights the importance of promoting a more active lifestyle to improve public health and prevent numerous ailments and, in the most extreme cases, deaths. Indeed, people who are not sufficiently active have a risk of death between 20% and 30% higher than those who are sufficiently active.

In addition, diseases related to poor nutrition and not enough physical activity also have a strong impact from an economic point of view, representing a burden on health budgets with an increase in national public spending. Physical inactivity could generate around 500 million new cases of preventable non-communicable diseases in the decade of 2020–2030, with global treatment costs of €300 billion. For Italy, physical inactivity costs 1 billion a year for the treatment of non-communicable diseases and for mental health, with the Peninsula ranking second in the EU in terms of costs deriving from physical inactivity immediately after Germany (€2.8 billion) and before France (€932 million) and Spain (€446 million).

This costs each Italian citizen €17 per year, attributable only to the lack of adequate and regular physical activity. Worse is only Germany at €34 per capita/year and Portugal at €22 per capita/year.

Thus, among the fundamental aspects of our daily life, which directly influence our health and wellbeing, proper nutrition and physical activity generate a kind of virtuous circle for our health. A proper diet provides the necessary fuel for physical activity, which in turn helps to keep the body in shape, preventing diseases and improving quality of life.

One important aspect of regular physical activity is the prevention of mental disorders, such as anxiety, depression and neurodegenerative diseases like Alzheimer's disease, dementia and cognitive decline. Recently, the relationship between the *microbiota* and physical activity is also becoming an important subject of study, in particular for the ability of the microbiota to influence the immune system and, consequently, improve individual living conditions. Regular physical activity makes it possible to diversify the individual microbial population, it having been shown that unlike sedentary individuals, athletes – or in any case, physically active individuals – show a wider diversity of intestinal bacteria with an abundance of beneficial species and a reduction in the proportion of proteobacteria, often associated with inflammatory states. The effects on the nervous system are also evident, in consideration of the now-consolidated association that welds the “microbiota-gut-brain” axis.

The demoscopic survey that closes this report illustrates the importance that food and sport have in the perception of the population for maintaining a good state of health.

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Preface

by Prof. Alberto Villani, Coordinator of the Paediatrics Unit of the Bambino Gesù Paediatrics Hospital and Research Center in Rome - Department of Systems Medicine, University of Rome Tor Vergata.

At every age and all around the world, nutrition and physical activity are considered important for the health and wellbeing of each individual and at all stages of life.

For many years, the scientific community has looked with increasing interest to those populations in the world characterised by an extraordinary longevity in wellbeing. Not only assessing the length of life, but in particular of living well for a long time.

In countries with a high economic standard, such as Italy, the average life of the population has lengthened in recent decades, as the number of years lived (life expectancy: about 85 years in women and about 80 years in men), but with the need for significant pharmacological/health support (already at over 60–65 years, both men and women take on average of more than 5 tablets a day).

It was of great interest to identify some places in the world where the number of individuals reaching the age of one hundred was at least 10 times higher than in the United States. These areas of the world were called “blue zones” and the first 5 were identified as being in Japan (Okinawa), Greece (Icaria), Italy (Sardinia), Costa Rica (Nicoya) and the USA (Loma Linda – California). Trying to identify the “secret” of longevity in the wellbeing of these populations, 9 common denominators have been identified, in places of the world that are so different and distant between them, yet all refer to lifestyle and, in particular and principally to nutrition (healthy and sober, inspired by the principles of the Mediterranean diet) and physical activity (understood as natural movements: walking). These populations have, albeit it unintentionally, scientifically demonstrated the importance of a healthy lifestyle characterised by constant and valid physical activity and a healthy diet, such as the Mediterranean diet.

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[1] Buettner D., Skemp S. “Blue Zones: lessons from the world’s longest lived”. Am J Lifestyle Med; 318-321: Sep-Oct 2016.

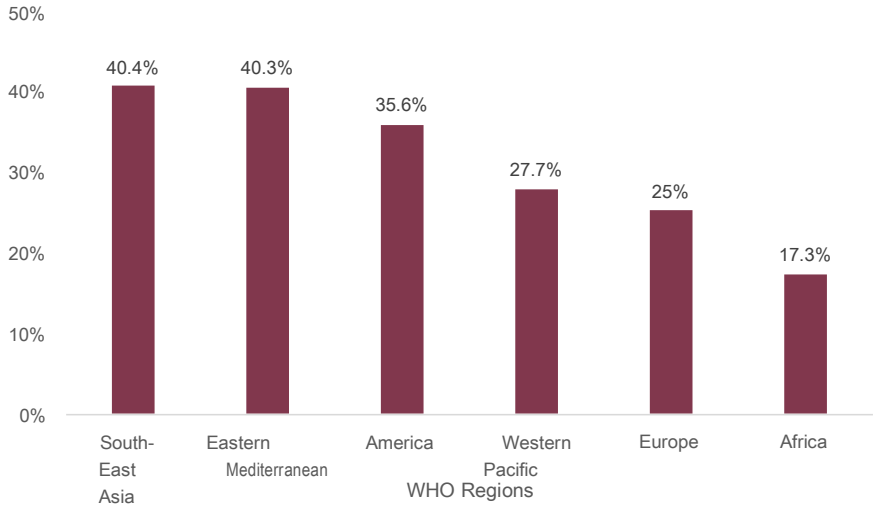
Healthy lifestyles and proper nutrition are an important heritage that must be established from the earliest ages of life. Educating girls and boys to do adequate physical activity (walking, climbing stairs, playing freely, running and jumping) and adopt a diet based on the principles of the Mediterranean diet is the best investment for a long and healthy life, avoiding the current main causes of death: non-communicable diseases (cardiovascular diseases, cancers, metabolic diseases, etc.).

This “Food and Sports” report aims to be a scientifically solid contribution and, at the same time, thanks to its easy reading, usable by all those who are interested in acquiring the correct information to ensure that good nutrition and physical activity constitute a perfect combination for health.

1. Proper nutrition and physical activity – a perfect combination for psychophysical wellbeing

An extensive and consolidated amount of scientific literature has certified the well-known importance of physical activity and nutrition for our physical and mental wellbeing. Food and sports are the crucial factors that can improve the quality of life, reduce the risk of chronic diseases and mental disorders and promote better physical fitness. Adopting healthy eating habits and exercising through regular physical activity is fundamental to living a balanced and healthy life. According to the WHO, globally, in 2020 on average 1 in 3 adults (31.3%) did not reach the recommended levels of physical activity[2] [1] [2] and in 2016, 81% of the adolescent population between 11 and 17 years of age was found to be insufficiently physically active[3] [3]. The levels of physical inactivity vary from area to area around the planet and, as reported in the recent WHO report "Global Levels of Physical Activity in Adults", the highest percentages were observed in Southeast Asia, the Eastern Mediterranean and the Americas region, respectively at 40.4%, 40.3% and 35.6%. On the contrary, the lowest levels of inactivity, and therefore the best performance, were found in the Western Pacific area (27.7%), in Europe (25%) and in Africa (17.3%) [1].

Graph 1.1 - Prevalence of levels of physical inactivity among adults (+18)



Sources: Processing of WHO data by the Fondazione Aletheia [2]

[2] For adults, in order to achieve the recommended levels of physical activity, it is necessary to perform at least 150 minutes of moderate-intensity activity or 75 minutes of vigorous-intensity activity per week.

[3] Adolescents are physically active if they engage in at least 60 minutes of moderate- or vigorous-intensity physical activity per day.

Over the last 10 years, the global situation has worsened with an increase of 5 percentage points of inactive people, from 26% in 2010 to 31% in 2020. If this trend continues, global levels of physical inactivity will reach 35% by 2030 [1]. This alarming data highlights the importance of promoting a more active lifestyle to improve public health and prevent numerous ailments and, in the most extreme cases, deaths. Indeed, people who are not sufficiently active have a risk of death between 20% and 30% higher than those who are sufficiently active [4].

At a national level, according to the latest Annual Report (2024) from Italy's National Institute of Statistics (ISTAT), the picture looks different, with today's adults being less sedentary than their peers of twenty years ago. Between 2003 and 2023, the share of those who declare not practicing either sport or physical activity went from 39.5% to 31.5% [5]. In the last twenty years, the levels of sports practice among the youngest group (16–24 years) show a slight improvement from 54.2% in 2003 to 57.7% in 2023, accompanied by a slight increase in the rate of physical activity from 18.7% to 20.6%. These dynamics are reflected in a reduction in sedentary lifestyle among young people, from 26.6% in 2003 to 21.7% in 2023 [5]. Even among adults (25–64 years), there is a significant improvement, although less evident than the increase in the proportion of older people (over 65 years) who practice sports, which has more than doubled in the last twenty years from 6.7% to 16.4% [5].

Before delving into numbers and reflexes for our health, it is good to clarify the terminology used to indicate physical activity, exercise or sport.

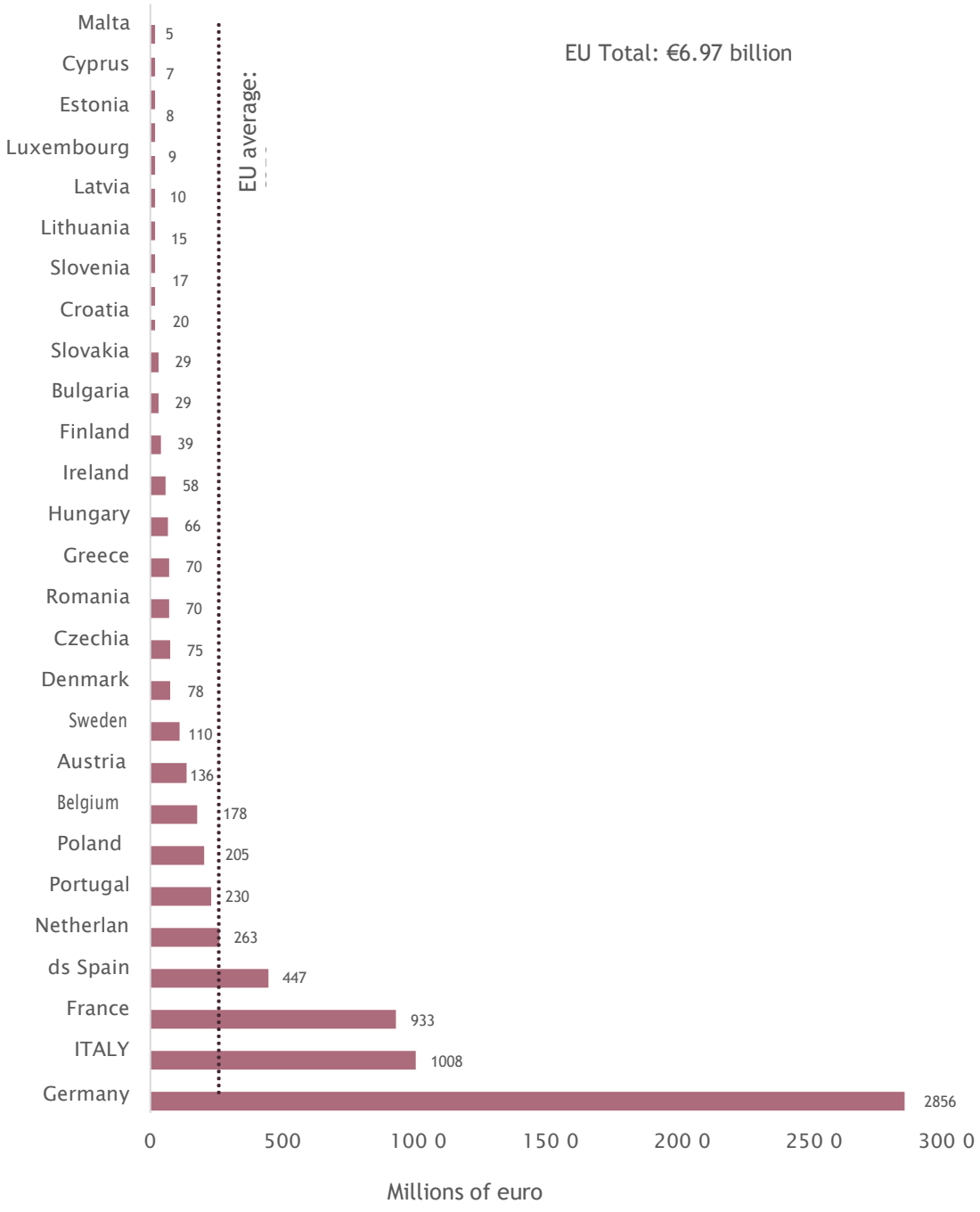
"*Physical (or motor) activity*", as defined by the WHO, means "Any bodily movement produced by skeletal muscles that requires energy expenditure" greater than that of resting conditions. This definition, therefore, includes not only sports activities, but also simple daily movements such as walking, cycling, dancing, playing, gardening and housework, which are part of "spontaneous motor activity". "*Exercise*", on the other hand, means "physical activity that is planned, structured, repetitive, and purposeful" [6].

Finally, "*Sport*", in its broadest sense, as outlined by the EU Commission in the White Paper on Sport, means "all forms of physical activity which, through casual or organised participation, aim at expressing or improving physical fitness and mental wellbeing, forming social relationships or obtaining results in competition at all levels" [7].

Considering physical activity as a mere means to achieving the goal of maintaining body weight is reductive. In fact, its benefits go beyond the simple physical appearance. On a body and organic level, regular physical activity helps improve blood circulation, preventing hypertension, boosting the immune system, increasing endurance and muscle strength and keeping the heart and lungs healthy. Regular physical activity has also been shown to help prevent non-communicable diseases, such as heart disease, diabetes and various forms of cancer.

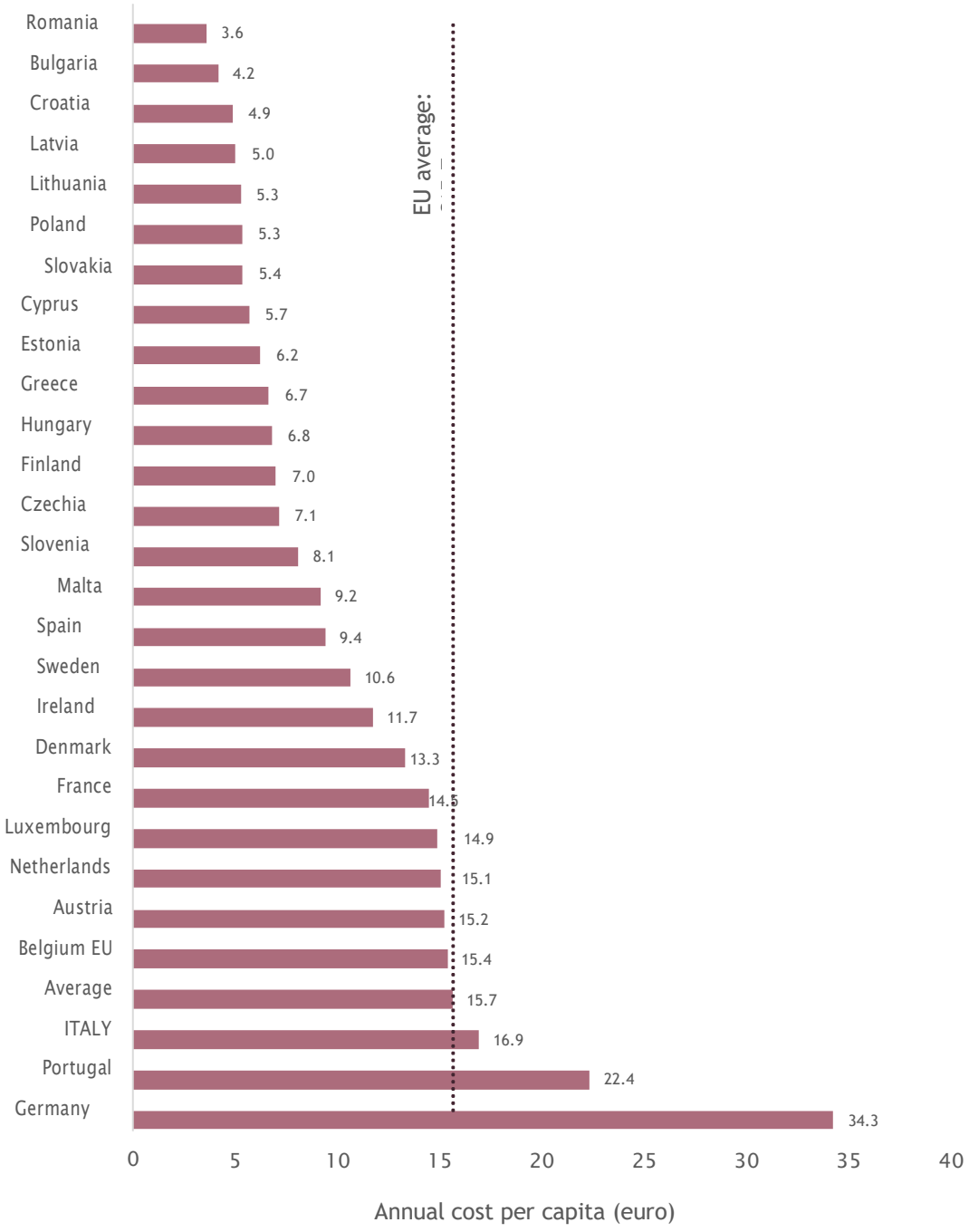
From an economic point of view, these diseases represent a burden on the country's health budgets and economy. Therefore, an adequate awareness of the adoption of lifestyles that enhance the benefits of physical activity is a more than valid way to alleviate the burden on public spending in the country [7]. In fact, social and economic reflections are relevant. Physical inactivity could generate around 500 million new cases of preventable non-communicable diseases in the decade of 2020–2030, with global treatment costs of €300 billion. For Italy, physical inactivity costs 1 billion a year for the treatment of non-communicable diseases and for mental health, with the Peninsula ranking second in the EU in terms of costs deriving from physical inactivity immediately after Germany (€2.8 billion) and before France (€932 million) and Spain (€446 million). This costs each Italian citizen €17 per year, attributable only to the lack of adequate and regular physical activity. Worse is only Germany at €34 per capita/year and Portugal at €22 per capita/year [3].

