HEPALIS

PERSONAL TRAINER TRAINING MODULES

Increasing the physical activity levels of low-income sedentary individuals under the guidance of personal trainers

101089438

MOBAD time to digital transformation

UCAM Universidad Católica de Murcia

CUS Padova

MindSpin

UNEFS

hepalis.com

Co-funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

HEPALIS

Introduction To Physical Activity And Health

Module 1

2023

Contents

1. Importance of physical activity for overall health and wellbeing 4
1.1. What is physical activity? 5
1.2 Which are the benefits of physical activity? 7
1.2.1 Benefits of regular PA on physical health 7
1.2.2 Benefits of regular PA on mental health and wellbeing 10
1.3 How much of physical activity is recommended to get health benefits? 13
2. Benefits of physical activity for low-income individuals 16
2.1 Current levels of inactivity 17
2.2 A focus on low-income individuals 17
2.2.1 Physical activity for low-income individuals 18
2.2.2 Individual/community barriers to in low-income individuals 19
2.3 Practical guidelines for low-income individuals 20
3. Basic principles of exercise science and physiology 23
3.1. Principles in exercise physiology 26
3.2 FITT principles 27
REFERENCE 28

1. Importance of physical activity for overall health and wellbeing

1.1. What is physical activity?

Physical Activity (PA) is defined as any bodily movement produced by the contraction of skeletal muscles that results in an increase of energy expenditure over resting levels (Caspersen, Powell and Christenson, 1985; Word Health Organization [WHO], 2020).

PA is an umbrella term that includes leisure time PA (i.e., exercise, sport), activities of daily living, household tasks, and work (Caspersen et al., 1985). PA refers to all movement including during leisure time (e.g., running, dancing, swimming, yoga, and gardening) or for transport to get to and from places (e.g., walking from a place to another; WHO, 2020). PA can also be undertaken as part of work (e.g., lifting, carrying or other active tasks), and as part of domestic tasks around the home (e.g., cleaning and care duties). While some of these activities are done by choice and can provide enjoyment (e.g., leisure time PA), others (i.e., work, or domestic duties) may be necessary. However, all forms of PA can provide health benefits if undertaken regularly and of sufficient duration and intensity.

Types of PA include aerobic, muscle-strengthening, bone-strengthening, balance, and flexibility activities.

1. Aerobic activities:

Aerobic activities move large muscles (e.g., arms and legs).
Aerobic activity makes the heartbeat faster than usual, and people breathe harder during this type of activities.

Aerobic activities can be practiced with different levels of intensity. The level of intensity depends on how hard people have to work to do the activity. To do the same activity, people who are less fit usually have to work harder than people who are more fit.

Levels of intensity include:
• Light-intensity activities: common daily activities that don't require much effort.
• Moderate-intensity activities: make the heart, lungs, and muscles work harder than light-intensity activities do. On a scale of 0 to 10, moderate-intensity activity is a 5 or 6 and produces noticeable increases in breathing and heart rate. A person doing moderate-intensity activity can talk but not sing.
• Vigorous-intensity activities: make the heart, lungs, and muscles work hard. On a scale of 0 to 10, vigorous-intensity activity is a 7 or 8. A person doing vigorous-intensity activity can't say more than a few words without stopping for a breath.

Moderate- and vigorous-intensity aerobic activities are better than light-intensity activities. However, even light-intensity activities are better than no activity at all.

Examples of aerobic activity include:
• Gardening (e.g., digging or hoeing)
• Walking, hiking, jogging, running
• Water aerobics or swimming laps
• Bicycling, skateboarding, rollerblading, and jumping rope
• Ballroom dancing and aerobic dancing
• Tennis, soccer, hockey, and basketball

Co-funded by the European Union

2. Muscle-strengthening

Muscle-strengthening activities improve the strength, power, and endurance of the muscles. Doing push-ups and sit-ups, lifting weights, and climbing stairs are examples of muscle-strengthening activities. Muscle-strengthening can also be aerobic, depending on whether they make heart and lungs work harder than usual.

3. Bone-strengthening

With bone-strengthening activities, feet, legs, or arms support the body's weight, and the muscles push against the bones. This helps make the bones strong. Running, walking, jumping rope, and lifting weights are examples of bone-strengthening activities. Bone-strengthening activities also can be aerobic, depending on whether they make heart and lungs work harder than usual. For example, running is both an aerobic activity and a bone-strengthening activity.

4. Balance activities

These activities can improve the ability to resist forces that can make people fall, either while stationary or moving. Walking backward, standing on one leg, walking heel-to-toe, practicing standing from a sitting position, or using a wobble board are examples of balance activities. Strengthening muscles of the back, abdomen, and legs also improves balance.

5. Flexibility activities

Stretching helps improve flexibility and ability to fully move joints. Doing side stretches and doing yoga exercises are examples of flexibility activities.

Relevant definitions in the context of PA:
Physical Exercise (PE) is PA that is planned and structured, such as lifting weights, taking an aerobics class, while sport is any form of competitive PA or game, needing physical effort and skills, that is done or played by athletes according to specific rules.

Opposite to PA, sedentary behaviour is defined as any waking behaviour characterized by an energy expenditure ≤ 1.5 metabolic equivalents, such as sitting or lying down (Tremblay et al., 2017). Recent evidence indicates that high levels of continuous sedentary behaviour (i.e., sitting for long time) are associated with overall mortality (Owen et al., 2010). Reducing sedentary behaviour through the promotion of PA can support individuals to increase their levels of PA towards achieving the recommended levels for optimal physical and psychological health.

Co-funded by the European Union

1.2 Which are the benefits of physical activity?

Practicing regular PA positively impacts health and wellbeing, representing a protective factor for both physical and mental health (Coombes et al., 2015; Stanton, Happell, & Reaburn, 2014).

The benefits of regular PA on health and wellbeing are numerous (WHO, 2020), and include reduction of mortality rates and good mental health. These benefits apply to people of all ages, sexes, races, and ethnicities (WHO, 2020). For all populations, doing some PA is better than doing none. If individuals are not currently meeting the WHO (2020) recommendations for PA, doing some PA will bring in any case benefits to health. Indeed, health benefits occur also with levels of PA below the WHO (2020) recommendations for PA.

1.2.1 Benefits of regular PA on physical health

Morality risk:
Being physically active leads to a reduction in all-cause of mortality (Lopez et al., 2020). Evidence from recent studies suggest that, compared with the lowest levels of PA, any level and all intensities (including light intensity) of PA are associated with a lower risk of all-cause mortality and adverse events in patients with different chronic conditions, including hypertension, type 2 diabetes, cancer, and cardiovascular diseases (Li et al., 2015; Rijal et al., 2023).

Cardiovascular disease, blood pressure and hypertension:
PA reduces the risk of cardiovascular disease (CVD), with a magnitude of risk reduction comparable to that of not smoking (Blair et al., 1996; Manson et al., 2002). Furthermore, regular PA is proven to help prevent (and manage) CVD, thanks to multiple physiological responses that cause beneficial short- and long-term autonomic adaptations, resulting in lowered risk of hypertension, which is a key risk factor for CVD, thus impacting the risk of developing CVD (WHO, 2010).

A recent systematic review (Pescatello et al., 2019) demonstrates strong evidence for:
1) an inverse dose-response relationship between PA and incident hypertension among adults with normal blood pressure
2) PA reduces the risk of CVD progression among adults with hypertension
3) PA reduces blood pressure among adults with normal blood pressure, pre-hypertension, and hypertension
4) the magnitude of the blood pressure response to PA varies by resting blood pressure, with greater benefits among adults with prehypertension than normal blood pressure.

Type 2-diabetes:
PA reduces the risk of developing diabetes and plays a role in diabetes treatment via multiple biological mechanisms (Colberg et al., 2016). Multiple types of PA emerged as beneficial for reducing diabetes-related mortality, including walking (Williams & Franklin, 2015; Williams & Thompson, 2013), running (Williams & Franklin, 2015), and gardening (Johnsen et al., 2013).

A recent review demonstrated that the effect is consistent across individuals of different backgrounds with a reduced risk of developing type-2 diabetes in "highest" versus "lowest" levels of PA among non-Hispanic whites (RR= 0.71 [95% CI: 0.60 to 0.85]); Asians (RR= 0.76 [95% CI: 0.67 to 0.85]); Hispanics (RR = 0.74 [95% CI 0.64 to 0.84]); and American Indians (RR = 0.73 [95% CI: 0.60 to 0.88]), highlighting that any volume of aerobic leisure-time PA is beneficial in terms of reducing the risk of diabetes-related mortality (Boyer et al., 2021).

A recent study (Jayedi et al., 2023) performed a dose–response analysis and suggested that the risk of type-2 diabetes decreased significantly at a walking speed of 4 km/h and above. The study also concluded that walking at faster speeds is associated with a graded decrease in the risk of type-2 diabetes.

Cancers:
Cancer primary prevention:
Higher levels of PA are associated with a reduced risk of developing different types of cancer: when comparing the incidence among individuals in the highest category of PA with individuals in the lowest, strong evidence demonstrated reduced risks of bladder, breast, colon, endometrial, esophageal adenocarcinoma, renal and gastric cancers, with relative risk reductions ranging from approximately 10 to 20% (McTiernan et al., 2019).

Co-funded by the European Union

Cancer	Overall Evidence Grade	Approximate % Relative Risk Reduction
Bladder	Strong	15%
Breast	Strong	12 – 21%
Colon	Strong	19%
Endometrium	Strong	20%
Esophagus (adenocarcinoma)	Strong	21%
Gastric	Strong	19%
Renal	Strong	12%
Lung	Moderate	21 – 25%
Hematologic	Limited	Variable effect sizes
Head & Neck	Limited	Variable effect sizes
Ovary	Limited	8%
Pancreas	Limited	11%
Prostate	Limited	Variable effect sizes
Brain	Grade not assignable	Variable effect sizes
Thyroid	Limited	0
Rectal	Limited	0

Table 1. 2018 Physical Activity Guidelines Advisory Committee Evidence on Relationship between Physical Activity and Risk of Developing Invasive Cancer.

Cancer mortality in patients with a diagnosis:
Systematic reviews and meta-analyses on the relationship between PA and mortality among cancer patients are available only for breast, colorectal, and prostate cancer.

Breast cancer: Evidence shows an inverse association between PA after diagnosis and cancer-specific and all-cause mortality in patents with a diagnosis of breast cancer: higher levels of PA are associated with improved survival outcomes (ranging from 38 to 48%) (Ammitzboll et al., 2016, Friedenreich et al., 2016; Jones et al., 2016; Lahart, 2015).

Colorectal cancer: Evidence shows an inverse association between PA after diagnosis and all-cause mortality and colorectal cancer-specific mortality in patents with a diagnosis of colorectal cancer: higher levels of PA are associated with improved survival outcomes (ranging from 25 to 50%). One meta-analysis also assessed dose-response (Schmid & Leitzmann, 2014): in comparisons of less active to more active individuals, each 5, 10, or 15 MET-hours per week increase in post-diagnosis PA was associated with a 15 percent (95% CI: 10%-19%), 28 percent (95% CI: 20%-35%), and 35 percent (95% CI: 28%-47%) lower risk for all-cause mortality.

Prostate cancer: Evidence shows an inverse association between PA after diagnosis and all-cause mortality and prostate cancer-specific mortality in patents with a diagnosis of prostate cancer: higher levels of PA are associated with improved survival outcomes (38%) (Friedenreich et al., 2016).

Bone health and osteoporosis:
Epidemiological and intervention studies provide evidence of a strong relationship between PA and bone health, with individual practicing regular PA having a lower incidence of fractures (Moayyeri, 2008).
A recent systematic review also highlight that PA plays a role in the prevention of osteoporosis (Pinheiro et al., 2020), and various guidelines recommend engagement in PA for the management of osteoporosis (The Royal Australian College of General Practitioners and Osteoporosis Australia, 2017).

1.2.2 Benefits of regular PA on mental health and wellbeing

The mental health benefits of PA are well established (White et al., 2017; Marquez et al., 2020): meta-analyses have shown that PA has beneficial effects on mental health outcomes, health-related quality of life, and wellbeing both in general population (Bize et al., 2007) and in people living with disabilities (Ginis et al., 2021). Potential mechanisms of PA on quality of life and wellbeing include PA-induced changes in neurotransmitters of the brain and endogenous opioids that are known to be associated with multiple psychological disorders (Antunes et al., 2005).

PA emerged to be effective in:
1) preventing the development of psychological symptoms/disorders
2) treating psychological symptoms/disorders.

Co-funded by the European Union

Self-esteem and self-efficacy: Self-esteem can be defined as a person's evaluative judgment of the self (Rosenberg, 1965). Self-esteem is crucial for a satisfying life and constitutes a fundamental aspect of psychological wellbeing (Rosenberg, 1965). Self-efficacy refers to beliefs about personal abilities and the ability to satisfactorily carry out the necessary demands in different situations (Bandura, 1982).

Multiple studies (Elavsky et al. 2005; McAuley & Blissmer, 2000) found that PA fosters self-esteem and self-efficacy, resulting in greater well-being/satisfaction with life. Specifically, the exercise and self-esteem model (Sonstroem & Morgan, 1989) suggests that PA is associated with global self-esteem via perceptions of self-efficacy, physical competence, and physical acceptance.

Anxiety, depression, and general distress:
Recently, an overview of systematic reviews (Singh et al., 2023) showed that regular PA is highly beneficial for improving symptoms of depression, anxiety, and distress across a wide range of adult populations (i.e., general population, people with a diagnosis of psychological disorders, and people with chronic disease).

Anxiety, depression, and general distress prevention: PA emerged as effective in preventing the development of psychological disorders such as anxiety and depression (Galper et al., 2006; Anderson & Shivakumar, 2013). People who practice regular PA experience fewer depressive and anxiety symptoms compared to those who do not practice regular PA (Anderson & Shivakumar, 2013; Galper et al., 2006). Indeed, adults with high, versus low, levels of PA emerged at reduced risk of developing anxiety symptoms (AOR= 0.81 [95% CI: 0.69 to 0.95]) (Schuch et al., 2019) or depressive symptoms (AOR= 0.78 [95% CI: 0.70 to 0.87) (Schuch et al., 2018).

Anxiety, depression, and general distress treatment: People experiencing anxiety and depressive symptoms may benefits from PA too: evidence indicated that PA was associated with reduced symptoms of anxiety (Gordon et al., 2017; Gordon et al., 2018) and reduced symptoms of depression (Gordon et al., 2018; Perez-Lopez et al., 2017). In accordance, multiple research trials examining the effects of PA on depression and anxiety suggest that PA may have similar effects to psychotherapy and pharmacotherapy (Kvam et al., 2016; Schuch et al., 2019; Schuch & Stubbs, 2019).
What type of PA emerged as particularly beneficial in people experiencing anxiety and depressive symptoms? A recent study (Martínez-Calderon et al., 2023) found that yoga interventions may improve anxiety symptoms in anxiety disorders and depression symptoms in depressive disorders.

Negative body image and eating disorders:
Body image is the internal representation that individuals have of their own body and physical appearance, regardless of how their body actually look (Alleva, Sheeran, Webb, Martijn, & Miles, 2015). Negative body image has been identified as a public health concern, due to its deleterious outcomes in terms of physical and mental health (e.g., Bornioli et al., 2021; Swami et al., 2010); indeed, negative body image is one of the strongest predictors of eating disorders (EDs) development.

Negative body image and eating disorder prevention:
PA can reduce negative body image and promote body appreciation and positive body image (Menzel & Levine, 2011) through the perception of self-efficacy, physical competence, and physical acceptance (Eime et al., 2013). In accordance, a recent scoping review (Sabiston et al., 2019) found that participation in PA emerged as related to less negative body image and more positive body image. In accordance with these findings, two meta-analyses have shown that individuals who engage in regular PA reported higher levels of body appreciation and higher positive body image than individuals who do not engage in regular PA (Campbell & Hausenblas, 2009). Experimental research (Bassett-Gunter et al., 2017) has further demonstrated a positive relationship between PA and body image, such that those who engage in PA experience healthier body image (e.g., more body satisfaction or less body dissatisfaction) compared to those who do not engage in PA.

Eating Disorder treatment:
Patients with a diagnosis of EDs may benefits from PA too. A recent systematic review (Toutain et al., 2022) investigated different PA interventions that have been implemented in the treatment of patients with Anorexia Nervosa (AN) and other EDs: aerobic exercise, resistance exercise, and mind–body PA interventions. Aerobic and resistance exercise were found to improved muscle strength in AN, while mind-body PA decreased the core symptoms of AN (i.e., body concerns, body dissatisfaction) and improved quality of life and mental health of patients with AN (e.g., reduction of anxiety and depressive symptoms).

Sleep quality and insomnia:
In epidemiological research, PA has been associated with better sleep (Youngstedt & Kline, 2006).

Sleep quality:
PA emerged to be effective in improving sleep quality in different population. For example, a study by Kline et al. (2021) found that PA induced significant improvements in subjective sleep quality in postmenopausal women, with even a low dose of PA resulting in greatly reduced odds of having significant sleep disturbance.
Furthermore, a longitudinal study conducted among elderly people found that engaging in frequent and regular PA reduced difficulties in maintaining sleep, thus reducing insomnia incidence (Inoue et al., 2013). Results emerged also from randomized controlled trials: higher levels of PA have been found to positively affect sleep quality in different populations, including menopausal women (Mansikkamäki et al., 2012) and older adults (King et al., 2008).

Co-funded by the European Union

Insomnia treatment:
Results of cross-sectional findings from epidemiological studies (Strand et al., 2013), as well as a prospective study of midlife women (Kline et al., 2013), support the inverse association between PA and insomnia.
PA is indeed considered an effective, non-pharmacological approach to improve sleep in people with insomnia (Yang et al., 2012). In accordance, results from randomized controlled trials showed that higher levels of PA positively affect insomnia in inactive adults suffering from this condition (Passos et al., 2011; Reid et al., 2010; Hartescu et al., 2015) and in overweight adults with obstructive sleep apnea (Kline et al., 2011).

Cognitive impairment:
PA represents a modifiable risk factor to reduce the risk of dementia and related neurodegenerative diseases (Prakash et al., 2015). This is possibly due to the neural and vascular adaptations to PA that improve cognitive function through promotion of neurogenesis, angiogenesis, synaptic plasticity, and decreased proinflammatory processes (Rasmussen et al., 2009). Greater amounts of moderate to vigorous PA emerged as associated with improvements in different cognitive domains (e.g. processing speed, memory, and executive function), brain function and structure, and a reduced risk of developing cognitive impairment, including Alzheimer's disease (Brasure et al., 2018; Northey et al., 2018; Rathore et al., 2017; Engeroff et al., 2018). The beneficial effects of PA were demonstrated across a variety of types (e.g., aerobic activity, walking, muscle-strengthening activity, and yoga; Northey et al., 2018).

1.3 How much of physical activity is recommended to get health benefits?

The WHO (2020) guidelines on PA and sedentary behaviour provide evidence-based public health recommendations for different age groups (i.e., youth, adults, and older adults) and specific population groups (i.e., pregnant and postpartum women, people living with disability and chronic condition) on how much PA (frequency, intensity and duration) is required to get significant health benefits and mitigate health risks.

Pertaining to adults, WHO (2020) recommends:
Adults (18–64 years):
• should do at least 150–300 minutes of moderate-intensity aerobic PA; or at least 75–150 minutes of vigorous-intensity aerobic PA; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week
• should limit the amount of time spent being sedentary. Replacing sedentary time with PA of any intensity (including light intensity) provides health benefits
To get additional health benefits from PA, adults:
• should do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week
• may increase moderate-intensity aerobic PA to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic PA; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week
• to help reduce the detrimental effects of high levels of sedentary behaviour on health, all adults should aim to do more than the recommended levels of moderate- to vigorous-intensity PA.

Adults aged 65 years and above:
• Same as for adults and, as part of their weekly PA, older adults should do varied multicomponent PA that emphasizes functional balance and strength training at moderate or greater intensity, on 3 or more days a week, to enhance functional capacity and to prevent falls.

Pregnant and postpartum women (if no contraindication emerged):
• should do at least 150 minutes of moderate-intensity aerobic PA throughout the week
• incorporate a variety of aerobic and muscle-strengthening activities
• should limit the amount of time spent being sedentary. Replacing sedentary time with PA of any intensity (including light intensity) provides health benefits.

People living with chronic conditions/disability:
• should do at least 150–300 minutes of moderate-intensity aerobic PA; or at least 75–150 minutes of vigorous-intensity aerobic PA; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week
• It is possible to avoid sedentary behaviour and be physically active while sitting or lying (e.g., upper body led activities, inclusive and/or wheelchair-specific sport and activities)
• as part of their weekly PA, older adults should do varied multicomponent PA that emphasizes functional balance and strength training at moderate or greater intensity, on 3 or more days a week, to enhance functional capacity and to prevent falls
• should limit the amount of time spent being sedentary. Replacing sedentary time with PA of any intensity (including light intensity) provides health benefits.
To get additional health benefits from PA, people living with chronic conditions/disability:
• should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week
• may increase moderate-intensity aerobic PA to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic PA; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week
• to help reduce the detrimental effects of high levels of sedentary behaviour on health, all adults should aim to do more than the recommended levels of moderate- to vigorous-intensity PA.

Co-funded by the European Union

Figure 1. Word Health Organization guidelines for PA (2020).

2. Benefits of physical activity for low-income individuals

2.1 Current levels of inactivity

Physical inactivity is defined as doing insufficient PA to meet current PA recommendations (WHO, 2020). Physical inactivity is partly due to inaction during leisure time and sedentary behaviour on the job/at home. Likewise, an increase in the use of "passive" modes of transportation also contributes to insufficient PA.

The 2016 global comparative estimates indicated that worldwide 27.5% of adults (Guthold et al., 2018) do not meet the 2010 WHO global recommendations on PA for health; this affects not only individuals over their life span and their families, but also health services and society as a whole, since physical inactivity is the 4th leading risk factor for global mortality, accounting for roughly 3.2 million deaths annually (WHO, 2020). Indeed, people who are insufficiently physically active have a 20% to 30% increased risk of all-cause mortality compared to those who engage in at least 30 minutes of moderate intensity PA most days of the week (WHO, 2020).

The prevalence of inactivity varies, and can be as high as 80% in some adult sub-populations (Carty et al., 2021). Inequalities in the amount of PA among different group exist: women and men, old and young, and the socioeconomically advantaged and disadvantaged (Moreno-Llamas et al., 2022).

2.2 A focus on low-income individuals

Differences in the amount of PA may be explained by significant inequities in the opportunities for PA by social position and gender, within as well as between countries (Moreno-Llamas et al., 2022). People of low socioeconomic position, marginalized population, people with disabilities and chronic diseases, women, and older adults often have less access to safe, accessible, affordable, and appropriate spaces and places in which to be physically active. In accordance, physical inactivity was found to be greater in individuals with lower incomes, lower education, in women, older adults, non-White populations, and those from rural areas (WHO, 2018). These populations are also more likely than other populations to have chronic diseases related to sedentary lifestyles (Diez-Roux et al., 1997; Lutfey & Freese, 2005; Oates et al., 2017).

The socioeconomic status (SES), or its derivatives (e.g., income, education, and occupation), has been recognized as an important determinant of health and wellbeing because it influences people's attitudes, experiences, and exposure to several health risks across the life span (Marmot, 2005). In particular, low-income individuals have a higher risk of unhealthier lifestyles, cardiovascular disease, overweight and obesity, and all-cause mortality than high income individuals (Foster et al., 2018; Lago et al., 2018; Pampel et al., 2010; Stringhini et al., 2017; Zhang et al., 2021). This might be explained by the fact that lower-SES individuals, in addition to having fewer resources, have several co-occurring risk factors, such as increased psychosocial stress, fewer opportunities for health-promoting behaviors, and less access to high-quality health care (Adkins et al. 2017; Haviland et al. 2005).

SES also impacts the practice of regular PA: low-income individuals are more likely to be less physically active than high income groups (Parks et al., 2003; Shuval et al., 2017). Indeed, participation in PA follows a social gradient, such that those who are more advantaged are more likely to be regularly physically active, less likely to be sedentary, and less likely to experience the adverse health outcomes associated with inactive lifestyles than less advantaged groups (Ball et al., 2015). Physical inactivity in low-income individuals contributes not only to missed opportunities for adults to have better health, but also to the increasing burden of morbidity and mortality that results from chronic diseases, which are very common in low-income individuals (over 80%; Ndubuisi, 2021), especially considering that people who are insufficiently active have a 20 to 30% increased risk of death compared to people who are sufficiently active (WHO, 2020).

2.2.1 Physical activity for low-income individuals

Of all the lifestyle behaviors, PA has one of the largest positive impacts on the risk of all-cause mortality (33% reduction; Centres for Disease Control and Prevention 2020), and these benefits apply for people of all ages, abilities, and incomes (WHO, 2020). Given that numerous health conditions are highly preventable or treatable through PA (WHO, 2020), it is crucial to develop PA intervention for low-income individuals, since the rates of inactivity are very high in this group, with negative consequences on their physical and mental health.

In low-income individuals, regular PA confers a multitude of health-improving and life-saving benefits, including prevention of chronic disease, reduction in all-cause mortality and improvement in mental health and well-being. In accordance, both recreational and non-recreational PA emerged as associated with a lower risk of mortality and cardiovascular disease events in individuals from low-income countries (Lear et al., 2017), while leisure-time PA emerged as the key health behavior protecting against obesity (Harper & Lynch, 2007). Furthermore, there is a stronger inverse association of self-reported moderate-to-vigorous PA with all-cause mortality in low SES groups (Paudel et al., 2023), making evident the importance of practice PA in low-income individuals.

Among low-income individuals, people living with disability may particularly benefits from the practice of regular PA, since this population is at a greater risk of inactivity-related health consequences (Ginis et al., 2021). PA emerged to be beneficial for most people living with disability and, importantly, no evidence suggested that PA is harmful to this population (Ginis et al., 2021): PA in this population was positively associated with cardiorespiratory fitness, muscular strength, functional skills, psychosocial wellbeing, and indicators of cardiometabolic health. WHO guidelines (2020) for this population emphasizes that some PA is better than none, and that people living with disability can have benefits from PA even below the recommended threshold for adults (i.e., 150 min per week). These findings reflect that PA health benefits are graded: the biggest benefits are reached when inactive people make small increases in PA, even of light intensity (Bull et al., 2020). Since many people with disability are often completely inactive, practicing even low levels of PA could have a positive impact on health on this population (Bull et al., 2020). Furthermore, a dose-response relationship has been highlighted, whereby all PA accumulated throughout the day (is considered beneficial (US Department of Health and Human Services, 2018): this is especially important for people living with disability, who experience barriers to reaching the guideline recommendations.

Co-funded by the European Union

Increasing PA is a simple, widely applicable, low-cost global strategy that could reduce mortality and chronic diseases in low-income individuals. However, low-income indivi¬duals may face specific barriers to engaging in PA, such as lack of access to facili¬ties and equipment. Understanding these barriers is crucial to provide inclusive and impactful services for low-income individuals.

2.2.2 Individual/community barriers to in low-income individuals

Low-income can greatly impact the practice of regular PA (Armstrong et al., 2018; Government of Canada, 2020). In most countries, women, older adults, underprivileged groups, and people with disabilities and chronic diseases have fewer opportunities to access safe, affordable, and appropriate programmes and places where practice PA. There are many contributing factors as to why low-income individuals have difficulties accessing PA, called barriers to PA (Bantham et al., 2021; Jefferis et al., 2014; Zubala et al., 2017).
The most salient are the following:

1) Time
Time is extremely influential on the amount of PA practiced (Spinney & Millward, 2010): the less time someone has available, the less likely they have to participate in PA.
Low-income individuals face multiple challenges and competing demands in their life, reducing their time to practice PA. Examples may include (Armstrong et al., 2018): increased time for transportation (i.e., public transit), family responsibilities (e.g., poor spousal support), work hours (i.e., two jobs instead of one), and lack of access to childcare (reduced free time).

2) Income
Low income prevents access to many of the PA facilities available. Gym membership, transportation, equipment, and appropriate clothes are only some of the costs that low-income individuals must consider when trying to access PA (Smith et al., 2017).
Poverty and low socioeconomic status may also impact healthy food options, thereby increasing reliance on high-fat, high-calorie fast foods. This combination of decreased PA and poor diet can substantially increase an individual's risk of becoming overweight (Bantham et al., 2021).

3) Limited education about the benefits of physical activity
Obstacles to PA in low-income individuals include lack of education about the benefits of PA. For example, lack of knowledge about what constitutes adequate amount of PA, lack of awareness of how much PA they should perform to positively impact their health and belief that they acquire sufficient PA through daily activities.