Graph 1.2 - Annual direct health costs for non-communicable and mental illnesses resulting from physical inactivity



Sources: Processing of WHO data by the Fondazione Aletheia [3]

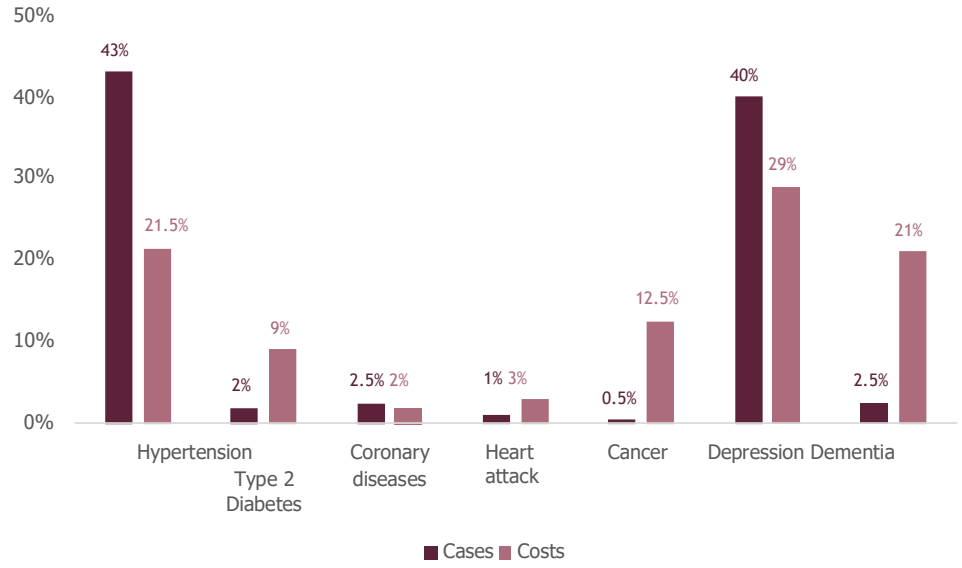
Graph 1.3 - Direct health costs per capita for the treatment of non-communicable and mental diseases resulting from physical inactivity



Sources: Processing of WHO data by the Fondazione Aletheia [3]

47% of new cases of non-communicable diseases (NCDs) are associated with hypertension and 43% with depression. New cases of these two diseases will account for 22% and 28% of total *direct healthcare costs*, respectively.

Graph 1.4 - Estimated distribution of cases and costs by type of non-communicable disease attributed to physical inactivity, 2020–2030



Sources: Processing of WHO data by the Fondazione Aletheia [2]

The benefits of physical activity also extend to the sphere related to psychological wellbeing. In fact, sport facilitates the release of neurotrophic factors (related to neural development), improves cerebrovascular health and determines benefits on glucose and lipid metabolism, thus promoting the supply of nutrients to the brain, with consequent positive effects on the cognitive functioning of children, adults and the elderly [8]. Physical activity can also help reduce stress, fight depression and anxiety, plus improve mood [4]. For the latter aspect, it should be emphasised that multiple variables contribute to psychological wellbeing, including the sense of self-esteem that physical activity helps boost [8].

In the pages of this report, the link between limited or no physical activity and obesity will also be explored, as well as the onset of chronic diseases of a different nature. In the Gimbe Foundation document titled “Position Statement: Foods, diets and supplements - the science of nutrition among myths, assumptions and evidence” included with factors related to obesity it is indicated that, regardless of body weight or weight loss, the increase in exercise (understood, therefore, as sport) improves health [9].

Nutrition, just like physical activity, is one of the fundamental aspects of our daily lives, directly affecting our health and wellbeing. A balanced diet provides our body with the essential nutrients it needs to function properly. In this relationship between food and health, physical activity fits perfectly, generating a kind of virtuous circle for wellbeing. A proper diet provides the necessary fuel for physical activity which in turn helps to keep the body in shape, preventing diseases and improving quality of life. As a result, a healthy body is better able to absorb nutrients, thus closing the circle of this positive balance.

Sports and nutrition are combined by several factors, including the propensity for “conviviality” that distinguishes both the consumption of food and the performance of many sports practiced today.

The Mediterranean diet, recognised by UNESCO as an intangible cultural heritage of humanity, is not only a set of healthy foods but also represents a lifestyle that promotes conviviality and the pleasure of sharing meals with others. This sense of community and sharing is also reflected in sport, where physical activity often takes place in social contexts, taking shape in the concept of a “team” [10]. In children, for example, participation in group sports is particularly important for the development of interpersonal relationships. Through sport, they learn the value of collaboration, compliance with the rules and “fair play”. In addition, sports activities give younger people the opportunity to make friends and build a social support network that can have positive effects on emotional and psychological wellbeing [10].

In short

- in addition to promoting better physical fitness, food and sports are crucial factors that can improve the quality of life while reducing the risk of chronic diseases and mental disorders.
- According to the WHO, globally, in 2020 31.3% of adults did not reach the recommended levels of physical activity and in 2016, 81% of the adolescent population (11–17 years old) was insufficiently physically active.
- At a national level, according to the latest Annual Report (2024) from Italy's National Institute of Statistics (ISTAT), the picture looks different, with today's adults being less sedentary than their peers of twenty years ago. Between 2003 and 2023, the share of those who declare not practising either sport or physical activity went from 39.5% to 31.5%.
- Regular physical activity helps improve blood circulation, preventing hypertension, helping to boost the immune system, increasing endurance and muscle strength and keeping the heart and lungs healthy. It also helps prevent non-communicable diseases, such as heart disease, diabetes and various forms of cancer.
- Physical inactivity could generate around 500 million new cases of preventable non-communicable diseases in the decade of 2020–2030, with global treatment costs of €300 billion. For Italy, physical inactivity costs 1 billion a year for the treatment of non-communicable diseases and for mental health, with the Peninsula ranking second in the EU in terms of costs deriving from physical inactivity. This costs each Italian citizen €17 per year, attributable only to the lack of adequate and regular physical activity.
- In the relationship between food and health, physical activity fits perfectly, generating a kind of virtuous circle for wellbeing. A proper diet provides the necessary fuel for physical activity which in turn helps to keep the body in shape, preventing diseases and improving quality of life.

2. Nutrition in sport

Nutrition has a direct impact on the performance of motor activities, understood as the time required to exhaust energy during physical activity [11]. Anyone who regularly performs physical activity must follow a balanced diet, capable of supporting physical effort, maximising energy. Although there are common rules and principles, nutrition is extremely individual and any variation in terms of nutrients must be implemented by weighing the expenditure and recovery capacities of each individual [12]. In this context, macro- and micro-nutrients together with water play an extremely important role since their impact on physical activity depends on the management of their intake (how, how much and when). With this in mind, it is possible to distinguish nutrients according to their functions: energy, plastic and hydrating.

2.1. The Functions of Nutrients

2.1.1. Energy function

Nutrients with energy function are those that provide the body with the necessary fuel to sustain physical activity. These can be mainly divided into two categories: carbohydrates and fats. Each category has a specific role and a different mode of energy supply.

Carbohydrates

Carbohydrates (simple and complex) are the primary and most immediate source of energy for the body, especially during moderate and high intensity physical activities. They are quickly converted into glucose, which enters the bloodstream and is used by cells as a “fuel” for energy. During exercise, in the absence of glucose in the circulation, the muscles use *glycogen* (a form of carbohydrate stored in the muscles and liver) as fuel.

A diet rich in complex carbohydrates helps maintain high levels of muscle glycogen, improving endurance and performance [11].

- Sources of simple carbohydrates: fruit, sugar, honey. These foods provide energy quickly, useful for quick recovery after an intense workout or as an immediate energy boost.
- Sources of complex carbohydrates: bread, pasta, rice, whole grains, legumes and potatoes. These foods release energy slower, providing a constant and prolonged energy intake, ideal for long-term activities.

Fats (or Lipids)

Fats (saturated and unsaturated) are a long-lasting source of energy, mainly used during long-lasting and low-intensity physical activities. The intake of lipids allows you to take in a smaller volume of food and to engage the digestive processes to a limited extent. When available carbohydrates decrease, the body begins to use stored fats as a source of energy [12].

- Sources of fat: dried fruit and seeds, olive oil, fatty fish (such as salmon and mackerel), whole dairy products. These foods, in addition to energy, provide essential fatty acids and fat-soluble vitamins (A, D, E and K), important for general health and physical performance.

2.1.2. Plastic function

Plastic function is the ability of a nutrient to form and regenerate tissues. Proteins, found mainly in legumes, meat, fish, eggs and milk and derivatives, but also in grains and tubers (although of lower quality), are the main plastic nutrients.

Proteins

Proteins are fundamental, specifically, for the construction and maintenance of muscles. Among other functions, amino acid synthesis and energy function are highlighted, since after an hour of exercise, muscle proteins also contribute to energy metabolism, enzyme regulation, endocrine and immune function as well as gene expression control [12].

During physical activity, muscles undergo physiological micro-lesions that require proteins to be repaired and strengthened, thus improving muscle performance and endurance.

o Animal protein sources

Animal proteins are considered complete proteins because they contain all the essential amino acids that the body cannot synthesise on its own [13]. These foods are particularly effective in supporting muscle recovery and growth.

Some examples follow:

- Meat: chicken, turkey, beef, pork or lamb. They are rich in high-quality protein and also provide vitamins and minerals, which are important for energy production and oxygen transport in the muscles.
- Fish: tuna, mackerel, sardines and cod, oily fish. In addition to protein, fatty fish provide omega-3 fatty acids, which have anti-inflammatory properties and promote muscle recovery.
- Eggs, one of the best sources of complete protein. Egg whites are particularly high in protein, while yolks contain essential fats, vitamins and minerals.
- Dairy products: milk, yogurt, cheese and cottage cheese. These foods not only provide protein but also important minerals, such as calcium.

o Plant protein sources

Plant proteins may be combined with those from other sources to provide a complete amino acid profile.

- Legumes: beans, lentils, chickpeas and peas. These are excellent sources of protein and fibre. Both help maintain a sense of fullness and regulate blood glucose levels. The combination with grains makes this mix complete from a protein profile.
- Grains: wheat, quinoa, amaranth, spelt, oats, rice and barley. When combined with legumes, they provide all the essential amino acids.
- Nuts and seeds: almonds, walnuts, chia seeds, linseed and pumpkin seeds. In addition to protein, these foods provide unsaturated fats and essential micronutrients.

Bear in mind that an insufficient intake of protein due to particularly restrictive and unbalanced diets negatively affects sports activity. However, at the same time, the claim that those who carry out physical activity need to increase their protein intake is false. In fact, as mentioned by the Ministry of Health and the Italian Institute of Health (ISS), the protein quota for athletes should not be increased more than 2 grams per day per kilogram of body weight. Even more so, increasing protein intake with the use of protein supplements, such as creatine and carnitine, during physical activity is erroneous, especially when combined with the use of anabolic hormones
[8] [12]. The use of anabolic drugs for doping purposes may lead to the appearance of serious unwanted effects and health risks such as cardiovascular dysfunction, liver damage, severe forms of acne, behavioural disorders such as increased aggression and violence, the appearance of psychiatric disorders (hypomania), as well as inducing forms of addiction [14].

2.1.3. Hydrating function

Hydration is guaranteed by water-rich foods and beverages with a hydrating function. Water is the main element needed to carry out physical activity, which is also associated with the consumption of fruits and vegetables with a high water content, such as cucumbers, watermelons and oranges, which can help keep the body hydrated. Hydration is essential for the proper functioning of physiological processes, to prevent dehydration and help avoid momentary illnesses such as muscle cramps, fatigue and heat stroke [15].

Water is also the main source of minerals crucial to the performance of all physiological functions. They help to maintain the acid-base balance, allowing for the correct metabolic functioning of the body, regulate enzymatic activities, contribute to the construction of hormones, regulate neuro-muscular functions and contribute to the growth, replacement and maintenance of body tissues and structures [12]. The most important minerals in the context of physical activity are sodium and potassium, which actively contribute to water balance and the maintenance of the osmotic pressure of body fluids. The type of physical activity and the climatic environment in which it takes place determine a greater or lesser amount of sweating and, consequently, a different level of need to reintegrate these minerals [12].

Sodium can be increased up to 8 grams/day, compared to 2 grams commonly necessary for a person who does not practice physical activity. It is found especially in foods such as bread (540 milligrams/100 grams), corn (236 milligrams/100 grams) or mackerel (144 milligrams/100 grams). Potassium is mainly contained in dried beans (1445 milligrams/100 grams), wheat bran (1160 milligrams/100 grams) and dried figs (1010 milligrams/100 grams) [12].

Human physiology requires sodium for the maintenance of hydro-electrolyte balance and for normal neuromuscular function [16]. However, a sodium intake above recommended levels can compromise these physiological processes, fuelling the risk of developing hypertension and water retention [17]. Hypertension, or high blood pressure, is a pathological condition closely related to excessive sodium intake. Indeed, this mineral affects blood volume and systemic vascular resistance, contributing to the increase in blood pressure. Furthermore, high consumption

of sodium causes water retention, as the kidneys retain water in an attempt to maintain *plasma osmolarity*, increasing blood volume and, as a result, blood pressure. Water retention can likewise manifest with peripheral edema and increase cardiac workload, further aggravating the risk of cardiovascular diseases. Therefore, it is essential to monitor and moderate sodium intake, promoting consumption in accordance with nutritional guidelines to prevent cardiovascular complications and maintain the body's water balance [18].

2.2. Before, during and after sport

The time at which nutrients are consumed can significantly affect the performance of exercise and subsequent recovery, since the times of assimilation of nutrients from different foods vary and can affect how exercise is done and the condition of the subjects. Here are some non-exhaustive examples:

- Pre-workout

  A balanced meal with carbohydrates, protein and fat consumed 2–3 hours before physical activity can improve endurance and reduce the risk of early fatigue. Along with hydration, the intake of carbohydrates is a primary factor that is necessary unless a condition of hypoglycaemia is established that can, in turn, cause muscle tightening. The time at which these nutrients are taken can positively or negatively influence performance and recovery [19]. Some studies have shown that a potential benefit deriving from the intake of carbohydrates in the hours before exercise comes from the increase in muscle glycogen levels before the start of the exercise itself. In addition, carbohydrate intake immediately before (5 minutes) exercise can lead to improvements in performance with a mean return greater than 10% compared to standard [20]. Before training,

good hydration is imperative, guaranteed by the sufficient consumption of water in the hours prior.

- During training

In particular, for intense and prolonged physical activities, carbohydrate supplementation may be recommended. This is because, especially during high-intensity physical activity, once the circulating glucose is exhausted, muscle glycogen is used as an energy source. Taking carbohydrates when the glycogen reserves also decrease renders glucose in the circulation available again and, as a result, delays muscle tightening, improving and prolonging performance [19].