4) General health condition
Chronic health conditions are frequent among low-income individuals, preventing or making it difficult for them to be physically active. A literature review focusing on Black/Africans American women observed that in 33% of the studies included, health conditions such as diabetes, obesity and cardiovascular diseases were reported as an impediment for the engagement in PA (Joseph et al., 2015). Bautista et al. (2011) also observed that 21% of Latino participants not practicing PA reported "My physical condition does not allow me to exercise" as a barrier to practice PA.

5) Unsafe Neighborhoods
Access to facilities (e.g., recreation centers, parks) and the safety or attractiveness of one's neighborhood play an important role in whether or not individuals use such spaces to engage in PA. Researchers have shown that obstacles to PA in low-income individuals include a lack of safe and affordable spaces for PA due to high crime rates. In accordance, feeling unsafe in the neighborhood has been shown to prevent low-income individuals from practicing PA (Basky, 2020; Morin, 2016). Concerns mentioned include general safety, verbal harassment, physical harm (e.g., being assaulted), and gang-related activities.

6) Environment Facilities
Obstacles to PA in low-income neighborhoods include a lack of infrastructure supporting the practice of PA (i.e., fewer recreational facilities being available), such as sidewalks, bike lanes, and efficient public transportation. These factors can prevent residents from incorporating activities like walking or biking into their daily routines.

There are many other barriers that low-income individuals may face when trying to participate in PA, including transportation, baseline mental and physical health, access to healthcare and medication, and location (Basky, 2020).

2.3 Practical guidelines for low-income individuals

Low-income populations are more likely than other populations to have chronic diseases related to sedentary lifestyles. Increasing PA levels in these populations holds particular promise for improving health, quality of life, and reducing health care costs. Given the multiple benefits of PA for physical and mental health in low-income individuals, how to support them to achieve (and maintain) the recommended guidelines (WHO, 2020) for PA?

PA can be undertaken in many, economic, ways: walking, cycling, wheeling, and active forms of recreation (for example, dance, yoga, tai chi). PA can also be undertaken at work and around the home. All forms of PA can provide health benefits if undertaken regularly and of sufficient duration and intensity.

There are free ways to add movement into daily routine (National Heart, Lung and Blood Institute, 2013):
1- Park car in the far parking spots when running errands
2- Get off one bus stop early
3- Take the stairs instead of the elevator

Helpful video:
https://youtu.be/0i1lCNHaxhs
https://youtu.be/61p1OIO20wk
https://www.youtube.com/watch?v=99Grz6zrzil

Co-funded by the European Union

Useful tips to promote and sustain the practice of PA in low-income individuals include:

1- Effective communication
Effective communication is one of the most powerful tools to sustain low-income clients in the practice of regular PA. Dissemination of materials related to the importance of PA for health and wellbeing among low-income individuals may play an important role in fostering the practice of PA in this group. In this scenario, it is crucial to provide messages that meet the needs of low-income individuals.

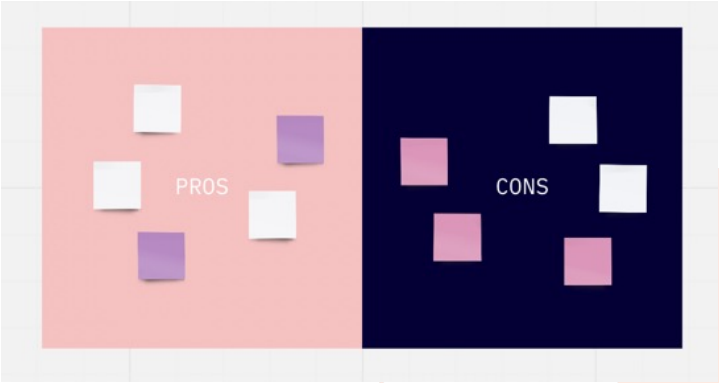
Effective communication includes:

1) The practice of active listening to ensure to hear not just the words the person is saying, but the entire message. Rephrase or paraphrase what you have heard when making your reply is very helpful

2) Asking open questions to elicit additional information. This is particularly helpful to elicit concerns and barriers associated with the practice of regular PA (e.g., what are the difficulties/barriers to engage in regular PA?)

Be also mindful of nonverbal communication - body matters! (e.g., facial expression and body language).

2- "Pros and Cons" list
Pros and cons list is a simple - but powerful - decision-making tool used to help understand both sides (pros and cons) of an argument - in this case the practice of regular PA. Individuals could benefit from creating a list that details both sides of practicing regular PA: the list makes it easier to visualize the potential impact of the decision. The list may be an online template, or a paper-pencil list could be created by low-income individuals.



3- Identification of barriers to PA and ways to overcome them
Multiple barriers might obstacle the practice of regular PA, which need to be identified to achieve long-term changes in PA levels. Ways to overcome barriers should also be suggested. Among the most common barriers to engage in regular PA in low-income individuals, we find:

Lack of resources/equipment: To overcome this barrier, individuals should select activities that require minimal facilities or equipment (e.g., walking, jogging, online workout resources that require minimal equipment) to be performed. It is also important to help people in the identification of inexpensive, convenient resources in their community.

Lack of time to engage in a new activity: To overcome this barrier, individuals should monitor their activities for one week and identify three, 30-minute slots they could use for the practice of PA. To save time, individuals should select activities that they can fit into their home/work routine, so they are not wasting time on transportation to another venue (e.g., walking in the neighborhood if it is safe, climbing stairs).

Lack of self-efficacy: Individuals need to feel capable of performing PA effectively. A way to sustain self-efficacy is to provide basic knowledge and skills, encouragement and advice. It is also useful to elicit individuals' concerns about self-efficacy, to correct misperceptions that may emerge (e.g., engage in PA is time-consuming). Furthermore, low-income individuals should be helped to set realistic goals for PA and to break them down into manageable steps.

Lack of motivation: Motivation is crucial to sustain the practice of regular PA. To increase motivation, individuals should carefully 1) plan and schedule their goals; 2) track their progress (e.g., schedule PA for specific times/days and "check" it off on the calendar each time they complete it).

Lack of social support: Social support is crucial to long-term success in engaging in regular PA. Individuals should explain to family and friends their goals and ask for their support (e.g., invite friends to participate in PA). Furthermore, it is very helpful to suggest low-income individuals to share information about low-cost or free PA resources in the community, such as community centers, parks, or local organizations offering discounted programs.

By carefully considering these aspects, personal trainers can implement activities that not only maximizes engagement but also addresses the unique needs and challenges faced by low-income clients in promoting PA and healthy lifestyles.

Co-funded by the European Union

3. Basic principles of exercise science and physiology

The principles of exercise physiology are based on the understanding of the production and use of energy in biological systems. In every cell, the hydrolysis of adenosine triphosphate (ATP), often referred to as the universal energy currency, is the instant energy source for almost all energy-requiring processes.

ATP + H20 > ADP + Pi + energy

The store of ATP in cells is limited, so ATP must be continuously replenished. This happens through aerobic and anaerobic processes in a way that carbohydrates, fat, proteins, and phosphocreatine are transformed into H20, CO2, lactate, and creatine. During these processes, part of the change in free energy is used for the resynthesis of ATP. The ATP-ADP (adenosine diphosphate)-ATP cycle is the basic mechanism of energy metabolism in cells and constitute an intermediate between energy consumption and utilization processes (Henriksson & Sahlin, 2003).
The transition from rest to exercise requires an increase in energy demand and, therefore, the rate of ATP utilization can increase more than 150 time. This leads to the utilization of all the ATP stored in muscles in 2/3 seconds. To guarantee cellular homeostasis and keep the muscular filaments contracting, it is crucial to maintain a constant muscle ATP concentration (i.e., the rate of ATP regeneration must be equal to the rate of ATP utilization). This requires different supplying systems of fuel and oxygen and the control of the energetic processes.

A**naerobic processes of ATP generation**
During muscle contraction, ATP is the link between fibre shortening/lengthening, force development and metabolism. The most important regulatory enzymes responsible for energy release from ATP are ATPase like actomyosin-ATPase, Na+/K+-ATPase and sarcoplasmic reticulum CA2+-ATPase, which are activated by calcium. In addition, muscles contain phosphocreatine (PCr), a high-energy phosphate stored in muscle tissue at a concentration 3 times higher than ATP. Because of the small quality of ATP available in cells, the breakdown to ADP immediately stimulates the breakdown of PCr to provide energy for ATP resynthesis. This reaction is catalyzed by the creatine kinase (CK) enzyme. The “high energy phosphate” system, however, is limited by the fact that the quantity of releasable phosphate for the energy-production (PCr and ATP) during intensive work is drastically reduced. During shot-term intensive exercise followed by longer phases of regeneration, high-energy phosphates are re-phosphorylated by the oxidative pathway. The capacity for resynthesis depends on the oxidative capacity of the system (Sahlin et al., 1995). In contrast, at highly intensive physical loads of longer duration, the PCr concentration drops rapidly. In this case, the resynthesis occurs through the anaerobic energy provision from carbohydrates, which leads to the production of lactic acid, a process named anaerobic glycolysis, since this process does not require oxygen.
Glycogen phosphorylase plays a crucial role in anaerobic glycolysis. It breaks down the muscle glycogen and is regulated by Ca2+ released from the transverse tubular system through the enzyme phosphorylase-kinase. Also the enzyme phosphofructokinase appears to play a key role in anaerobic glycolysis since is inhibited by the sinking pH value due to the lactic acid production and thus limiting the anaerobic glycolysis. Furthermore, local acidosis in the working muscles appears to reduce the formation of cross-bridges between the myosin heads and the actin molecules of muscle fibers.

Co-funded by the European Union

Aerobic processes of ATP generation
In contrast to the anaerobic energy system which provides energy at a high liberation rate but with limited supply, muscles need a continuous supply of energy at rest and during long duration but low intensive activities. This is provided by the oxidative (aerobic) system which has a lower energy liberation rate but a strong energy yielding capacity. Aerobic production of APT occurs in the mitochondria and involves the interaction of the citric acid cycle (Krebs Cycle) and the electron transport chain. Oxygen serves as the final hydrogen acceptor at the end of the electron transport chain. The term maximal aerobic power reflects the amount of ATP which can be produced aerobically and therefore the rate at which oxygen can be transported by the cardiorespiratory system to the active muscles.

Oxidation of carbohydrate
The first step in the oxidation of carbohydrates is the anaerobic breakdown of muscle glycogen and blood glucose to pyruvate (the end product of glycolysis). In the presence of oxygen, pyruvate is converted into acetyl-coenzyme A, which enters the Krebs Cycle. The Krebs Cycle breaks down these substrates into carbon dioxide and hydrogen and forming two ATPs. In addition, 6 molecules of reduced nicotinamide-adenine-dinucleotide are produced from glucose, which carry the hydrogen atoms into the electron transport chain where they are user to re-phosphorylate ADP to ATP (oxidative phosphorylation).

Oxidation of fat
Triglycerides are stored in fat cells and skeletal muscles and serve as a major energy source for fat oxidation. For this to happen, the triglycerides are broken down by lipases to their basis units (one molecule of glycerol and three molecules of free fatty acids). After having entered the mitochondria, the free fatty acids undergo reactions in which they are converted to acetyl-coenzyme A, a process called beta-oxidation. From this point, the fat metabolism follows the same pathway as the carbohydrate metabolism when acetyl coenzyme A enters the Krebs Cycle and the electron transport chain.

Oxidation of proteins
Oxidation of proteins is utilized to obtain energy at rest and during physical exercise. Multiple amino acids contribute to the production of energy. The access to amino acids increases in proportion to the load intensity of any PA, but the proportion of energy provided by amino acids during physical exercise appears to be limited (about 10%). It is crucial to underling that amino acids are oxidized in greater quantities when the caloric supply is insufficient and in the presence of a carbohydrate deficiency. This leads to catabolic states (degradation of functional proteins) and loss of nitrogen. The degradation of functional proteins is problematic because muscles are affected by this phenomenon, which has a detrimental effect on performance capacity.

Co-funded by the European Union

3.1. Principles in exercise physiology

These principles provide the foundation for the adjustment that the body must make in response to the physical stress incurred during exercise, and are involved in training adaptations associated with participation in regular exercise programs.

1) Homeostasis
Homeostasis is the tendency of the body to maintain a stable internal environment for cells by narrowly regulating critical variables (e.g., pH, acid-base balance oxygen tension, blood glucose concentration, body temperature). Any disruption to homeostasis elicits regulatory responses by the body to bring disrupted variables back to normal levels. Engaging in PA is a disruptor of homeostasis: the more intense the exercise, the greater the disruption in homeostasis.

2) Overload principle
The principle of overload is based on the need to train the body at a level beyond which it normally performs. The overload should be a training stimulus, sufficient for chronic adaptations to occur. The amount of overload necessary to elicit a training response depends on the person's training state: an un-trained person needs little overload stimulus to improve performance, while athletes need to be stimulated with a resistance of very high intensity. Exercise frequency, duration, and intensity are often manipulated to provide overload to the systems of the body, with specific consideration given to the mode of exercise. It is very important to give the system of the body being exercised enough time to recover and only apply a training stimulus again when the system is no longer fatigued (Glynn & Fiddler, 2009).

3) Specificity principle
Specificity implies that the body's chronic responses and adaptations to exercise are specific to the type of exercise performed and the muscle groups involved: any exercise will train a system for the particular task being carried out as the training stimulus. Examples:

a) A training programme including muscle strengthening trains the muscle in the range that it is working and the way that the muscle is being used (i.e. isometrically, concentrically, or eccentrically).
b) Riding a bicycle requires concentric knee extension from mid-to inner range. A cyclist wishing to increase the strength of his quadriceps will need to train concentrically in mid- to inner range.

4) Reversibility principle – if you don't use it, you lose it
The beneficial effects of training begin to be lost as soon as training stops (i.e., return to baseline or pre-training level). This happens in a similar time frame as it takes to train the system (Glynn & Fiddler, 2009).

Co-funded by the European Union

5) Individuality principle
People respond differently to the same training programme. This variability may be influenced by different variables, including: pre-training status; initial fitness level of the individual; health status; and genetic disposition. Individuals with a lower fitness level before starting an exercise programme would show improvement in fitness more quickly than those who are relatively fit before the beginning of the training. Some individuals with health conditions may not be able to work at the same level of intensity as healthy individuals, taking longer time to achieve a training goal (Glynn & Fiddler, 2009). A proper training programme shoud be modified to take individual differences into account.

6) Progression principle
When athletes adapt to a training stimulus, the exercise load (i.e., intensity, duration and/or frequency) must be increased to get the improvement continue. Examples of progression include increasing the load lifted, training frequency, and quality and quantity of drills. However, overload may overstress the physiological system and increase the risk of injuries; therefore, adequate overload stimulus without overstressing the body is optimal.

3.2 FITT principles

FITT stands for:

Frequency (how often): Exercise should be carried out 3-5 days a week. Little additional benefit is seen with more than five training sessions a week. Training twice a week does not produce increases in VO2max; however, it may produce some functional changes and it is better than no exercise at all (Glynn & Fiddler, 2009).

Intensity (how hard): Intensity varies between light, moderate, and vigorous intensity activities. Intensity can be monitored by heart rate.

Time (duration/how long): A total of 20-60 minutes of continuous or intermittent aerobic activity a day should be performed. The activity can be divided into a minimum of 10-minute bouts throughout the day. The duration of training is dependent on intensity. Individuals starting at the lower end of the training band need to sustain exercise longer (30-60 minutes) to achieve training effects (Glynn & Fiddler, 2009).

Type of activity (what kind of exercise): Refers to the sort of activity to complete (e.g., aerobic activities, strengthening activities, balance activities, flexibility activities).

Helpful video:
https://www.youtube.com/watch?v=rFSnPDxwrMA
https://youtu.be/yAFb0vxopmc

References

Adkins, A., Makarewicz, C., Scanze, M., Ingram, M., & Luhr, G. (2017). Contextualizing walkability: do relationships between built environments and walking vary by socioeconomic context?. Journal of the American Planning Association, 83(3), 296-314.

Alleva, J. M., Sheeran, P., Webb, T. L., Martijn, C., & Miles, E. (2015). A Meta-Analytic Review of Stand-Alone Interventions to Improve Body Image. PLoS ONE, 10(9), e0139177.

Ammitzbøll, G., Søgaard, K., Karlsen, R. V., Tjønneland, A., Johansen, C., Frederiksen, K., & Bidstrup, P. (2016). Physical activity and survival in breast cancer. European journal of cancer, 66, 67-74.

Anderson, E., & Shivakumar, G. (2013). Effects of exercise and physical activity on anxiety. Frontiers in psychiatry, 4, 27.

Antunes, H. K. M., Stella, S. G., Santos, R. F., Bueno, O. F. A., & Mello, M. T. D. (2005). Depression, anxiety and quality of life scores in seniors after an endurance exercise program. Brazilian journal of psychiatry, 27, 266-271.

Armstrong, K., Ravenell, K. L., McMurphy, S., & Putt, M. (2007). Racial/ethnic differences in physician distrust in the United States. American journal of public health, 97(7), 1283-1289.

Armstrong, S., Wong, C. A., Perrin, E., Page, S., Sibley, L., & Skinner, A. (2018). Association of physical activity with income, race/ethnicity, and sex among adolescents and young adults in the United States: findings from the National Health and Nutrition Examination Survey, 2007-2016. Jama Pediatrics, 172(8), 732-740.

Australia, H. (2017). Osteoporosis prevention, diagnosis and management in postmenopausal women and men over 50 years of age. 2022-02-27]. https://www. racgp. org. au/getattachment/2261965f-112a-47e3-b7f9-cecb9dc4fe9f/Osteoporosis-prevention-diagnosis-and-management-inpostmenopausal-women-and-men-over-50-years-of-age. aspx.

Ball, K., Carver, A., Downing, K., Jackson, M., & O'Rourke, K. (2015). Addressing the social determinants of inequities in physical activity and sedentary behaviours. Health promotion international, 30(suppl_2), ii8-ii19.

Bandura, A. (1982). Self-efficacy mechanism in human agency. American psychologist, 37(2), 122.

Bantham, A., Ross, S. E. T., Sebastião, E., & Hall, G. (2021). Overcoming barriers to physical activity in underserved populations. Progress in cardiovascular diseases, 64, 64-71.

Bassett-Gunter, R., McEwan, D., & Kamarhie, A. (2017). Physical activity and body image among men and boys: A meta-analysis. Body image, 22, 114-128.

Basky, G. (2020). Fitness advice ignores realities of life on the margins.

Bautista, L., Reininger, B., Gay, J. L., Barroso, C. S., & McCormick, J. B. (2011). Perceived barriers to exercise in Hispanic adults by level of activity. Journal of physical Activity and Health, 8(7), 916-925.

Bize, R., Johnson, J. A., & Plotnikoff, R. C. (2007). Physical activity level and health-related quality of life in the general adult population: a systematic review. Preventive medicine, 45(6), 401-415.

Blair, S. N., Kampert, J. B., Kohl, H. W., Barlow, C. E., Macera, C. A., Paffenbarger, R. S., & Gibbons, L. W. (1996). Influences of cardiorespiratory fitness and other precursors on cardiovascular disease and all-cause mortality in men and women. JAMA, 276(3), 205-210.

Bornioli, A., Lewis-Smith, H., Slater, A., & Bray, I. (2021). Body dissatisfaction predicts the onset of depression among adolescent females and males: a prospective study. Journal of Epidemiology and Community Health, 75(4), 343-348.

Boyer, W. R., Ehrlich, S. F., Crouter, S. E., Churilla, J. R., & Fitzhugh, E. C. (2021). Leisure-time aerobic physical activity and the risk of diabetes-related mortality: An analysis of effect modification by race-ethnicity. Journal of Diabetes and its Complications, 35(1), 107763.

Brasure, M., Desai, P., Davila, H., Nelson, V. A., Calvert, C., Jutkowitz, E., ... & Kane, R. L. (2018). Physical activity interventions in preventing cognitive decline and Alzheimer-type dementia: a systematic review. Annals of internal medicine, 168(1), 30-38.

Brown, J. C., Ma, C., Shi, Q., Niedzwiecki, D., Zemla, T., Couture, F., ... & Meyerhardt, J. A. (2023). Association between physical activity and the time course of cancer recurrence in stage III colon cancer. British journal of sports medicine.

Bull, F. C., Al-Ansari, S. S., Biddle, S., Borodulin, K., Buman, M. P., Cardon, G., ... & Willumsen, J. F. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. British journal of sports medicine, 54(24), 1451-1462.

Campbell, A., & Hausenblas, H. A. (2009). Effects of exercise interventions on body image: A meta-analysis. Journal of health psychology, 14(6), 780-793.

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. Public health reports, 100(2), 126.

Centres for Disease Control and Prevention. Benefits of physical activity, 2020. Available: https://www. cdc. gov/ physicalactivity/ basics/pa-health/ index. htm [Accessed 23 Nov 2023]

Carty, C., van der Ploeg, H. P., Biddle, S. J., Bull, F., Willumsen, J., Lee, L., ... & Milton, K. (2021). The first global physical activity and sedentary behavior guidelines for people living with disability. Journal of Physical Activity and Health, 18(1), 86-93.

Colberg, S. R., Sigal, R. J., Yardley, J. E., Riddell, M. C., Dunstan, D. W., Dempsey, P. C., ... & Tate, D. F. (2016). Physical activity/exercise and diabetes: a position statement of the American Diabetes Association. Diabetes care, 39(11), 2065.

Co-funded by the European Union

Coombes, J. S., Law, J., Lancashire, B., & Fassett, R. G. (2015). “Exercise is medicine” curbing the burden of chronic disease and physical inactivity. Asia Pacific Journal of Public Health, 27(2), NP600-NP605.

Department of Health and Human Services. 2018 Physical Activity Guidelines Advisory Committee scientific report. Available: https://health.gov/paguidelines/second-edition/report/ [Accessed 23 Nov 23]

Diez-Roux, A. V., Nieto, F. J., Muntaner, C., Tyroler, H. A., Comstock, G. W., Shahar, E., ... & Szklo, M. (1997). Neighborhood environments and coronary heart disease: a multilevel analysis. American journal of epidemiology, 146(1), 48-63.

Diderichsen, F., Evans, T., & Whitehead, M. (2001). The social basis of disparities in health. Challenging inequities in health: From ethics to action, 1, 12-23.

Eime, R. M., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport. International journal of behavioral nutrition and physical activity, 10(1), 1-21.

Elavsky, S., McAuley, E., Motl, R. W., Konopack, J. F., Marquez, D. X., Hu, L., ... & Diener, E. (2005). Physical activity enhances long-term quality of life in older adults: efficacy, esteem, and affective influences. Annals of behavioral medicine, 30, 138-145.

Engeroff, T., Ingmann, T., & Banzer, W. (2018). Physical activity throughout the adult life span and domain-specific cognitive function in old age: a systematic review of cross-sectional and longitudinal data. Sports medicine, 48, 1405-1436.

Foster, H. M., Celis-Morales, C. A., Nicholl, B. I., Petermann-Rocha, F., Pell, J. P., Gill, J. M., ... & Mair, F. S. (2018). The effect of socioeconomic deprivation on the association between an extended measurement of unhealthy lifestyle factors and health outcomes: a prospective analysis of the UK Biobank cohort. The Lancet Public Health, 3(12), e576-e585.

Friedenreich CM, Neilson HK, Farris MS, Courneya KS. Physical Activity and Cancer Outcomes: A Precision Medicine Approach. Clinical cancer research: an official journal of the American Association for Cancer Research. 2016;22(19):4766–75.

Galper, D. I., Trivedi, M. H., Barlow, C. E., Dunn, A. L., & Kampert, J. B. (2006). Inverse association between physical inactivity and mental health in men and women. Medicine & Science in Sports & Exercise, 38(1), 173-178.

Ginis, K. A. M., van der Ploeg, H. P., Foster, C., Lai, B., McBride, C. B., Ng, K., ... & Heath, G. W. (2021). Participation of people living with disabilities in physical activity: a global perspective. The Lancet, 398(10298), 443-455.

Glynn, A. J., & Fiddler, H. (2009). The Physiotherapist’s Pocket Guide to Exercise E-Book: Assessment, Prescription and Training. Elsevier Health Sciences.

Gordon, B. R., McDowell, C. P., Hallgren, M., Meyer, J. D., Lyons, M., & Herring, M. P. (2018). Association of efficacy of resistance exercise training with depressive symptoms: meta-analysis and meta-regression analysis of randomized clinical trials. JAMA psychiatry, 75(6), 566-576.

Gordon, B. R., McDowell, C. P., Lyons, M., & Herring, M. P. (2017). The effects of resistance exercise training on anxiety: a meta-analysis and meta-regression analysis of randomized controlled trials. Sports Medicine, 47, 2521-2532.

Guthold, R., Stevens, G. A., Riley, L. M., & Bull, F. C. (2018). Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1· 9 million participants. The lancet global health, 6(10), e1077-e1086.

Gray, P. M., Murphy, M. H., Gallagher, A. M., & Simpson, E. E. A. (2016). Motives and Barriers to Physical

Activity Among Older Adults of Different Socioeconomic Status. Journal of Aging and Physical Activity, 24(3),

419-429.

Guthold, R., Stevens, G. A., Riley, L. M., & Bull, F. C. (2020). Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1· 6 million participants. The Lancet Child & Adolescent Health, 4(1), 23-35.

Haviland, M. G., Morales, L. S., Dial, T. H., & Pincus, H. A. (2005). Race/ethnicity, socioeconomic status, and satisfaction with health care. American Journal of Medical Quality, 20(4), 195-203.

Hartescu, I., Morgan, K., & Stevinson, C. D. (2015). Increased physical activity improves sleep and mood outcomes in inactive people with insomnia: a randomized controlled trial. Journal of sleep research, 24(5), 526-534.

Henriksson, J., & Sahlin, K. (2003). Metabolism during exercise–energy expenditure and hormonal changes. Textbook of sports medicine: Basic science and clinical aspects of sports injury and physical activity, 30-48.

Inoue, S., Yorifuji, T., Sugiyama, M., Ohta, T., Ishikawa-Takata, K., & Doi, H. (2013). Does habitual physical activity prevent insomnia? A cross-sectional and longitudinal study of elderly Japanese. Journal of aging and physical activity, 21(2), 119-139.

Jayedi, A., Zargar, M. S., Emadi, A., & Aune, D. (2023). Walking speed and the risk of type 2 diabetes: a systematic review and meta-analysis. British Journal of Sports Medicine.

Johnsen, N. F., Ekblond, A., Thomsen, B. L., Overvad, K., & Tjønneland, A. (2013). Leisure time physical activity and mortality. Epidemiology, 717-725.

Jones, L. W., Kwan, M. L., Weltzien, E., Chandarlapaty, S., Sternfeld, B., Sweeney, C., ... & Caan, B. J. (2016). Exercise and prognosis on the basis of clinicopathologic and molecular features in early-stage breast cancer: the LACE and pathways studies. Cancer research, 76(18), 5415-5422.

Joseph, R. P., Ainsworth, B. E., Keller, C., & Dodgson, J. E. (2015). Barriers to physical activity among African American women: an integrative review of the literature. Women & health, 55(6), 679-699.

Co-funded by the European Union

King, A. C., Pruitt, L. A., Woo, S., Castro, C. M., Ahn, D. K., Vitiello, M. V., ... & Bliwise, D. L. (2008). Effects of moderate-intensity exercise on polysomnographic and subjective sleep quality in older adults with mild to moderate sleep complaints. The Journals of Gerontology Series A: Biological Sciences and Medical Sciences, 63(9), 997-1004.

Kline, C. E., Crowley, E. P., Ewing, G. B., Burch, J. B., Blair, S. N., Durstine, J. L., ... & Youngstedt, S. D. (2011). The effect of exercise training on obstructive sleep apnea and sleep quality: a randomized controlled trial. Sleep, 34(12), 1631-1640.

Kline, C. E., Hillman, C. H., Sheppard, B. B., Tennant, B., Conroy, D. E., Macko, R. F., ... & Erickson, K. I. (2021). Physical activity and sleep: An updated umbrella review of the 2018 Physical Activity Guidelines Advisory Committee report. Sleep medicine reviews, 58, 101489.

Kline, C. E., Irish, L. A., Krafty, R. T., Sternfeld, B., Kravitz, H. M., Buysse, D. J., ... & Hall, M. H. (2013). Consistently high sports/exercise activity is associated with better sleep quality, continuity and depth in midlife women: the SWAN sleep study. Sleep, 36(9), 1279-1288.

Kvam, S., Kleppe, C. L., Nordhus, I. H., & Hovland, A. (2016). Exercise as a treatment for depression: a meta-analysis. Journal of affective disorders, 202, 67-86.

Lago, S., Cantarero, D., Rivera, B., Pascual, M., Blázquez-Fernández, C., Casal, B., & Reyes, F. (2018). Socioeconomic status, health inequalities and non-communicable diseases: a systematic review. Journal of Public Health, 26, 1-14.

Lahart, I. M., Metsios, G. S., Nevill, A. M., & Carmichael, A. R. (2015). Physical activity, risk of death and recurrence in breast cancer survivors: a systematic review and meta-analysis of epidemiological studies. Acta oncologica, 54(5), 635-654.

Lear, S. A., Hu, W., Rangarajan, S., Gasevic, D., Leong, D., Iqbal, R., ... & Yusuf, S. (2017). The effect of physical activity on mortality and cardiovascular disease in 130 000 people from 17 high-income, middle-income, and low-income countries: the PURE study. The Lancet, 390(10113), 2643-2654.

Li, T., Wei, S., Shi, Y., Pang, S., Qin, Q., Yin, J., ... & Liu, L. (2016). The dose–response effect of physical activity on cancer mortality: findings from 71 prospective cohort studies. British journal of sports medicine, 50(6), 339-345.

Lopez, J. P. R., Sabag, A., Juan, M. M., Rezende, L. F., & Pastor-Valero, M. (2020). Do vigorous-intensity and moderate-intensity physical activities reduce mortality to the same extent? A systematic review and meta-analysis. BMJ Open Sport & Exercise Medicine, 6(1), e000775.

Lutfey, K., & Freese, J. (2005). Toward some fundamentals of fundamental causality: Socioeconomic status and health in the routine clinic visit for diabetes. American Journal of Sociology, 110(5), 1326-1372.

Mansikkamäki, K., Raitanen, J., Nygård, C. H., Heinonen, R., Mikkola, T., & Luoto, R. (2012). Sleep quality and aerobic training among menopausal women—a randomized controlled trial. Maturitas, 72(4), 339-345.

Manson, J. E., Greenland, P., LaCroix, A. Z., Stefanick, M. L., Mouton, C. P., Oberman, A., ... & Siscovick, D. S. (2002). Walking compared with vigorous exercise for the prevention of cardiovascular events in women. New England journal of medicine, 347(10), 716-725.

Marmot, M. (2005). Social determinants of health inequalities. The lancet, 365(9464), 1099-1104.

Marquez, D. X., Aguiñaga, S., Vásquez, P. M., Conroy, D. E., Erickson, K. I., Hillman, C., ... & Powell, K. E. (2020). A systematic review of physical activity and quality of life and well-being. Translational behavioral medicine, 10(5), 1098-1109.

Martínez-Calderon, J., Casuso-Holgado, M. J., Muñoz-Fernandez, M. J., Garcia-Muñoz, C., & Heredia-Rizo, A. M. (2023). Yoga-based interventions may reduce anxiety symptoms in anxiety disorders and depression symptoms in depressive disorders: a systematic review with meta-analysis and meta-regression. British Journal of Sports Medicine, 57(22), 1442-1449.

McTiernan, A. N. N. E., Friedenreich, C. M., Katzmarzyk, P. T., Powell, K. E., Macko, R., Buchner, D., ... & Piercy, K. L. (2019). Physical activity in cancer prevention and survival: a systematic review. Medicine and science in sports and exercise, 51(6), 1252.

McAuley, E., & Blissmer, B. (2000). Self-efficacy determinants and consequences of physical activity. Exercise and sport sciences reviews, 28(2), 85-88.

Menzel, J. E., & Levine, M. P. (2011). Embodying experiences and the promotion of positive body image: The example of competitive athletics.

Moayyeri, A. (2008). The association between physical activity and osteoporotic fractures: a review of the evidence and implications for future research. Annals of epidemiology, 18(11), 827-835.

Moreno-Llamas, A., García-Mayor, J., & De la Cruz-Sánchez, E. (2022). Gender inequality is associated with gender differences and women participation in physical activity. Journal of Public Health, 44(4), e519-e526.

Morin, P., Lebel, A., Robitaille, É., & Bisset, S. (2016). Socioeconomic factors influence physical activity and sport in Quebec schools. Journal of School Health, 86(11), 841-851.

Ndubuisi, N. E. (2021). Noncommunicable diseases prevention in low-and middle-income countries: an overview of health in all policies (HiAP). INQUIRY: The Journal of Health Care Organization, Provision, and Financing, 58, 0046958020927885.

Northey, J. M., Cherbuin, N., Pumpa, K. L., Smee, D. J., & Rattray, B. (2018). Exercise interventions for cognitive function in adults older than 50: a systematic review with meta-analysis. British journal of sports medicine, 52(3), 154-160.

Oates, G. R., Jackson, B. E., Partridge, E. E., Singh, K. P., Fouad, M. N., & Bae, S. (2017). Sociodemographic patterns of chronic disease: how the mid-south region compares to the rest of the country. American journal of preventive medicine, 52(1), S31-S39.

Co-funded by the European Union

Owen, N., Healy, G. N., Matthews, C. E., & Dunstan, D. W. (2010). Too much sitting: the population-health science of sedentary behavior. Exercise and sport sciences reviews, 38(3), 105.

Pampel, F. C., Krueger, P. M., & Denney, J. T. (2010). Socioeconomic disparities in health behaviors. Annual review of sociology, 36, 349-370.

Parks, S. E., Housemann, R. A., & Brownson, R. C. (2003). Differential correlates of physical activity in urban and rural adults of various socioeconomic backgrounds in the United States. Journal of Epidemiology & Community Health, 57(1), 29-35.

Passos, G. S., Poyares, D., Santana, M. G., D'Aurea, C. V. R., Youngstedt, S. D., Tufik, S., & de Mello, M. T. (2011). Effects of moderate aerobic exercise training on chronic primary insomnia. Sleep medicine, 12(10), 1018-1027.

Paudel, S., Ahmadi, M., Phongsavan, P., Hamer, M., & Stamatakis, E. (2023). Do associations of physical activity and sedentary behaviour with cardiovascular disease and mortality differ across socioeconomic groups? A prospective analysis of device-measured and self-reported UK Biobank data. British Journal of Sports Medicine.

Perez-Lopez, F. R., Martinez-Dominguez, S. J., Lajusticia, H., Chedraui, P., & Project, T. H. O. S. A. (2017). Effects of programmed exercise on depressive symptoms in midlife and older women: a meta-analysis of randomized controlled trials. Maturitas, 106, 38-47.

Pescatello, L. S., Buchner, D. M., Jakicic, J. M., Powell, K. E., Kraus, W. E., Bloodgood, B., ... & Piercy, K. L. (2019). Physical activity to prevent and treat hypertension: a systematic review. Medicine & Science in Sports & Exercise, 51(6), 1314-1323.

Piercy, K. L., Troiano, R. P., Ballard, R. M., Carlson, S. A., Fulton, J. E., Galuska, D. A., ... & Olson, R. D. (2018). The physical activity guidelines for Americans. JAMA, 320(19), 2020-2028.

Pinheiro, M. B., Oliveira, J., Bauman, A., Fairhall, N., Kwok, W., & Sherrington, C. (2020). Evidence on physical activity and osteoporosis prevention for people aged 65+ years: a systematic review to inform the WHO guidelines on physical activity and sedentary behaviour. International journal of behavioral nutrition and physical activity, 17(1), 1-53.

Prakash, R. S., Voss, M. W., Erickson, K. I., & Kramer, A. F. (2015). Physical activity and cognitive vitality. Annual review of psychology, 66, 769-797.

Rasmussen, P., Brassard, P., Adser, H., Pedersen, M. V., Leick, L., Hart, E., ... & Pilegaard, H. (2009). Evidence for a release of brain- derived neurotrophic factor from the brain during exercise. Experimental physiology, 94(10), 1062-1069.

Rathore, A., & Lom, B. (2017). The effects of chronic and acute physical activity on working memory performance in healthy participants: a systematic review with meta-analysis of randomized controlled trials. Systematic reviews, 6, 1-16.

Reid, K. J., Baron, K. G., Lu, B., Naylor, E., Wolfe, L., & Zee, P. C. (2010). Aerobic exercise improves self-reported sleep and quality of life in older adults with insomnia. Sleep medicine, 11(9), 934-940.

Lopez, J. P. R., Sabag, A., Juan, M. M., Rezende, L. F., & Pastor-Valero, M. (2020). Do vigorous-intensity and moderate-intensity physical activities reduce mortality to the same extent? A systematic review and meta-analysis. BMJ Open Sport & Exercise Medicine, 6(1), e000775.

Rijal, A., Nielsen, E. E., Adhikari, T. B., Dhakal, S., Maagaard, M., Piri, R., ... & Jakobsen, J. C. (2023). Effects of adding exercise to usual care in patients with either hypertension, type 2 diabetes or cardiovascular disease: a systematic review with meta-analysis and trial sequential analysis. British Journal of Sports Medicine, 57(14), 930-939.

Rosenberg, M. (1965). Rosenberg self-esteem scale. Journal of Religion and Health.

Sabiston, C. M., Pila, E., Vani, M., & Thogersen-Ntoumani, C. (2019). Body image, physical activity, and sport: A scoping review. Psychology of Sport and Exercise, 42, 48-57.

Sahlin, K., Jorfeldt, L., Henriksson, K. G., Lewis, S. F., & Haller, R. G. (1995). Tricarboxylic acid cycle intermediates during incremental exercise in healthy subjects and in patients with McArdle's disease. Clinical science, 88(6), 687-693.

Salmi, L., Hasanen, E., Simula, M., Virmasalo, I., & Muukkonen, P. (2023). Perceived barriers to physical activity in the social spaces of low socioeconomic status suburbs. Well-being, Space and Society, 5, 100164.

Schmid, D. L. M. F., & Leitzmann, M. F. (2014). Association between physical activity and mortality among breast cancer and colorectal cancer survivors: a systematic review and meta-analysis. Annals of oncology, 25(7), 1293-1311.

Schuch, F. B., & Stubbs, B. (2019). The role of exercise in preventing and treating depression. Current sports medicine reports, 18(8), 299-304.

Schuch, F. B., Stubbs, B., Meyer, J., Heissel, A., Zech, P., Vancampfort, D., ... & Hiles, S. A. (2019). Physical activity protects from incident anxiety: A meta- analysis of prospective cohort studies. Depression and anxiety, 36(9), 846-858.

Schuch, F. B., Vancampfort, D., Firth, J., Rosenbaum, S., Ward, P. B., Silva, E. S., ... & Stubbs, B. (2018). Physical activity and incident depression: a meta-analysis of prospective cohort studies. American Journal of Psychiatry, 175(7), 631-648.

Smith, S. A., Whitehead, M. S., Sheats, J. Q., Chubb, B., Alema-Mensah, E., & Ansa, B. E. (2017). Community engagement to address socio-ecological barriers to physical activity among African American breast cancer survivors. Journal of the Georgia Public Health Association, 6(3), 393.

Sonstroem, R. J., & Morgan, W. P. (1989). Exercise and self-esteem: rationale and model. Medicine and science in sports and exercise, 21(3), 329-337.

Shuval, K., Li, Q., Gabriel, K. P., & Tchernis, R. (2017). Income, physical activity, sedentary behavior, and the 'weekend warrior'among US adults. Preventive medicine, 103, 91-97.

Singh, B., Olds, T., Curtis, R., Dumuid, D., Virgara, R., Watson, A., ... & Maher, C. (2023). Effectiveness of physical activity interventions for improving depression, anxiety and distress: an overview of systematic reviews. British Journal of Sports Medicine.

Co-funded by the European Union

Stanton, R., Happell, B., Hayman, M., & Reaburn, P. (2014). Exercise interventions for the treatment of affective disorders–research to practice. Frontiers in psychiatry, 5, 46.

Strand, L. B., Laugsand, L. E., Wisløff, U., Nes, B. M., Vatten, L., & Janszky, I. (2013). Insomnia symptoms and cardiorespiratory fitness in healthy individuals: the Nord-Trøndelag Health Study (HUNT). Sleep, 36(1), 99-108.

Stringhini, S., Carmeli, C., Jokela, M., Avendaño, M., Muennig, P., Guida, F., ... & Tumino, R. (2017). Socioeconomic status and the 25× 25 risk factors as determinants of premature mortality: a multicohort study and meta-analysis of 1· 7 million men and women. The Lancet, 389(10075), 1229-1237.

Swami, V., Frederick, D. A., Aavik, T., Alcalay, L., Allik, J., Anderson, D., ... & Zivcic-Becirevic, I. (2010). The attractive female body weight and female body dissatisfaction in 26 countries across 10 world regions: Results of the International Body Project I. Personality and social psychology bulletin, 36(3), 309-325

Toutain, M., Gauthier, A., & Leconte, P. (2022). Exercise therapy in the treatment of anorexia nervosa: Its effects depending on the type of physical exercise—A systematic review. Frontiers in Psychiatry, 13, 939856.

Tremblay, M. S., Aubert, S., Barnes, J. D., Saunders, T. J., Carson, V., Latimer-Cheung, A. E., ... & Chinapaw, M. J. (2017). Sedentary behavior research network (SBRN)–terminology consensus project process and outcome. International journal of behavioral nutrition and physical activity, 14, 1-17.

White, R. L., Babic, M. J., Parker, P. D., Lubans, D. R., Astell-Burt, T., & Lonsdale, C. (2017). Domain-specific physical activity and mental health: a meta-analysis. American journal of preventive medicine, 52(5), 653-666.

Williams, P. T., & Franklin, B. A. (2015). Incident diabetes mellitus, hypertension, and cardiovascular disease risk in exercising hypercholesterolemic patients. The American Journal of Cardiology, 116(10), 1516-1520.

Williams, P. T., & Thompson, P. D. (2013). The relationship of walking intensity to total and cause-specific mortality. Results from the National Walkers' Health Study. PLoS One, 8(11), e81098.

World Health Organization (2020). Guidelines on physical activity and sedentary behaviour.

Yang, P. Y., Ho, K. H., Chen, H. C., & Chien, M. Y. (2012). Exercise training improves sleep quality in middle-aged and older adults with sleep problems: a systematic review. Journal of physiotherapy, 58(3), 157-163.

Youngstedt, S. D., & Kline, C. E. (2006). Epidemiology of exercise and sleep. Sleep and biological rhythms, 4, 215-221.

Zhang, Y. B., Chen, C., Pan, X. F., Guo, J., Li, Y., Franco, O. H., ... & Pan, A. (2021). Associations of healthy lifestyle and socioeconomic status with mortality and incident cardiovascular disease: two prospective cohort studies. Bmj, 373.

Zubala, A., MacGillivray, S., Frost, H., Kroll, T., Skelton, D. A., Gavine, A., ... & Morris, J. (2017). Promotion of physical activity interventions for community dwelling older adults: A systematic review of reviews. PloS one, 12(7), e0180902.

HEPALIS

Interactive tool: Introduction To Physical activity And Health

Module 1

2023

1. Which is the definition of physical activity?

A. Any bodily movement produced by the contraction of skeletal muscles that results in an increase of energy expenditure over resting levels

B. A planned and structured activity, such as lifting weights, taking an aerobics class

C. A competitive activity or game, needing physical effort and skills, that is done or played by athletes according to specific rules

D. Any waking behaviour characterized by an energy expenditure ≤ 1.5 metabolic equivalents

Correct answer: A. Any bodily movement produced by the contraction of skeletal muscles that results in an increase of energy expenditure over resting levels

2. Flexibility activities:

A. Improve the strength, power, and endurance of the muscles

B. Improve the ability to resist forces that can make people fall

C. Improve the ability to fully move joints

D. Helps make the bones stronger

Correct answer: C. Improve the ability to fully move joints

3. Which is the percentage of improved survival outcomes in breast cancer thanks to physical activity?

A. 25 to 35%

B. 30 to 40%

C. 35 to 45%

D. 38 to 48%

Correct answer: D. 38 to 48%

4. Which is the percentage of improved survival outcomes in prostate cancer thanks to physical activity?

A. 25%

B. 30%

C. 35%

D. 38%

Correct answer: D. 38%

5. According to the text, which are the potential mechanisms explaining the impact of physical activity on quality of life and wellbeing?

A. Changes in neurotransmitters of the brain and endogenous opioids

B. Changes in motivation

C. Changes in daily routine

D. None of the above-mentioned mechanisms

Correct answer: A. Changes in changes in neurotransmitters of the brain and endogenous opioids

6. Which is the definition of self-esteem?

A. The confidence that individuals are capable of achieving their goals

B. A person's evaluative judgment of the self

C. The confidence that individuals can make changes in difficult situations

D. The confidence that individuals can maintain changes in difficult situations

Correct answer: B. A person's evaluative judgment of the self

Co-funded by the European Union

7. Which is the definition of self-efficacy?
A. The confidence that individuals can maintain changes in difficult situations
B. The confidence that individuals can make changes in difficult situations
C. A person's evaluative judgment of the self
D. Beliefs about personal abilities and the ability to satisfactorily carry out the necessary demands in different situations
Correct answer: D. Beliefs about personal abilities and the ability to satisfactorily carry out the necessary demands in different situations

8. According to the text, what type of physical activity emerged as particularly beneficial in people experiencing anxiety and depressive symptoms?
A. Aerobic activities
B. Resistance training
C. Yoga interventions
D. Strength training
Correct answer: C. Yoga interventions

9. Which is the definition of body image?
A. A public health concern with deleterious outcomes in terms of physical and mental health
B. A trustworthy internal representation that individuals have of their own body and physical appearance
C. The internal representation that individuals have of their own body and physical appearance, regardless of how their body actually look
D. A person's evaluative judgment of the self
Correct answer: C. The internal representation that individuals have of their own body and physical appearance, regardless of how their body actually look

10. Which are the current levels of physical inactivity (2016 global comparative estimates)?
A. 23.5%
B. 25.5%
C. 27.5%
D. 29.5%
Correct answer: C. 27.5%

11. Which is the percentage of increased risk of all-cause mortality in people who are insufficiently physically active?
A. 15 to 20%
B. 20 to 30%
C. 30 to 40%
D. 35 to 40%
Correct answer: B. 20 to 30%

Co-funded by the European Union

12. Inequities in the amount of physical activity among different group exist:
A. Physical inactivity is greater in men compared to women
B. Higher socio-economic status is associated with greater physical inactivity
C. Physical inactivity is greater in people with a high socio-economic status compared to low-income individuals
D. Physical inactivity is greater in individuals with lower incomes, lower education, in women, older adults, and non-White populations
Correct answer: D. Physical inactivity is greater in individuals with lower incomes, lower education, in women, older adults, and non-White populations

13. According to the text, is the socioeconomic status an important determinant of health and wellbeing?
A. Yes. It influences people's attitudes, experiences, and exposure to several health risks across the life span
B. No, it is not
C. Yes. It is associated with higher rates of psychological disorders
D. Yes, but no explanations can be provided
Correct answer: A. Yes. It influences people's attitudes, experiences, and exposure to several health risks across the life span

14. Which of the following is an individual barrier for the practice of physical activity?
A. General health condition
B. Unsafe neighborhood
C. Lack of environment facilities
D. None of the above
Correct answer: A. General health condition

15. Which of the following is a community barrier for the practice of physical activity?
A. General health condition
B. Lack of equipment
C. Unsafe neighborhood
D. Time
Correct answer: C. Unsafe neighborhood

16. The overload principle:
A. Implies that people respond differently to the same training programme
B. Implies that the beneficial effects of training start to be lost as soon as training stops
C. Implies that the body's chronic responses and adaptations to exercise are specific to the type of exercise performed and the muscle groups involved
D. It is based on the need to train the body at a level beyond which it normally performs
Correct answer: D. It is based on the need to train the body at a level beyond which it normally performs

17. The specificity principle:
A. Implies that people respond differently to the same training programme
B. Implies that the beneficial effects of training start to be lost as soon as training stops
C. Implies that the body's chronic responses and adaptations to exercise are specific to the type of exercise performed and the muscle groups involved
D. It is based on the need to train the body at a level beyond which it normally performs
Correct answer: C. Implies that the body's chronic responses and adaptations to exercise are specific to the type of exercise performed and the muscle groups involved

18. The reversibility principle:
A. Implies that people respond differently to the same training programme
B. Implies that the beneficial effects of training start to be lost as soon as training stops
C. Implies that the body's chronic responses and adaptations to exercise are specific to the type of exercise performed and the muscle groups involved
D. It is based on the need to train the body at a level beyond which it normally performs
Correct answer: B. Implies that the beneficial effects of training start to be lost as soon as training stops

19. The individuality principle:
A. Implies that people respond differently to the same training programme
B. Implies that the beneficial effects of training start to be lost as soon as training stops
C. Implies that the body's chronic responses and adaptations to exercise are specific to the type of exercise performed and the muscle groups involved
D. It is based on the need to train the body at a level beyond which it normally performs
Correct answer: A. Implies that people respond differently to the same training programme

20. The progression principle:
A. Implies that people respond differently to the same training programme
B. Implies that the beneficial effects of training start to be lost as soon as training stops
C. Implies that the body's chronic responses and adaptations to exercise are specific to the type of exercise performed and the muscle groups involved
D. Implies that when athletes adapt to a training stimulus, the exercise load must be increased to get the improvement continue
Correct answer: D. Implies that when athletes adapt to a training stimulus, the exercise load must be increased to get the improvement continue

Co-funded by the European Union

HEPALIS

Self-Assessment Test: Introduction to Physical Activity And Health

Module 1

2023

1. What is the definition of physical activity?
a. Physical activity is an umbrella term that includes leisure time physical activity (exercise, sport), activities of daily living, household tasks, and work (3 points)
b. Physical activity refers to all movement including during leisure time (e.g., running, dancing, swimming, yoga, and gardening) (2 points)
c. Physical activity refers to all movement for transport to get to and from places (e.g., walking from a place to another) (1 point)

2. Physical benefits of physical activity include:
a. Prevention of different types of cancer (e.g., bladder, breast, colon, endometrial, esophageal adenocarcinoma, renal and gastric cancers) (2 points)
b. Reduction of the risk of developing type-2 diabetes (1 point)
c. Lower risk of all-cause mortality and adverse events in patients with different chronic conditions, including hypertension, type 2 diabetes, cancer, and cardiovascular diseases (3 points)

3. According to the reading, which evidence emerged for the relation among physical activity and hypertension?
a. Physical activity lowered the risk of hypertension (1 point)
b. Physical activity reduces blood pressure among adults with normal blood pressure, pre-hypertension, and hypertension (2 points)
c. Greater benefits of physical activity emerged among adults with prehypertension than normal blood pressure (3 points)

4. Physical activity emerged to be effective in:
a. Preventing the development of multiple psychological symptoms (1 point)
b. Treating multiple psychological symptoms/disorders (2 points)
c. Preventing and treating different psychological symptoms/disorders (3 points)

5. To mitigate health risk, adults:
a. Should do at least 150–300 minutes of moderate-intensity aerobic physical activity (1 point)
b. Should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity (2 points)
c. Should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week (3 points)

6. Pregnant and postpartum women (if no contraindication emerged):
a. Should do at least 150 minutes of moderate-intensity aerobic PA throughout the week, incorporating a variety of aerobic and muscle-strengthening activities, and should limit the amount of time spent being sedentary (3 points)
b. Should do at least 150 minutes of moderate-intensity aerobic PA throughout the week and incorporate a variety of aerobic and muscle-strengthening activities (2 points)
c. Should do at least 150 minutes of moderate-intensity aerobic PA throughout the week (1 point)

Co-funded by the European Union

7. Why low-income individuals are at higher risk of developing unhealthier lifestyles?
a. Because of their low socio-economic status and related derivatives (e.g., education, and occupation) (2 points)
b. Because they have fewer resources than high-income individuals (1 point)
c. Because they have fewer resources than high-income individuals and several co-occurring risk factors (i.e., increased psychosocial stress, fewer opportunities for health-promoting behaviors, and less access to high-quality health care) (3 points)

8. Why the development of physical activity interventions for low-income individuals is crucial?
a. Because they have fewer opportunities to access safe, affordable, and appropriate places where practice PA (2 point)
b. Because physical activity reduces mortality and chronic diseases in low-income individuals (3 points)
c. Because of the lack of equipment to practice physical activity that characterize this population (1 point)

9. Which are the most common barriers for practicing regular physical activity in low-income individuals?
a. Individual's barriers, including income, time, and general health condition (2 points)
b. Individual's and community barriers (3 points)
c. Community barriers, including lack of environmental facilities (1 point)

10. The homeostasis principle says:
a. Physical activity is a disruptor of homeostasis (1 point)
b. Homeostasis is the tendency of the body to maintain a stable internal environment for cells by narrowly regulating critical variables (e.g., pH, acid-base balance oxygen tension, blood glucose concentration, body temperature) (3 points)
c. The more intense the exercise, the greater the disruption in homeostasis (2 points)

Note: Scores within the 1-12 range will receive Comment 1, 13-24 range will receive Comment 2, and 25-36 range will receive Comment 3 for interpretation.

Co-funded by the European Union

Comment 1 (1-12 points range): Congratulations on completing the self-evaluation! Your score falls within the 1-12 point range, indicating that there might be some areas where you could enhance your understanding the Exercise Programming and Instruction. Consider revisiting the module's content, paying special attention to key principles and strategies. Continuous learning is key to providing effective and inclusive services.

Comment 2 (13-24 points range): Great job! Your score falls within the 13-24 point range, suggesting a solid understanding of the key concepts covered in the module. There might be a few areas where you could delve deeper or refine your knowledge, so consider revisiting specific sections for a more comprehensive understanding. Keep up the good work, and don't hesitate to explore further to enhance your expertise.

Comment 3 (25-36 points range): Fantastic performance! Your score falls within the 25-36 point range, indicating a strong grasp of the material covered in the training module. You have demonstrated a comprehensive understanding of the Exercise Programming and Instruction in personal training, with a particular focus on low-income individuals. Your commitment to continuous improvement and staying informed is commendable. Keep up the excellent work in promoting inclusive and effective practices in the field of fitness.

17. The specificity principle:
A. Implies that people respond differently to the same training programme
B. Implies that the beneficial effects of training start to be lost as soon as training stops
C. Implies that the body's chronic responses and adaptations to exercise are specific to the type of exercise performed and the muscle groups involved
D. It is based on the need to train the body at a level beyond which it normally performs
Correct answer: C. Implies that the body's chronic responses and adaptations to exercise are specific to the type of exercise performed and the muscle groups involved

18. The reversibility principle:
A. Implies that people respond differently to the same training programme
B. Implies that the beneficial effects of training start to be lost as soon as training stops
C. Implies that the body's chronic responses and adaptations to exercise are specific to the type of exercise performed and the muscle groups involved
D. It is based on the need to train the body at a level beyond which it normally performs
Correct answer: B. Implies that the beneficial effects of training start to be lost as soon as training stops

19. The individuality principle:
A. Implies that people respond differently to the same training programme
B. Implies that the beneficial effects of training start to be lost as soon as training stops
C. Implies that the body's chronic responses and adaptations to exercise are specific to the type of exercise performed and the muscle groups involved
D. It is based on the need to train the body at a level beyond which it normally performs
Correct answer: A. Implies that people respond differently to the same training programme

20. The progression principle:
A. Implies that people respond differently to the same training programme
B. Implies that the beneficial effects of training start to be lost as soon as training stops
C. Implies that the body's chronic responses and adaptations to exercise are specific to the type of exercise performed and the muscle groups involved
D. Implies that when athletes adapt to a training stimulus, the exercise load must be increased to get the improvement continue
Correct answer: D. Implies that when athletes adapt to a training stimulus, the exercise load must be increased to get the improvement continue

Co-funded by the European Union

HEPALIS

Client Assessment And Goal Setting

Module 2

2023

Contents

1. Importance of client 4
assessment and goal 4
setting in personal training 4
2. Methods for conducting evaluations of personal 9
fitness training clients 9
2.1 Documents related to the evaluation and prescription of physical exercise. 12
2.2 Fitness assessment tools. 16
3. Set realistic and 23
achievable fitness goals based on the results of the client's assessment. 23
3.1 Goal Setting 27
3.2 Time progression 30
4. Communication 31
techniques and motivation to work with clients, ... 31
particularly those with low economic resources. 31
Annexes 34

1. Importance of client assessment and goal setting in personal training

Physical exercise has multiple health benefits and can even be a great therapeutic tool in many chronic pathologies. However, it is necessary to know how to plan, quantify and adjust the loads according to individual conditions and circumstances. The prescription of physical exercise represents a complex decision because it requires knowledge of the types of specific programs, in addition to knowing the characteristics of possible pathologies to be treated and the individual conditions, which should be recorded in the medical record.

The main determinants are, therefore:
Individual goals. They surely represent the main conditioning factors because the prescription of exercise is developed according to the objectives. You must be clear if you want to improve endurance, strength, or balance, if you want to reduce blood pressure, sugar or cholesterol, if you want to improve an altered gait, etc. To make a correct individualized prescription of physical exercise, the characteristics and predilections of the individual must also be known, if they prefer to walk or run, if they know how to swim or ride a bike, etc.

Personal history: It is essential to consider all those problems and pathologies of the patient that may have relevance in the practice of physical exercise, as well as the history and physical-sports preferences. In the same way, it would be necessary to consider the history and sports habits of the relatives.

Level of physical activity: The diagnosis of physical inactivity involves quantifying the amount, volume (METh) of physical activity in any type of method, subjective or, ideally, objectively with technological methods and determining if it reaches the recommended minimums.