- Post-workout recovery

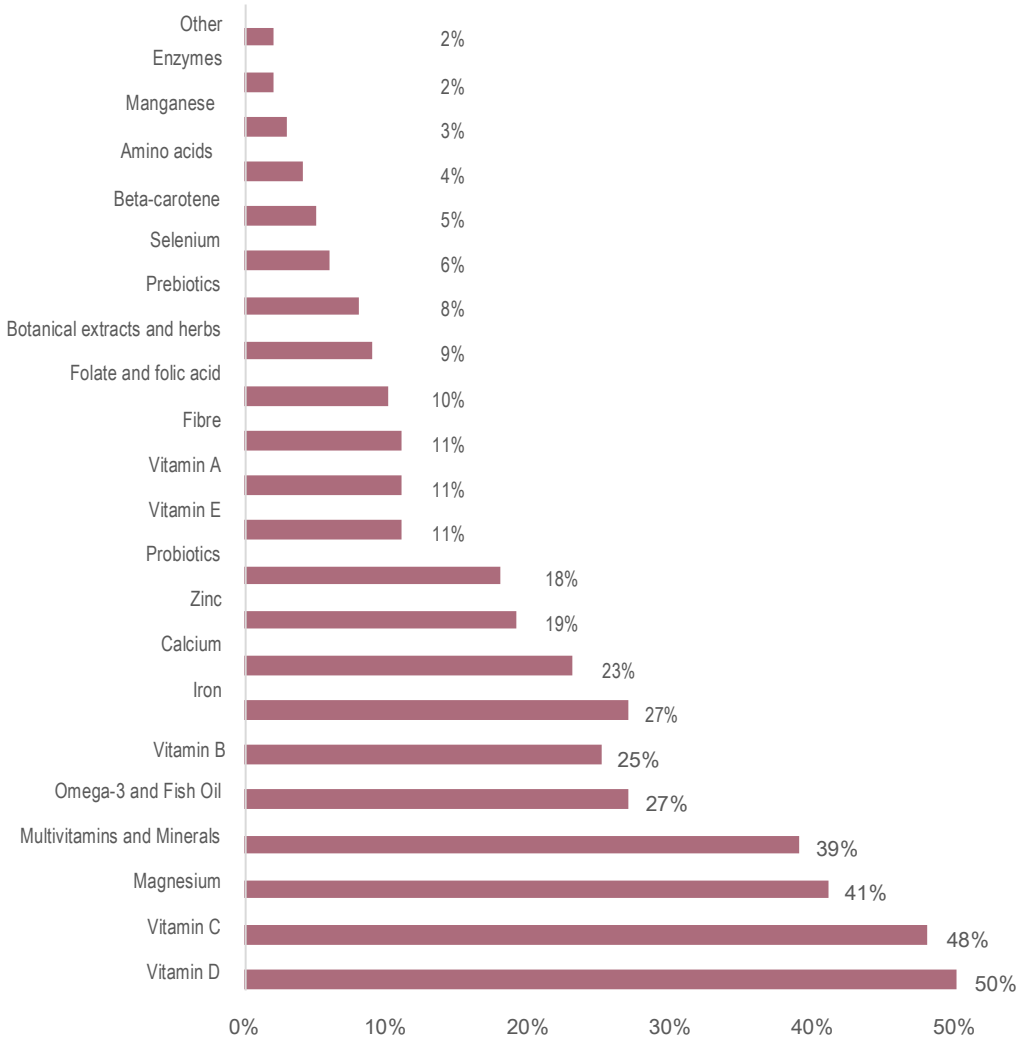
From a biological point of view, each exercise session is followed by a period of duration proportional to that of the exercise itself, defined as “Excess Post-exercise Oxygen Consumption”[4] (EPOC). During this time, the cleavage of nutrients (thus, the energy gain) due to cellular metabolism continues. For this reason, it is recommended to consume foods containing protein and carbohydrates during this window as their intake will have a lower caloric potential given the more active metabolism. In addition, immediately after training, the muscles are more “fertile”, so it is advisable to consume a small amount of carbohydrates and proteins, a practice able to promote the maximum resynthesis of muscle glycogen [19] and facilitate protein synthesis.

[4] Excess Post-exercise Oxygen Consumption

2.3. Dietary supplements, some clarification

The European Directive 2002/46/EC for approximation of the laws of the Member States relating to food supplements defines as supplements those " foodstuffs the purpose of which is to supplement the normal diet and which are concentrated sources of nutrients or other substances ... such as vitamins and minerals, or other substances with a nutritional or physiological effect, in particular but not exclusively amino acids, essential fatty acids, fibre and various plants and herbal extracts, both mono-compounds and multi-compounds, in pre-dosed forms" [21]. According to the survey conducted by IPSOS (a marketing research and public opinion polling company) on the consumption of dietary supplements in Europe, in 2022, as many as 9 out of 10 consumers reported having taken dietary supplements at least once in their lives. In general, the most commonly-used supplements were: vitamin D (50%), vitamin C (49%) and magnesium (41%). Multivitamin products and mineral supplements, which are the most recommended for energy recovery, are in fourth place with a consumption of 39%. Italy ranks in the top 3 countries where these products are more common, with over 35% of consumption, preceded only by Denmark (42%) and Finland (40%) [22].

Graph 2.3.1 - Consumption of food supplements



Sources: Processing of Ipsos data by the Fondazione Aletheia

This survey also shows that on average, 8% of consumers of food supplements use the latter with the specific purpose of improving sports performance [22]. Despite this, as the Ministry of Health recalls in the “Decalogue for the Correct Use of Food Supplements”, even if an individual practices sports frequently, a varied and balanced diet is sufficient to meet the body's nutritional needs. As such, the possible use of dietary supplements must always be justified by taking into account the state of health, the type of sport practiced, its intensity and duration, as well as the specific conditions of the individual [23].

In addition, it is best not to generalise with respect to this issue given that there are different types of food supplements. The can be mainly divided into two categories based on the origin of the nutrients they contain: natural or synthetic.

The difference lies not only in their origin and in the process of obtaining them, but also in the way in which they are absorbed and used by our body.

Natural supplements are obtained by extracting active ingredients from biological sources, such as plants, herbs, fruits, roots, algae and minerals. These supplements often contain a combination of nutrients (vitamins, minerals, antioxidants) and phytocompounds that work together to provide broader benefits than a single isolated molecule [24]. For example, a natural vitamin C supplement derived from acerola or rose hip contains not only ascorbic acid (vitamin C) but also flavonoids and other substances that improve absorption and effectiveness. These synergistic compounds make the *natural supplement* more balanced and biocompatible with our body, promoting better use and reducing the risk of side effects [25].

The advantages of natural supplements include:

- Better absorption thanks to the presence of complementary natural compounds;
- Lower risk of overdose or side effects, as they work in harmony with the body's physiological processes;
- Synergistic action – the nutrients interact more effectively when present in their natural matrix.

An alternative method of production is laboratory, through advanced chemistry procedures able to synthesise individual molecules particularly similar to natural ones. This results in synthetic supplements that, although they have the advantage of being able to be produced on a large scale and with precise dosages, often lack those complementary substances that promote better assimilation and bioavailability. For example, creatine is one of the supplements most used by athletes who want to improve their physical and athletic performance, reducing muscle fatigue [26]. Today, it is a totally synthetic product obtained by reaction between cyanamide and sarcosinate at pH 7-14 and at high temperatures. Despite the safety of use, over the years, varying amounts of by-products of the synthesis process such as

creatinine, dicyandiamide or dihydrotriazine, have been detected, being potentially harmful for consumers. This is attributable to insufficient optimisation in the production process or inadequate purification and not to the molecule itself [27]. In addition, the abuse of creatine supplements can induce weight gain and false increases in plasma creatinine levels in the urine and blood, causing kidney dysfunction. Occasionally, it also causes stomach pain, headache, dehydration, irritability and muscle cramps [26]. Many products used in sports are, in fact, substances commonly found in foods (carbohydrates, proteins, amino acids, lipids, vitamins, minerals, caffeine, etc.) marketed as “extracts” or synthesised industrially.

CREA (Italyìs Agricultural Research Council), within the “Guidelines for Healthy and Proper Nutrition”, groups these products into four categories below:

- Group A - Products for which there is a proven reason for use in the competitive field by athletes in specific situations. Some of these products are recommended in competitive sports when it is not possible to consume common foods and are, for example, “enriched” beverages, whey proteins or energy bars. Others are recommended in case of diagnosed nutritional deficiencies, such as calcium and iron supplements, probiotics, multivitamins or vitamin D. whilst still others are used as an “ergogenic aid”, or to improve sports performance, such as caffeine, beta-alanine or creatine.
- Group B - Includes supplements that need further study to confirm their effectiveness. This group includes food polyphenols, being substances with a bioactive action such as quercetin, curcumin, vitamin C and E, or carnitine.
- Group C - Includes supplements that have no significant evidence of benefit.
- Group D - Lists products whose use is prohibited or which have a high risk of contamination with doping substances, such as ephedrine, strychnine, precursors and hormone promoters, peptides that release a growth hormone.

As previously said, it is good not to generalise since in recent years, we have witnessed a growing rise in supplements and natural functional products that can represent a valid alternative to artificial products [16]. Conversely, with regard to the use/abuse of products based on proteins and amino acids, the EFSA (European Food Safety Agency) expressed an unfavourable opinion, finding no proven benefit.

Protein-enriched food products have seen a significant increase in popularity among those who practice sports, both competitively and non-competitively. As reported by the Immagino Observatory, in fact, in 2023 protein-enriched products were the most used, representing 3.8% of the total, almost 20% more than the previous year [28]. Among many body builders, there is a belief that a high-protein diet, supplemented with purified proteins, is essential for the development of muscle mass. However, an excess of protein is a risk factor for those with kidney problems and can cause significant damage to the liver and kidneys, as also described in the previous report “Diseases, Food and Health: the risks of incorrect nutritional models and the benefits of the Mediterranean Diet” by the Fondazione Aletheia [13].

A diet consisting in the balanced consumption of natural food, functional to the activities carried out by each individual and their energy expenditure, would suffice to cover energy needs, as detailed in Chapter 3. Therefore, food consumption is always favoured over the practice of supplementation. Food is an essential part of the diet that cannot be replaced in any way. This assumption is also confirmed by the fact that the protective and preventive effects of the elements taken with food seem to decrease when these compounds are taken individually and in concentrated form with supplements [16].

In short

- Nutrition has a direct impact on the performance of motor activities. In fact, anyone who regularly performs physical activity must follow a balanced diet, capable of supporting physical effort, maximising energy.
- The time at which nutrients are consumed can significantly affect the performance of exercise and subsequent recovery, as the assimilation times of nutrients from different foods are different from each other.
- In Europe, in 2022, as many as 9 out of 10 consumers reported having taken dietary supplements at least once in their lives. In general, the most commonly-used supplements were: vitamin D (50%), vitamin C (49%) and magnesium (41%). Italy is in the top 3 of the countries where these products are more common, with a consumption of 35%, preceded only by Denmark (42%) and Finland (40%).
- In this context, an important distinction is that between natural supplements and synthetic supplements. Natural supplements are obtained through the extraction of active ingredients from biological sources, such as plants, herbs, fruits, roots, algae and minerals. Synthetic supplements, rather, are produced in the laboratory through advanced chemistry procedures.
- Protein-enriched food products have seen a significant increase in popularity among those who practice sports, both competitively and non-competitively. In fact, in 2023, as reported by the Immagino Observatory, protein-enriched products were the most used, representing 3.8% of the total, almost 20% more than the previous year.

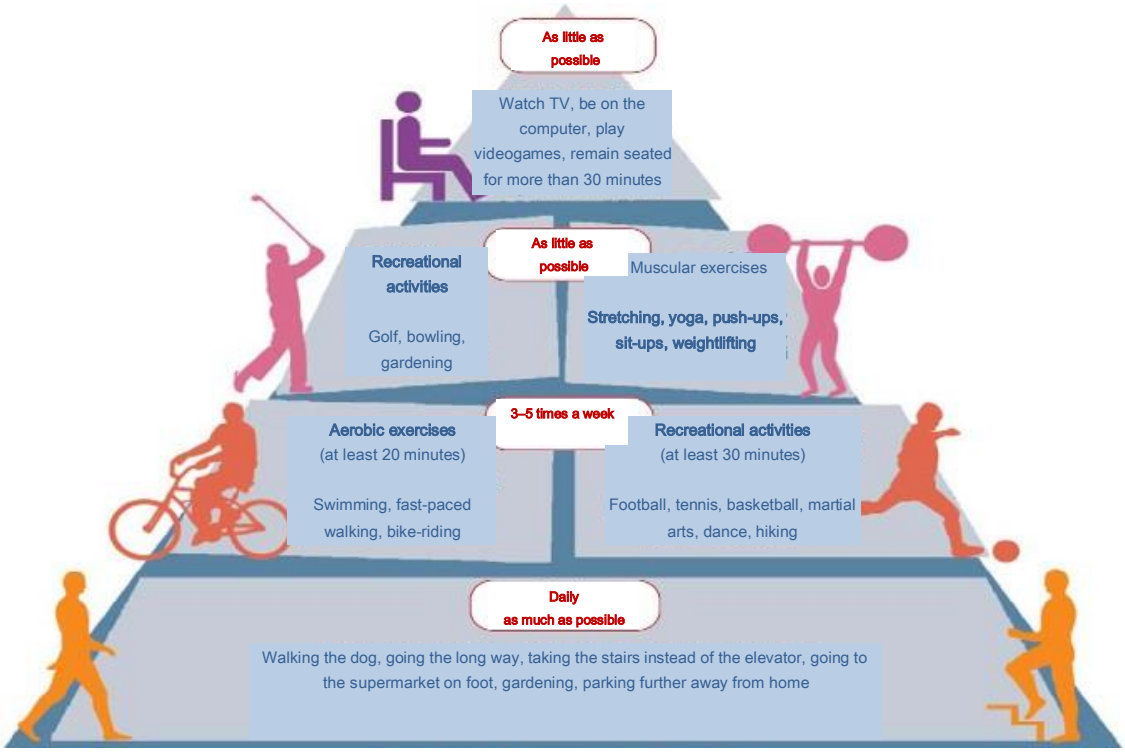
3. The 2 Pyramids

3.1. Physical Activity and Nutrition

The pyramid of physical activity (or movement), as defined by the Ministry of Health and the Italian Institute of Health, has been designed to promote a balanced and a structured approach to physical activity. This theoretical model illustrates the importance of integrating different types of movement into everyday life, dividing them into hierarchical levels. Each level of the pyramid represents a type of physical activity, from the simplest and most daily to the most structured and vigorous [29].

Therefore, an integrated approach between the pyramid of physical activity and that of nutrition generates benefits in the management of being overweight and associated chronic diseases.

Image 3.1.1 - The pyramid of physical activity



Sources: Heart Project - Italian Institute of Health

Image 3.1.2 - The food pyramid

Sources: Heart Project - Italian Institute of Health

In fact, as mentioned by the Italian Institute of Health, reducing overweight only with a decrease in calorie intake is not necessary; it is necessary to adopt a lifestyle that includes certain levels of physical activity. Therefore, combining a balanced diet with adequate physical activity is essential for effective and sustainable weight management and to improve general health [12].

3.2. Energy demand and Physical Activity Level (PAL)

Nutrition and physical activity are also closely related in the definition of the energy to be taken during the day. Indeed, according to the Italian Society of Human Nutrition (SINU), as the Physical Activity Level (PAL) increases, the amount of energy the body needs increases proportionally.

The Physical Activity Level, as defined by the Italian Society of Endocrinology, is a coefficient used to calculate the Total Energy Expenditure (TEE) and defines the different levels of sedentary lifestyle/motor competence [30]:

- Sedentary/scarecly active: Physical Activity Level = 1.4–1.69
- Active or moderately active: Physical Activity Levels = 1.70–1.99
- Very active: Physical Activity Levels = 2.00–2.40

According to the Reference Intake Levels (RILs), it is possible to identify four distinct categories by age: 6–12 months, 1–17 years, 18–59 years and geriatric age (over 60 years). Each corresponds to a given average energy requirement or[5] in terms of kcal [31].

- 6–12 months: about 690 kcal per day for males and 630 for females;
- 1–17 years: 2000 kcal per day for males and 1840 for females;
- 18–59 years: 2400 kcal per day for males (1.70 metres in height and 65 kg in weight) and

  2000 kcal per day for females (1.70 m and 65 kg) considering a sedentary profile (Physical Activity Level: 1.45). Considering, rather, a profile with marked motor commitment (Physical Activity Level: 2.10), energy needs increased by about 44% for males and 48% for females: 3450 and 2960 kcal/day, respectively.
- Over 60: 1985 kcal per day for males (1.70 metres and 65 kg) and 1845 kcal per day day for females (1.70 metres and 65 kg) considering a sedentary profile (Physical Activity Level: 1.40). Considering, instead, a moderately active profile (Physical Activity Level: 1.75), energy needs increased by about 25% for males and 21% for females to 2485 and 2230 kcal/day respectively.

This proportional relationship between Energy Requirement (ER[6]) and Physical Activity Level (PAL) is linked to the fact that the Total Energy Expenditure (TEE[7]) is calculated taking into account three components:

- Basal metabolism (BM) (55–70% of ER in a sedentary individual) that represents the amount of energy used by an individual at rest, or the energy for activities necessary for survival such as cardiac contraction, breathing, renal filtration, nervous system functioning [30];
- The energy expenditure from physical activity (25–50%), representing expenditure in terms of energy sustained during physical activity [30];
- Food-induced thermogenesis (7–13%) representing energy necessary for the body to carry out the processes of digestion, absorption and metabolism of proteins, carbohydrates, lipids and alcohol [30].

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[5] Calculated as an average of the values in the table

[6] ER = BM (Basal Metabolism) x PAL (Physical Activity Level)

[7] The transfer of energy from an organism to the external environment, on which the ER is based

Table 3.2.1 - Recommended kcal/day levels related to the level of physical activity for children and adolescents, adults and the elderly

CHILDREN AND ADOLESCENTS (1–17 years)		
PAL	Kcal/day (values for both sexes)	
Light activity (PAL ~1.4–1.69)	770-2410	
Moderate activity (PAL ~1.7–1.99)	790-2510	
Heavy activity (PAL ~2–2.4)	810-2690	
ADULTS (18–59 years)		
PAL	Kcal/day	
	Males	Females
1.45	2385	2045
1.60	2630	2260
1.75	2875	2470
2.10	3455	2960
ELDERLY (>60 years)		
PAL	Kcal/day	
	Males	Females
1.40	1985	1780
1.50	2130	1910
1.60	2270	2040
1.75	2485	2230A

Sources: CREA (2018) [17].