Fitness level: The quantification of aerobic capacity (VO2 max. ≈ MET max) is very relevant because it has an inverse relationship with the risk of morbidity and mortality for most chronic pathologies. In addition, it allows you to individually determine the intensity of the activities within the framework of a physical exercise program. A physical activity of 4 METs may be very easy for a person with a physical condition of 10 MET (4/10 = 40% of the MET max.), but the same activity may be excessive, even dangerous, for a person with low aerobic capacity, for example, 5 MET (4/5 = 90% of the MET max). To be able to determine the different parameters of physical condition, the conditioning factors and determinants for the application of a physical preparation program, a functional assessment is necessary in the form of field tests or, ideally, in a physiology laboratory.

Functional assessments represent the main instrument to objectify and avoid potential risks in the practice of physical exercise and/or sport, as well as to enable the adaptation of the type and intensity of physical exercise on an individual basis. They are essential in people at risk and with known diseases, in competitive athletes and, periodically, they are advisable in apparently healthy people, especially those over 45 years of age if they do high-intensity exercise. Among the objetives of the functional assessments are:

Co-funded by the European Union

> Detect those with personal or family risk factors.
> Assess the general state of physical condition (endurance, strength, flexibility, etc.).
> Assess the ability of the heart to adapt to moderate and intense exercise.
> Rule out or evidence of coronary, rhythm or tension alterations, during exertion.
> To assess the non-contraindication for the practice of physical exercise and sport.
> To determine possible absolute and temporal contraindications and relative limitations in the practice of physical exercise and sport.
> Determine the physical activity levels of the individual and the population in general.
> Determine subjects with specific pathologies and include them in healthy physical exercise group programs that allow their periodic re-evaluation and monitoring of improvements.
> Prepare a sports medical report a personal and confidential document of the patient, with a summary of all their data, results of the tests carried out, advice and recommendations.
> Prepare an exercise prescription report, a document adapted to the characteristics, objectives, and limitations of the patient, seeking the maximum benefits of physical activity, depending on individual pathologies.
> Have a medical-sports certificate.
> Adapt health insurance benefits according to the risk prior to the sports competition.
> To obtain and monitor statistical and epidemiological data on the sports population (e.g. population at risk in relation to sedentary lifestyles and obesity).

Tabla 1 Cardiovascular risk classification

Cardiovascular risk	Patient Characteristics	Physical activity recommendations
Low (A)	< 45 years (men), < 55 years (women) and/or only a risk factor	Physical Activity of any intensity (including vigorous)
Moderate (B)	≥ 45 years (men) , ≥ 55 years (women) and/or only a risk factor	Physical Activity up to 6 MET (mild-moderate) or previous functional assessment
High (C)	Previous diagnosis or one or more signs or symptoms or of cardiovascular, pulmonary or metabolic disease	AF up to 3 MET (light) or previous functional assessment

Co-funded by the European Union

Tabla 2 . Main individual risk factors

Physical inactivity	Does not practice moderate physical exercise on a regular basis or less than 30 minutes/day, 5 days a week (150 minutes/week) or equivalent
Obesity	Body mass index (BMI) ≥30 kg/m2
Family history	AMI or coronary revascularization (bypass or angioplasty) or sudden death in a parent or first-degree male relative under the age of 55 or first-degree female relative of less than 65 years
Smoking	Current smoker (>1 cigarette/day in the last month) or who has quit less than 6 months or exposure to environmental smoke
Arterial hypertension	SBP ≥140 mmHg or DBP ≥90 mmHg or take medication against hypertension
Hypercholesterolemia	Total cholesterol >200 mg/dl or LDL cholesterol >130 mg/dl, or HDL cholesterol <40 mg/dl or take lipid-lowering medication
Hyperglycemia	Fasting plasma glucose ≥126 or ≥110 mg/dl confirmed in two measurements separated in time

Co-funded by the European Union

Tabla 3 Need for Functional Assessment

Exercise intensity		Low risk (A)	Moderate risk (B)	High risk (C)
Light	<3 WITH Common household activities, pétanque, etc.	Recommended	Recommended	Highly Recommended
Moderate	3-6 WITH Walking fast or with a 6% slope, gentle running, swimming, dancing, etc.	Recommended	Highly Recommended	Highly Recommended
Vigorous	>6 WITH Intense race, team sport, of contact, competition, etc.	Highly Recommended	Highly Recommended	Highly Recommended

Drug interactions: The prescription of physical exercise behaves like a drug in certain fine diseases to the point of presenting pharmacological interactions (for example, in type 1 diabetes mellitus it enhances the action of insulin or a reduction in HR in the case of taking β-adrenergic blockers)
Contraindications: Depending on the established objectives (e.g. competition) it is necessary to determine, based on a functional assessment, the possible contraindications for the practice of physical exercise, usually of high intensity and/or competition. Contraindications may include:
Temporary, i.e. for a certain period (e.g. acute pathologies).
Relative, in which the practice of certain types of physical activity is discouraged.
Absolute, in which most activities and competition are absolutely contraindicated.

Affordable resources and facilities available and accessible. Structural constraints include external resources and infrastructures that intervene in participation preferences, interfering with or disrupting the connection between preferences and participation. Examples of this category may include the costs of the activity or transportation and the adequacy of facilities.

Co-funded by the European Union

2. Methods for conducting evaluations of personal fitness training clients

Advising physical activity or prescribing physical exercise means proposing the performance of activities or physical exercise in a responsible and individualized way, depending on the characteristics and limitations of each one, with the aim of improving health and physical condition.

In a generic way, we can classify the types of intervention on the indication of physical exercise into:

Unsupervised physical exercise. Physical exercise tips or recommendations on which participants freely self-regulate their work and physical progression. There is no comprehensive assessment of your fitness level. It does not require any kind of infrastructure or special implementation and is usually used by apparently healthy people.

Advised physical exercise. The person follows the instructions of a professional with regular check-ups, although most of the sessions are carried out autonomously following a pre-established program. It requires more dedication and specialization from the professionals who direct the programs because it involves an initial evaluation of the person, a more precise programming with the development of an individualized physical exercise program and a periodic control of the evolution of the physical condition and health status of the participants. It is recommended to apply it in healthy populations with risk factors and in some stable chronic patients.

Supervised physical exercise. Fully directed physical exercise practice that is facilitated by the prior development of an individualized physical exercise program and the continuous presence of a qualified professional during the sessions, given that it presents the same requirements as the previous situation (evaluation, planning, and monitoring) and, in addition, an exhaustive and continuous control. It applies to populations with specific characteristics or chronic diseases.

Short Specialist Talks can represent a timely intervention, lasting 2 to 10 minutes, including information and a motivating proposal for change, within the framework of a professional consultation. The goal is to increase physical activity in individuals who do not meet international physical activity recommendations and to reinforce or increase physical activity in those who do, as well as to reduce periods of sedentary time. All kinds of resources can be used, such as lifestyle recommendations, minimum physical activity, active breaks, or active pills (i.e., interrupting continuous sitting time with activities of any intensity on a regular basis, e.g., 2-5 minutes every hour). A follow-up of 3-6 months is recommended and, in any case, a new assessment and brief counselling every two years at the latest would be required.

The guidelines for action in the face of the different possibilities are depending on the number of subjects and the individualization of the prescribed exercise, as well as the inter-consultation with other specialists.

Co-funded by the European Union

Individual Education (Counselled Physical Activity or Unsupervised Exercise): Education consultation focused on developing personal skills and resources to increase physical activity and decrease sedentary periods. It can be used to address other prevalent chronic factors or problems (obesity, hypertension, type 2 diabetes mellitus, dyslipidemia, etc.), as well as an incorrect diet or the consumption of tobacco, alcohol, and other toxic habits.

Group or collective education (advised physical activity): A 2-3 hour workshop or series of scheduled sessions aimed at a group of users or collectives in order to improve their abilities to address a certain health problem or fitness goal. Group health education techniques aim to improve compliance with international physical activity recommendations. All kinds of techniques can be used with different professionals (medicine, nursing, physiotherapy, physical education, and sports, etc.).

Individual prescription of physical exercise (specific physical exercise): The prescription of exercise requires, on the part of the professional, a broad knowledge of all the medical data, the objectives and the specific conditioning factors and contraindications of the individual to apply an individualized physical exercise program.

Inter-consultation with a specialist in physical education and sports medicine: In the case of patients with doubts or complex health problems, lack of resources, etc., specialists in physical education and sports medicine, with the knowledge and ability to carry out complex functional assessments, can represent an important resource that primary care should consider as a reference. like the rest of the specialties.

Referral to a healthy physical exercise program (supervised, directed): In the same way that the patient can go with a prescription for drugs to a pharmacy, in the case of a recommendation or medical guidelines for physical exercise, the subject can go to the sports center or equipment with professionals specialized in physical exercise for people with different diseases or directly to a professional. It is advisable that the professional in charge of preparing the individualized physical exercise program has the relevant health information about the patient that is usually included in the medical report on the prescription of exercise.

In general, for adults, physical activity can consist of recreational or leisure activities, travel (such as walking or cycling), work or home activities, games, sports, or exercises programmed in the family or community environment. The important thing is to achieve an active lifestyle. It is possible to be a sedentary person with an adequate, even high, level of physical activity. Cardiorespiratory fitness improves even with light-intensity physical activity, and discontinuous activities of less than 10 minutes have also been shown to improve cardiorespiratory fitness.

Among the health strategies, the following stand out:
- Reduce time spent on TV, computer, video games, sitting, lying down, or driving.
- Continuously interrupt (every 20 minutes) sedentary behavior.
- Increase the time spent on light-intensity activity (LDL).
- Increase the time of moderate- and vigorous-intensity exercise.

In adults, some general minimum recommendations for physical activity are established:
• Avoid inactivity: Minimal activity is better than none.
• Moderate PA (3-6 METs, e.g. 4 METs) 150 minutes/week (best 5 days × 30 minutes)
• Vigorous PA (>6 METs, e.g. 8 METs) 75 minutes/week (best 3 days × 25 minutes), or combinations of moderate and/or vigorous PA.

For more Benefit:
• Moderate-intensity aerobic PA (3-6 METs) 300 minutes/week (best 5 days × 60 minutes)
• Vigorous PA (>6 MET) 150 minutes/week (best 3 days × 50 minutes) or equivalent combination of moderate and/or vigorous PA. If there are no individual constraints against it, it is better with greater intensity.
• Strength activity at moderate or vigorous intensity (8-12 reps/set) 2 sessions/week or more.
• Flexibility/balance work of 2 to 3 sessions/week or more (stretching needs to be included).
In the consultation, it is a priority to identify inactive and sedentary people, ideally with quantitative recording methods and taking advantage of technological devices.

2.1 Documents related to the evaluation and prescription of physical exercise.

Communication is necessary between the different professionals involved in the prescription of exercise, both from the doctor who makes the prescription to the professional who carries out the individual physical exercise program, for which a series of documentation is needed that can provide information on the initial state of the subject and its evolution. The following documents are proposed:

Functional assessment indication document: This document makes it possible to identify and classify people according to the level of cardiovascular risk a priori, which advises the type of exercise depending on the intensity and the possible indication to carry out a previous medical-sports functional assessment.

Web: https://www.paho.org/en/hearts-americas/cardiovascular-risk-calculator-app

Sports medical report: The sports medical report (EMS) is a personal and confidential document that collects all kinds of personal, family and medical data, such as objectives, history, physical examination, baseline parameters and complementary tests performed, conclusions, recommendations, etc

Exercise Prescription Medical Report: The exercise prescription medical report is a personal and confidential document that must contain the relevant medical information to be taken into account in the preparation of the individualized physical exercise program.

Co-funded by the European Union

Contents of an IMPE:
• Date
• Identification data and affiliation of the user.
• Need for intervention.
• Functional assessment. You should try to put the relevant data, such as anthropometric data, functional data, etc.
• Objective. You need to set your goal clearly (e.g., reduce weight, improve cardiorespiratory fitness, improve strength, etc.).
• Individual constraints. Limitations or aspects to be taken into account when performing physical exercise are described.
• Conditioning factors of medication. The possible interactions of the participant's medication with physical exercise are detailed.
• Remarks. Any aspect that may be important not foreseen in the previous sections is described.
• Medical professional details. Section for the identification data of the responsible medical professional: name and surname, association number, medical centre, signature.

The individualized physical exercise program (Table 4) must be developed and supervised by specialized professionals and, if applicable, must respond to the needs and objectives determined by a health professional, through a medical report of physical prescription. To properly develop an individualized physical exercise program, it is highly recommended to have accredited and specific training in physical exercise with health objectives, to know and know how to use all the available resources of the environment, to know the reasons for the referral and to determine the maximum information about the relevant capacities of the physical condition and potential for improvement in the specific disease. Therefore, it is necessary to consider the individual conditions and contraindications of physical exercise and a fluid and bidirectional relationship with the health field if necessary.

Table 4 shows an example of the determination of individual, or group practice programs adapted to specific profiles of patients referred from the health field to apply an individual physical exercise program in the case of moderate hypertension.

Tabla 4 Individual physical exercise program

INDIVIDUAL PHYSICAL EXERCISE PROGRAM	**INDIVIDUAL PHYSICAL EXERCISE PROGRAM** **-High blood pressure II**
	HBP 140-160/90-100 mmHg
Heating	Aerobics: 10 min Stretching: 10 min
Strengh	Dynamic work in large groups muscular, cyclic, continuous, repetitive and varied (e.g. walking, jogging, hiking, dancing, swimming, cycling, non-competitive sports) Time: 20-60min Intensity: 60-70%FCR (Borg 8-14) 10-30 METh/set (700-2000 kcal/set) Active recoveries: 3-15min
Resistance aerobic	Strength Circuit: Global Exercises, dynamic with low load. 2-7 sessions/week Series: 2-6 Intensity: 25-50%1RM Lots of reps and low loads o Body Weight Exercises (Borg 8-15) Working time: 30-120s Rest time: 30-120s Iso ups and bounds: NO
back to the calm	Stretching: 5 min
Frecuency	5 sessions/set
Progression	Aerobic resistance 1st set: 20 min 2nd set: 22 min 3rd set: 24 min 4th set: 26 min 5th set: 28 min 6-12th September: 30 min Strength 1st set: 2 sets of 6 reps/set 2nd set: 2 series of 7 reps/series 3rd set: 2 sets of 8 reps/set 4th set: 2 sets of 9 reps/set 5th set: 2 series of 10 rep/series 6-12th set: 2-6 sets of 12 reps/set
Revision	Every 6 months

Co-funded by the European Union

Physical condition report: During an individual physical exercise program, it is necessary to periodically assess one or more physical abilities in order to objectify the individual evolution with respect to the practice of physical exercise, relating its results to the objectives that motivate the individual physical exercise program. At the same time, this periodic assessment makes it possible to accurately determine the progression of the loads in terms of improvements compared to previous moments.

The physical fitness report (Annex 1) is a document that represents the cross-sectional equivalent, an analysis of the physical condition and evolution of the individual physical exercise program, which includes, mainly, the evolution of the different physical capacities. It would be very illustrative and of great value to be able to have a physical condition report at the beginning and end of an individual physical exercise program to assess the correspondence of the improvement of the physical condition data with the clinics and the health status of the referred patient.

Sports Medical Certificate: The sports medical certificate is a public document that endorses an adequate state of health of an individual to be able to participate in certain physical activities or sports competitions (Annex 2).
Taking into account the medico-legal regulations, it must comply with a series of requirements such as the systematization of the minimum tests required in functional assessments, the rights of patients, the regulations on the authorization and accreditation of sports medicine centers, the verification of the signature by a specialist in physical education and sports medicine, etc.

Characteristics of the sports medical certificate:
It is an official medical certificate (public document, medico-legal) of general use that certifies the result of a sports medical physical assessment in the case of federated, non-federated, school-age, scheduled and/or supervised sport, physical access tests, etc.

It is independent of other documents that may be required specifically for different entities. It makes it possible to carry out a sport's medical physical assessment at any time of the season, independently of the start of the different sports activities (for example, competitions). It guarantees the authenticity of the data and is difficult to falsify, especially if one takes into account the possibility of certification with a digital signature, It identifies the medical professional responsible for the physical assessment of the sports doctor, who must be legally trained in terms of knowledge and material technical means, in accordance with current legislation).

Identify the medical center, the day and place where the athlete's evaluation tests have been carried out.

The tests used in the sports medical physical assessment are marked, including the special tests, those not used on a regular basis.

It specifies the conclusions (pass/fail; with limitations) regarding fitness or for the practice of sports.

In the event of relative and/or temporal limitations, the recommendations of the responsible doctor must be followed, and the assessment must be carried out again to obtain the Sports Medical Certificate within the time indicated.

It establishes a period of validity, variable depending on the criteria of the receiving body, such as federations, clubs, sports facilities, etc., and medical criteria, depending on the person's pathologies (which produce a time limitation, or which are pending complementary tests). In any case, medical criteria are always a priority and must prevail over all others.

It includes the date, the signature, ideally the digital one, and the seal of the responsible medical professional.

2.2 Fitness assessment tools.

In order to know the level of health and physical condition of subjects who start a physical activity plan, it is necessary to have tools that facilitate the effective measurement of their initial state and level of physical fitness, in order to establish a development plan in the short, medium and long term. Subjective and objective methods are available for this purpose.

Subjective methods:
These types of methods are often the most used tools because of the low cost and ease of managing large samples. They have the problem of subjective interpretation of questions and perception of behavior in the sense of overestimating or underestimating the same physical activity.

Registration by simple valuation. This instrument presents a list of physical activities that are developed based on the specific characteristics of the segment of the population under study. The person should write down which of these activities he or she does during the day and for how long.

Physical activity diary. This instrument consists of making a diary according to the specific characteristics of the study population group. Each person should write down in this diary what type of physical activity they do each day, for how long, and at what time intervals they do it.

Questionnaires. Many epidemiological studies have used questionnaires to measure population physical activity and look for associations with health. They are valid instruments for classifying the population into different categories of physical activity, but they are not suitable for quantifying their caloric expenditure derived from physical activity. The questionnaire is an inexpensive and easy-to-administer tool for many people. However, it is based on the subjective perception of behaviour, the subjective interpretation of the questionnaire questions, and the degree of memory of the people.
For this reason, it is important to validate questionnaires by comparing them with objective methods. There are three types of questionnaires:

Global questionnaires. This type of questionnaire contains few items (1-4). They measure overall level of physical activity and allow people to be classified as physically active or physically inactive. Its operability is prioritized at the expense of accuracy or precision. The challenge is to find a quick and useful measurement system that allows an approximation to the assessment of physical activity, especially in daily practice.

Co-funded by the European Union

GPAQ (Global Physical Activity Questionnaire). Global Physical Activity Questionnaire (WHO) that aims to measure the intensity, duration and frequency of physical activity. It is specially designed for use in developing countries.

web: https://www.who.int/publications/m/item/global-physical-activity-questionnaire

GPPAQ (General Practice Physical Activity Questionnaire). Screening tool for routine general practice that provides a simple index of physical activity.

web: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/192450/GPPAQ_-_pdf_version.pdf

ClassAF (Rapid Physical Activity Classifier). A method of rapid classification of physical activity in adults, based on three items (with values from 0 to 3): domestic and/or occupational PA, leisure-time PA (including sport) and frequency. (Table 5)

Tabla 5. Classaf (quick classifier of physical activity).

Physical activity at work or home		
Inactive	Sitting most of the day (1 MET)	0
Light	Standing most of the day without moving (1.42 MET)	1
Moderate	Frequent walking (2.9 MET)	2
Intense	Activity that requires significant physical effort (6 MET)	3
Physical exercise or Sport		
None	Does not do any type of exercise	0
Easy	Walk, play pétanque, yoga, etc. (3.3 MET)	1
Moderate	Bicycle, gymnastics, aerobics, running, tennis, swimming, etc. (4 MET)	2
Intense	Squash, football, basketball, hockey, etc. (8 MET)	3
Weekly frequency of PE and/or sport		
	Never	0
	Once a week	1
	Twice a week	2
	Three or more times per week	3

Reminder questionnaires. These types of questionnaires contain between 1 and 20 items, measure the frequency, duration and type of physical activity during a day, week or month, and allow people to be classified into different categories or within a continuous scale: for example, in categories of light, moderate, or vigorous intensity physical activity.

IPAQ (International Physical Activity Questionnaire), one of the most widely used questionnaires, especially the short version, which attempts to quantify and rate physical activity in the last seven days based on vigorous PA, moderate PA and walking.
web: https://www.sralab.org/sites/default/files/2017-07/IPAQ_English_self-admin_long.pdf

Historical questionnaires. These types of questionnaires include more than 20 items, report on the volume of physical activity carried out in leisure or occupational time during the previous year, throughout a person's life, and define turning points; for example, the moment from which the volume of physical activity is sufficient to obtain healthy benefits.

MLTPA (Minnesota Leisure Physical Activity Questionnaire). Try to collect information about a list of physical activities from the previous week, the previous month, the last quarter, and the year.

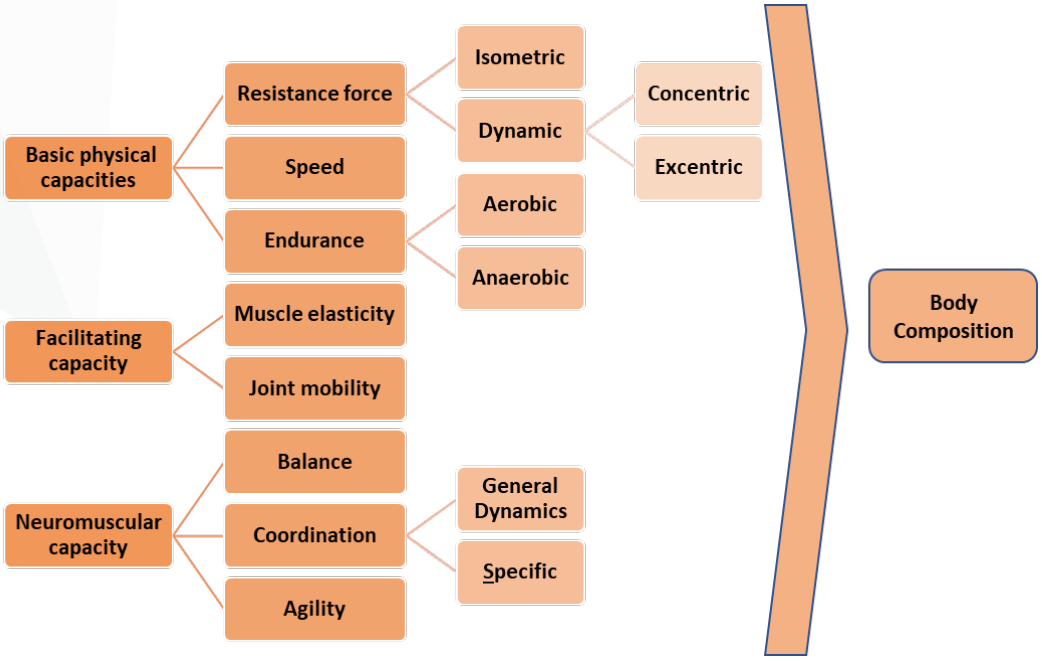
Objective methods.

Physical fitness has numerous components (physical abilities) that, together, determine the individual's ability to perform work, e.g., walking, running, going up or down stairs, carrying objects, self-sufficiency, etc. Therefore, physical fitness is relevant from a public health perspective, as it allows the development of activities of daily living. Methods of measuring physical condition allow us to determine the energy potential and vitality accumulated in people as a result of their state of health and the physical activity they perform. Methods are used to quantify the level of development of each of the person's physical abilities. Any type of physical activity involves a whole series of physiological responses and functional adaptations by the different organic systems: muscular, cardiovascular, respiratory, etc., with variations in different parameters that we can measure and evaluate.

Physical fitness can be measured by analysing some of the physical abilities in isolation or by applying a series of tests that analyse manifestations of multiple abilities. To try to determine the most relevant parameters, various functional assessment tests (laboratory, field tests) can be used in the health field and in the sports or community environment.

Co-funded by the European Union

Figure 1: Classification of physical capacities.



Physical assessment tests in the healthcare field: In the healthcare field, multiple instruments and tools are available to try to objectively determine the different functional parameters in relation to the state of health, such as:

Body Composition
• Dual X-ray densitometer. Reference standard for measuring body composition that allows you to measure the amount of fat, too much lean and mineral density. The problem is that it is expensive and causes irradiation.
• Air displacement plethysmography. It is not commonly used in the clinical setting.
• Anthropometry. The most used method is the measurement of skin folds, bone diameters, muscle perimeters and the application of estimative formulas.
• Bioelectrical bioimpedance. From 2 or 4 poles, lower and/or upper extremities, still to be considered in athletes that the values depend on the degree of hydration and training.

Strenght
• Dynamometry. Manual, leg and lumbar dynamometers can be used.
• Isokinetics. With isokinetic machines, with a constant angular velocity, that measure muscle strength in the different degrees of a given range of motion.
• Bosco test. It correlates various types of vertical jumps on a contact platform with the percentage of fast muscle fibers and the explosive strength of the lower extremities.
• Surface electromyography. It allows the evaluation of patterns of neuromuscular function.

Co-funded by the European Union

Cardiovascular-respiratory system: It is predominantly involved in aerobic capacity.
• Apparatus physical examination includes cardiac auscultation, blood pressure measurement, pulse palpation, etc.
• ECG. It allows the assessment of cardiac electrical function at rest and exertion.
• Echocardiogram. It allows the evaluation of the structure and mechanical functionality of the heart.
• Holter monitor. It allows you to record and evaluate the cardiac electrical function in a given time, usually in a 24-hour period.
• Spirometer. It allows the evaluation of respiratory function at relative rest.
• Pulse oximeter. It measures capillary oxygen saturation, usually in the fingers.
• Ergospirometry, cardiopulmonary test (CPX). It allows the study of the organic systems involved in the functional ability to generate the energy necessary for physical activity.
• Ergometry. Similar to the above, but it does not make a gas analysis but an estimation of values (e.g., MET) indirectly, based on the direct relationship between the work power performed and the corresponding functional response, especially on the part of oxygen consumption (VO2) and heart rate (HR).

Flexibility: Apart from the physical examination itself, more objective data can be obtained by using different goniometers, to quantify the degrees of freedom of movement of each joint.

Coordination (neuromuscular) abilities.
With stabilometric platforms, force platforms, gait pattern analysis, reaction time, static and dynamic balance, etc.

Functional assessment tests in the field of sports.

Field tests for the assessment of physical condition, initially oriented to sports performance and in many other cases, are currently used for the assessment of health status (health-related fitness test) and for the determination of relevant parameters in the prescription of physical exercise. Although these types of tests are less accurate than laboratory tests, they have the advantage that they are applied to population groups at a low cost.

Battery of tests: They allow you to analyze and monitor your physical condition in a safe and, at the same time, motivating way within the framework of healthy physical exercise programs. The results allow the realization of individualized physical exercise programs. Below are some examples validated in different subpopulations:

• Senior Fitness Test (Rikli-Jones). A series of tests to assess the physical condition of older people with different levels of physical and functional fitness. Among the tests are: 6-minute walking test or 2-minute step (aerobic capacity), push-ups and 30-second chair stand and sit test (strength), sitting trunk flexion test and back scratch test (flexibility), 8-foot up-and-go (coordination) and BMI (body composition). Although normative values are available for the elderly, it is considered applicable to other populations and highlights the usefulness of obtaining the age of functional physical condition, which compares the functional age obtained with the chronological age of the individual.

Co-funded by the European Union

• UKK Health-Related Fitness Test Battery. 2-km walk test (aerobic capacity), hand grip, jump-and-reach, modified arm bottom (push-ups), dynamic trunk flexion (sit-ups) (strength), front shrug (flexibility), one-foot balance and figure-eight (speed), height, weight and waist circumference (body composition). This series is designed for adults who are not in very good physical condition.

• Alpha-fitness. Field test for the assessment of health-related physical fitness in children and adolescents. It uses tests such as the shuttle run (aerobic capacity), the horizontal jump (strength), the 4 × 10 meter shuttle test (speed and agility) and others such as height, weight, waist circumference or skinfolds such as the tricipital and subscapular.

• AFISAL-INEFC. Assessment series of the main components and capacities of physical condition in relation to health in adults with low physical condition. Tests such as 2-km walk test (aerobic capacity), hand grip, vertical jump and trunk push-ups (muscle strength), seated trunk flexion test (flexibility), balance with only one foot without vision and others such as BMI, waist-to-hip ratio or various skin folds are applied.

• Eurofit. Based on the Council of Europe's principle of sport for all, it aims to motivate children and adolescents to participate regularly in physical activities and sports. It seeks to analyze: body balance (flamenco position), upper limb speed (percussion-tapping test), flexibility (seated trunk flexion test), explosive strength (horizontal jump), static force (dynamometer), enough endurance (abdominals), isometric strength (suspension), speed (10 × 5 meter run), maximum aerobic power (20-meter shuttle run).