Finding a balance between these numerous components is a rather complex task. For this reason, in addition to the Guidelines for healthy eating developed by the Council for Agricultural Research and Analysis of Agricultural Economics (CREA) in 2018, it is also useful to take into account the recommendations of the World Health Organization (WHO) regarding the amount of physical activity recommended for different age groups.

To complete the general picture on energy needs and diets, it is good to keep in mind that foods and beverages provide a certain amount of energy, expressed in terms of kcal, called “Energy Density” (ED) and the amount of calories, for the same weight, varies based on the content of macronutrients, fibre and water present in them [17].

In general:

- 1 g of protein provides 4 kcal;
- 1 g of lipids provides about 9 kcal;
- 1 g of available carbohydrates provides about 4 kcal.

Since water lacks energy density (1 gram of water provides zero kcal), it is the element that determines the variability of food since it contributes to the weight but not to energy content. The lowest ED foods are those with a high water and fibre content, such as fruits and vegetables [17].

Numerous studies have highlighted the correlation between the energy density value of the diet and the quality of the diet itself, showing that there is a proportional relationship: low energy density diets are associated with high diet quality in all age groups.

Therefore, it is possible that energy density can be used as a marker of the nutritional quality of the individual dietary model [17]. So, there is an individual energy requirement expressed in kcal, but it is also good to know that the type of macronutrients that go to make up these kcal can make a difference by generating a state of wellbeing or, on the contrary, the onset of pathological conditions, such as obesity and other diseases related to incorrect eating styles [13].

In general, foods can be divided into four categories, depending on their energy density:

- Foods with very low energy density: <0.6 kcal/g (fruit, vegetables, herbal teas, coffee, skimmed milk);
- Low energy density foods: 0.6–1.5 kcal/g (milk, yoghurt, fish, meat, legumes, potatoes);
- Medium energy density foods: 1.5–4 kcal/g (bread, pasta, rice, cheeses, cold meats, eggs, sugar);
- High energy density foods: >4 kcal/g (sweet and savoury snacks, biscuits, chips).

To conclude, we would like to remind you that depending on how food is cooked, there is an extreme variety in terms of calories, nutritional properties and a sense of satiety. For example, 100 grams of French fries provide about 290 kcal (average energy density 2.90 kcal/gram), while 100 grams of boiled or roasted potatoes provide about 85 kcal (low energy density = 0.85 kcal/gram). This indicates that, for the same calories, we could eat more than three times as many boiled potatoes as fried potatoes.

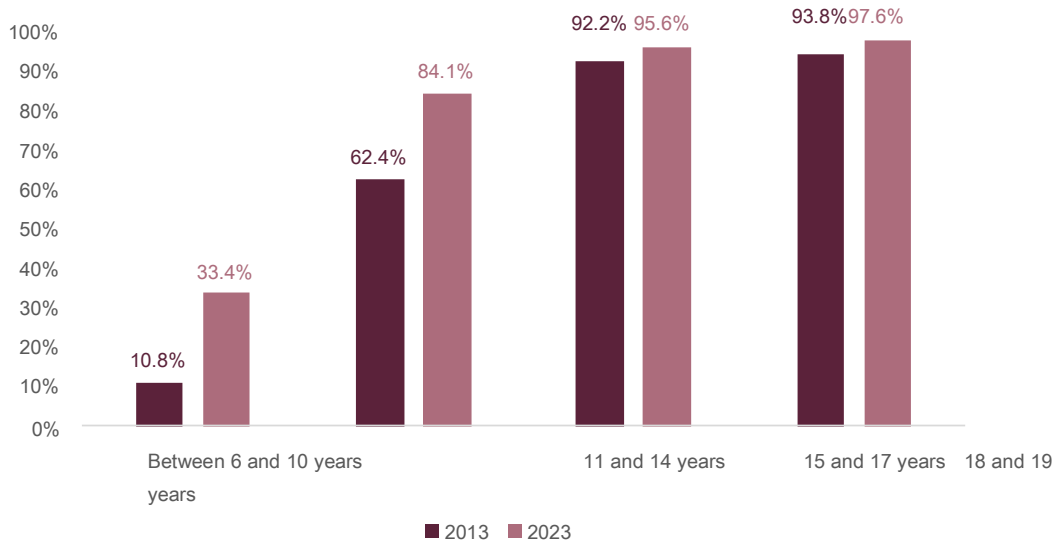
3.3. A sport for every age

There is a relationship between the energy taken in by food and energy needs and in this, physical activity plays a crucial role in maintaining health and wellbeing. This assumption is true at all ages. As reported in the WHO document “Guidelines on Physical Activity, Sedentary Behaviour and Sleep for Children under 5 Years of Age”, even infants under one year of age should be active as much as possible. At an early age, movement is not yet well developed, so at least 30 minutes in a prone position during wakefulness is recommended from the beginning of life. With the evolution of age and motor skills, several activities are recommended, such as the interactive floor game through which children can perform various motor and learning activities [32].

In general, physical activity is recommended for children aged 1 to 4 years,
daily for at least 180 minutes, of which 60 at moderate or high intensity for those between 3 and 4 years of age. At this age, it is advisable to reduce sedentary time to a minimum, especially if in front of a screen. The WHO recommends limiting sedentary time for children under 5 years of age as much as possible, especially screen time which should not exceed 60 minutes per day. For children under 1 year, it is recommended to avoid contact with screens altogether, instead promoting activities that involve movement and human interaction [10] [32]. This suggestion clashes with a growing trend of children and adolescents spending more and more time using smartphones, PCs, tablets and TVs, increasingly reducing physical and sports activity. In fact, with regard to a sedentary lifestyle, the data reveals a worrying situation for the youngest against a slight improvement on the population in general. Even with regard to the daily use of mobile phones in the younger age group between 6 and 10 years, there is a strong increase, with a tripling of the incidence (from 10.8% in 2013 to 33.4% in 2023). This demonstrates the fact that, in the face of the numerous alarms launched by doctors in recent years on the need to increase physical activity and the actions taken in families and schools, the increased use of mobile phones has frustrated efforts made in this direction for young people.

In this regard, as mentioned, the significant increase in the last decade in the number of young people using smartphones is alarming, especially in the lower age groups [33].

Graph 3.3.1 - Young people (6–19 years old) who use their mobile phones every day



Sources: Processing of Italy's National Institute of Statistics (ISTAT) data by the Fondazione Aletheia

Prolonged periods of sedentary activity can interfere with the development of key motor skills such as walking, running, jumping and climbing. This is without considering that physical activity carried out correctly and on a regular basis helps to develop muscle strength, coordination and balance, fundamental factors for healthy growth. From a cognitive point of view, excessive time spent in front of a screen can limit opportunities for active learning and interaction with the environment.

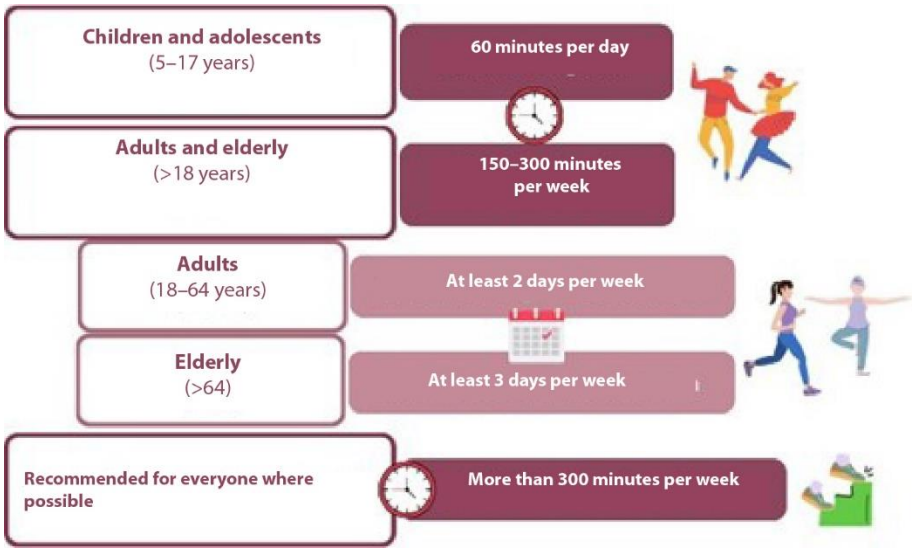
Children learn through play and exploration, which are brain-stimulating activities and promote cognitive development. In particular, outdoor play and interactive games with other children or adults promote language development, problem-solving and social skills. Children and adolescents between 5 and

17 years should perform an average of 60 minutes per day of moderate- to high-intensity physical activity, mainly aerobic. In this case, a minimum of high-intensity activity is also recommended at least three times a week. For adults between 18 and 64 years of age, it is recommended to practice at least 150 to 300 minutes per week (about 20 to 45 minutes per day) of *physical aerobic activity*

at medium intensity or between 75 and 150 minutes per week (about 10 to 20 minutes per day) at high intensity. It is also important to perform muscle-building activities involving all major muscle groups (legs, back, abdomen, chest, shoulders and arms) 2 or more days a week. For adults over 65, the same guidelines as adults apply, with a specific addition: as part of their weekly physical activity, the elderly should carry out a varied and multicomponent physical activity that emphasises functional balance and strength training 3 or more days a week in order to prevent falls and related injuries, as well as the decline in bone health and functional capacity [10].

It is essential not to interrupt the habit of physical activity with advancing age, as in increasingly advanced-age sarcopenia occurs physiologically, defined as a syndrome that is characterised by progressive and generalised loss of mass, muscle strength and/or performance that leads to an increased risk of physical disability, poor quality of life, falls and numerous other complications, including diabetes. The emergence of this condition can be slowed down and treated through physical activity, which to date is the most effective approach, together with proper nutrition. In particular, moderate-intensity exercises have the greatest results on trophism and muscle quality [34] [8].

Image 3.3.1 - Recommendations for physical activity levels



Sources: Processing of WHO data by the Fondazione Aletheia

BOX 1 – Sports in particular physical conditions

Pregnancy

Physical activity during pregnancy and postpartum is of fundamental importance for the health and wellbeing of both the gestational parent and baby. Contrary to what was thought in the past, moderate exercise is not only safe, but highly recommended for pregnant people. According to the WHO, it promotes good circulation with benefits on the foetus, reduces the risk of management diabetes, preterm birth and thrombosis and, in addition, brings psychological benefits, including reduction of fatigue, stress and depression [6]. During pregnancy, it is recommended to practice at least 150 minutes per week of moderate intensity, favouring aerobic activities such as walking or swimming, but also gentle gymnastics, water exercises, yoga and pilates [8]. Postpartum is also a particularly delicate period and, in this context, dedicating time to physical activity can help reduce the risk of depression and anxiety, improve mood and promote cardiorespiratory function [6]. Particular attention should be paid to the timing of physical activity in conjunction with breastfeeding, as exercise at the highest levels is associated with a significant increase in lactic acid in breast milk that could compromise its acceptance by the newborn. For this reason, breastfeeding is recommended at a stage prior to physical activity [6].

Neoplasms

Physical activity is also a crucial component in the management of certain pathological conditions. In this case, reference is made to neoplasms, a term that includes tumours of solid organs and those of blood cells, such as lymphoma and leukaemia [35]. Physical activity, in general, can be integrated into the therapeutic pathway of cancer patients through different times and modalities, although the profound diversity of cancer pathologies makes it impossible to describe unambiguous indications. For this reason, it is important to specify that there are general directions, such as those indicated by the Ministry of Health, which suggest between 150 and 300 minutes of moderate-intensity aerobic activity. But these indications can vary depending on the condition of the individual [8] and it is therefore important to comply with doctors' instructions for specific cases.

In short

- Combining a balanced diet with adequate physical activity is essential for effective and sustainable weight management and to improve general health.
- Nutrition and physical activity are also closely related in the definition of the energy to be taken during the day. Indeed, according to the Italian Society of Human Nutrition (SINU), as the Physical Activity Level (PAL) increases, the amount of energy the body needs increases proportionally. Foods and beverages provide a certain amount of energy but, with the same weight, the amount of calories varies based on the content of macronutrients, fibre and water present in them.
- Despite the recommendations, there is a growing trend of children and adolescents spending more and more time using smartphones, PCs, tablets and TVs, increasingly reducing physical and sports activity. In fact, with regard to a sedentary lifestyle, the data reveals a worrying situation for the youngest against a slight improvement on the population in general. With regard to the daily use of mobile phones in the younger age group between 6 and 10 years, there is a strong increase, with a tripling of the incidence going from 10.8% in 2013 to 33.4% in 2023.
- Children and adolescents should perform an average of 60 minutes per day of moderate- to high-intensity physical activity, mainly aerobic. Adults should practice between 20 and 45 minutes per day of medium-intensity aerobic physical activity or between 10 and 20 minutes per day of high-intensity aerobic physical activity. In addition to following the same guidelines as adults, older adults should engage in varied, multi-component physical activity that emphasises functional balance and strength training for three or more days per week in order to prevent falls and related injuries, as well as declining bone health and functional capacity.

4. Reflections on health

The synergy between sport and nutrition represents an effective strategy for the prevention of various chronic diseases. Also in this case, as reported in the report “Diseases, Food and Health” of the Fondazione Aletheia [13], the main diseases associated with poor physical and motor activity will be examined.

4.1. Overweight

Obesity is defined by the Italian Institute of Health as an excessive accumulation of body fat in relation to lean mass, both in terms of absolute amount and distribution at precise points in the body [36]. It is considered a multifactorial disease in that its onset is linked to the interaction between a multiplicity of factors that include firstly diet and physical activity, followed by the environment in which one lives, genetics, psychological state, or individual economic, social and cultural conditions [37].

Practicing sports and following a balanced diet are therefore crucial for the prevention of obesity. In fact, an imbalance between the two favours being overweight, which can lead to obesity. For this reason, we should avoid following a diet comprised of products with high energy density and try to keep moving with the right level of physical activity, as repeatedly mentioned in the previous pages [38].

The environment and genetics are important factors that affect the propensity for weight gain and physical activity.

We often hear talk of an “obesogenic environment” in reference to an environment in which people are exposed to factors that promote weight gain and the accumulation of body fat, such as an increasingly fast diet rich in saturated fats and sugars, the shift towards sedentary jobs, less physical activity also linked to an increasing use of means of transport [39].

In addition, it is important not to underestimate genetic factors – some individuals have a genetic predisposition to fat deposit. These are genotypes more or less susceptible to the development of obesity and thrifty genotype or sparing genotype.

According to this theory, with evolution, man has selected a series of genes that favour the accumulation of fat to cope with periods of famine that, to date, no longer play in this favour, but, on the contrary, can represent a boost to obesity [40] [41].

The performance of regular and daily physical activity is fundamental both for the prevention and for the management and treatment of being overweight and obese [42].

The mechanisms by which physical activity performs a therapeutic action are different. Among them:

- Endocrine modifications - In subjects suffering from obesity, the production of Growth Hormone (GH) is reduced. In this case, physical activity is a powerful stimulant for the secretion of GH, especially if we refer to anaerobic exercises. In addition, obesity also involves the development of insulin resistance and consequent hyperglycemia. The regular practice of aerobic activities contributes to improving cellular glucose utilisation and improving insulin sensitivity [43].
- Improvement of the lipid profile and functionality - Physical activity helps maintain and increase muscle mass, reducing the percentage of body fat. A body with greater muscle mass and less fat mass improves certain functions, such as cardiovascular function, with better pressure control and reduction of cardiovascular events [8] [44].
- Stress reduction - Sport is a powerful ally against stress and depression, often leading to improper eating behaviours. Physical activity stimulates the production of endorphins, improving mood and reducing the propensity to overeat for emotional reasons [44].
- Development of healthy habits - Participating in sports and physical activities from childhood encourages an active lifestyle, reducing the risk of obesity in adulthood [44].

4.2 Cardiovascular disorders

Cardiovascular diseases are a group of pathologies that include ischaemic heart diseases, such as acute myocardial infarction and angina pectoris, and cerebrovascular diseases, such as ischaemic and haemorrhagic stroke [45]. They represent the leading cause of death in Italy. According to Italy's National Institute of Statistics (ISTAT) data, 31% of deaths nationwide are attributable to this category of diseases, followed by cancers (24.7%) and Covid-19 (9%) [13] [46].