There are other tests that, apart from a comprehensive assessment series, can be applied in the field of physical exercise for health.

Aerobic capacity. They are based on determining the aerobic power (VO2 max) of the individual at a given distance and time, taking into account the direct correlation between the physical work to be performed per unit of time (power), heart rate (HR) and the necessary oxygen consumption (VO2).

Below are some of the most commonly used tests, both for active people and for those who are sedentary or have diseases.
• Bench test (Astrand). A test that consists of going up and down a step at a constant pace (metronome) and estimating aerobic power from HR, sex, and step height.
• Cooper test. Cardiorespiratory endurance test that is based on running the longest possible distance in 12 minutes at a constant speed, applicable to different age groups.
• Léger-Lambert shuttle race. Endurance test in which participants have to complete a 20-metre route forward and backward following a progressive rate of increase marked by an acoustic signal (1-minute stages). It aims to assess aerobic power
• Mile Test (Rockport). It consists of walking 1609 meters at maximum speed without running.
• UKK test (2k). It consists of walking 2000 meters as fast as possible. Look for a walk index or percentage of cardiorespiratory fitness based on age, height, weight, time used and final heart rate in healthy people between the ages of 16 and 65
• George-Fisher test. You have to walk or run as fast as possible for 2,400 meters.

• Test 6MWT (6-minute walking test). The 6-minute walking test, a variant of the Cooper test, is a cardiorespiratory functional examination (tolerance to exertion) based on the distance achieved during 6 minutes. It is easy to do, is usually well tolerated, and reflects activities of daily living very well, which is why it is often used in cardiorespiratory patients. It requires a corridor of 25-30 meters, flat, without obstacles and a pleasant temperature.

Strengh
• Manual grip. A dynamometric test that correlates with muscle strength and is a predictor of premature death in adults.
• Dynamometers. Of various body segments.
• Dating platform. In different positions.
• Indirect calculation of 1 RM. With formulas such as those of Brzycki, Lander, O'Conner, Lombardi, etc.

Flexibility
• Sitting trunk flexion flexion (sit-and-reach test). Usually a box is used where the soles of the feet are rested and the hands move over them.

Velocity
• Gait speed test. It is based on the association between gait speed and premature mortality and morbidity, including the risk of hospitalization or fall. It consists of walking at the usual pace or at maximum speed over a distance between 4 and 10 meters and an acceleration zone of between 2.5 and 3.5 meters. The results have been compared with normative values.

Coordination or neuromuscular abilities
Balance tests with only one foot with eyes open or eyes closed (static balance).
Straight forward and backward line gait tests, with eyes open or eyes closed (dynamic balance, agility).

Co-funded by the European Union

3. Set realistic and achievable fitness goals based on the results of the client's assessment.

The elements that make it possible to dose physical activity are the type of activity itself and the individual workload involved.

Type of physical activity:
Depending on the objectives and characteristics, conditioning factors and preferences of the individuals, a certain modality or type of physical activity can be chosen, which can be one of the main difficulties in counselling or prescribing exercise. Certain activities (e.g. walking, running, cycling, swimming) should be chosen that lead to an improvement in specific physical abilities (e.g. endurance, strength, flexibility, etc.), that avoid possible side effects and that take into account possible individual contraindications.

Workload:

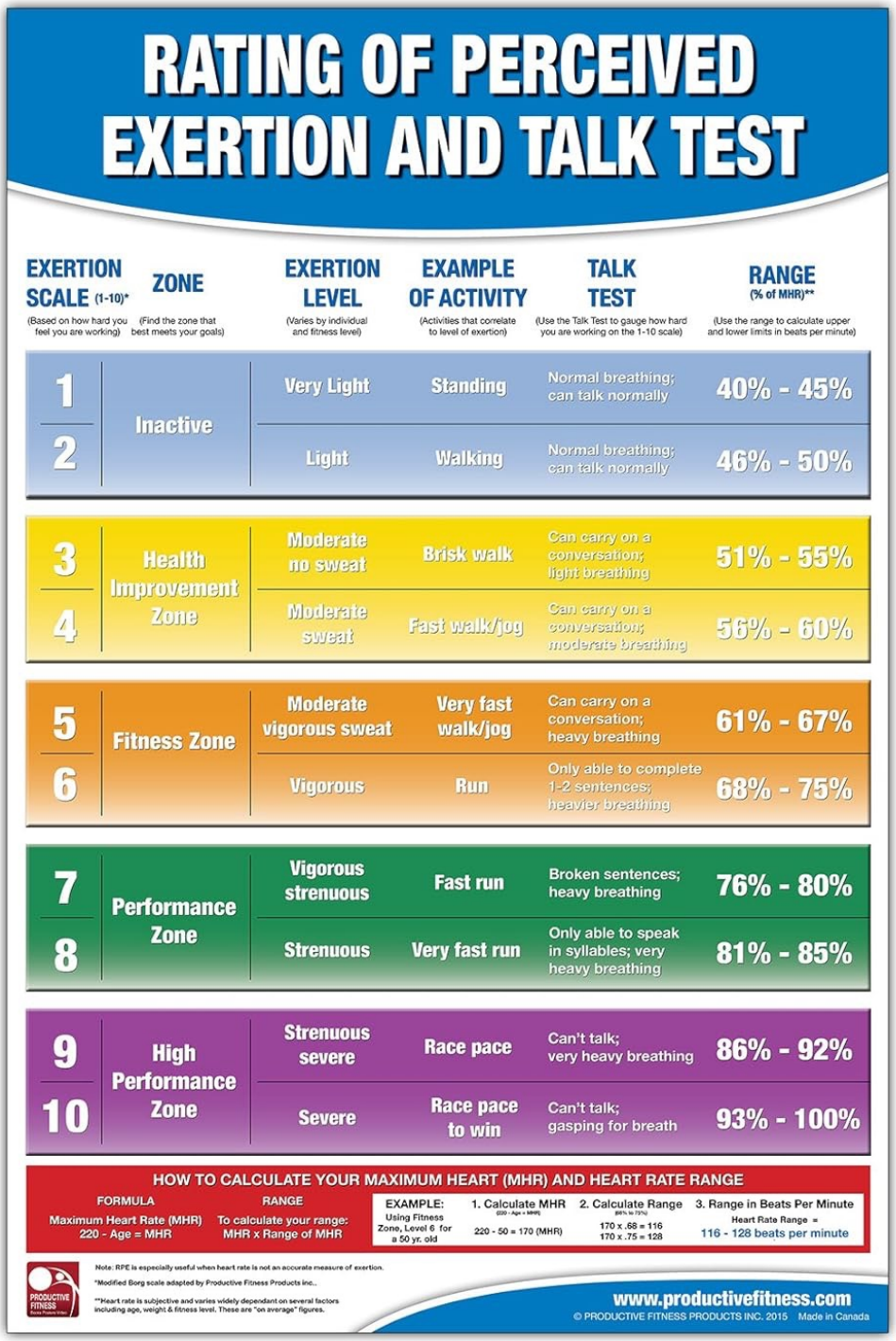
In the context of training, load is referred to as a stimulus, effort or physical work that involves the performance of a certain exercise for an individual who, exceeding a certain threshold, can cause an imbalance in the body, in order to obtain an adaptation effect. Knowing the load of the exercise and its variables allows us to assess and quantify the effort, offer the possibility of having different observable elements, and facilitate its control and enable the dosage in an objective way.
External load refers to the quantity and quality of the work to be done. It is measured with parameters such as workload, intensity, duration, frequency, recovery, density, speed of execution, number of repetitions, etc.
Internal load refers to the reaction, effect, or functional modifications that a certain job reactively causes in the body.

It can be assessed using variables such as heart rate (HR), oxygen consumption (VO2), blood lactate concentration or subjective perception of effort (EPE), among others. Intensity, or level of effort, is defined as the ratio of the volume of physical activity (work done, caloric expenditure) per unit of time.

It can be quantified with:
- physical quantities, (e.g. power)
- objective physiological tests (e.g., VO2, MET, HR, etc.) or
- subjective perceptual methods (e.g., Borg scale, conversation test)

Co-funded by the European Union

Figure 2: Rating of Perceived Exertion Chart/Poster; RPE Poster - Talk Test Chart.



RATING OF PERCEIVED EXERTION AND TALK TEST

EXERTION SCALE (1-10)* (Based on how hard you feel you are working)	ZONE (Find the zone that best meets your goals)	EXERTION LEVEL (Varies by individual and fitness level)	EXAMPLE OF ACTIVITY (Activities that correlate to level of exertion)	TALK TEST (Use the Talk Test to gauge how hard you are working on the 1-10 scale)	RANGE (% of MHR)** (Use the range to calculate upper and lower limits in beats per minute)
1	Inactive	Very Light	Standing	Normal breathing; can talk normally	40% - 45%
2		Light	Walking	Normal breathing; can talk normally	46% - 50%
3	Health Improvement Zone	Moderate no sweat	Brisk walk	Can carry on a conversation; light breathing	51% - 55%
4		Moderate sweat	Fast walk/jog	Can carry on a conversation; moderate breathing	56% - 60%
5	Fitness Zone	Moderate vigorous sweat	Very fast walk/jog	Can carry on a conversation; heavy breathing	61% - 67%
6		Vigorous	Run	Only able to complete 1-2 sentences; heavier breathing	68% - 75%
7	Performance Zone	Vigorous strenuous	Fast run	Broken sentences; heavy breathing	76% - 80%
8		Strenuous	Very fast run	Only able to speak in syllables; very heavy breathing	81% - 85%
9	High Performance Zone	Strenuous severe	Race pace	Can't talk; very heavy breathing	86% - 92%
10		Severe	Race pace to win	Can't talk; gasping for breath	93% - 100%

HOW TO CALCULATE YOUR MAXIMUM HEART (MHR) AND HEART RATE RANGE

FORMULA	RANGE	EXAMPLE: Using Fitness Zone, Level 6 for a 50 yr. old	1. Calculate MHR (220 - Age = MHR)	2. Calculate Range (68% to 75%)	3. Range in Beats Per Minute
Maximum Heart Rate (MHR) 220 - Age = MHR	To calculate your range: MHR x Range of MHR		220 - 50 = 170 (MHR)	170 x .68 = 116 170 x .75 = 128	Heart Rate Range = 116 - 128 beats per minute

Note: RPE is especially useful when heart rate is not an accurate measure of exertion.

*Modified Borg scale adapted by Productive Fitness Products inc..

**Heart rate is subjective and varies widely dependant on several factors including age, weight & fitness level. These are "on average" figures.

www.productivefitness.com

It is important about the total workload control to consider the duration, corresponding to the time of application of a certain workload. It can be measured in hours, minutes, seconds, etc. It does not take into account the pause time between loads and also the Volume, since if we take into account that intensity is a measure of the amount or volume of work per unit of time, the volume, or total amount of physical activity performed, of workload, is defined as the product of the intensity of the exercise performed by the time.
It is necessary to quantify the actual load exerted in physical activity sessions, for which objective recording methods can be used from technological instruments to measure parameters such as acceleration, heart rate or power exerted.

• Direct calorimetry. In the laboratory, body heat production and caloric expenditure are measured in a calorimetric chamber, which is impractical for physical activity.
• Indirect calorimetry. Energy expenditure is estimated from the ratio between carbon dioxide production and oxygen intake (RER = VCO2/VO2); for example, with an ergospirometer.

• Pedometer. Count the number of steps from the vertical movements that occur cyclically in each step to ambulation. You can use one-, two-, or three-axis sensors. While it is very useful for measuring the volume of activities such as walking or running, it is not useful for activities such as swimming, cycling, or upper body movements. Based on the average length of the step and the exercise time, you can estimate the distance traveled, but not other parameters such as speed (intensity) or acceleration.

• Accelerometer. It measures motion on one or more spatial axes. Currently, most mobile phones, watches and fitness trackers incorporate triaxial accelerometers as part of their technology. With the integration of other elements (e.g. watch and GPS), they allow estimating parameters such as strength, work, power and energy expenditure or can report sedentary behaviour, hours and types of sleep, etc. In addition, by allowing the recording and processing of the data collected, they represent a true Holter system of physical activity.

• GPS. It records movement from satellite information, which is very useful in outdoor activities and in combination with digital mapping systems (e.g. smartphones, watches, fitness trackers).

• Heart Rate Monitor. These instruments monitor the rhythm or heart rate as a physiological response to the intensity of physical activity. It is based on the linear relationship between heart rate and oxygen consumption.

• Smartphones. They enable the inclusion of many of the above technologies and increase accuracy in PA assessment. They allow the use of all kinds of applications and data processing (including images and videos), with hardly any technical limitations. The only drawback is the battery life and the difficulty of using it continuously.

• Watches and fitness trackers. They don't present all the technological possibilities of smartphones, but among their advantages is battery life (it can last for days and weeks); continuous recording of activity both directly (accelerometer) and indirectly (HR) and also linked to a watch (e.g. Bluetooth) allows the majority of PA to be recorded and processed.

Co-funded by the European Union

3.1 Goal Setting

The concept of goal setting in sports psychology is widely recognized as a valuable tool for enhancing athletic performance and motivation. However, not all types of goals are equally effective, and certain guidelines have been established to maximize their impact. Here are some key principles related to goal setting in sports:

Set Specific, Measurable, and Behavioral Goals: Goals should be explicit, measurable, and expressed in terms of observable behaviors. Specific goals, such as improving free throw accuracy from 70% to 85%, are more effective than vague goals like "do your best." Measurable goals provide clear criteria for success and progress, motivating athletes to achieve specific outcomes.

Set Moderately Difficult but Realistic Goals: The difficulty of a goal should be challenging but achievable. Research suggests that moderately difficult goals, rather than extremely difficult ones, lead to the best performance. Unrealistic goals that exceed an athlete's abilities can result in frustration and demotivation.

Dated in time: it is important to set a deadline in which the objective will be achieved in order to plan the necessary steps to achieve it. For this, short-term objectives and long-term objectives will be set. While it is important to set long-term goals, such as achieving a personal best, athletes should also set short-term goals. Short-term goals, such as improving a specific technical element or increasing training attendance, allow athletes to see immediate improvements, stay motivated, and track their progress toward achieving their long-term goals.

Figure 3: Goal´s establishment:

Set Process and Performance Goals, Not Just Outcome Goals: Outcome goals, such as winning a game, can be motivating, but they have inherent weaknesses because they are often outside of the athlete's control. Performance goals (e.g., improving a personal best) and process goals (e.g., focusing on a specific skill) are more effective in maintaining focus on what depends on the subject. Faced with a result objective, the result may be to achieve it or not (win or not win), however in a performance objective it will be easier to know to what extent the objective has been achieved (improve a long jump by 20cm). Athletes should set goals for both practice and competition. Practice goals help maintain motivation during training sessions and contribute to long-term skill development.

Combining process-focused goals and outcome-focused goals can lead to greater success. A balance between these types of goals is essential to ensure that athletes remain motivated and flexible when setting their goals.

Set Positive Goals: Goals should be framed in positive terms, focusing on what athletes should do rather than what they should avoid. Positive goals promote success-oriented thinking, motivation, constructive behavior and helps athletes focus on success instead of failure.

Identify Target Dates: In addition to setting specific, measurable, and behavior-based goals, it is essential to assign target dates for goal accomplishment. Target dates add a sense of urgency and create a realistic time frame for achieving the objectives. Athletes are constantly reminded of the time constraints associated with their goals.

Identify Goal-Achievement Strategies: Goal setting is not limited to defining objectives; it also involves developing and implementing strategies for achieving those goals. Athletes need to understand that setting goals is just the first step. Identifying multiple strategies for goal achievement is critical. This means recognizing different approaches and tactics that can help in reaching the desired outcomes. For example, an athlete aiming to increase their field goal percentage may develop strategies like additional practice sessions or specific shooting drills to improve their accuracy.

Commitment. Athletes and coaches should ensure that goals are documented in writing. Written records of goals help maintain clarity and commitment to the objectives, especially during long seasons when goals might be forgotten or neglected. Athletes can place their written goals in visible locations like lockers, journals, or notebooks. Keeping a goal log or notebook to record goals, strategies, and progress on a daily or weekly basis is a recommended practice. Coaches can consider creating goal-setting contracts for their athletes. These contracts outline all the established goals, along with the associated goal-achievement strategies for each athlete. Athletes then sign these contracts, signifying their commitment to the goals and strategies. Coaches keep these contracts on file and can use them to remind athletes of their goals throughout the season. This contractual approach provides a formal commitment to the goals and a tangible reminder of the athlete's responsibilities.

Co-funded by the European Union

Incorporating these components into the goal-setting process helps athletes maintain focus, motivation, and a clear sense of direction.

To enhance the effectiveness of goal-setting in the context of sports, it is crucial to incorporate these important elements:

Goal Evaluation: Providing feedback about an athlete's performance in relation to their goals is essential. Athletes should receive ongoing feedback that helps them understand how their current performance aligns with their short- and long-term goals. Performance statistics, observations, or other forms of evaluation can serve as valuable feedback. For goals that are not easily quantifiable, creative methods, such as using paper clips to track negative thoughts during practice, can be employed to provide feedback.

Support for Goals: A goal-setting program requires the support and understanding of key individuals in an athlete's life. This typically includes the coach, the athlete's family, and teammates. Athletes must make efforts to educate these individuals about the goals they are setting and why they are essential for their progress. When there is alignment between the athlete's goals and the support provided by significant others, it is more likely that behavior change will occur.

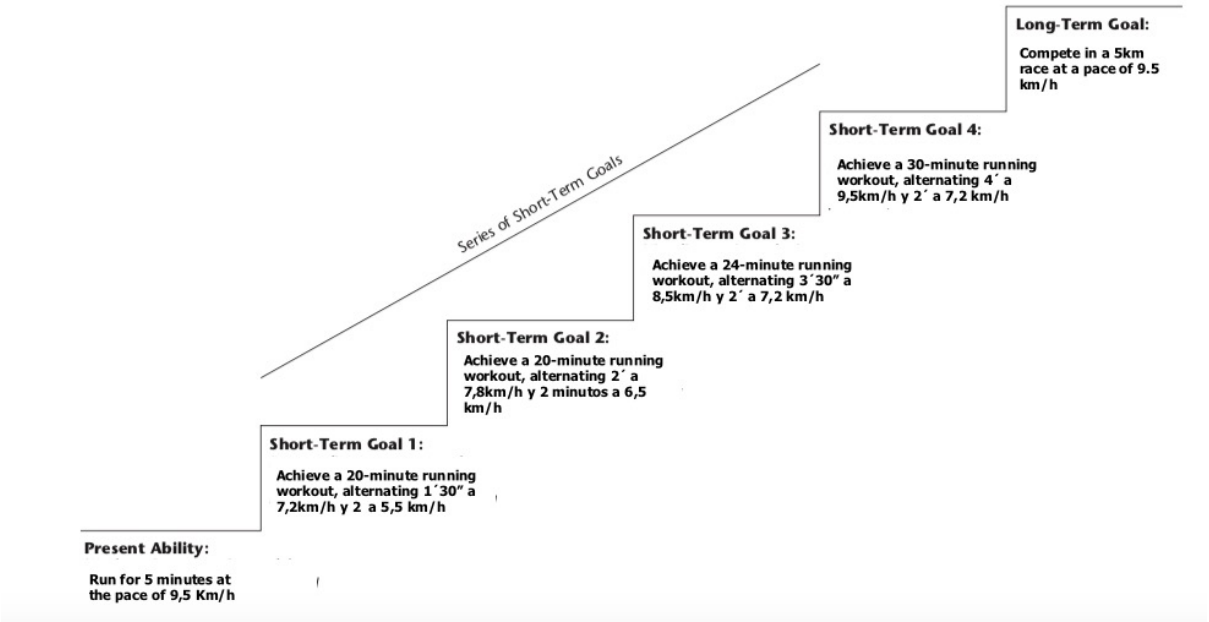
Group Goals: While much attention has been given to individual athlete goals, it's also crucial to establish group goals, especially in team sports. Group goals should clarify the team's mission or objectives and outline the process for achieving these goals. Long-term team objectives should be set, and a clear sequence of short- and long-term goals should be established. Assessing the team's progress toward group goals, rewarding such progress, and fostering team confidence in these goals are important. It's essential for all team members to have input into the team goal-setting process.

Clarify Role Expectations: When setting group goals, it's important to recognize that there are multiple types of goals within a team. These can include individual member goals for themselves, individual goals for the team, group goals, and group goals for individual members. These goals may not always align or may have different expectations. Thus, coaches and team leaders need to facilitate discussions to integrate individual goals with team goals. Role clarification and definition are critical to ensure effective team performance.

By incorporating these elements into the goal-setting process, athletes and teams can optimize their ability to set and achieve meaningful objectives, enhancing motivation, performance, and success in sports.

Co-funded by the European Union

Figure 4. Goal Staircase example: A series of short-term goals leads to long-term goals for improved aerobic capacity.



3.2 Time progression

In the field of health, the most important thing is to make an appropriate progression, usually with weekly microcycles, in which both the volume (duration and/or frequency) and the intensity are progressively increased, to then go on to adjust the desired intensity and increase little by little until the participants can exercise at moderate or vigorous intensity for about 20-30 minutes at a time.
In the long term, the exercise program can be structured in different stages:
1. Initiation or conditioning stage (weeks 3-6). Progression of low-intensity, short-duration physical exercise. Learning and practice adherence need to be prioritized.
2. Improvement stage (weeks 6-28). 20-45 minutes of moderate or vigorous physical activity is achieved.
3. Maintenance stage (from week 28). 45-60 minutes of physical exercise are achieved and maintained. Autonomy in the practice of physical exercise is encouraged beyond organized programs.

Co-funded by the European Union

4. Communication techniques and motivation to work with clients, particularly those with low economic resources.

One of the main determining factors is the motivation to practice physical activity. There are several models that study and propose specific actions in relation to behavior change, such as: self-determination theory, self-efficacy theory, transtheoretical or stage model of change, reasoned action theory, planned behavior theory, health-action process, etc.
The transtheoretical model, which is one of the most widely used models of behavior change in the field of health (Armitage, 2009). Proposed by Prochaska and DiClemente (1983) to predict smoking cessation, and thanks to its consistency, it has been transferred to multiple contexts to explain behavior change.
The model's construct of stages of change illustrates how behavior changes over time, progressing through six stages:

Precontemplation: Does not consider increasing physical activity in the next 6 months. In this state, people have no intention of changing, either because of misinformation or ignorance about the consequences of their behavior, or if they have tried to change but have not been able to, they are demoralized. In all cases, subjects tend to avoid focusing on their risky behavior, they do not intend to act in the foreseeable future.

Contemplation: You are aware of a problem and plan to increase your physical activity in the next 6 months. In this step, individuals begin to recognize that their behavior is problematic and begin to value the positive and negative effects of their behavior. If the subject is at this stage, he will show an intention to change in the next six months, but if the balance between costs and benefits is balanced, it can produce a deep ambivalence that ends in chronic contemplation or procrastination.

Preparation: The person prepares to start becoming active in the next 30 days. The subject intends to take action in the immediate future (1 month) and they can start taking small steps towards behavior change, call the club where they want to start training, buy a book, consult a doctor, etc.

Action: The person has been active on a regular basis for less than 6 months. By now, individuals have made specific overt modifications to modify their behavior in the acquisition of new healthy behaviors. The action is observable, but the subject may not be one hundred percent committed to performing the behavior (e.g., starts training but does not perform all the exercises in the training session).

Maintenance: The person has been active on a regular basis for more than 6 months. In this step, people have been able to sustain the action for at least six months. They are more engaged than in the previous state, have a lower risk of abandoning the acquired behavior, and feel more self-efficacy. It is estimated that this state lasts from six months to five years.

Termination: Here, behavior has become a habit, an identity, and a way of life, where people are not tempted to abandon the behavior and are sure not to return to their initial state.
In general, for people to progress, they need to feel self-efficacy, defined as the confidence that they can make and maintain changes in difficult situations that tempt them to return to their old behavior, and a balance of decisions referring to the awareness that the advantages of change outweigh the disadvantages. Coaches can help and motivate people to continue doing the activity.

Co-funded by the European Union

Behavioral Recommendations for Coaches

Sternberg Horn, Lox and Labrado (2008) make the following recommendations on the idea that coaches' expectations and behaviour can significantly affect the performance and psychological growth of athletes.

1. Use Reliable Information Sources: Coaches should base their preseason or early season expectations on performance-based information rather than personal cues like gender, ethnicity, socioeconomic status, or appearance. Objective performance data are more accurate predictors of an athlete's abilities.

2. Continuous Assessment and Flexibility: Coaches should acknowledge that their initial assessments of an athlete's competence may be inaccurate. They should revise their expectations as the season progresses since athletes may progress at different rates. Flexibility in expectations is essential.

3. Monitor Practice Time: Coaches should keep track of the time each athlete spends in non-skill-related activities during practices. This can help identify if certain athletes, such as those with high or low expectations, are receiving unequal opportunities to improve their skills.

4. Inclusive Instructional Design: Coaches should design practice activities that offer all athletes an opportunity to improve their skills. This means adapting instruction and drills to cater to the needs of less skilled players to help them achieve success.

5. Constructive Feedback: Coaches should respond to skill errors with constructive feedback, offering guidance on how to improve. Praise and criticism should be aligned with the level of performance exhibited by each athlete.

6. Emphasize Skill Improvement: Coaches should focus on skill improvement as a measure of evaluating and reinforcing individual athletes rather than just relying on absolute performance scores. This approach communicates positive expectations for each athlete's potential for improvement.

7. Individual Coach-Athlete Interaction: Coaches should interact frequently with all athletes on their team to gather their perceptions, opinions, and attitudes about team rules and practice organization. This fosters an inclusive atmosphere where all athletes feel valued.

8. Create a Mastery-Oriented Climate: Coaches should work to establish a mastery-oriented climate during team practices. This approach emphasizes skill development for all players and promotes a team-oriented attitude, rather than just focusing on winning at all costs.

These recommendations are intended to promote positive coach-athlete interactions and create an environment where all athletes have the opportunity to grow and excel, regardless of their initial skill levels or other personal characteristics. Such an approach can contribute to the overall success and well-being of athletes and the team as a whole.

Co-funded by the European Union

Annexes

Anexo 1. Fitness Report

Example FIT Testing Sheet (Sample)

Fitness Assessment

Name:_____Age:_____Date: _____

Weight:_____ RHR: _____RBP: _____THR:_____

Neck:_____ Waist:_____ Hip: _____Height: _____

Estimated Body Fat: BMI: _____WTH: _____Misc:

_____

AEROBIC CAPACITY EVALUATION - GERKIN PROTOCOL

Member's heart rate is monitored continuously throughout the evaluation and during the cool-down period. Obtain and record the heart rate during the final 15 seconds of each stage. Once the individual's heart rate exceeds the THR, the individual continues the evaluation for an additional 15 seconds. The evaluation is completed and the final evaluation stage is recorded if the individual's heart rate does not return to, or below, the THR or the member reaches the final stage (11.4). Additionally, record the hear rate after one minute cool down.

Stage 1: 4.5 mph, 0% grade - HR _____Stage 5: 5.5 mph, 4% grade - HR _____Stage 9: 6.5 mph, 8% grade - HR _____
Stage 2: 4.5 mph, 2% grade - HR _____Stage 6: 5.5 mph, 6% grade - HR _____Stage 10: 6.5 mph, 10% grade - HR _____
Stage 3: 5.0 mph, 2% grade - HR _____Stage 7: 6.0 mph, 6% grade - HR _____Stage 11: 7.0 mph, 10% grade - HR _____
Stage 4: 5.0 mph, 4% grade - HR _____Stage 8: 6.0 mph, 8% grade - HR _____Stage Completed: _____

Converted VO2 Max: ml/kg/min Time Evaluation Terminated: _____Cool Down HR (After 1 min): _____

STRENGTH EVALUATION – GRIP

Trial 1, Left Hand: _____kg Trial 2, Left Hand: kg_____ Trial 3, Left Hand: _____kg
Trial 1, Right Hand: _____kg Trial 2, Right Hand: kg_____ Trial 3, Right Hand: _____kg

Dominant Hand: Left / _____ Right _____ Highest Grip Score: _____kg Evaluation Terminated: _____

STRENGTH EVALUATION – LEG

Trial 1: _____kg Trial 2:_____ kg Trial 3: _____kg

Highest Leg Score: _____ kg Evaluation Terminated:_____

STRENGTH EVALUATION – ARM

Trial 1: _____kg Trial 2: _____kg Trial 3: _____ kg

Highest Arm Score: _____ kg Evaluation Terminated: _____

ENDURANCE EVALUATION – PUSH-UP

Number of Successfully Completed Push-ups: _____Evaluation Terminated: _____

ENDURANCE EVALUATION – CURL-UP

Number of Successfully Completed Curl-ups: _____Evaluation Terminated: _____

FLEXIBILITY EVALUATION – SIT & REACH

Trial 1: _____ inches Trial 2: _____inches Trial 3: _____inches

Furthest Distance Score: _____ inchesEvaluation Terminated: _____

HealthFit Matrix

		10	7	5	3	1
Body Composition (%)	M	<16	≤18	≤22	≤25	≥26
	F	<22	≤24	≤28	≤31	≥32
Aerobic Capacity (ml/kg/min)		≥55	≥42	≥35	≥30	≤29
Muscular Endurance [Situp + Pushup ÷ 2 (max 45)]		≥40	≥34	≥26	≥17	≤16
Muscular Strength (lb)		≥119	≥109	≥104	≥94	≤93
Flexibility (in)		>15	>13	>11	>9	≤9

HealthFit Score

Test Type		Raw Score	Ring Value	X	Points
Body Composition				2.0	
Aerobic Capacity				2.5	
Muscular Endurance	Push-up			2.0	

Co-funded by the European Union

Annex 2.