The onset of these diseases is attributable to a number of factors, including diet, physical activity, lifestyle, stress, genetics and the environment. A sedentary lifestyle is one of the main modifiable risk factors for cardiovascular disease. A recent analysis suggests that 37% of deaths from cardiovascular disease is attributable to physical inactivity, second only to increased blood cholesterol. In addition, according to the Italian Institute of Health, people who do little movement have a double risk of having a heart attack and triple risk of dying as a result of the attack than people who regularly engage in physical activity [47] [48]. These conditions are therefore partly preventable. This is because, with regular physical activity, the heart becomes more robust and resistant to fatigue. Aerobic activity increases the body's demand for oxygen and the workload on the heart and lungs, making the latter – along with circulation – increasingly efficient. In fact, a trained heart pumps a greater amount of blood without additional energy expenditure [29]. Regular physical activity thus represents an important element to reduce cardiovascular risk, as it is one of the modifiable factors without a pharmacological treatment, but simply with a small effort [47]. Suffice it to think that to reduce the risk of cardiovascular disease it is recommended to carry out moderate physical activity, for example walking, for at least 30 minutes a day, five days a week [47].

4.3. Tumours

An excessively rich energy balance and high levels of sedentary lifestyle have proven repercussions that can lead, in more extreme cases, to the onset of neoplasms. According to estimates by the World Cancer Research Fund (WCRF), in fact, 20–25% of cancer cases are attributable to these two factors [49]. On the other hand, aerobic activity – if carried out regularly – helps to reduce Body Mass Index and therefore, indirectly, prevent cancers related to being overweight and obese [50]. Cancer prevention is a crucial area in modern medicine. And for this reason, the WHO has outlined 9 recommended preventive approaches with the aim of reducing the incidence and mortality from cancers:

1. Do not smoke or use any form of tobacco
2. ***Eat healthily***
3. Breastfeed (reduces breast cancer risk for women)
4. Vaccinate children against the Hepatitis B virus and Papilloma virus
5. Limit sun exposure and use protection
6. Reduce indoor and outdoor air pollution
7. ***Be physically active***
8. Limit alcohol consumption
9. Avail of organised cancer screening programs

Sources: Processing by the Fondazione Aletheia

As reported by the Ministry of Health, the adoption of a healthy lifestyle, which includes regular physical activity and proper nutrition, generates a positive impact on the risk of getting cancer with a 30% reduction [49]. One of the cases in which the combination of proper nutrition and physical activity has a better influence on health in terms of neoplasms is, in particular, that of colon cancer. Specifically, on the part of physical activity, movement promotes a series of natural contractions of the abdominal muscles that accelerate intestinal transit. This means that food waste products remain in contact with the walls of the stomach and intestine for a much shorter time, reducing the risk of cell damage. In fact, according to the Italian Association for Cancer Research (AIRC), active people have a 30–40% lower risk of developing this type of cancer than sedentary people [50]. On the nutritional front, intestinal motility is favoured if a good amount of fibre is absorbed. A study conducted by the World Cancer Research Fund (WCRF) and the American Institute for Cancer Research (AICR) shows that 90 grams of whole grains per day (three servings) would be enough to reduce the risk of colorectal cancer by 17% [51].

BOX 2 – Race for the Cure

The projects of the Susan G. Komen Association are concrete examples of how physical activity can be promoted as a preventive tool. An emblematic example of promoting sport as prevention is the “Race for the Cure”, an international event organised by the Susan G. Komen Foundation. This non-competitive race, which takes place in numerous cities around the world, aims to raise public awareness of the importance of early detection and prevention of breast cancer. Participating in this race not only helps to raise funds for research but also promotes an active lifestyle among participants. This is followed by projects dedicated to other activities, such as golf or padel.

4.4. Mens sana in corpore sano

Regular physical activity is widely recognised for its multiple benefits on overall health, including the prevention of mental disorders, such as anxiety, depression, and neurodegenerative diseases such as Alzheimer's disease, dementia and cognitive decline [52].

It is a well-established fact that physical activity stimulates the release of endorphins [53], neurotransmitters produced by the nervous system and known as “happiness hormones”. They are able to act as natural analgesics, relieving pain and inducing a feeling of wellbeing [54]. But the benefits of endorphins go beyond the simple sensation of pleasure. These neurotransmitters also play a significant role in the protection and regeneration of the central nervous system. In fact, endorphins help reduce the inflammatory state in the nervous system, which is often a condition capable of promoting the early onset of neurodegenerative diseases [55]. They also promote neurogenesis, or the formation of new nerve cells, and improve synaptic plasticity, which is essential for learning and memory [56].

Numerous studies have shown that regular physical activity can reduce the risk of developing Alzheimer's disease. By improving blood circulation and brain oxygenation, it promotes a supportive environment for nerve cell health. In addition, physical activity helps reduce levels of beta-amyloid protein – a component strongly associated with the formation of plaques in the brains of Alzheimer's patients [57].

Through physical activity, it is also possible to promote healthy and active ageing, positively influencing the quality of life during ageing. In fact, exercises such as walking, swimming or simply cycling can reduce the risk of heart disease by keeping circulation active and acting on the maintenance of muscle mass, counteracting sarcopenia.

On the other hand, obesity is often associated with an increased prevalence of depression [58], measured not only on the basis of mood tone but also on the basis of reduced or increased appetite.

We recall that depressive and anxiety disorders generate a lot of suffering that can compromise both mental and physical health and that they require treatments including antidepressants. In this regard, the non-inferiority trials [8] collected then evaluated in the meta-analyses showed that for cases of depression, from mild to moderate, the effect of exercise interventions is comparable to that of antidepressant drugs and psychotherapy, in particular for aerobic exercise with at least moderate intensity and supervised by professionals; while for severe depression exercise interventions seem to be a valid complementary therapy [59] [60].

That is why it is important to pay the right attention to exercise by seeing it not only for its slimming properties but also for all these other aspects that indirectly influence the state of health and the relationship with nutrition [59] [60].

4.5. Microbiota

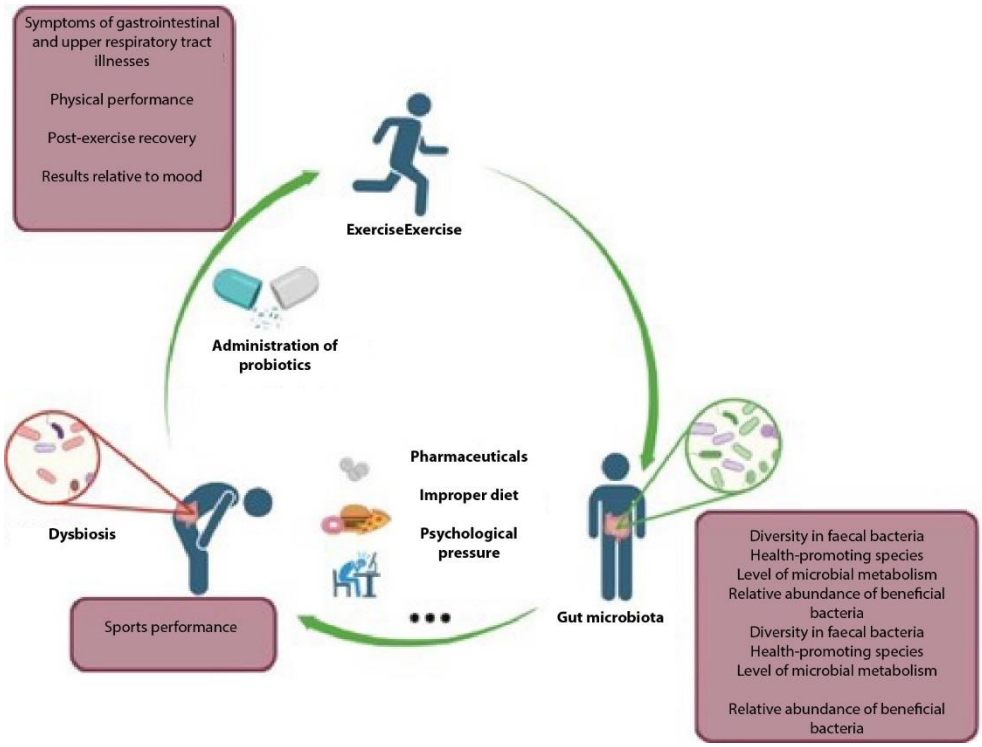
Since Elie Metchnikoff, father of probiotics, hypothesised the beneficial effect of lactic acid bacteria over a hundred years ago, more and more interest has been devoted to the relationship between the microbiota and human health [61]. Recently the relationship between microbiota and physical activity has become the subject of study, in particular for the ability of the microbiota to influence the immune system and, consequently, improve individual living conditions. In fact, it is widely recognised that diet and physical activity are part of the broader concept of “lifestyle” capable of heavily influencing not only sports performance but also living conditions themselves. In this sense, as described in the report “Disease, Food and Health” from the Aletheia Foundation, diet affects

[8] Experimental clinical study in which the objective to evaluate whether an intervention/treatment has an effect at least equal to that of the intervention considered standard, that is, to evaluate whether the loss of effect of the new intervention is lower than a so-called “non-inferiority limit” established as the smallest value with clinical relevance.

the composition of the intestinal microbiota [13], with an important contribution also guaranteed by physical activity.

“The microbiota can be viewed as a metabolic 'organ' exquisitely tuned to our physiology that performs functions that we have not had to evolve on our own” [62]. First of all is the ability to hydrolyse the complex polysaccharides that make up many plants. In addition, it performs other important functions, namely participating in the degradation of proteins and the deconjugation and dehydroxylation of bile salts [63], participating in the development of the immune system and contributing to its proper functioning through constant communication with its components, synthesising various vitamins, such as vitamin K [64], promoting intestinal peristalsis, thus allowing an efficient disposal of undigested food waste and limiting the conditions of “overload” in the intestinal lumen. Finally, it supports angiogenesis and has a xenobiotic metabolism through which it metabolises excess pharmaceuticals [65] [66].

Image 4.5.1 Interaction between physical activity and microbiota



Sources: Dietary Patterns, Gut Microbiota and Sports Performance in Athletes: A Narrative Review, Nutrients 2024.

Notes: Upward arrows indicate an increase or improvement, downward arrows indicate a reduction.

However, all the beneficial functions described above can be lost if the composition of the microbiota undergoes variations due to a series of influencing factors, including – according to recent scientific research – even the poor performance of physical activity [61].

Thus, regular physical activity diversifies the individual microbial population [67]. In fact, it has been shown that unlike sedentary individuals, athletes (or in any case, physically active individuals) show a broader diversity of fecal bacteria and an abundance of beneficial species [68]. Beyond that, physical activity intensifies microbial metabolism, as demonstrated by increased carbohydrate and amino acid metabolism and catabolism [69]. In addition, physical activity is able to modulate the composition of the microbiota by reducing the proportion of proteobacteria, often associated with inflammatory states [70].

In consideration of the now well-established association that welds the “microbiota-gut-brain” axis, the effects on the nervous system are also evident. In fact, when these elements are in perfect balance with each other, a condition of so-called “homeostasis” is established. On the contrary, an unfavorable genetic predisposition, improper lifestyles, incorrect diets and sedentary lifestyle negatively affect this harmony, causing “dysbiosis” – an alteration of the existing crosstalk between us and our resident microbiota that causes an inflammatory state. The latter, if not adequately treated, can become systemic and constitute a concrete hypothesis for the pathogenesis of depression and numerous other mental problems such as schizophrenia, autism spectrum disorders, anxiety, Parkinson's disease and Alzheimer's [71].

In short

- The synergy between sport and nutrition represents an effective strategy for the prevention of various chronic diseases.
- Obesity is considered a multifactorial disease in that its onset is linked to the interaction between a multiplicity of factors that include firstly diet and physical activity, followed by other factors, such as the environment in which one lives, genetics, psychological state or individual economic, social and cultural conditions. Practicing sports and following a balanced diet are therefore crucial for the prevention of obesity.
- The onset of cardiovascular diseases is attributable to a number of factors, including diet, physical activity, lifestyle, stress, genetics and the environment. A sedentary lifestyle is one of the main modifiable risk factors for cardiovascular disease. Recent analyses suggest that 37% of deaths from cardiovascular disease is attributable to physical inactivity, second only to increased blood cholesterol.
- According to the Italian Association for Cancer Research (AIRC), active people have a 30–40% lower risk of developing this type of cancer than sedentary people.
- Regular physical activity is widely recognised for its multiple benefits on overall health, including the prevention of mental disorders, such as anxiety, depression, and neurodegenerative diseases such as Alzheimer's disease, dementia and cognitive decline. In fact, numerous studies have shown that regular physical activity can reduce the risk of developing Alzheimer's disease.
- In addition, physical activity is able to modulate the composition of the microbiota by reducing the proportion of proteobacteria, often associated with inflammatory states.

5. Common principles, tailored rules

Although there are general principles for a balanced and healthy diet, nutritional needs vary greatly when moving from daily physical activity to organised and specialised sport. This transition from common rules, valid for all, to individual diets, essential for athletes of different sports disciplines, is of fundamental importance and gives us an even better understanding of the fundamental role that nutrition plays in human health and activities. Even in the world of sports nutrition, there is an indissoluble link between nutrition and physical performance. In this sense, an athlete's diet must be calibrated to meet the required specifications of their sport. For example, endurance sports like cycling and marathons require a constant and sustained energy intake. Strength sports such as weightlifting call for a high protein intake to support muscle growth, while speed sports require yet a different preparation to those that combine other motor needs, such as football or rugby.

If you compare the nutrient intake percentages recommended by the
Italian Society of Human Nutrition (SINU) for the different sports, it is noted that they differ in terms of carbohydrates, lipids and above all proteins. The latter are the most variable fraction [31].

As reported by the Italian Institute of Health, an intake of carbohydrates equal to 55–65% of the daily caloric intake, protein of 10–15% and lipids of 25–30% is recommended for an athlete [12]. These percentages take on specific values when narrowing the field to certain types of sports. Through a detailed analysis of the different sports categories – endurance, strength sports, speed sports, mixed activities – this chapter aims to provide a general overview of the variability and influence of nutrition in different sports contexts. The objective is to illustrate how a personalised diet can not only improve performance, but also promote general wellbeing and sports longevity, understood as the ability of an athlete to maintain high levels of performance and competitiveness over time, minimising the risk of injuries and performance losses [72].

This concept includes not only the duration of an active sports career but also the ability to maintain a good physical condition and general wellbeing that allow an athlete to continue practicing sport with pleasure and success for many years. Proper nutrition plays a crucial role in this context, contributing to recovery, injury prevention and the maintenance of general health.

Food is thus a powerful and versatile tool, capable of transforming from a simple source of energy into a real secret weapon to achieve maximum athletic performance [73]. The following are some examples of the different sports activities:

- In endurance sports such as running a marathon, cross-country skiing, road cycling, long-distance swimming, triathlon, etc., where the recommended distribution in nutrients is as follows: 60% carbohydrates, 15% protein, 25% fat. This is because those who practice such sports need greater stores of glycogen deposited in the muscles than proteins, with the carbohydrates that are necessary during prolonged efforts.
- A higher intake of protein is recommended for those who practice strength sports, such as lifting or throwing weights, calling for: 55% carbohydrates, 20% protein, 25% fat. In this case, these are sports that require considerable involvement of muscle tissue with particular calibre damage and significant muscle stress. For this reason, a greater intake of proteins that promote cell regeneration and muscle mass development is required.
- In speed and shooting sports, such as long jump, 100-metre dash, sprint swimming, it is important that the percentage of carbohydrate and protein intake is optimised, to the detriment of fats: 60% carbohydrates, 22% protein, 18% fat. This is because carbohydrates and proteins are the nutrients that contribute to developing the short-lived explosive strength typical of these sports.
- Mixed-activity sports, so defined because they are a middle ground between endurance and speed sports, from the point of energetic view. This category includes team sports such as football, volleyball, basketball and

tennis. In this case, the breakdown of nutrients respects an average between the two previous ones: 57% carbohydrates, 18% protein, 25% fat. Among the athletes who practice these sports, the practice of “supercompensation” is very important – a key concept in sports science that refers to the process by which the body adapts to training, improving its physical abilities above the starting levels. In this context, in the days before the races, the “glycogen load” is applied, being a method through which the athlete optimises glycogen deposits, improving athletic performance [74].

- Combining instead strength sports and speed sports, we get the category of combat sports such as boxing, taekwondo and kickboxing. These are sports that involve long workouts consisting of actions involving strength, agility and fast speed. These are the sports that require the most protein: 55% carbohydrates, 25% protein, 20% fat. This is because the type of muscle work requires a fast and protein-optimised recovery.
- The last category is that of sports that require weight control, such as artistic and rhythmic gymnastics. The energy requirement in this case consists of 55% carbohydrates, 25% protein and 20% fat.

As reported by the Council for Agricultural Research and Analysis of Agricultural Economics (CREA) in the Dossier “Guidelines for a Healthy Diet”, this classification of the nutritional intake according to the discipline carried out allows for the correct identification of the average daily nutritional needs, but to date results from a sort of stasis that does not take into account a series of discriminating factors, including, for example: the years of training and experience, the type of preparation and the intake of proteins according to the “carbohydrate supply” [17]. Factors that, on the other hand, play an important role and therefore lead to personalised diets based on individual conditions.