Medical Certificate

Competitive sport activity

The undersigned (licensed physician) ....., on the basis of the medical tests: **medical visit, test of urines (urinalyses), electrocardiogram at rest and stress test, spirography** (diagnostic test as by the Italian law to be able to practice competitive sports activities – Ministerial Decree 18/02/1982)

certifies that

Name .....Surname.....

Born.....in.....

Resident in (city).....address.....

can practice competitive Athletics sport activity.

This certificate is valid for (max. 12 months).....

and will expire on.....

Date,

The Doctor

(stamp e signature)

BIBLIOGRAPHIC REFERENCES.

Armitage CJ. (2009) Is there utility in the transtheoretical model? Br J Health Psychol.2,(195-210). doi: 10.1348/135910708X368991. Epub 2008 Oct 14. PMID: 18922209.

González-Peris M, Peirau X, Roure E, Violán M. (2022) Guide to prescribing physical exercise for health. 2nd ed. Barcelona: Generalitat de Catalunya.

Gould, D. (1983). Developing psychological skills in young athletes. In N. L. Wood (Ed.), Coaching science update. Ottawa, ON: Coaching Association of Canada.

Horn, T. S. (2008). Coaching effectiveness in the sport domain. In T. S. Horn (Ed.), Advances in sport psychology (3rd ed.) (pp. 237–267). Champaign, IL: Human Kinetics.

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. Journal of Consulting and Clinical Psychology, 51(3), 390–395. https://doi.org/10.1037/0022-006X.51.3.390

HEPALIS

Interactive Tool Client: Assessment And Goal Setting

Module 2

2023

1. Why is it important to consider the personal history of a client before prescribing physical exercise?
A. To detect personal or family risk factors
B. To assess the general state of physical condition
C. To record the medical history of the client
D. To determine the type and intensity of physical exercise for an individual
Correct answer: D. To determine the type and intensity of physical exercise for an individual

2. What is the main purpose of assessing the general state of physical condition in functional assessments?
A. To determine the type and intensity of physical exercise for an individual
B. To record the medical history of the client
C. To detect personal or family risk factors
D. To assess the general state of physical condition
Correct answer: D. To assess the general state of physical condition

3. What is the main purpose of detecting personal or family risk factors in functional assessments?
A. To determine the type and intensity of physical exercise for an individual
B. To record the medical history of the client
C. To assess the general state of physical condition
D. To detect personal or family risk factors
Correct answer: D. To detect personal or family risk factors

4. What is the main determinant for prescribing physical exercise?
A. Personal history
B. Level of physical activity
C. Fitness level
D. Individual goals
Correct answer: D. Individual goals

5. What is the main goal of Short Specialist Talks?
A. To make money
B. To improve health and physical condition
C. To increase physical activity in individuals who do not meet international physical activity recommendations
D. To promote a specific brand of exercise equipment
Correct answer: C. To increase physical activity in individuals who do not meet international physical activity recommendations

6. Which type of intervention on the indication of physical exercise is recommended for apparently healthy people?
A. Unsupervised physical exercise
B. Short Specialist Talks
C. Supervised physical exercise
D. Advised physical exercise
Correct answer: A. Unsupervised physical exercise

Co-funded by the European Union

7. Which type of physical exercise practice involves the continuous presence of a qualified professional during sessions?
A. Unsupervised physical exercise
B. Advised physical exercise
C. Supervised physical exercise
D. Short Specialist Talks
Correct answer: C. Supervised physical exercise

8. What is the recommended follow-up period for supervised physical exercise?
A. 1-3 months
B. 3-6 months
C. 6-12 months
D. 2 years
Correct answer: B. 3-6 months

9. Which type of education consultation focuses on developing personal skills and resources to increase physical activity?
A. Individual Education
B. Group or collective education
C. Supervised physical exercise
D. Unsupervised physical exercise
Correct answer: A. Individual Education

10. What is the main goal of supervised physical exercise?
A. To promote a specific brand of exercise equipment
B. To provide a timely intervention
C. To improve health and physical condition
D. To make money
Correct answer: C. To improve health and physical condition

11. Which type of intervention on the indication of physical exercise involves an initial evaluation of the person and a more precise programming?
A. Supervised physical exercise
B. Advised physical exercise
C. Short Specialist Talks
D. Unsupervised physical exercise
Correct answer: B. Advised physical exercise

12. Which type of intervention on the indication of physical exercise involves interrupting continuous sitting time with activities of any intensity on a regular basis?
A. Short Specialist Talks
B. Advised physical exercise
C. Supervised physical exercise
D. Unsupervised physical exercise
Correct answer: A. Short Specialist Talks

Co-funded by the European Union

13. What is the term used to refer to a device that counts the number of steps taken during physical activity?
A. Accelerometer
B. Direct calorimetry
C. Indirect calorimetry
D. Pedometer
Correct answer: D. Pedometer

14. What is the term used to refer to the reaction or effect that physical activity has on the body?
A. Intensity
B. Volume
C. Frequency
D. Internal load
Correct answer: D. Internal load

15. What is the term used to refer to the total amount of physical activity performed?
A. Volume
B. Intensity
C. Frequency
D. Recovery
Correct answer: A. Volume

16. What is the term used to refer to the time of application of a certain workload?
A. Intensity
B. Recovery
C. Duration
D. Frequency
Correct answer: C. Duration

17. What is the term used to refer to a device that measures motion on one or more spatial axes?
A. Accelerometer
B. Pedometer
C. Indirect calorimetry
D. Direct calorimetry
Correct answer: A. Accelerometer

18. What is the term used to refer to the measurement of body heat production and caloric expenditure in a laboratory?
A. Direct calorimetry
B. Indirect calorimetry
C. Accelerometer
D. Pedometer
Correct answer: A. Direct calorimetry

Co-funded by the European Union

19. What are the two elements that make it possible to dose physical activity?
A. Frequency and recovery
B. Volume and speed of execution
C. Type of activity and individual workload
D. Intensity and duration
Correct answer: C. Type of activity and individual workload

20. What is the definition of intensity in relation to physical activity?
A. The amount of work done per unit of time
B. The amount of rest time between sets
C. The distance traveled
D. The number of repetitions performed
Correct answer: A. The amount of work done per unit of time

21. Which model of behavior change is one of the most widely used in the field of health?
A. Self-determination theory
B. Reasoned action theory
C. Self-efficacy theory
D. Transtheoretical model
Correct answer: D. Transtheoretical model

22. According to the reading, what can significantly affect the performance and psychological growth of athletes?
A. Athletes' appearance
B. Athletes' socioeconomic status
C. Coaches' expectations and behavior
D. Athletes' gender
Correct answer: C. Coaches' expectations and behavior

23. According to the reading, what is self-efficacy defined as?
A. The awareness of the advantages of change outweighing the disadvantages
B. The ability to resist temptation and maintain healthy behaviors
C. The belief that individuals are capable of achieving their goals
D. The confidence that individuals can make and maintain changes in difficult situations
Correct answer: D. The confidence that individuals can make and maintain changes in difficult situations

24. According to the reading, what is one of the main determining factors for clients with low economic resources to practice physical activity?
A. Lack of access to resources
B. Lack of motivation
C. Lack of knowledge about the benefits of physical activity
D. Lack of time
Correct answer: B. Lack of motivation

Co-funded by the European Union

25. In which stage of change does the person intend to take action in the immediate future (1 month)?
A. Contemplation
B. Action
C. Precontemplation
D. Preparation
Correct answer: D. Preparation

26. According to the reading, what is one of the main factors that can lead to chronic contemplation or procrastination?
A. A balanced cost-benefit ratio
B. Lack of knowledge about the benefits of physical activity
C. Lack of access to resources
D. Lack of motivation
Correct answer: A. A balanced cost-benefit ratio

Co-funded by the European Union

HEPALIS

Self-Assessment Test: Client Assessment And Goal Setting

Module 2

2023

1. What is the main purpose of assessing the general state of physical condition in functional assessments?
A. To determine the type and intensity of physical exercise for an individual (2 points)
B. To record the medical history of the client (1 point)
C. To assess the general state of physical condition (3 points)

2. What is the main determinant for prescribing physical exercise?
A. Level of physical activity (2 points)
B. Fitness level (1 point)
C. Individual goals (3 points)

3. Which type of intervention on the indication of physical exercise is recommended for apparently healthy people?
A. Unsupervised physical exercise (3 points)
B. Supervised physical exercise (2 points)
C. Advised physical exercise (1 point)

4. What is the main goal of supervised physical exercise?
A. To promote a specific brand of exercise equipment (2 points)
B. To provide a timely intervention (1 point)
C. To improve health and physical condition (3 points)

5. What is the term used to refer to a device that counts the number of steps taken during physical activity?
A. Accelerometer (1 point)
B. Smartphone (2 points)
C. Pedometer (3 points)

6. What is the term used to refer to the time of application of a certain workload?
A. Periodization (2 points)
B. Recovery (1 point)
C. Duration (3 points)

7. What are the two elements that make it possible to dose physical activity?
A. Type of activity and individual workload (3 points)
B. Intensity and duration (1 points)
C. Activity and workload (2 points)

8. According to the reading, what can significantly affect the performance and psychological growth of athletes?
A. Coaches' appearance (2 points)
B. Coaches' socioeconomic status (1 point)
C. Coaches' expectations and behaviour (3 points)

9. According to the reading, what is one of the main determining factors for clients with low economic resources to practice physical activity?
A. Motivations´types (2 points)
B. Lack of motivation (3 points)
C. Lack of knowledge about the benefits of physical activity (1 point)

Co-funded by the European Union

10. According to the reading, what is one of the main factors that can lead to chronic contemplation or procrastination?
A. A balanced cost-benefit ratio (3 points)
B. Lack of knowledge cost-benefits of physical activity (2 points)
C. Lack of access to resources (1 point)

Note: Scores within the 1-10 range will receive Comment 1, 11-20 range will receive Comment 2, and 21-30 range will receive Comment 3 for interpretation.

Comment 1 (1-10 points range): Congratulations on completing the self-evaluation! Your score falls within the 1-10 point range, indicating that there might be some areas where you could enhance your understanding the estrategies Client Assessment and Goal Setting. Consider revisiting the module's content, paying special attention to key principles and strategies. Continuous learning is key to providing effective and inclusive services.
Comment 2 (11-20 points range): Great job! Your score falls within the 11-20 point range, suggesting a solid understanding of the key concepts covered in the module. There might be a few areas where you could delve deeper or refine your knowledge, so consider revisiting specific sections for a more comprehensive understanding. Keep up the good work, and don't hesitate to explore further to enhance your expertise.
Comment 3 (21-30 points range): Fantastic performance! Your score falls within the 21-30 point range, indicating a strong grasp of the material covered in the training module. You have demonstrated a comprehensive understanding of the estrategies Client Assessment and Goal Setting in personal training, with a particular focus on low-income individuals. Your commitment to continuous improvement and staying informed is commendable. Keep up the excellent work in promoting inclusive and effective practices in the field of fitness.

Co-funded by the European Union

HEPALIS

Exercise Programming And Instruction

Module 3

2023

Contents

1. Strength training. Important aspects and classifications..... 4
2. Functional Training 13
3. Technical execution of exercises performed on bodybuilding machines 18
4. Technical execution of exercises performed with free weights..... 21
5. Cardio Training 24
6. Training of people with joint pathologies 28
7. Training of pregnant women 32
8. Training in the elderly 37
References..... 39

1. Strength training. Important aspects and classifications.

Strength training is currently considered an essential element in the training planning of any sports specialty in which the aim is to achieve adequate performance and health of the athlete. It is also an essential activity to ensure mobility and the functioning of the musculoskeletal system, and even to promote functional independence in the elderly. In the field of sports, strength is one of the most relevant indicators of an athlete's physical condition to achieve maximum performance in any sports discipline in which motor action is paramount. The combination of strength training methods has been described as an effective strategy for the development of this ability. It is especially recommended for the improvement of power and explosive strength.

Resistance training with overload is a very important physical activity to develop characteristics such as muscle strength, muscle power (Hakkinen & Komi, 1981), hypertrophy and endurance (de Salles et al., 2009). Strength training in sports such as basketball is part of the pre-season training program (Fulton, 1992), strengthening a muscle also prevents the athlete from possible sports injuries and increasing the confidence, self-esteem and motivation of athletes towards the practice of their sport (Ignjotović et al., 2011).

Maximal strength training has been shown for many years to be effective in improving different actions specific to team sports such as the kick in football (Taïana et al., 1993), the pitch in baseball (Lachoventzt et al., 1998; McEvoy & Newton, 1998; Newton & McEvoy, 1994), netball (Cronin et al., 2001) and handball (Hoff & Almasbakk, 1995; Van Muijen et al., 1992), approach jumping in volleyball (Newton et al., 1999) and jumping in basketball for professional players (Tsimachidis, Patikas, Galazoulas, Bassa, Kotzamanidis, 2013) and players in youth (Calleja, Cámara, Martínez, Mejuto, & Terrados, 2015).
The American College of Sports Medicine (ACSM) states in its recommendations (Fiataraone et al., 2019) that people of all ages and abilities who regularly participate in endurance Strength exercises reduce the risk of numerous diseases, improve quality of life, and reduce mortality.

Figure 1: Strength - Resistance Training for Health (ACMS, 2109) https://www.acsm.org/docs/default-source/files-for-resource-library/resistance-training-for-health.pdf?sfvrsn=d2441c0_2

Strength as a physical capacity has different manifestations and different ways of planning your training and among them are:

Concentric Contraction Methods

● Maximum Intensities Method I. The objective of this method is to increase maximum strength with hardly any development of muscle hypertrophy. The variables of the training load are as follows: intensity between 90 and 100% for 1RM, 4-8 sets, 1-3 repetitions per set, and a maximum/explosive speed in execution. The effects of this method are: increased strength due to its impact on nervous factors, increased explosive force, reduced inhibition of the central nervous system, and improved intramuscular coordination.

Co-funded by the European Union

● Maximum Intensities Method II. The purpose of this method is to increase maximal strength with little increase in body weight due to the small hypertrophy that occurs. The variables of the training load are intensity between 85 and 90% for 1RM, 4-5 sets, 4-5 repetitions per set, and maximum speed in execution. The effects of this method are less than those of the previous method in relation to: explosive force, reduced inhibition of the central nervous system, and intramuscular coordination.

● Repetition Method I. The goal of this method is to improve maximal strength, accompanied by average hypertrophy and less impact on nervous factors. The variables of the training load are: intensity between 80 and 85% for 1RM, 3-5 sets, 5-7 repetitions per set, and a maximum or medium speed in the execution. Maximum muscle tension is only reached in the last few repetitions of each set.

● Repetition Method II. The purpose of this method is to increase maximal strength as well as high muscle hypertrophy. The variables of the training load are: intensity of 70-80% for 1RM, 3-5 sets, 6-12 repetitions per set, the speed in the execution should be medium-high or the maximum possible. The effects of this method on nervous factors are low or non-existent, there is an increase in strength deficit, little influence on explosive strength, and a greater number of motor units recruited.

● Repetition Method III. The goal of this method is general muscle conditioning with high muscle hypertrophy. This is a basic method of strength training with the following load variables: 60-75% intensity for 1RM, 3-5 sets, 6-12
repetitions per set, the speed of execution should be average. Muscle failure is not reached in the work series.

● Mixed or pyramid method. The purpose of this method is to increase maximum force by acting on both nervous and structural parameters. The variables of the training load are: intensity of 60-100% for 1RM, 7-14 sets, gradual increase from 1 to 8 repetitions and vice versa, the speed in the execution must be medium-maximum or maximum. The effects of this method are: increased explosive strength, high muscle hypertrophy, and improved intramuscular coordination.

● Pure concentric method. The goal of this method is the development of explosive force through a strong impact on the nervous parameters. This method consists of making explosive concentric contractions without previous stretching or counter-movement, that is, the eccentric phase of the movement is eliminated in order to stimulate the muscles in the concentric phase. The training load variables are: intensity of 60-80% for 1RM, 4-6 sets, 4-6 repetitions per set, the speed in the execution must be maximum or explosive. It is a method widely used in the field of sport and should be reserved for the last phase of the competitive stage (Cometti, 1998).

Co-funded by the European Union

● Contrast method. The purpose of this method is to improve both maximum strength and explosive strength, both applicable to a specific sports discipline. According to Pérez Caballero (2003), the traditional system consists of combining series with high loads (6RM at 80% 1RM), and other series with light loads (6RM with 40-50% 1RM). Both types of series should be run at the highest possible speed. In contrast systems, you can work by pausing between load changes, or you can switch from the highest to the lightest load without rest in the same series. Another possibility is to first perform all the sets/repetitions with high loads, and after a break perform all the sets/repetitions with the lightest loads. Contrast work can also be used by combining maximum and sub-maximum loads (intense tension) with others without loads (maximum speed), such as performing squats at 90-95% of 1RM and then performing a series of sprints of 40, 50 or 60 meters. In the same way, isometric exercises can be alternated with explosive exercises, such as jumps without overload.

● Method based on execution power. Determining the intensity of work by the percentage of the maximum, by the repetitions per set that can be done with a weight, or by the effort apparently made, are attempts to solve a problem subjectively. Very often, the stimulus proposed to athletes does not adjust to their physiological state, and different effects are caused than intended. If the speed of execution of each repetition could be controlled, this would be the best information to dose the training load (González Badillo, 1991). Speed is a determining factor of training specificity, and a valid benchmark for rating movements in terms of their physiological state on the muscle and nervous system. The power-based method of execution allows the coach greater control over the training process.

O Force resistance: load between 30-70% of the maximum load; perform the repetitions indicated by the device and continue as long as the established power is maintained; average power between 50-100% of the absolute maximum power; intensity/power between 70-90% of the power reached with the load used.
O Hypertrophy: load between 70-90% of the maximum load; perform the repetitions indicated by the device and continue as long as the minimum power established is maintained; average power between 30-60% of the absolute maximum power; intensity/power determined until only a value of 80-85% of the maximum power achieved with the load used in training is reached.
O Maximum strength: load between 70-100% of the maximum load; repetitions are automated; power between 5-50% of the absolute maximum power; intensity/power determined at least 90% of the power achieved with the training load.
O Fast/explosive strength: load between 20-70% of the maximum load; repetitions are automated; power between 50-100% of the absolute maximum power; intensity/power determined at least 90% of the power achieved with the training load.

Co-funded by the European Union

Isometric shrinkage methods

This type of method is based on its static performance, also producing muscle tension. In isolation, it only acquires some relevance in sports such as shooting, artistic gymnastics or skiing. Combining this method with others based on concentric contractions or explosive motor actions, it is of greater interest for competitive sports, but not at an amateur level.

In the isometric training methodology, three different ways of working can be distinguished:

- Maximum isometrics: Poses a maximum resistance that cannot be exceeded.
- Total isometrics: the load is not maximum, but isometric contraction is maintained until maximum fatigue.
- Dynamic static: This is performed by marking a predetermined isometric contraction time and ends the repetition with an explosive concentric contraction.

Eccentric Contraction Methods

This system is also known as negative dynamic training. In eccentric contraction, tension occurs when the muscle is lengthening, producing greater muscle tension and therefore greater force than with isometric and concentric contraction. In this contraction the contractile capacity of the muscle is joined by the resistance of the actin and myosin bridges when stretched.

- The general characteristics of the eccentric system can be summarized in the following sections:
- It is advisable to apply it in combination with concentric methods.
- This work should not be carried out for a period longer than 3 weeks.
- It should be inserted into the training planning away from competition.
- It has the difficulty that it requires, with some exceptions, the help of one or more companions.
- It poses a risk of injury if appropriate action is not taken.
- It is only suitable for athletes with great experience with strength training.
- It does not increase muscle mass (Cometti, 1998).
- Eccentric work improves more than any other method, the strength of the connective tissues and therefore the elastic strength.
- It is metabolically more efficient (energy-saving) than the other methods (Kaneko, Fuchimoto, Toji & Suei, 1983).
- Muscle electrical activity is lower than that of the other two methods.

Co-funded by the European Union

Explosive Strength and Elastic-Explosive Force

● Method based on dynamic efforts

The goal of this method is to improve the MFI (Strength Manifestation Index). The load variables are: intensity between 30-70% for 1RM, 6-10 repetitions/set, the speed of the execution should be maximum/explosive. The effects that occur with this method are the improvement in the frequency of impulse and synchronization, the maximum power is developed or maintained although it has little effect on the dynamic force. The number of repetitions per set should not be maximum so that the exercise can be performed with maximum power.

● Explosive eccentric-concentric method

The purpose of this type of method is to achieve a multiple effect caused by the influence of explosive concentric contraction on the MFI, the elastic, reactive and disinhibiting effects of the shortening-stretch cycle (CEA) and the improvement of the maximum force due to the high stress caused in the braking phase and the number of repetitions proposed. The load variables are: intensity between 70-90% for 1RM, 6-8 reps/set, the speed of execution should be maximum/explosive. The effects of this method are: the improvement of all neuromuscular processes; a special effect on the mechanisms that inhibit and facilitate muscle contraction; it does not favor the development of maximum strength in trained subjects, but it does favor its power; it promotes the storage capacity of elastic energy due to the positive effect on nervous mechanisms; increases mechanical efficiency (work-to-energy ratio) (Komí, 1992); and improves the degree of tolerance to the higher training load (Bosco, 2000; Komí, 1992).
In this method, the eccentric phase of the exercise is performed with as little resistance as possible, almost dropping the weight freely until the moment when the concentric phase begins, which is performed explosively. The transition from the eccentric to the concentric phase should be as brief as possible (Schmidtleicher, 1992). If the development is maintained within the indicated intensities, the number of repetitions per set proposed by this author is not achievable in exercises such as the bench press or squats. The best criterion for determining whether the charges are effective is that the deceleration in the eccentric phase is abrupt, carried out in a very short time, and the concentric acceleration is very explosive, with a very short downtime between the two. If the movement is carried out in this way, the tension caused will be equivalent to more than 200% of the weight used. This method can be considered as a variant of plyometrics with loads.

Co-funded by the European Union

● Plyometrics

The purpose of this method is to target all neuromuscular processes. The load variables are: intensity between 70-90% for 1RM, 3-5 sets, 5-10 reps/set, the speed of the execution should be maximum/explosive, the execution power should drop very little. In relation to the intensity of the load, the resistance that must be overcome most often in plyometrics is one's own body weight, but there are several variants. A classification of the intensity with respect to the jumping task could be as follows: Low intensities: simple jumps to overcome small obstacles. Medium intensities: multi-jumps with little displacement and deep jumps from small heights: 20-40 cm. High intensities: multi-jumps with wide displacements, deep jumps from greater heights: 50-80 cm and jumps with small loads. Deep jumps: with reduction of one's own body weight through rubber bands tied to supports.

● Method with specific loads

These types of methods are employed to apply rapid force. This type of strength is related to the explosive strength and speed of execution that must be trained in relation to the optimal and/or maximum speed with which the sports gesture is performed. The manifestation and training of rapid strength is specific to each sport. Once maximum strength has been optimally developed, it will be a matter of performing specific gestures at competition speed or slightly higher. According to Kutnesov (1989), it is called the variable effect method, which consists of the optimal alternation of the number of exercises with lower and higher resistances to the competition both in a session and in the year of preparation. In short, training for explosive strength or the application of maximum strength is specific to each sport, and must move within parameters of resistance, series, repetitions and pauses that allow a manifestation of speed and power close to those necessary in competition in each of the repetitions that are performed.

Reactive Strength Training Systems

These types of methods are adapted to each sports discipline. It consists of performing very fast contractions in plyometric regime, with very short CEAs. As a general method, the plyometric methods described in the previous section can be noted, but always without external load and with the shortest contact time.

Strength Resistance Training Systems

Strength resistance training aims to prepare the athlete to maintain the best levels of strength and technique for the duration of the competition. Strength-endurance training will also be specific to each sport, but according to Reib (1992), the main action of this specific activity in each sport discipline should be directed above all to:
1. Develop neuromuscular budgets for higher speed.
2. Increase the local muscular endurance of the specific muscle group interested in the competition.
3. Create budgets for the improvement of sports technique and its control for an effective manifestation of it in conditions of increasing fatigue.
4. Build the ability to mobilize psychophysical capacities in conditions of fatigue.

Co-funded by the European Union

Figure 2: Summary of Strenght Types - https://pin.it/5BpucU5

Task 1: Define the type of strength that our athlete needs and that combination of them through interviewing and kinematic and biomechanical analysis of the sport in question and limit the training methodology to their needs.

Co-funded by the European Union

2. Functional Training

Functional training is characterized by adapting to the natural movements of the human body. For example, some everyday movements such as jumping, bending, or pushing can be part of this type of routine. In this way, a very complete work is achieved since the activity of all muscles and joints is involved.

Functional exercises, in addition to being global, are of gradual intensity. However, they are always adjusted to our capabilities and goals. It is important that these sessions are marked by a professional. The personal trainer oversees drawing up a functional training table adapted to each person. The exercises will be short and the intensity will increase according to the progress of each athlete.

The personal trainer should know the person's history, considering whether they suffer or have suffered any type of injury, for example. In this way, the results of functional training will be effective, and risks will be minimized.

From the collection of the personal information of each athlete, the monitor will establish varied circuits in which the different muscle chains are worked. In addition, they will be the one who will determine the intensity, recovery intervals, as well as the appropriate warm-up exercises and stretches.

Functional training exercises are those that are based on strength-endurance work and involve the participation of all muscle groups based on generic exercises such as:

● Front or side planks, resting on hands or elbows, to tone the core, trunk or central area of the body.

Figure 3: Irons - https://blog.smartfit.com.mx/planchas-los-mejores-ejercicios-abdominales/

Co-funded by the European Union

● Squats to strengthen the lower body involving muscles such as quadriceps, hamstrings and glutes.

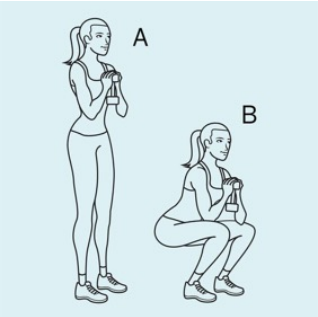


Figure 4: Squat - https://www.pinterest.es/pin/303993043612958445/

● Lunges, another intense option to work the lower body and posterior chain.

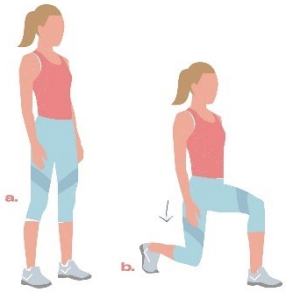


Figure 5: Steps

● Assisted pull-ups or pull-ups, an excellent exercise that raises the pulse and with which the strength is significantly increased using one's own body weight, based on back traction against gravity.

Figure 6: Rubber-assisted pull-ups - https://www.pinterest.es/pin/49961877090321126/

● Deadlifts and weight-bearing exercises to work the posterior muscle chain and improve hand grips, as well as core strengthening with a stabilizing character.

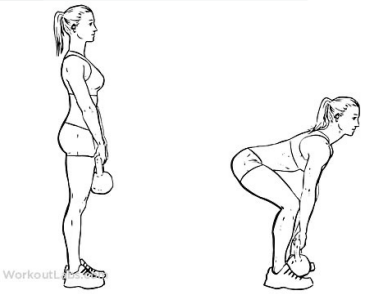


Figure 7: Deadlift - https://www.pinterest.es/pin/531284087287600929/

● Box climbs, with which we simulate the displacement of our weight when climbing stairs or overcoming a significant slope to also improve grip with free weights.

Figure 8: Step ups - https://www.pinterest.es/pin/128775489207630 09/

● Single-leg hip raise to strengthen the glutes, abdomen, lower back, and legs, and strengthen the knees.

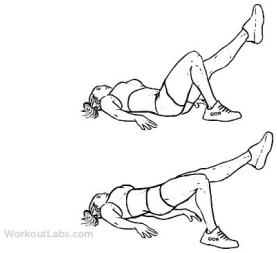


Figure 9: single-leg hip raise - https://www.pinterest.es/pin/854135885549067445/

● Push-ups to work the chest, triceps and deltoids, and strengthen the entire core.