In short

- Although there are general principles for a balanced and healthy diet, nutritional needs vary greatly when moving from daily physical activity to organised and specialised sport.
- An athlete's diet must be calibrated to meet the required specifications of their sport.
- Endurance sports like cycling and marathons require a constant and sustained energy intake. Strength sports such as weightlifting call for a high protein intake to support muscle growth, while speed sports require yet a different preparation to those that combine other motor needs, such as football or rugby.
- The Italian Institute of Health reports that an intake of carbohydrates equal to 55–65% of the daily caloric intake, protein of 10–15% and lipids of 25–30% is recommended for an athlete.
- Food is thus a powerful and versatile tool, capable of transforming from a simple source of energy into a real secret weapon to achieve maximum athletic performance.
- “Supercompensation” is very important – a key concept in sports science that refers to the process by which the body adapts to training, improving its physical abilities above the starting levels. In this context, in the days before the races, the “glycogen load” is applied, being a method through which the athlete optimises glycogen deposits, improving athletic performance.

6. Food and sport, between perception and reality

The last chapter of this work is dedicated to the analysis of habits and perceptions that characterise physical activity and food. The survey explores a variety of aspects of eating habits and physical activity/sport thanks to a segmentation of the population by age groups, level of education and geographical location, allowing us to appreciate the differences between the dimensions analysed.

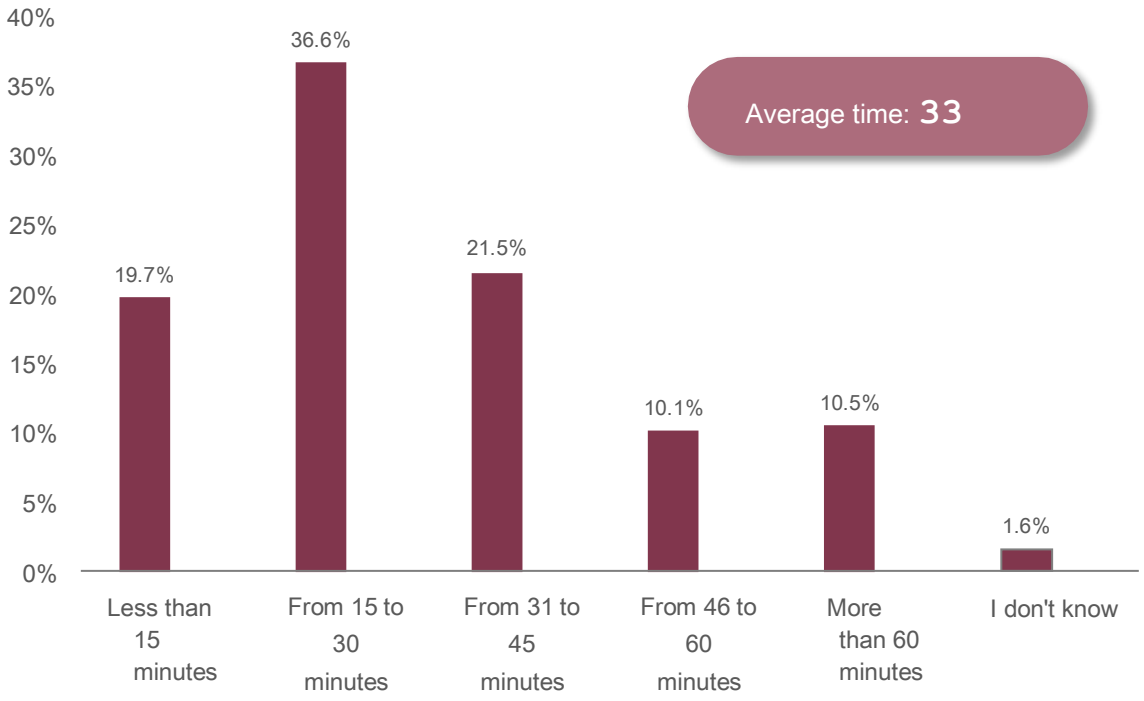
6.1. Physical activity

The section dedicated to physical activity and sport highlights with particular attention the time dedicated to the practice of movement and sports, the motivations and places of physical activity and other variables that affect the propensity to carry out physical activity.

Among the priority factors of the analysis is the duration and frequency of physical activity, with walking being an important source of movement. The average daily time spent walking is 33 minutes, with a third of respondents spending between 15 and 30 minutes a day on foot. 42% of respondents exceed 30 minutes a day, with 1 in 5 citizens not even reaching 15 minutes a day. This type of activity, although of low intensity, is a form of daily movement within everyone's reach and certainly useful for health.

Graph 6.1.1- Time spent walking

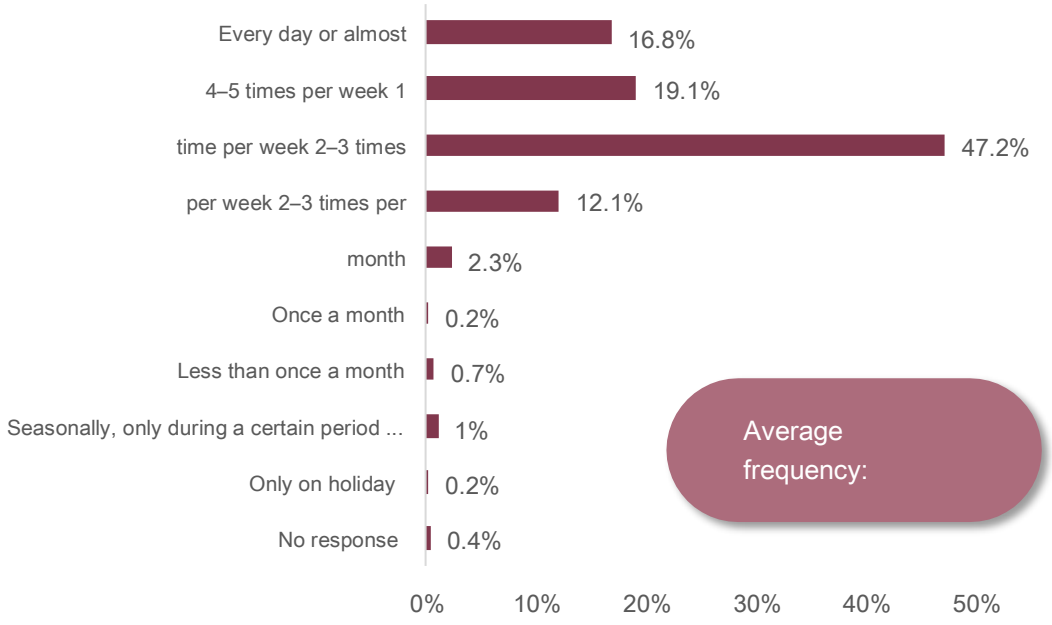
"On average, on a typical day, how much time do you spend walking?"



Sources: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

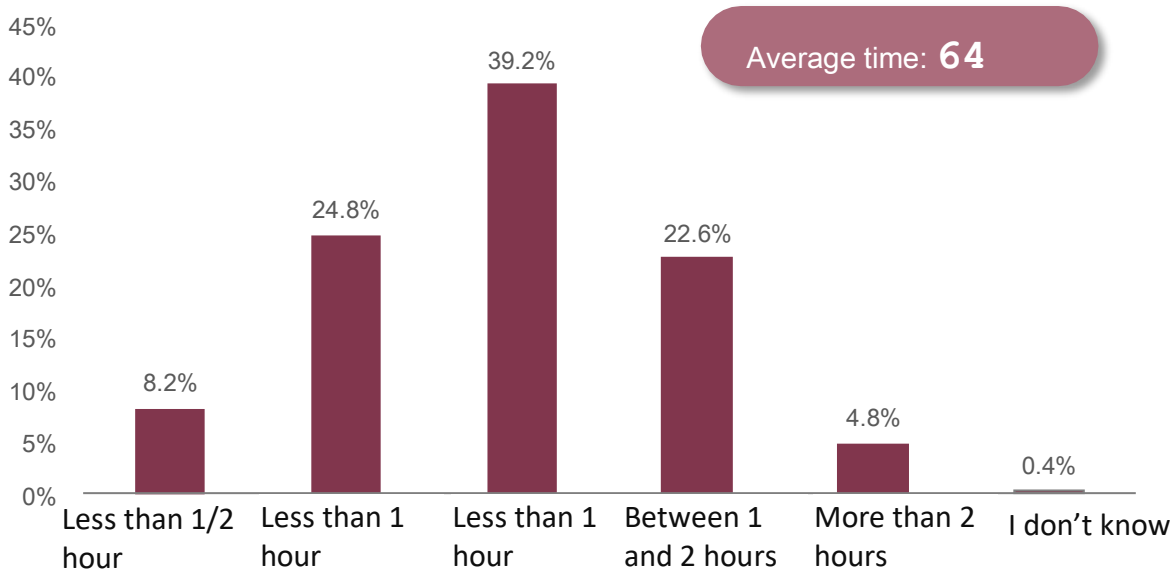
Respondents engage in physical activity or sports on average 3 to 4 times a week, with 47.2% practising sports once a week. The average duration of the sessions is 64 minutes, a measure that reflects the minimum recommended time to obtain health benefits from physical activity. The results show slight variations between genders and ages, with slightly longer sessions among men (68 minutes) compared to women (60 minutes) and young people between 18 and 24 years of age (69 minutes).

Graph 6.1.2 - Motor or sports activity frequency – “Overall, how often do you practice motor or sports activity?”



Sources: Survey “Food, Sport and Health – Consumer Survey”, Ixé Institute (2024)

Graph 6.1.3 - Duration of practice –
“On average, how long does a sports or motor session last?”



Source: Survey “Food, Sport and Health – Consumer Survey”, Ixé Institute (2024)

Stands out among the more common activities are fast walking (36.6%), generic aerobics (23%) and fitness activities such as spinning/cycling classes and other gym activities in general (20.4%). Disciplines such as cycling (14%) and swimming (9.2%) also enjoy marked popularity. This panorama reflects a preference for activities that can be carried out with a certain flexibility, both outdoors and in the gym and that require a reduced investment in economic and logistical terms.

Table 6.1.1 - Main sports and motor activities – "What sports activities do you practice?"

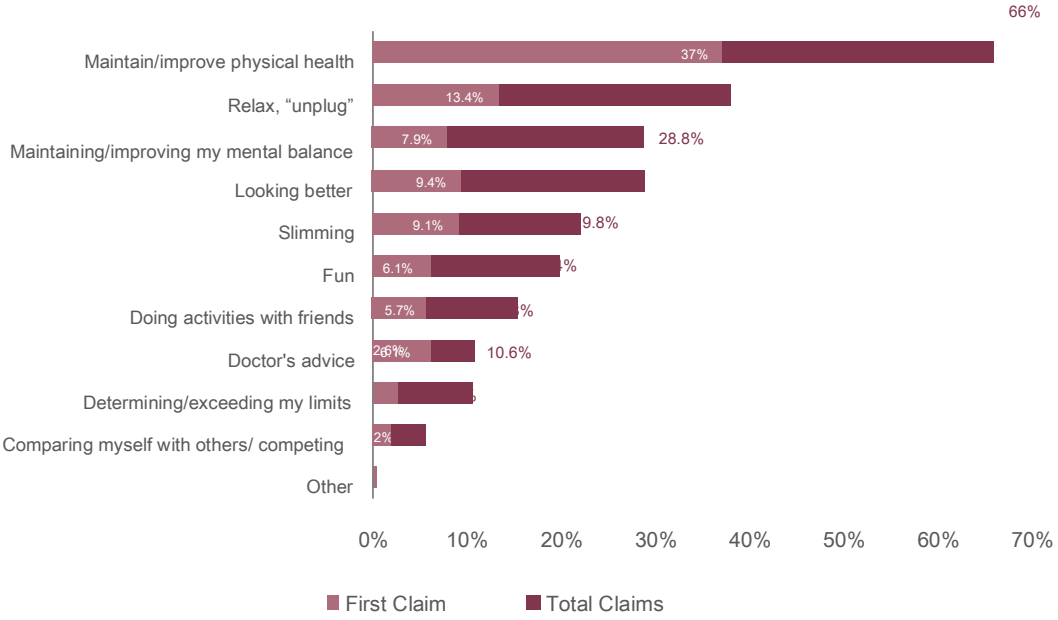
Walk fast	36.6%
Gymnastics (in general)	23%
Fitness (spinning class/exercise bikes or gym activities in general)	20.4%
Cycling	14%
Jogging/running	9.7%
Athletics	9.2%
Swimming	9.2%
Football	6.9%
Five-a-side football	6.3%
Tennis/padel	5.9%
Trekking	5.8%
Body building	5.4%
Martial arts (karate, judo, tai chi...)	4.5%
Aerobic gymnastics	3%
Basketball	2.7%
Mountain biking	2.7%
Dance (modern, jazz ...)	2.5%
Volleyball	2.4%
Skiing (downhill, cross-country)	2.2%
Boxing (Muay Thai, French boxing ...)	2.1%
Fencing	1.5%
Water aerobics	1.4%
Running/walking/marathon	1.1%
Handball	1%

Source: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

Physical health is the main motivation behind exercise, cited by two out of three respondents, followed by the desire to relax (38.1%) and to maintain mental balance (28.9%). These figures indicate how sports activity is perceived not only as a way to improve one's physical condition, but also to relieve stress and balance the commitments of daily life. For younger age groups (18–24 years), fun and competition play an important role, while in the more adult age groups (55–64 years), the importance of practicing sports to follow medical recommendations for wellbeing and health emerges.

Graph 6.1.4 - Motivations behind exercise

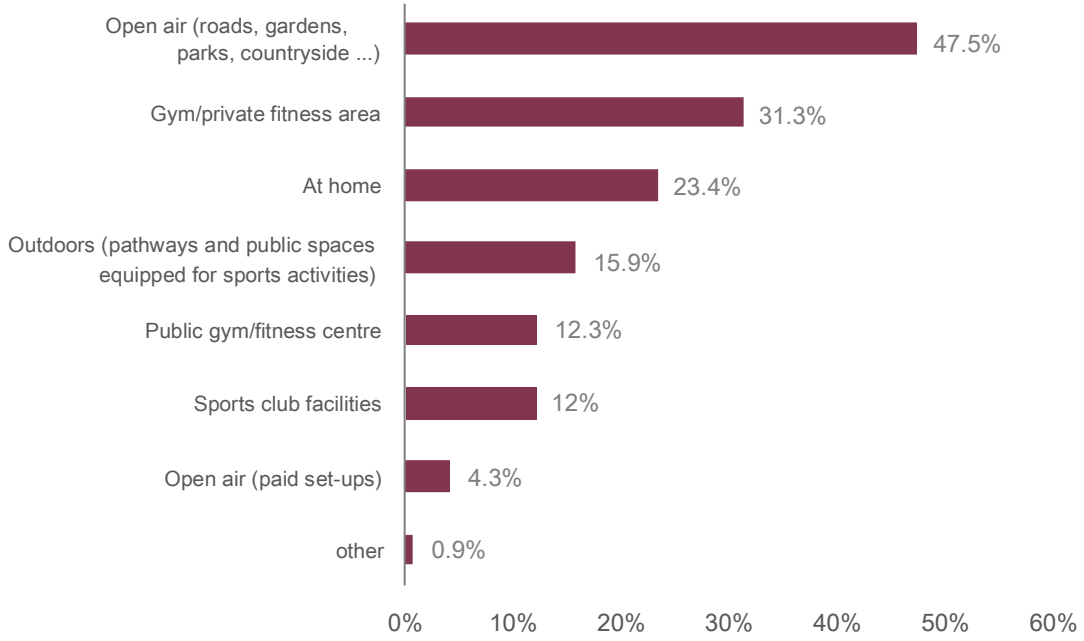
"What are the main reasons that push you to practice physical activity or sports?"



Sources: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

The majority of respondents prefer to practice outdoor sports (47.5%), in spaces such as on the streets or in parks and gardens. Private gyms are also popular (31.3%), while 23.4% of respondents prefer to exercise at home. Men tend to choose outdoor spaces more (55%), while women are also oriented towards private gyms (36%).

Graphic 6.1.5 - Places of physical activity –
"Where do you usually practice physical activity or sports?"

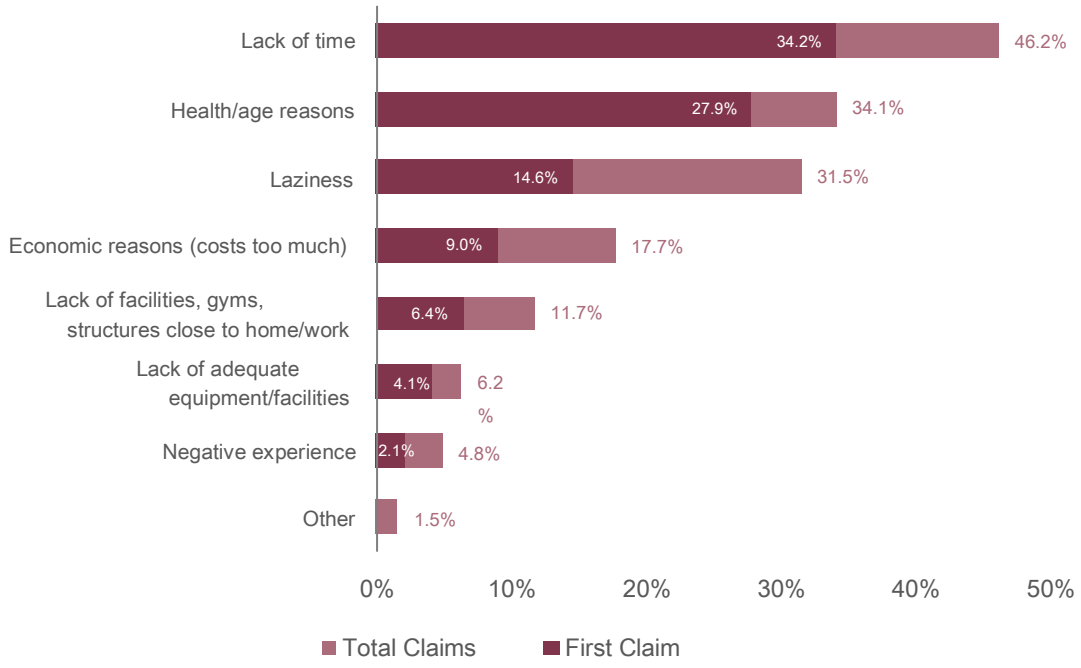


Sources: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

This data reflects a growing attention to nature and the benefits that the external environment can bring to sports practice.

The main obstacles that lead to the abandonment of sports are lack of time (46.2%) as well as health or age reasons (34.1%). Laziness represents the third reason for abandonment, reported by one in three respondents. In particular, a lack of time is greatly noted among young people who often balance study and work while in the older age groups, health problems and reduced physical abilities emerge.

Graph 6.1.6 - Causes of an abandonment of sports practice –
"What led you to abandon practising sports?"

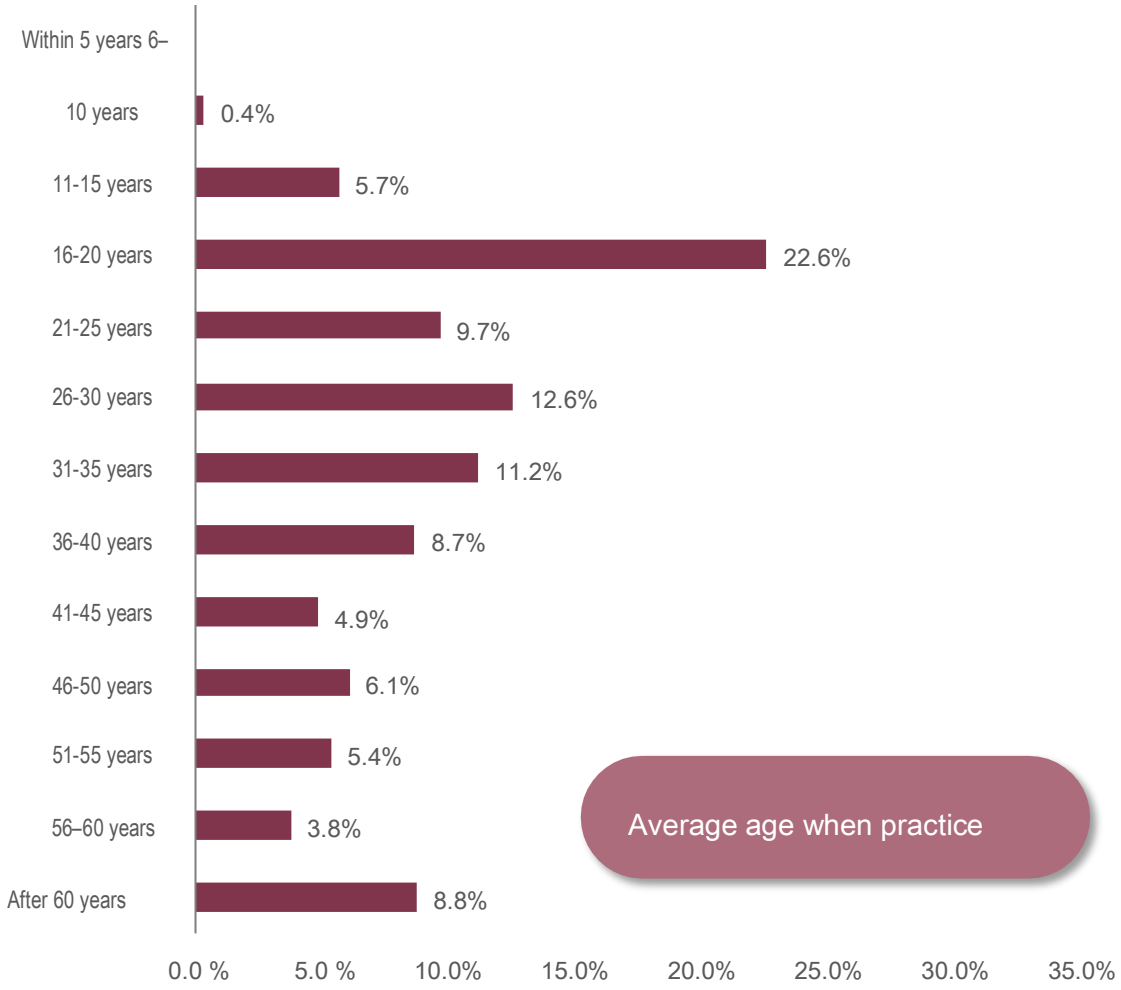


Sources: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

This data is relevant to understanding barriers to sports participation and can help in the development of policies that facilitate access to physical activities for all.

In fact, to the question: "At what age did you abandon sport?", on average, the withdrawal from sports activity is detected around the age of 35, reflecting a decline in sports activity with advancing age and the arrival of other life commitments or physical limitations.

Graph 6.1.7 - Abandonment of sport – “At what age did you abandon sport?”

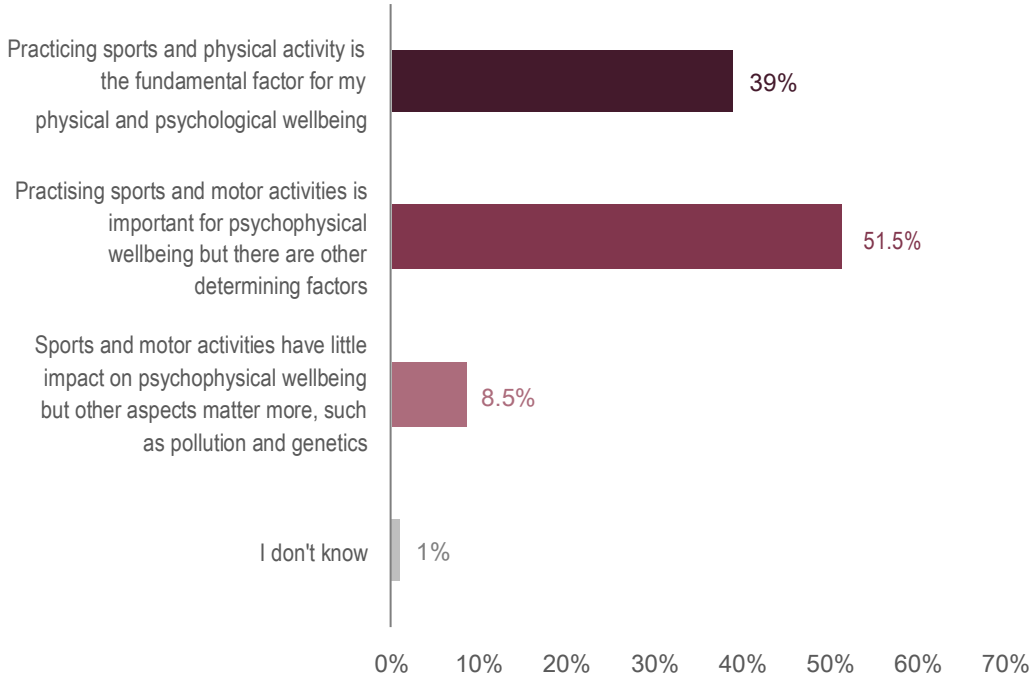


Sources: Survey “Food, Sport and Health – Consumer Survey”, Ixé Institute (2024)

In addition, the majority of respondents (51.5%) consider sport important for psychophysical wellbeing, although not the only determining factor. A further 39% define it as fundamental, highlighting an awareness of the benefits of sport, combined with other determining factors. Only a minority (8.5%) believe that sport has a limited role compared to other factors such as pollution and genetics.

Graphic 6.1.8 - Relationship between sport and health

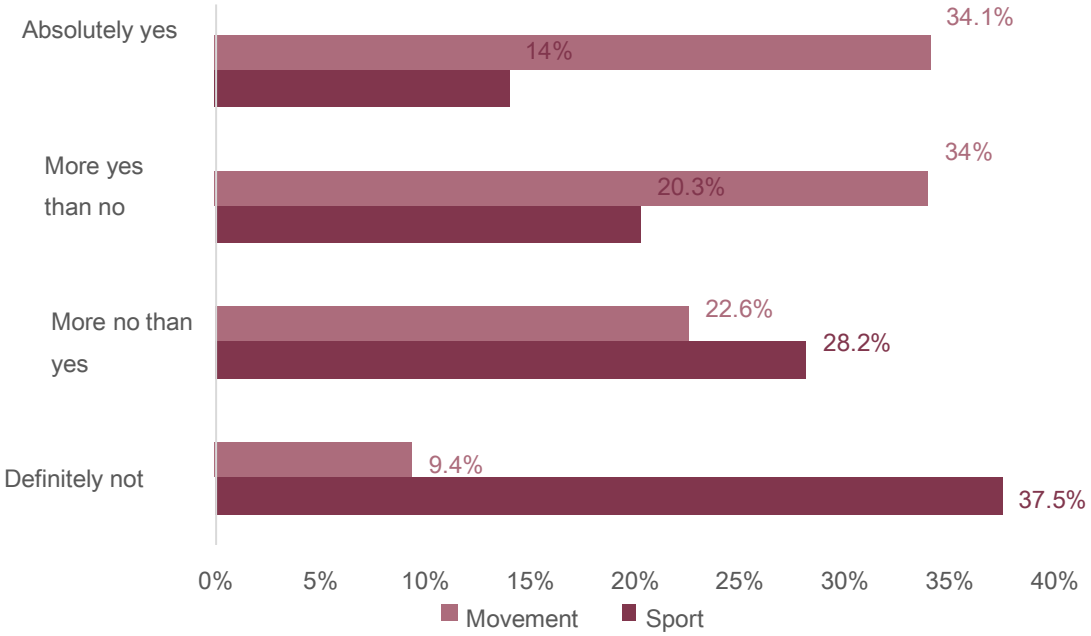
"Thinking in particular about the relationship between sport and health, which of the following statements do you agree with the most?"



Sources: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

Overall, the people interviewed claim that they do sufficient physical activity. In fact, considering who affirms doing an activity that complies with their health needs, there is a percentage equal to 68.1% for movement (walking, cycling or climbing stairs) and 34.3% for sport.

Graph 6.1.9 - Physical activity during the day
"In general, would you say you get enough physical activity during the day?"



Sources: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

The survey therefore shows a heterogeneous picture, where sport is experienced and interpreted in different ways, yet always with an awareness of the associated benefits. This data offers important insights for supporting sports practice for all age groups and encouraging forms of socialisation and aggregation through sport.

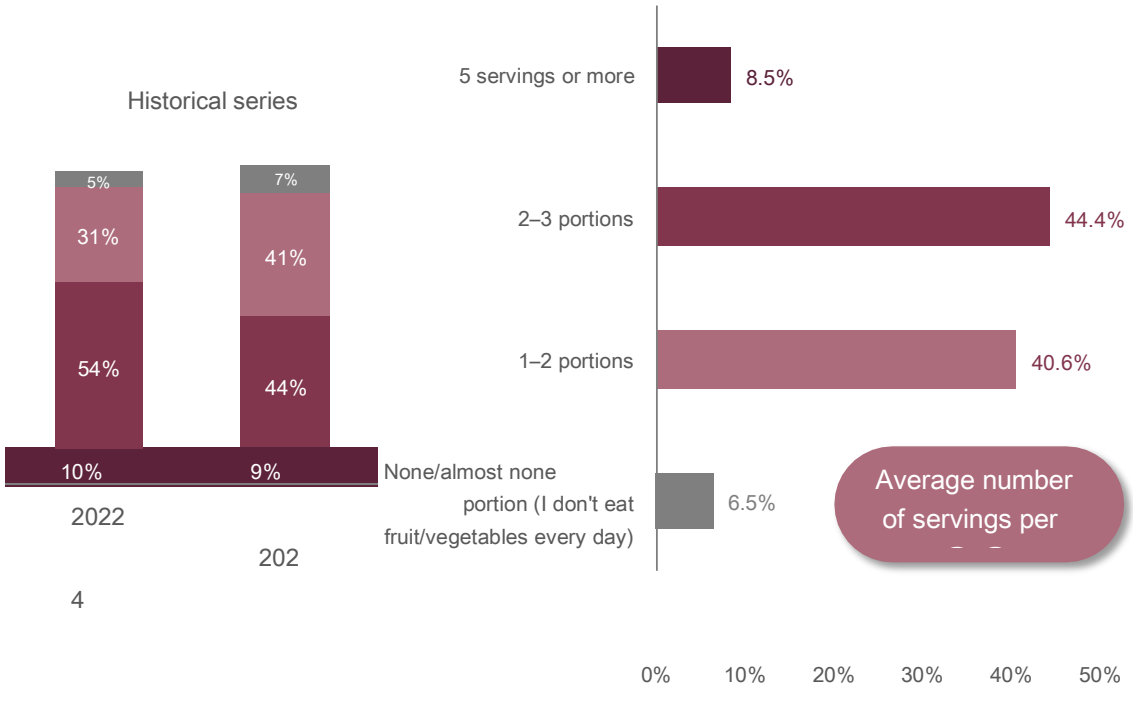
6.2. The link between food and sports

Food and sport are linked by elements that can have positive effects on our health and, therefore, on the quality of our lives. If these elements converge in virtuous habits put into practice on a daily basis, they contribute to the achievement of personal and social wellbeing.

Among the important habits are certainly those like the consumption of fruits and vegetables which, with their contribution of minerals and hydration, are often associated with adequate nutrition for proper physical activity and good sports practice.

However, despite the fact that medical and health indications lead to a high daily consumption of fruit and vegetables, the Ixè Institute's demoscopic survey still shows that the people interviewed should have an appropriate consumption (at least 5 servings per day). Only 8.5% of respondents have a consumption of 5 or more portions of fruit and vegetables with a significant polarisation between the youngest (among whom only 5% have adequate consumption) and people aged 65 and over (of which 11% consume 5 or more portions of fruit and vegetables).

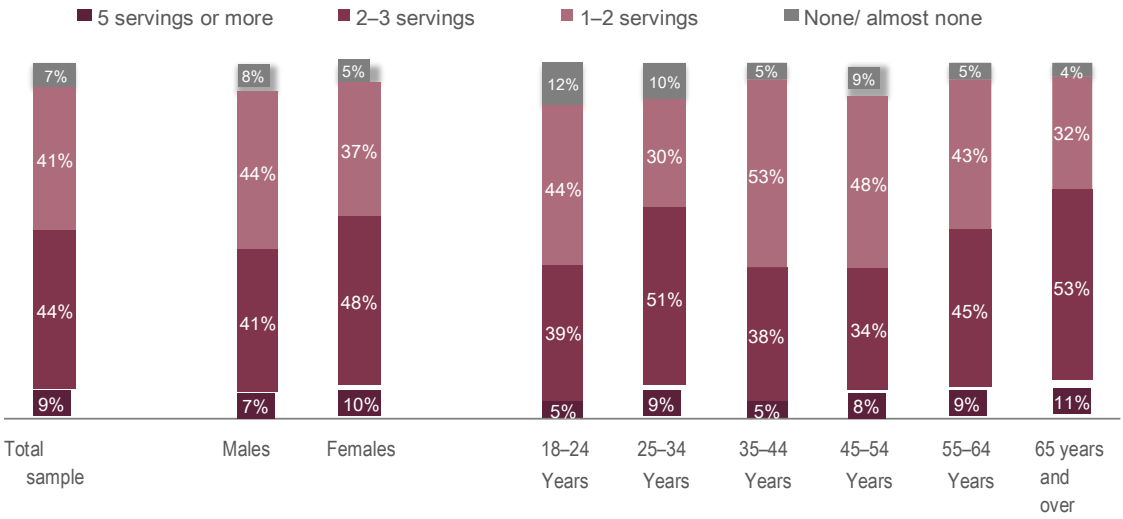
Graph 6.2.1: Daily fruit and vegetable consumption – "On average, how many servings of fruit and vegetables do you consume in a day?"



Sources: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

Graph 6.2.2 - Daily fruit consumption. Detail by gender and age

"On average, how many servings of fruit and vegetables do you consume in a day?" – breakdown by gender and age



Sources: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

Another important aspect that links food and sport concerns the quality of food and, in particular, the frequency with which packaged, prepared, enriched food or "fast food" and enriched energy drinks are consumed. In contrast to the consumption of fruit and vegetables, the sample survey shows that among young adults (aged between 18 and 24 years), there is a higher consumption of packaged snacks, ready meals or enriched and energy drinks (between 0.6 and 2.5 times per week) compared to older people who have up to 6 times lower consumption of such products.