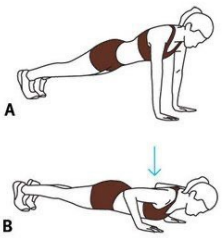


Figure 10: Push up - https://www.pinterest.es/pin/285626801354363279/

Co-funded by the European Union

● Bulgarian squats for the anterior and posterior muscles of your legs (quadriceps, abductor, soleus) in addition to the glutes.

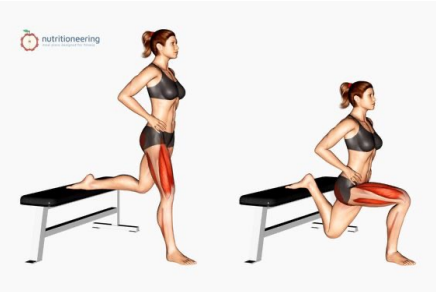


Figure 11: Bulgarian split squat - https://www.pinterest.es/pin/749145719293348307/

● Standing scales (standing on one leg with arms stretched out and upper body and another leg parallel to the floor), for balance and core strength.

Figure 12: Standing scales - https://www.pinterest.es/pin/1150599404774084106/

Task 2 : Perform functional exercises following the criteria described above in order to improve their functionality based on the objectives set by the athlete's needs.

3. Technical execution of exercises performed on bodybuilding machines

Strength training generates multiple benefits, including: improved motor performance, sports performance, self-image, health conditions and quality of life, and the prevention of pathologies and diseases (Copeland et al., 2019)
The type of resistances used in strength training has diversified considerably. In addition to the traditional means (barbells, dumbbells, elastic bands, weight machines and medicine balls), new elements such as vibrating machines, unstable surfaces, TRX® bands or kettlebells have been added (Raya & Sánchez, 2018).
Along the same lines, we are going to focus on strength work through bodybuilding machines.
Weight machines offer the following advantages: they provide the performer with greater safety; they allow the different bodybuilding exercises to be learned easily and it is possible to change the workload very quickly. Among the disadvantages we can highlight that they do not adapt to the anthropometric characteristics of all subjects and that they do not allow to achieve a great neuromuscular activation, since they stabilize and guide the movements made by the performer.

Training on weight machines has specific impacts on the body, generating beneficial physiological adaptations. These exercises, by applying controlled and guided resistance, allow for a focused load on specific muscle groups. This targeting can result in increased strength and muscle mass in those areas. In addition, the use of machines provides additional stability during movement, reducing the risk of injury and allowing individuals to work more safely. The variability of the machines also makes it easy to modify the load and intensity, which contributes to the customization of training programs according to individual needs.

Despite the benefits, it's crucial to note that machine training should be complementary and not exclusive to an exercise program. Incorporating functional exercises and strength training with free weights is essential to promote a full range of motion and activate stabilizing muscle groups. In addition, proper supervision, whether from a personal trainer or fitness professionals, is essential to ensure that technical execution is correct and safe, thus maximizing the benefits of training on machines to improve athletic performance.

Precise technical execution in exercises is a crucial component of maximizing athletic performance. Proper technique not only optimizes the effectiveness of movement, but also reduces the risk of injury, allowing athletes to perform exercises more efficiently and safely. Correct alignment, proper range of motion, and optimal muscle activation are key elements that contribute to solid technical execution. In addition, improved technique can lead to greater biomechanical efficiency, allowing athletes to use their strength more effectively and ultimately improve their performance in competitions.

To do this, a series of indications must be considered for the correct use of the machines.

Co-funded by the European Union

Seat Height and Position Adjustment:
Adjust the seat height and position to ensure the joints are properly aligned.
When sitting, your knees should form a 90-degree angle, with your feet flat firmly on the floor.
Resistance or Weight Settings:
Select a weight or resistance suitable for your fitness level and goals.
Start with a light weight and perform a few repetitions to assess the difficulty before increasing the load.

Body Alignment and Posture:
Maintain a neutral posture of the spine and align the joints throughout the movement.
Avoid arching your back or locking your joints, maintaining a stable and controlled position.

Adjusting Safety Devices:
Verify that safety devices, such as locking pins, are properly seated. These devices prevent sudden movements and ensure a safer workout.

Stabilization & Grips:
Use the grips provided by the machine to maintain stability during the exercise.
Adjust stabilization elements, such as pads and supports, to fit your anatomy and reduce the risk of injury.

Range of Motion Control:
Adjust the machine to limit or allow a specific range of motion based on your physical needs and capabilities.
Avoid excessive movements that can compromise the integrity of the joints.

Ergonomic Considerations:
Make sure the machine is set up ergonomically for your body, avoiding unnecessary stress on your joints.
Adjust any accessories, such as cushions and headrests, to optimize comfort.

Co-funded by the European Union

4. Technical execution of exercises performed with free weights.

Specifically, free weight training is part of strength exercises, and encompasses those accessories that allow freedom of movement. This means that, although precision is required to exercise in the right way without the risk of injury, you don't have to take that preset route to which gym machines are subjected. Among the accessories that can be used are dumbbells, medicine balls, weights, or kettlebells.

Free weight exercises are exercises that have a much greater range of motion than any other strength training method. For example, if we compare the squat to the knee extension machine, we will need much more mobility in the squat. Due to this greater range of motion, many of these exercises are considered as multi-joint movements (where more than one joint is involved) we will need greater intermuscular coordination (coordination between muscle groups) and with it, a greater work of our central nervous system (CNS).

Below are some examples of routines with free weights and their correct technical execution.
Full body with free weights

Strength training with free weights consisting of several blocks:
● Block 1: Three sets with 10 repetitions of barbell squats, pull-ups and parallel dips. Two-minute breaks should be taken between sets.
● Block 2: three sets with 10 repetitions of deadlifts, dumbbell bench press, and dumbbell bench row. Between sets, you should also rest for two minutes.
● Block 3: like the previous ones, there are three sets with 10 repetitions per exercise in each one. The exercises are the lateral raises with dumbbells, the biceps curls with dumbbells and the low plank, which is the one that should be supported on the forearm.

Free Weight Leg Routine

● Squats. Hold the bar behind your back and perform the squat trying not to bend your body excessively but keeping your trunk straight. You should lower yourself further than you do in normal squats and perform five sets of five repetitions.
● Front squat. In this case, keep the bar in front and not behind. Four sets of this exercise of about eight to 10 repetitions should be completed.
● Jump squat. In this exercise, we do not use props, but we use our body weight. It involves completing the squat by lowering yourself until your glute is just a few inches from your heels, and jumping when you get your body back upright. 15 repetitions can be completed in four sets.
● Strides. Hold the bar from behind, as in the first few squats, but you can grab dumbbells at your sides and alternately raise and lower them as you complete the movement. It is known to involve stepping forward and bending your knees so that they form right angles. It is recommended to do five sets of 10 to 12 repetitions.
each should be completed.

Co-funded by the European Union

Free Weight Arm Routine

● Pronated biceps curl. It is proposed to hold the bar not with the forearms facing upwards, but downwards. Go up and down to complete the trajectory of the bar from approximately hip to chest, taking care not to raise your shoulders. It is recommended that you complete five sets of between eight and 15 repetitions.
● Supination biceps curl. In this case, you do grab the bar with your forearms facing upwards to complete the full movement. Auxiliary aid is used to lower and hold the descent for five to six seconds alone, although less weight can be held, and the entire movement can be done alone. Four sets of four to six repetitions each should be completed.
● Incline blank biceps curl. He leans his back on the bench to complete the curls with a single dumbbell at his side. Perform four sets of 10 to 12 reps on each arm.
● Incline blank torso biceps curl. In this case, you should turn around to rest your chest on the bench, where you have previously supported your back. When the dumbbell is raised, it rotates to supination for a more complete exercise. Four sets of eight to 10 repetitions per arm are performed.

● Closed bench press. You should rest your back on the bench and hold the bar with the discs at chest height. Between 8 and 10 repetitions should be done in each of the four sets.
● Triceps extensions with disc. Sitting on the bench with your back straight. You need a disc that you must hold behind your head, going up and down until you complete the trajectory up to your shoulders. The descent should be done slowly for the exercise to be more effective, reaching six seconds. You can complete four sets of 15 repetitions.
● Flexion with displacement (push-up). The execution of the exercise involves some difficulty. You should stand with your trunk and legs parallel to the ground, climb up to the high board, and complete an elbow bend to go down. But, when you're down, you should use your hands and wrists (even forearms) to slide the balls of your feet back and forth before climbing back up. You should be on a surface that facilitates that glide, and you can do repetitions until you fail.

Co-funded by the European Union

5. Cardio Training

Cardiovascular training, also called cardio or aerobic, encompasses all those activities and exercises that increase heart rate and breathing using large muscle groups in a repetitive and rhythmic way. Walking, running, swimming, or exercising on the bicycle and elliptical are cardiovascular or also called aerobic activities, which have a direct impact on improving the function of the heart, lungs and circulatory system.

Cardiovascular exercise is often associated only with weight loss, but it has many other benefits for our health:

- It improves the cardiovascular system and decreases the risk of heart disease.
- It increases lung capacity, increasing our endurance.
- It reduces the risk of diseases associated with a sedentary lifestyle such as hypertension, diabetes, and cholesterol.
- Improves sleep and rest.
- Reduces stress and fatigue.
- Reduces anxiety and depression.
- Reduces Cognitive Decline in Older Adults
- Improves the immune system.
- It helps to control body weight and lose fat, in combination with a proper diet.

The main physiological parameter that describes our adaptation to cardiovascular training is the maximum volume of oxygen or Vo2max.

Maximal oxygen consumption is the maximum amount of oxygen that the individual can process per unit of time and weight and is expressed in mL/kg minute. It represents the body's ability to absorb, transport, and metabolize oxygen.

VO2 max is determined by intrinsic factors of the individual, most of which have nothing to do with their training, such as genetics, sex, weight and height, age, hemoglobin level and muscle mass, and the type of sports activity. Training can improve it little, only 15-20%. With age it decreases, in women, the maximum value is at 14 years of age while in men at 16. From this age, it declines in both sexes. In men it is higher than in women (20-30%) since they have a higher percentage of muscle mass and hemoglobin concentration in the blood. In addition, the VO2 max will also depend on the sports activity.

The improvement of cardiovascular performance (oxygen consumption and anaerobic threshold) is especially relevant for the conditional performance of many sports specialties. This is one of the most common effects and utilities referred to in almost all studies for different types of sports populations, sedentary subjects of different ages, or even patients with certain pathologies. This means considering HIIT as an effective alternative to continuous exercise of low and moderate intensity with similar or greater effects on the improvement of cardiovascular performance, which can have substantial applications both for the improvement of specific performance in situation or team sports characterized by acyclic/discontinuous efforts and for endurance sports of short and medium duration (characterized by performing efforts of a difficult nature). predominantly cyclical).

To train VO2max we must design a training plan and intensity percentages, we do not base ourselves on the value of maximum oxygen consumption but on percentages of our maximum heart rate. Once we know at which beats the threshold is, we need to design the intervals.

Here are three examples of interval training:
- 5 intervals of 5 minutes between 5 and 0 beats below MHR. Recoveries of 5 minutes without falling below 70-75% of MHR.
- 8 intervals of 2 minutes between 2 and 0 beats below MHR. Recoveries of 2 minutes without falling below 70-75% of MHR.
- 2 intervals of 15 minutes between 10 and 5 beats below MHR. Recoveries of 15 minutes without falling below 70-75%.

Recoveries between intervals will be incomplete if they do not exceed the threshold, resting until 70-75% of MHR. One of the reasons for incomplete recoveries is to get the body used to metabolizing and recycling lactic acid. Since these are very short intervals, you must be strict about time and heart rate, so they should be done in an environment where you can always control the speed. Unless you have athletics track for running, it is best to do them on a treadmill or stationary bike/roller.

As final considerations that help to summarize and contextualize all this information and guide its practical application in an objective way:

- HIIT (High Intensity Training) formats help improve lactic threshold and adaptations to cardiovascular exercise efforts, as they are a potent exercise stimulus with promising acute and chronic effects on health and physical performance.
- HITTs can be an attractive and effective alternative to continuous moderate-intensity exercise with similar or greater effects if used correctly and individualized for each case.
- The dose-response relationship of this type of stimuli has yet to be established for each cohort of population, target and pathology, especially in terms of minimum and optimal intensity and volume.
- Bear in mind that the establishment and precise control of the duration and intensity of work and recovery intervals must be individualized so as not to generate rejection and abandonment in the population that is poorly trained or less familiar with this type of training.
- Start with the lowest work densities and intensities to progress to higher densities and intensities (e.g., start with 1:4 work densities to progress to 1:2 or even 1:1 densities). Monitoring work intensity using perceived exertion scales (RPE) can be one of the most practical and reliable alternatives available to all contexts and populations.
- The correct periodization of this training modality with the rest of the more traditional formats must be planned.
- It is also important to note, as some types of HIIT exercise might be contraindicated in certain clinical populations, that some subjects may require a specific prior evaluation before starting a high-intensity exercise program (e.g., heart disease patients or older people with risk factors).

Co-funded by the European Union

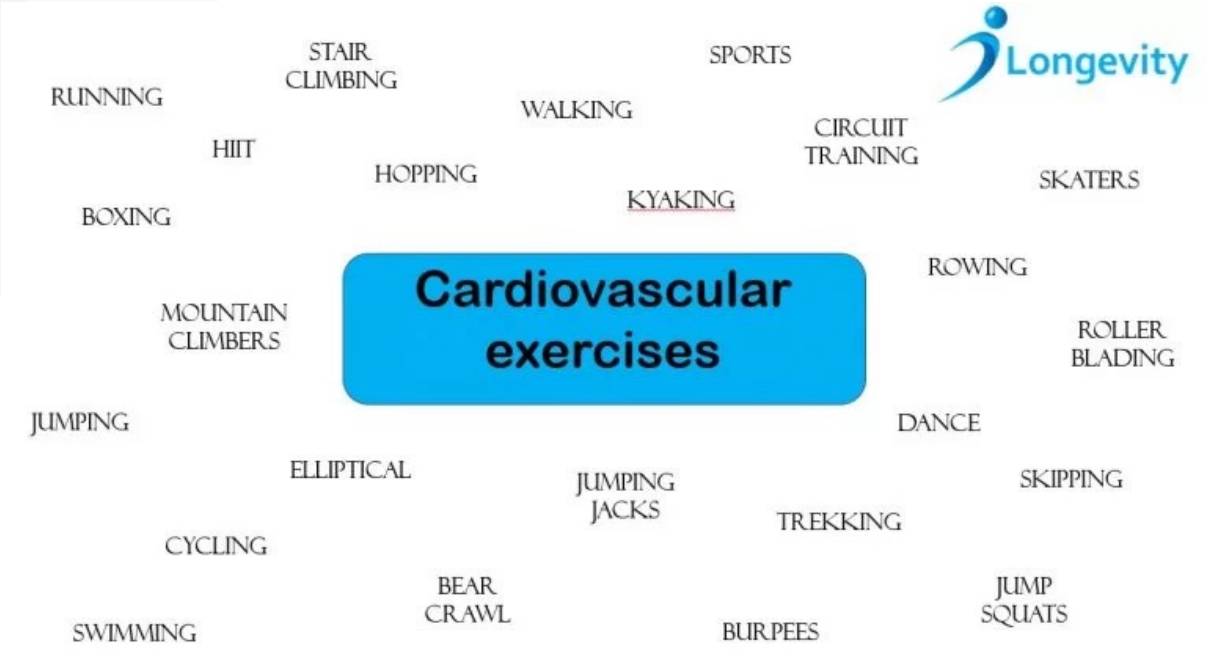


Figure 13: Cardiovascular exercices types - https://longevitypt.com.au/blog/types-of-cardiovascular-exercise/

Task 2 Define the type of cardiovascular need of the athlete and what combination of HIIT workouts should be applied to improve cardiovascular capacity.

6. Training of people with joint pathologies

Physical activity plays a critical role in people's health and well-being, and its importance is further magnified when it comes to individuals dealing with joint pathologies. Joint conditions, ranging from osteoarthritis to autoimmune diseases such as rheumatoid arthritis, can have a significant impact on the quality of life and functionality of those who suffer from them. Contrary to the common belief that absolute rest is the best option for preserving joint health, numerous studies support the idea that adequate and supervised physical activity can play a key role in managing and improving these conditions (Ben, Bonnal, & Gaudin, 2023).

Physical inactivity can lead to several negative consequences, such as loss of muscle mass, joint stiffness, and decreased mobility, which aggravates the symptoms of joint pathologies (Paredes, 2021). Conversely, a well-designed exercise program can contribute to strengthening surrounding muscles, improving flexibility, and reducing inflammation, thus providing substantial relief to those facing particular challenges.

Among the different joint pathologies that can occur, we find the following options:

Osteoartritis
It is characterized by the wear and tear of articular cartilage, usually affecting joints such as the knees, hips and hands. Despite the previous belief that rest was the best option, recent studies have shown that adequate exercise is critical to the management of osteoarthritis. Exercise programs that include low-impact activities, such as swimming or cycling, are particularly beneficial. Not only do these activities improve muscle strength, which provides better support to the joints, but they also help maintain mobility and reduce associated pain. A significant study in this context is that of Fransen et al. (2015) which highlights the efficacy of exercise for knee osteoarthritis.

Rheumatoid arthritis

It is an autoimmune disease that affects the joints and other organs, can lead to fatigue and loss of function. Despite these challenges, evidence supports that regular exercise can improve cardiovascular fitness, reduce fatigue, and contribute to emotional well-being in people with rheumatoid arthritis. However, it is crucial to tailor exercise programs to individual needs, considering each person's specific limitations and symptoms. The study by Hurkmans et al. (2009) highlights the importance of dynamic exercise programs for patients with rheumatoid arthritis.

Physical activity safety for people with joint problems is maximized through professional supervision. Physical therapists, kinesiologists, and specialized trainers play a crucial role in designing exercise programs tailored to individual abilities. Not only does this monitoring minimize the risk of injury, but it also allows for gradual and safe progression. The reference by Williams et al. (2007) underscores the importance of exercise endurance in individuals with and without cardiovascular disease, highlighting the need for a professional approach in exercise prescribing.

This theme has specific objectives when it comes to achieving an improvement in people with such characteristic pathologies.

Detailed Medical Evaluation:
- Get a complete medical evaluation to understand the nature and severity of joint pathology.
- Consult with health professionals, such as physical therapists or orthopedic doctors.

Set realistic goals:
- Define goals that are achievable and realistic, considering joint limitations.
- Adapt goals to individual abilities and general health.

Design a custom program:
- Create a program tailored to the specific needs of the person, taking into account the pathology and its restrictions.
- Include low-impact exercises that do not generate excessive stress on the affected joints.

Encourage Muscle Strengthening:
- Incorporate muscle-strengthening exercises to help stabilize and protect joints.
- Focus on muscle groups that provide support to the affected areas.

Working on Range of Motion:
- Integrate exercises that improve and maintain joint range of motion.
- Avoid movements that can cause excessive pain or stress on your joints.

Control Intensity and Duration:
- Adjust the recommended training intensity and duration according to individual tolerance and medical tolerances.
- Avoid sessions that are too long that can increase joint fatigue.

Incorporate Low Impact Exercises:
- Opt for low-impact activities, such as swimming, cycling, or water exercises.
- Reduce the load on your joints while maintaining the effectiveness of the workout.

Focus on Stability and Balance:
- Incorporate exercises that improve stability and balance, which can help prevent falls and further injuries.
- Use stable surfaces for exercises.

Joint Pathology Education:
- Provide educational information on joint pathology and preventive measures.
- Make sure the person understands their limitations and how to adapt their lifestyle.

Ongoing Professional Supervision:
- Work under the supervision of exercise professionals or physical therapists.
- Adjust the program as needed, based on individual response.

Co-funded by the European Union

Incorporate Stretching Sessions:
- Integrate gentle stretching sessions to improve flexibility and reduce joint stiffness.
- Avoid extreme positions that may cause discomfort.

Adapting Training to Changes in Joint Condition:
- Be flexible and adjust the program in case of changes in joint condition.
- Conduct periodic assessments to make accommodations as needed.

Promote Hydration and Nutrition:
- Ensure adequate hydration and nutrition to support overall health and recovery.
- Consult with healthcare professionals about possible supplements that may be beneficial.

Monitor and Communicate Regularly:
- Establish constant communication with the individual to get feedback.
- Monitor for any signs of discomfort or worsening joint condition.

Task 3: According to each of the objectives, a theoretical-practical workshop will be carried out by the students in which they have to complete a session with those exercises that they consider most relevant to achieve each of the proposed objectives.

7. Training of pregnant women

As awareness of the benefits of exercise has increased, so has interest in understanding how pregnant women can safely and effectively participate in workout programs.

Pregnancy is a unique period in a woman's life, characterized by significant physiological changes. Adequate physical activity during this time can play a crucial role in improving maternal well-being, preventing gestational complications, and promoting healthy fetal development (Parente, 2021). Despite growing evidence supporting the safety and efficacy of exercise during pregnancy, there are misperceptions and fears that may limit pregnant women's participation in training programs.

Physiological Changes
During pregnancy, a few physiological changes occur that affect various body systems. These include hormonal modifications, increased blood volume, changes in cardiovascular function, and musculoskeletal adaptations. These changes are critical for proper fetal development, but they can also influence the ability to perform exercise safely. The literature suggests that understanding these changes is essential for adapting training programs appropriately (Artal & O'Toole, 2003; Clapp, 2012).

Proceeds
Participation in exercise programs during pregnancy has been shown to offer several benefits for pregnant women. These include improving cardiovascular health, weight management, preventing gestational diabetes, reducing anxiety and depression, as well as facilitating labor and postpartum recovery (Barakat et al., 2016). In addition, regular exercise has been associated with a lower incidence of gestational complications.

The benefits that training can bring to pregnant women will depend on the trimester they are in.

1st Trimester	2nd Trimester	3rd Trimester
Improved cardiovascular health	Supporting Healthy Weight Management	Improved sleep quality
Reduced fatigue and increased energy.	Improved posture and reduced lumbar discomfort.	Facilitates postpartum recovery by maintaining strength and flexibility
Maintaining the right weight	Preparing for Labor Through Breathing and Flexibility Exercises	Relief of back pain through targeted stretching and strengthening exercises
Improved mood and stress reduction.	Improved blood circulation and reduction of excess weight.	Maintenance of muscle strength and endurance
Strengthening of key muscles (back, legs) to help support the weight of the growing uterus	Strengthening of the pelvic floor muscles to help with childbirth.	Helps control excessive weight gain

Co-funded by the European Union

Joint Mobility Training

Joint mobility during pregnancy is a crucial aspect for the physical well-being and quality of life of pregnant women. As the body undergoes significant changes to house and nourish the fetus, adjustments occur in the musculoskeletal system that can affect joint mobility. This process can lead to aches and pains, muscle aches, and restrictions in range of motion.

Several studies have highlighted the importance of maintaining joint mobility to reduce the risk of musculoskeletal discomfort, improve posture and facilitate the development of daily activities in pregnant women (Castellanos, 2021).

Implementing exercise programs and specific practices aimed at maintaining and improving joint mobility can contribute significantly to the overall well-being of pregnant women, providing a solid foundation for a healthier pregnancy and a smoother postpartum transition.

Below is an example of a joint mobility session for pregnant women:

Exercise	Series	Repetitions	Objective
1. Ankle Rotation	2-3	10-12 per side	Improves mobility in the ankles.
2. Circles with dolls	2-3	10-12 in each direction	Increases wrist mobility.
3. Knee Lift	2-3	10-12 per side	Promotes mobility of the hips and knees.
4. Lateral neck curls	2-3	8-10 per side	Improves neck flexibility.
5. Shoulder Rotation	2-3	10-12 in each direction	Increases shoulder mobility.
6. Pelvic Tilts	2-3	10-12	Contributes to hip mobility and lumbar relief.
7. Hip Rotation	2-3	10-12 in each direction	Improves hip mobility and flexibility.
8. Back Extensions	2-3	8-10	It encourages flexibility and relieves tension in the back.
9. Finger Wrist Rotation	2-3	10-12 in each direction	Improves the mobility of the wrists and fingers.
10. Ankle Flexions and Extensions	2-3	10-12	Work on mobility and strength in the ankles.

Co-funded by the European Union

Strength Training

The incorporation of strength training during pregnancy has emerged as a practice of interest, as it offers potential benefits for maternal health and fetal development.

While the impact of strength training on maternal health is remarkable, it is crucial to understand how these practices can affect fetal development. Research by Clapp (2002) suggests that moderate resistance exercise is not only safe during pregnancy but may also have beneficial effects on the fetus. Women who participate in strength training programs have been observed to have a lower risk of preterm birth and low birth weight, underscoring the importance of exploring this connection to optimize maternal and fetal health.

Strength training during pregnancy can be beneficial for many women, if it is done safely and tailored to each individual's specific needs. However, it is essential for any pregnant woman to first consult with her health care professional, such as her doctor or midwife, before starting or modifying an exercise program. Also, here are some general things to keep in mind:

Medical consultation: Before starting any pregnancy training program, it is crucial to get approval from a healthcare professional. Every pregnancy is unique, and the pregnant woman's health should be evaluated individually.

Adaptation of intensity: The intensity of the training should be adapted to the physical condition of the woman and the trimester of pregnancy. Generally, it is recommended to reduce the intensity and avoid lifting very heavy weights. Lighter weights can be used with more repetitions.

Safe postures and positions: Avoid exercises that require lying on your back after the first trimester, as this can affect blood circulation. In addition, you should avoid exercises that put excessive stress on the abdominal muscles, such as traditional abdominals.

Temperature control: Avoid overheating, as pregnant women are more prone to heat. Maintain good hydration and avoid hot environments.

Stability and balance: Since the center of gravity shifts during pregnancy, it is critical to incorporate exercises that improve stability and balance to reduce the risk of falls.

Pelvic floor exercises: Including specific exercises to strengthen the pelvic floor can be beneficial. This can help in childbirth and postpartum recovery.

Trimester modifications: As pregnancy progresses, some positions and exercises may become uncomfortable or risky. Certain movements may need to be modified or deleted.

Possible Risks

Although exercise during pregnancy can be beneficial in many cases, there are situations in which a pregnant woman must discontinue or modify her exercise routine. Some of the possible risks that could arise during training in pregnant women that might require discontinuation of exercise include:

Vaginal bleeding: Any type of vaginal bleeding during pregnancy is a cause for concern and should be evaluated by a healthcare professional. In case of bleeding, exercise should be stopped, and medical attention should be sought.

Persistent abdominal pain: Continuous or sharp abdominal pain during exercise can be a sign of trouble and should be evaluated by a doctor.

Dizziness or fainting: If a pregnant woman experiences dizziness or fainting during exercise, it is essential to stop activity and seek medical attention.

Breathing problems: Unusual or extreme breathing difficulties can be signs of problems and should be evaluated by a healthcare professional.

Uterine contractions: Regular or painful uterine contractions during exercise can be a cause for concern and should be evaluated by a doctor.

Leakage of amniotic fluid: If there is a leak of amniotic fluid, exercise should be discontinued, and medical attention should be sought immediately.

High blood pressure: Women who develop gestational hypertension or have high blood pressure should be carefully monitored and their physical activity may need to be restricted.

Pre-existing heart or breathing problems: Women with pre-existing heart or respiratory conditions may need restrictions on their physical activity, and in some cases, exercise may not be recommended.

It is critical for pregnant women to talk to their doctor before starting or continuing an exercise program during pregnancy. The health care provider will be able to provide specific guidance based on the woman's individual health and monitor for any signs of risk during pregnancy.

Co-funded by the European Union

8. Training in the elderly

Aging brings changes in muscle mass, bone density, cardiovascular capacity, and flexibility. The loss of muscle mass and strength, known as sarcopenia, is commonly associated with age. Resistance training has been shown to be effective in counteracting sarcopenia and improving muscle strength in older people (Fiatarone et al., 1990). Regular physical activity contributes to cardiovascular health. Aerobic training can improve lung and cardiovascular capacity, reducing the risk of cardiovascular disease, hypertension, and type 2 diabetes in older adults (Nelson et al., 2007).

Exercise not only benefits the body, but also the mind. Numerous studies support the connection between physical activity and improved mental health, including reduced risk of dementia and improved cognitive function in older adults (Lautenschlager et al., 2008)

Aging brings with it several physiological and functional changes that can increase the risk of falls in older people. Falls represent one of the top health concerns in this demographic, as they can result in serious injuries and have a significant impact on quality of life. The risk of falls increases with age due to loss of balance and strength. Training programs that include balance and strength exercises have been shown to be effective in reducing the incidence of falls in older people (Sherrington et al., 2019).