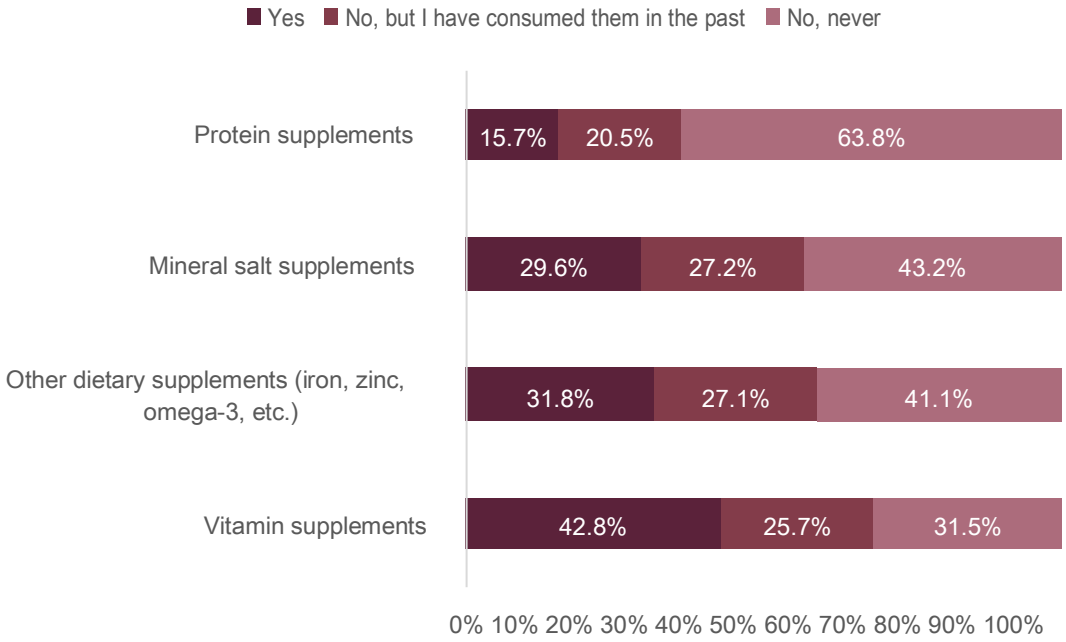
Table 6.2.1: Average frequency of consumption of energy drinks and enriched products – “On average, how often do you (average frequency)?”

	Total sample	Males	Females	18–24 Years	25–34 Years	35–44 Years	45–54 Years	55–64 Years	65 and over
Eat packaged, sweet or savoury snacks (cakes, chips, etc.)	1.6%	1.6%	1.6%	2.5%	2.2%	2.1%	2%	1.7%	0.6%
Consume foods or beverages with the wording “ZERO”, without sugar	1.1%	1.1%	1.1%	1.1%	1.5%	1.5%	1%	1%	0.7%
Drink carbonated drinks	1%	1.1%	0.9%	1.2%	1.4%	1.6%	1.1%	1.1%	0.4%
Eat “plant-based” meat substitutes	0.9%	0.8%	0.9%	1.1%	1.4%	0.9%	0.9%	0.6%	0.7%
Packaged ready meals, only needing reheating (ready-made soups, noodles, risotto, pizzas, etc.)	0.7%	0.8%	0.6%	1.2%	1.2%	1.1%	0.8%	0.5%	0.2%
Consume food or drink, “Enriched ...	0.7%	0.7%	0.6%	0.9%	1.1%	1.1%	0.7%	0.4%	0.3%
Consume Energy Drinks	0.5%	0.6%	0.4%	0.6%	1.2%	0.7%	0.4%	0.5%	0.1%
Eat in a fast food restaurant/eat food purchased in a fast food restaurant ...	0.5%	0.6%	0.4%	0.9%	1%	0.8%	0.5%	0.3%	0.1%

Sources: “Food, Sport and Health – Consumer Survey”, Ixé Institute (2024) Note: no. of times per week

On the same line, the consumption of supplements is attested. Considering that a good portion of the respondents said they had consumed supplements in the last 6 months (43% with regard to vitamin supplements and about 30% with regard to other food or mineral supplements), we note that these products are more established among young people compared to older people: 51% of young people aged 18–24 years say they consume vitamin supplements compared to 29% of 65-year-olds who also have a lower use of protein supplements (13%).

Graph 6.2.3 - Supplement consumption
"Supplement consumption - In the last 6 months, have you have consumed:"



Sources: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

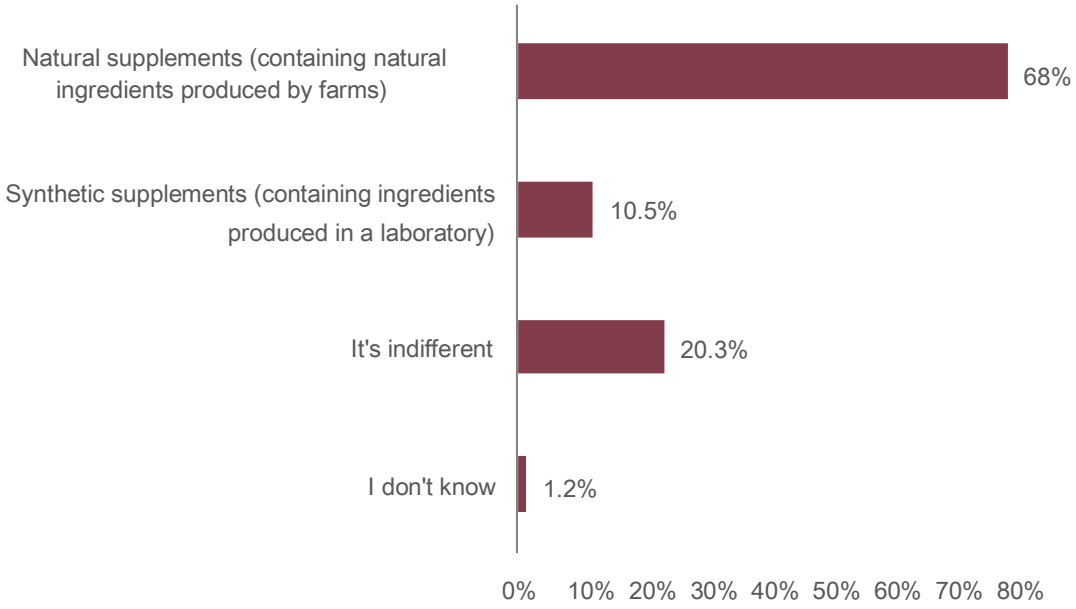
Table 6.2.2 - In-depth analysis by age group and gender – “Supplement consumption - the supplements you generally consume are:”

	Total sample	Males	Females	18–24 Years	25–34 Years	35–44 Years	45–54 Years	55–64 Years	65 and over
Vitamin supplements	43%	40%	46%	51%	59%	50%	41%	45%	29%
Other dietary supplements (iron, zinc, omega-3, etc.)	32%	29%	35%	36%	45%	31%	35%	37%	19%
Mineral salt supplements	30%	28%	31%	24%	37%	36%	35%	34%	19%
Protein supplements	16%	18%	14%	15%	30%	16%	15%	12%	13%

Sources: Survey “Food, Sport and Health – Consumer Survey”, Ixé Institute (2024)

Also in the context of supplement consumption, it is interesting to note that the majority of people surveyed (68%) declare a preference for natural supplements, with a clear tendency for older people to prefer their consumption – 80% of 65-year-olds say they prefer natural supplements compared to 5% of older people who are instead oriented towards synthetic supplements. Younger people are more open to synthetic supplements, with a preference for synthetic products that grows 4-fold from 5% of those over 65 to 23% of young people between 18 and 23 years of age.

Graph 6.2.4 - Natural or synthetic supplements
"Supplement Consumption – Given a choice, you would prefer to consume:"



Sources: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

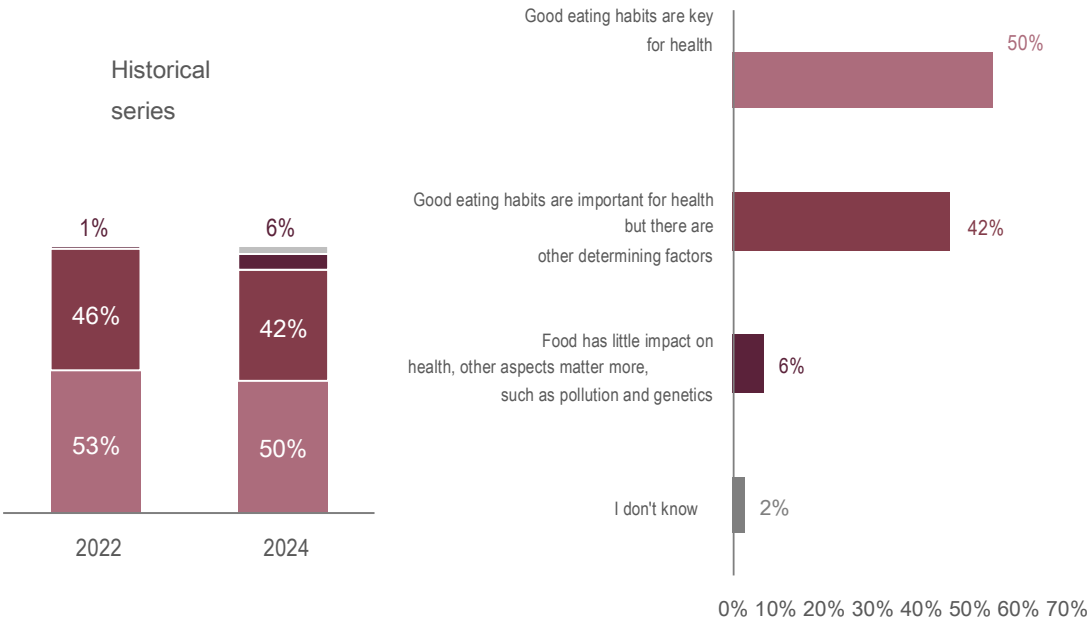
Table 6.2.3 - Natural or synthetic supplements – Broken down by gender and age – "Supplement consumption – Having the choice, you would prefer to consume:" - Breakdown by gender and age

	Total sample	Males	Females	18–24 Years	25–34 Years	35–44 Years	45–54 Years	55–64 Years	65 and over
Natural supplements	68%	69%	67%	61%	67%	58%	61%	73%	80%
Synthetic supplements	11%	10%	11%	23%	16%	15%	8%	5%	5%
It's indifferent	20%	19%	21%	16%	17%	26%	29%	21%	13%
I can't say	1%	2%	1%	0	1%	1%	2%	1%	3%

Sources: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

Finally, looking at the relationship between food and health in general, half of the people interviewed in the demoscopic survey believe that good eating habits are a fundamental factor for health, with only 6% believing that diet has little impact.

Graph 6.2.5 - Relationship between food and health
"Thinking about the relationship between food and health, which of the following statements do you agree with the most?"



Sources: Survey "Food, Sport and Health – Consumer Survey", Ixé Institute (2024)

If we also include in the count those who answered that good eating habits are important for health, the percentage rises to 91.6%. This preponderant percentage makes us understand how food is a crucial element for everything that concerns our lives and is thus a fundamental factor for the activities that fill our time, such as physical activity and sport, which complement and enrich our healthy living.

In short

- The average daily time spent walking is 33 minutes, with a third of respondents spending between 15 and 30 minutes a day on foot. 42% of respondents exceed 30 minutes a day, with 1 in 5 citizens not even reaching 15 minutes a day.
- Respondents engage in physical activity or sports on average 3 to 4 times a week, with 47.2% practising sports once a week.
- Stands out among the more common activities are fast walking (36.6%), generic aerobics (23%) and fitness activities such as spinning/cycling classes and other gym activities in general (20.4%). Disciplines such as cycling (14%) and swimming (9.2%) also enjoy marked popularity.
- Physical health is the main motivation behind exercise, cited by two out of three respondents, followed by the desire to relax (38.1%) and to maintain mental balance (28.9%).
- The majority of respondents prefer to practice outdoor sports (47.5%), in spaces such as on the streets or in parks and gardens. Private gyms are also popular at 31.3%, while 23.4% of respondents prefer to exercise at home.
- The main obstacles that lead to the abandonment of sports are lack of time (46.2%) as well as health or age reasons (34.1%).
- Overall, the people interviewed claim that they do sufficient physical activity. 68.1% of those interviewed practised movement (walking, cycling or climbing stairs) while 34.3% practised sports.
- Although medical and health indications lead to a high daily consumption of fruit and vegetables, only 8.5% of respondents have a consumption of 5 or more portions of fruit and vegetables with a significant polarisation between the youngest (among whom only 5% have adequate consumption) and people aged 65 and over (of which 11% consume 5 or more portions of fruit and vegetables).

- The sample survey shows that among young adults (aged between 18 and 24 years), there is a higher consumption of packaged snacks, ready meals or enriched and energy drinks (between 0.6 and 2.5 times per week) compared to older people who have up to 6 times lower consumption of such products.
- Most of the respondents stated that they had consumed supplements in the last 6 months (43% regarding vitamin supplements and about 30% regarding other dietary or mineral salt supplements). These products are more established among young people than older people – 51% of young people aged 18–24 years say they consume vitamin supplements compared to 29% of 65-year-olds, who also have a lower use of protein supplements (13%).
- 68% of people declare a preference for natural supplements, with a clear tendency for older people to prefer their consumption – 80% of 65-year-olds say they prefer natural supplements compared to 5% of older people who are instead oriented towards synthetic supplements. Younger people are more open to synthetic supplements, with a preference for synthetic products that grows 4-fold from 5% of those over 65 to 23% of young people between 18 and 23 years of age.
- Half of the people interviewed in the demoscopic survey believe that good eating habits are a fundamental factor for health, with only 6% believing that diet has little impact. If we also include in the count those who answered that good eating habits are important for health, the percentage rises to 91.6%.

Methodological note on the survey “Food, Sport and Health – Consumer Survey”, Ixé Institute (2024)

The survey was conducted by the Ixè Institute on behalf of the Fondazione Aletheia on a sample of 1,502 citizens.

The sample size guarantees estimates with good accuracy, containing the statistical error margin below +/-2.53%, and the sample distribution achieved ensures the representativeness of the results with respect to the parameters:

- Gender;
- Age;
- Macro-geographical area;
- Size of the municipality of residence;
- School level.

All these have been aligned with the most recent ISTAT data (Demographic statistics as of 1/1/2024).

Based on a questionnaire structured into 48 mainly closed-ended questions, the interviews were carried out from 10th to 18th October 2024, with a mixed technique, integrating the telephone mode – both on fixed users (CATI system – Computer Assisted Telephone Interview) and mobile phones (CAMI system – Computer Assisted Mobile Interview) – with the online mode (CAWI system – Computer Assisted Web Interview).

Glossary

Physical Activity

Defined as “any movement determined by the musculoskeletal system that translates into an energy expenditure greater than that of resting conditions”. This definition includes not only sports activities but also simple daily movements such as walking, cycling, dancing, playing, gardening and housework.

Physical activity can be carried out at different intensities:

- *Low-intensity* – includes low-energy activities such as walking slowly, bathing or other ancillary activities that do not lead to a substantial increase in heart or respiratory rate.
- *Moderate intensity* – includes activities that require an energy effort slightly higher than that required for low-intensity physical activities, such as brisk walking or, in general, aerobic physical activity.
- *High-intensity* – includes activities that require greater energy effort. Some examples are represented by sports such as volleyball, jumping rope for children, swimming or slow-paced running (jogging).

Aerobic and anaerobic physical activity

Aerobic physical activity involves the large muscles of the body (great pectoral, great dorsal/back and thighs/buttocks) moving rhythmically over a prolonged period of time. This activity improves cardiorespiratory capacity. Examples include walking, running, swimming and cycling.

Anaerobic physical activity, rather, consists of short and intense exercises, such as weightlifting and sprints, in which the oxygen demand exceeds the intake. This type of activity mainly increases muscle strength.

Direct healthcare costs

Resources associated with health treatment and care such as medications, medical visits (family doctor, specialist, emergency room), supportive therapies

(rehabilitation, long-term care, psychotherapies, etc.), laboratory tests, instrumental diagnostics, home nursing care and hospitalisations (admissions and day hospital).

Physical exercise

Indicates physical activity in a structured, planned and regularly-performed manner.

Glycogen

Reserve carbohydrate of animal organisms, formed through glycogen synthesis from glucose and accumulated in the liver and muscles.

Natural supplement

A product of natural origin intended to supplement the daily diet and which constitutes a concentrated source of nutrients or other substances of nutritional interest.

Human microbiota

All the microorganisms that live on and inside the human body and that are able to have an influence on human physiology.

Plasma osmolarity

Indicates the concentration of the blood and depends on the number of solute molecules present in the liquid part of the blood.

Sport

Means any form of physical activity that, through organised or unorganised participation, has as its objective the expression or improvement of physical and mental condition, the development of social relationships or the achievement of results in competitions of all levels.

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