Statistics reveal that falls are a widespread problem among older adults, being one of the leading causes of injuries and hospitalizations in this population group. Decreased muscle strength, loss of balance, and reduced bone density all contribute to the vulnerability of older people to these types of incidents. In addition, factors such as polypharmacy, decreased vision, and gait disturbances also increase the risk of falls in this segment of the population (Tinetti et al., 1988; Rubenstein, 2006).

It is in this context that strength training emerges as an essential tool to address and mitigate the risk of falls in the elderly population.

Strength training has been shown to be an effective strategy to counteract the risk factors associated with falls in older people. Loss of muscle mass, known as sarcopenia, is a common condition in aging, but resistance training programs have been shown to be able to reverse this process, strengthening muscles and improving physical function (Fiatarone et al., 1994).

In addition to increasing muscle strength, strength training also contributes to improved balance and coordination, crucial factors in preventing falls. Studies have shown that specific programs designed to improve functional capacity, mobility, and stability can significantly reduce the incidence of falls in older people (Sherrington et al., 2019).

In this context, we will thoroughly explore how strength training emerges as a key component in the prevention of falls in the elderly, highlighting its benefits and advocating for the implementation of structured and personalized programs to improve people's health and safety.

Co-funded by the European Union

References

Adams, O.P. (2013). The impact of brief high-intensity exercise on blood glucose levels. Diabetes Metab Syndr Obes. 6:113-22.Artal, R., & O'Toole, M. (2003). American College of Obstetricians and Gynecologists guidelines for exercise during pregnancy and postpartum. British Journal of Sports Medicine, 37(1), 6-12.

Ben Abderrahman, N., Bonnal, C., & Gaudin, E. (2023). Assessment and conservative treatment guidelines in knee osteoarthritis in ex-athletes (Bachelor's thesis)

Billat, V. (2001). Interval training for performance: a scientific and empirical practice. Special recommendations for middle- and long-distance running. Part II: anaerobic interval training. Sports Med. 31 (2): 75-90

Castellanos-Garrido, A. L., Aguilar-Camacho, M. F., Álvarez-Díaz, N. K., & Rozo-Chica, X. S. (2021). Validity of content of physical exercise guidelines for pregnant women. Archives of Medicine (Col), 21(1), 103-116.

Clapp, J.F. (2012). Exercise During Pregnancy: A Clinical Update. Sports Medicine Clinics, 31(2), 309-322.

Copeland, J.L., Good, J. & Dogra, S. (2019). Strength training is associated with better functional fitness and perceived healthy aging among physically active older adults: a cross-sectional analysis of the Canadian Longitudinal Study on Aging. Aging Clinical and Experimental Re

Gibala MJ, Little JP, van Essen M, Wilkin GP, Burgomaster KA, Safdar A, Raha S & Tarnopolsky MA (2006). Short-term sprint interval versus traditional endurance training: similar initial adaptations in human skeletal muscle and exercise performance. J Physiol. 575, 901–911..

Gibala M, Little J, MacDonald M, Hawley JA. (2012). Physiological adaptations to slow volume, high-intensity interval training in health and disease. J Physiol. 590 (5): 1077-1084.

Fransen M, McConnell S, Harmer AR, Van der Esch M, Simic M, Bennell KL. Exercise for osteoarthritis of the knee. Cochrane Database Syst Rev. 2015; 1(1):CD004376

Hood MS, Little JP, Tarnopolsky MA, Myslik F & Gibala MJ. (2011). Low-volume interval training improves muscle oxidative capacity in sedentary adults. Med Sci Sports Exerc. 43, 1849–1856.

Hurkmans E, van der Giesen FJ, Vliet Vlieland TP, Schoones J, Van den Ende EC. Dynamic exercise programs (aerobic capacity and/or muscle strength training) in patients with rheumatoid arthritis. Cochrane Database Syst Rev. 2009; (4):CD006853

Little, J.P., Safdar, A.S., Wilkin, G.P., Tarnopolsky, M.A., and Gibala, M.J. (2010). A practical model of lowvolume high-intensity interval training induces mitochondrial biogenesis in human skeletal muscle: potential mechanisms. J. Physiol. 588(6): 1011–1022.

Moh H. Malek, J. W. (2017). NSCA Handbook: Fundamentals of Personal Training.

Paredes Ramírez, C. G. (2021). Recreational physical activity in older adults with knee osteoarthritis (Bachelor's thesis, University of Guayaquil, Faculty of Physical Education, Sports and Recreation).

Co-funded by the European Union

Parente, S. S., Delgado, A. S., & Piñero, J. C. (2021). Optimal training program during pregnancy in the prevention of gestational hypertension and preeclampsia: a systematic review. Archives of Sports Medicine: Journal of the Spanish Federation of Sports Medicine and the Ibero-American Confederation of Sports Medicine, 38(202), 127-135.

Rakobowchuk M, Tanguay S, Burgomaster KA, Howarth KR, Gibala MJ & MacDonald MJ. (2008). Sprint interval and traditional endurance training induce similar improvements in peripheral arterial stiffness and flowmediated dilation in healthy humans. Am J Physiol Regul Integr Comp Physiol 295, R236–R242.

Raya-González, J. & Sánchez-Sánchez, J. (2018). Strength Training Methods for Improving Actions in Football. Apunts Educación Física y Deportes, 132, 72-93

S. Varelab, C.Ayanb & J.M. Cancelab. (2016). Effects of physical exercise and basic guidelines for its prescription in Alzheimer's disease. Andalusian Journal of Sports Medicine, 32-40.

Schoenfeld, B. J., Grgic, J., Van Every, D. W., & Plotkin, D. L. (2021). Loading recommendations for muscle strength, hypertrophy, and local endurance: a re-examination of the repetition continuum. Sports, 9(2), 32. https://doi.org/10.3390/sports9020032

Williams MA, Haskell WL, Ades PA, et al. Resistance exercise in individuals with and without cardiovascular disease: 2007 update: a scientific statement from the American Heart Association Council on Clinical Cardiology and Council on Nutrition, Physical Activity, and Metabolism. Circulation. 2007; 116(5):572-584.

HEPALIS

Interactive Tool: Exercise Programming And Instruction

Module 3

2023

1. What is the goal of the Repetition Method I of strength training?
A. To improve maximal strength
B. To increase muscle hypertrophy
C. To improve explosive force
D. To reduce inhibition of the central nervous system
Correct answer: A. To improve maximal strength

2. What is the purpose of the Repetition Method II of strength training?
A. To increase maximal strength with minimal hypertrophy
B. To improve maximal strength with average hypertrophy
C. To increase maximum strength with little hypertrophy
D. To increase maximum strength with explosive force
Correct answer: B. To improve maximal strength with average hypertrophy

3. What is the recommended intensity range for the Repetition Method II of strength training?
A. 80-85% for 1RM
B. 70-80% for 1RM
C. 110-120% for 1RM
D. 50-60% for 1RM
Correct answer: B. 70-80% for 1RM

4. What is the purpose of the Maximum Intensities Method I of strength training?
A. To improve maximal strength with average hypertrophy
B. To increase maximum strength with little hypertrophy
C. To increase maximum strength with minimal hypertrophy
D. To increase maximum strength with explosive force
Correct answer: C. To increase maximum strength with minimal hypertrophy

5. Which type of strength training method is based on its static performance and is only relevant in certain sports?
A. Dynamic static
B. Maximum isometrics
C. Total isometrics
D. Isometric shrinkage methods
Correct answer: D. Isometric shrinkage methods

6. Which type of strength training method is performed by maintaining an isometric contraction until maximum fatigue?
A. Maximum isometrics
B. Total isometrics
C. Dynamic static
D. Eccentric Contraction Methods
Correct answer: B. Total isometrics

7. Which type of strength training method is performed by posing a maximum resistance that cannot be exceeded?
A. Eccentric Contraction Methods
B. Dynamic static
C. Total isometrics
D. Maximum isometrics
Correct answer: D. Maximum isometrics

8. Which type of strength training method is metabolically more efficient?
A. Total isometrics
B. Eccentric Contraction Methods
C. Dynamic static
D. Maximum isometrics
Correct answer: B. Eccentric Contraction Methods

9. Which type of strength training method is recommended to be inserted into training planning away from competition?
A. Maximum isometrics
B. Total isometrics
C. Dynamic static
D. Eccentric Contraction Methods
Correct answer: B. Total isometrics

10. Which type of strength training method is performed by marking a predetermined isometric contraction time and ending the repetition with an explosive concentric contraction?
A. Maximum isometrics
B. Dynamic static
C. Eccentric Contraction Methods
D. Total isometrics
Correct answer: B. Dynamic static

11. Which type of strength training method is only suitable for athletes with great experience with strength training?
A. Eccentric Contraction Methods
B. Dynamic static
C. Total isometrics
D. Maximum isometrics
Correct answer: A. Eccentric Contraction Methods

12. What is the main goal of the explosive strength and elastic-explosive force method?
A. To improve the MFI
B. To improve the frequency of impulse and synchronization
C. To improve the maximum power
D. To improve the dynamic force
Correct answer: A. To improve the MFI

Co-funded by the European Union

15. What is the purpose of a warm-up in functional training?
A. To minimize the risks of injury
B. To determine the recovery intervals
C. To draw up a training table
D. To increase the intensity of the exercises
Correct answer: A. To minimize the risks of injury

16. What is the main characteristic of functional training?
A. It involves the participation of all muscle groups
B. It is based on strength-endurance work
C. It is adjusted to our capabilities and goals
D. It is a gradual intensity workout
Correct answer: C. It is adjusted to our capabilities and goals

17. What is the purpose of a cool-down in functional training?
A. To draw up a training table
B. To minimize the risks of injury
C. To increase the intensity of the exercises
D. To determine the recovery intervals
Correct answer: D. To determine the recovery intervals

18. What type of exercises are based on strength-endurance work and involve the participation of all muscle groups?
A. Functional training exercises
B. Cardiovascular exercises
C. Isolation exercises
D. Plyometric exercises
Correct answer: A. Functional training exercises

19. What is the purpose of a personal trainer in functional training?
A. To draw up a training table
B. To increase the intensity of the exercises
C. To minimize the risks of injury
D. To determine the recovery intervals
Correct answer: A. To draw up a training table

20. What is the purpose of using free weights in functional training?
A. To minimize the risks of injury
B. To determine the recovery intervals
C. To work the same muscle group repeatedly
D. To increase the intensity of the exercises
Correct answer: D. To increase the intensity of the exercises

21. What is the purpose of a series in functional training?
A. To work the same muscle group repeatedly
B. To work different muscle groups in a specific order
C. To increase the intensity of the exercises
D. To minimize the risks of injury
Correct answer: A. To work the same muscle group repeatedly

Co-funded by the European Union

22. What is the purpose of using material in functional training?
A. To increase the intensity of the exercises
B. To determine the recovery intervals
C. To work the same muscle group repeatedly
D. To minimize the risks of injury
Correct answer: A. To increase the intensity of the exercises

23. What is the purpose of circuits in functional training?
A To increase the intensity of the exercises
B. To minimize the risks of injury
C. To work different muscle groups in a specific order
D. To work the same muscle group repeatedly
Correct answer: C. To work different muscle groups in a specific order

24. Why is it important to have proper technique when using bodybuilding machines?
A. To optimize the effectiveness of movement and reduce the risk of injury
B. To reduce the effectiveness of the exercise
C. To show off in front of others
D. To increase the risk of injury
Correct answer: A. To optimize the effectiveness of movement and reduce the risk of injury

25. Why is it important to adjust the seat height and position on a machine?
A. To show off in front of others
B. To ensure proper alignment of the joints
C. To reduce the effectiveness of the exercise
D. To make the exercise more difficult
Correct answer: B. To ensure proper alignment of the joints

26. What is one of the indications for correct use of weight machines?
A. Maintaining a neutral posture
B. Adjusting the resistance or weight settings
C. Adjusting the seat height and position
D. Using the grips provided by the machine
Correct answer: C. Adjusting the seat height and position

27. What is one of the benefits of using bodybuilding machines?
A. Reduced safety
B. Decreased muscle mass
C. Improved motor performance
D. Increased flexibility
Correct answer: C. Improved motor performance

Co-funded by the European Union

28. What is one of the specific impacts on the body that training on weight machines can have?
A. Increased flexibility
B. Improved cardiovascular health
C. Decreased muscle mass
D. Targeted muscle activation
Correct answer: D. Targeted muscle activation

29. What is the purpose of adjusting safety devices on weight machines?
A. To make the exercise more challenging
B. To prevent sudden movements
C. To increase muscle activation
D. To improve range of motion
Correct answer: B. To prevent sudden movements

30. Why is it important to have proper body alignment and posture when using a machine?
A. To show off in front of others
B. To make the exercise more difficult
C. To ensure proper alignment of the joints
D. To reduce the effectiveness of the exercise
Correct answer: D. To reduce the effectiveness of the exercise

31. What is one of the advantages of using weight machines for strength training?
A. They provide the performer with greater safety
B. They are more customizable
C. They allow for a full range of motion
D. They are more effective than free weights
Correct answer: A. They provide the performer with greater safety

32. What is one way that training on weight machines can impact athletic performance?
A. By promoting a full range of motion
B. By reducing stability during movement
C. By targeting specific muscle groups
D. By increasing flexibility
Correct answer: A. By promoting a full range of motion

33. Why is it important to use proper alignment and posture when using a machine?
A. To show off in front of others
B. To ensure proper alignment of the joints
C. To make the exercise more difficult
D. To reduce the effectiveness of the exercise
Correct answer: B. To ensure proper alignment of the joints

Co-funded by the European Union

34. What is one way to adjust safety devices on a machine?
A. Using the grips provided by the machine
B. Verifying that safety devices are properly seated
C. Adjusting the seat height and position
D. Adjusting stabilization elements
Correct answer: B. Verifying that safety devices are properly seated

35. What is one way to adjust the seat height and position on a machine?
A. Verifying that safety devices are properly seated
B. Adjusting stabilization elements
C. Using the grips provided by the machine
D. Adjusting the seat height and position
Correct answer: D. Adjusting the seat height and position

36. What is the recommended starting point for selecting a weight or resistance on a weight machine?
A. A weight that is easy to lift
B. A weight that is half of your maximum
C. The heaviest weight available
D. A weight that is challenging but doable
Correct answer: D. A weight that is challenging but doable

37. What is one way to adjust stabilization and grips on a machine?
A. Adjusting the seat height and position
B. Using the grips provided by the machine
C. Adjusting stabilization elements
D. Verifying that safety devices are properly seated
Correct answer: C. Adjusting stabilization elements

38. What is one of the disadvantages of using weight machines for strength training?
A. They do not allow for a full range of motion
B. They are not effective for building muscle mass
C. They do not provide stability during movement
D. They are not customizable
Correct answer: A. They do not allow for a full range of motion

39. What is one of the benefits of using weight machines for strength training?
A. Limited customization
B. Increased risk of injury
C. Improved motor performance
D. Decreased stability during movement
Correct answer: C. Improved motor performance

Co-funded by the European Union

40. What is the purpose of using strides in a free weight leg routine?
A. To improve balance
B. To increase range of motion
C. To target specific muscle groups
D. To add resistance
Correct answer: C. To target specific muscle groups

41. What is the correct technical execution for a jump squat in a free weight leg routine?
A. Jump when your body is upright
B. Use props for support
C. Use dumbbells for added weight
D. Lower yourself until your glute touches your heels
Correct answer: A. Jump when your body is upright

42. What is the correct technical execution for an incline blank torso biceps curl in a free weight arm routine?
A. Hold the dumbbell at your side
B. Rest your chest on the bench
C. Rotate to supination when raising the dumbbell
D. Use auxiliary aid for support
Correct answer: C. Rotate to supination when raising the dumbbell

43. What type of coordination is required for multi-joint movements in free weight exercises?
A. Neuromuscular coordination
B. Muscle memory coordination
C. Intramuscular coordination
D. Intermuscular coordination
Correct answer: D. Intermuscular coordination

44. What is the purpose of using an incline bench in a free weight arm routine?
A. To improve balance
B. To target specific muscle groups
C. To increase range of motion
D. To add resistance
Correct answer: B. To target specific muscle groups

45. What is the correct technical execution for a squat in a free weight leg routine?
A. Hold the bar in front of your body
B. Bend your body excessively
C. Keep your trunk straight
D. Lower yourself slightly
Correct answer: C. Keep your trunk straight

Co-funded by the European Union

46. What is the purpose of using free weights in strength training?
A. To increase precision in exercises
B. To reduce the risk of injury
C. To allow for a greater range of motion
D. To target specific muscle groups
Correct answer: C. To allow for a greater range of motion

47. What is the recommended recovery time for 5 intervals of 5 minutes between 5 and 0 beats below MHR?
A. 15 minutes
B. 20 minutes
C. 10 minutes
D. 5 minutes
Correct answer: D. 5 minutes

48. What is the recommended duration for HIIT?
A. 40 minutes
B. 30 minutes
C. 20 minutes
D. 10 minutes
Correct answer: C. 20 minutes

49. What is the main benefit of cardiovascular training?
A. Reduced stress and fatigue
B. Increased muscle mass
C. Improved cardiovascular system
D. Weight loss
Correct answer: C. Improved cardiovascular system

50. What is the main factor that determines VO2 max?
A. Training
B. Genetics
C. Age
D. Weight
Correct answer: B. Genetics

51. At what age does the VO2 max start to decline in both men and women?
A. 14 years old
B. 16 years old
C. 20 years old
D. 30 years old
Correct answer: B. 16 years old

Co-funded by the European Union

52. What is the recommended intensity percentage for training VO2 max?
A. 90-95% of maximum heart rate
B. 80-85% of maximum heart rate
C. 70-75% of maximum heart rate
D. 50-60% of maximum heart rate
Correct answer: C. 70-75% of maximum heart rate

53. What is the recommended intensity for continuous exercise?
A. Moderate intensity
B. Maximum intensity
C. Low intensity
D. High intensity
Correct answer: A. Moderate intensity

54. What is the main benefit of HIIT compared to continuous exercise?
A. Reduced risk of diseases
B. Improved sleep and rest
C. Increased muscle mass
D. Improved cardiovascular performance
Correct answer: D. Improved cardiovascular performance

55. What is the recommended frequency for cardiovascular training?
A. Three times a week
B. Every day
C. Twice a week
D. Once a week
Correct answer: A. Three times a week

56. What is the main purpose of a detailed medical evaluation for individuals with joint pathologies?
A. To have someone to talk to during workouts
B. To ensure safety and tailor the program to individual needs
C. To get a discount on gym memberships
D. To determine the best type of exercise for the individual
Correct answer: B. To ensure safety and tailor the program to individual needs

57. What is the role of exercise in managing rheumatoid arthritis?
A. It can worsen symptoms
B. It has no impact on joint health
C. It is only beneficial for osteoarthritis
D. It can improve cardiovascular fitness and emotional well-being
Correct answer: D. It can improve cardiovascular fitness and emotional well-being

Co-funded by the European Union

58. What is the recommended approach for individuals with joint pathologies when it comes to exercise endurance?
A. To only focus on low-impact activities
B. To gradually increase intensity and duration
C. To avoid exercise altogether
D. To push themselves to their limits
Correct answer: B. To gradually increase intensity and duration

59. What is the main goal when setting realistic exercise goals for individuals with joint pathologies?
A. To lose weight
B. To achieve the same goals as someone without joint pathologies
C. To push the individual to their limits
D. To improve overall health and functionality
Correct answer: D. To improve overall health and functionality

60. What is the role of professional supervision in exercise programs for individuals with joint pathologies?
A. It minimizes the risk of injury
B. It is only beneficial for osteoarthritis
C. It is not necessary
D. It only focuses on cardiovascular fitness
Correct answer: A. It minimizes the risk of injury

61. What is the main benefit of incorporating muscle-strengthening exercises in a workout program for individuals with joint pathologies?
A. To make the workout more challenging
B. To increase muscle mass
C. To reduce stress on affected joints
D. To improve overall health and functionality
Correct answer: C. To reduce stress on affected joints

62. What is the recommended type of exercise for individuals with rheumatoid arthritis?
A. High-impact activities such as running
B. Low-impact activities such as swimming or cycling
C. Weightlifting
D. Yoga
Correct answer: B. Low-impact activities such as swimming or cycling

63. What type of exercise is recommended for individuals with joint pathologies to improve cardiovascular fitness and reduce fatigue?
A. Yoga
B. Weightlifting
C. Low-impact activities such as swimming
D. High-intensity interval training
Correct answer: C. Low-impact activities such as swimming

Co-funded by the European Union

64. What is the main limitation for pregnant women participating in exercise programs?
A. Lack of time
B. Fear of injury
C. Lack of interest
D. Misperceptions and fears
Correct answer: D. Misperceptions and fears

65. Which trimester of pregnancy is associated with improved sleep quality and reduced fatigue through exercise?
A. 1st trimester
B. 2nd trimester
C. All trimesters
D. 3rd trimester
Correct answer: B. 2nd trimester

66. What is the main risk associated with exercise during pregnancy?
A. Preterm labor
B. Musculoskeletal discomfort
C. Gestational diabetes
D. All of the above
Correct answer: A. Preterm labor

67. Which exercise can help improve wrist mobility in pregnant women?
A. Ankle rotation
B. Knee lift
C. Circles with dolls
D. Shoulder rotation
Correct answer: C. Circles with dolls

68. What is the main benefit of exercise during pregnancy for the fetus?
A. Improved cardiovascular health
B. Reduced risk of gestational complications
C. Facilitates postpartum recovery
D. Promotes healthy fetal development
Correct answer: D. Promotes healthy fetal development

69. What is the main purpose of flexibility training in older adults?
A. To increase cardiovascular health
B. To prevent falls
C. To improve flexibility
D. To improve mental health
Correct answer: C. To improve flexibility

70. What is the main purpose of balance and coordination training in older adults?
A. To improve mental health
B. To prevent falls
C. To improve flexibility
D. To increase cardiovascular health
Correct answer: B. To prevent falls

71. Which type of training has been shown to be effective in reducing the incidence of falls in older adults?
A. Aerobic training
B. Balance and coordination training
C. Resistance training
D. Flexibility training
Correct answer: B. Balance and coordination training

72. Which type of training has been shown to be effective in improving functional capacity, mobility, and stability in older adults?
A. Balance and coordination training
B. Aerobic training
C. Flexibility training
D. Resistance training
Correct answer: D. Resistance training

73. What is sarcopenia?
A. A condition that affects flexibility in older adults
B. A condition that affects muscle mass and strength in older adults
C. A condition that affects bone density in older adults
D. A condition that affects cardiovascular capacity in older adults
Correct answer: B. A condition that affects muscle mass and strength in older adults

74. What is the main purpose of aerobic training in older adults?
A. To improve mental health
B. To prevent falls
C. To increase cardiovascular health
D. To improve flexibility
Correct answer: C. To increase cardiovascular health

Co-funded by the European Union

HEPALIS

Self-Assessment Test: Exercise Programming and Instruction

Module 3

2023

1. What is the purpose of the Maximum Intensities Method I of strength training?
A. To increase maximum strength with little hypertrophy (1 point)
B. To increase maximum strength with minimal hypertrophy (3 points)
C. To increase maximum strength with muscles Fibers(2points)

2. Which type of strength training method is performed by posing a maximum resistance that cannot be exceeded?
A. Isometrics static (1 point)
B. Total isometrics (2 points)
C. Maximum isometrics (3 points)

3. What is the main characteristic of functional training?
A. It is based on strength-endurance work (1 point)
B. It is adjusted to our capabilities and goals (3 points)
C. It is a gradual intensity workout (2 points)

4. What is the purpose of a personal trainer in functional training?
D. To draw up a training table (3 points)
E. To minimize the risks of injury (2 points)
F. To determine the recovery intervals (1 point)

5. Why is it important to have proper technique when using bodybuilding machines?
A. To optimize the effectiveness of movement and reduce the risk of injury (3 points)
B. To reduce the effectiveness of the exercise (2 points)
C. To show off in front of others (1 point)

6. What is one of the benefits of using bodybuilding machines?
A. Decreased muscle mass (2 points)
B. Improved motor performance (3 points)
C. Increased flexibility (1 point)

7. What type of coordination is required for multi-joint movements in free weight exercises?
A. Muscle memory coordination (1 point)
B. Intramuscular coordination (2 points)
C. Intermuscular coordination (3 points)

8. What is the main benefit of cardiovascular training?
A. Reduced stress and fatigue (1 point)
B. Improved cardiovascular system (3 points)
C. Weight loss (2 points)

9. What is the main goal when setting realistic exercise goals for individuals with joint pathologies?
A. To lose weight (1 point)
B. To push the individual to their limits (2 points)
C. To improve overall health and functionality (3 points)

Co-funded by the European Union

10.vWhat type of exercise is recommended for individuals with joint pathologies to improve cardiovascular fitness and reduce fatigue?
A. Low-impact activities such as swimming (3 points)
B. Low-intensity interval training (1 point)
C. Low-impact activities such as Hiking (2 points)

11. What is the main limitation for pregnant women participating in exercise programs?
A. Misperceptions and fears (3 points)
B. Lack of time (2 points)
C. Fear of injury (1 point)

12. Which type of training has been shown to be effective in reducing the incidence of falls in older adults?
A. Aerobic training (1 point)
B. Balance and coordination training (3 points)
C. Resistance training (2 points)

Note: Scores within the 1-12 range will receive Comment 1, 13-24 range will receive Comment 2, and 25-36 range will receive Comment 3 for interpretation.

Comment 1 (1-12 points range): Congratulations on completing the self-evaluation! Your score falls within the 1-12 point range, indicating that there might be some areas where you could enhance your understanding the Exercise Programming and Instruction. Consider revisiting the module's content, paying special attention to key principles and strategies. Continuous learning is key to providing effective and inclusive services.

Comment 2 (13-24 points range): Great job! Your score falls within the 13-24 point range, suggesting a solid understanding of the key concepts covered in the module. There might be a few areas where you could delve deeper or refine your knowledge, so consider revisiting specific sections for a more comprehensive understanding. Keep up the good work, and don't hesitate to explore further to enhance your expertise.

Comment 3 (25-36 points range): Fantastic performance! Your score falls within the 25-36 point range, indicating a strong grasp of the material covered in the training module. You have demonstrated a comprehensive understanding of the Exercise Programming and Instruction in personal training, with a particular focus on low-income individuals. Your commitment to continuous improvement and staying informed is commendable. Keep up the excellent work in promoting inclusive and effective practices in the field of fitness.

Co-funded by the European Union

HEPALIS

Injury Prevention And Management

Module 4

2023

Contents

1. Common injuries incurred during physical exercise 4
1.1. Soft Tissue Injuries 6
1.2. Joint Injuries 7
1.3. Bone Injuries 10
2.Incidence of injuries by the type of physical exercise 12
3. Risk factors associated with engaging in physical exercise 15
4.Signs and symptoms of injuries 18
4.1 Contusion 19
4.2 Wound 19
4.3 Signs and symptoms in muscle injuries 20
4.4 Signs and symptoms in sprain 20
4.5 Signs and symptoms of dislocation 21
4.6 Signs and symptoms of fractures 21
5. Strategies for preventing injuries during physical exercises 22
Referances 26

1. Common injuries incurred during physical exercise

Key considerations

In accordance with the guidelines of the European Union (2008) regarding the role of physical activities in maintaining the health of the population, an important objective of sports policy is to intensify physical and sports activities among the population. The proposed programs should aim to encourage the participation of all individuals in physical and sports activities, promoting the idea that sports are a human right, regardless of age, race, ethnicity, social class, or gender. Therefore, sports policies should focus on increasing the number of people engaging in physical and sports activities.

The World Health Organization (WHO) and the European Union (EU) recommend moderate-intensity physical activities for a minimum of 60 minutes daily for children and youth, and at least 30 minutes daily for adults and the elderly. Currently, a considerable number of people of different ages and social statuses adhere to the recommendation to become active, recognizing the health benefits of physical and sports activities.

Individuals with low incomes, non-sporting backgrounds (migrants, refugees, office workers, online students, elderly individuals, people with physical disabilities, homemakers) face a disadvantage in reaping the benefits of physical and sports activities due to the impossibility to acquire sports equipment for home use.

In this context, sustaining injuries that commonly occur during the practice of physical and sports activities may be the price paid, especially when recommendations regarding equipment, environmental conditions, or specific training are neglected or exaggerated. In medicine, an injury is defined as any morphological, pathological, or traumatic alteration occurring at the tissue or cellular level. Injuries can occur in various body segments during the practice of physical and sports activities. The most frequent injuries involve the musculoskeletal system, while brain and spinal cord injuries are relatively rare. Injuries to the lower and upper extremities account for approximately 50% of all injuries (Burt, 2001). The significance of these injuries tends to be underestimated because they result in lower rates of death or disability compared to injuries to the head, trunk, and spine (Park et al., 2022). However, the subjective effects of limb injuries are considerable: pain, functional impairment, and treatment costs. Considering their incidence in leisure activities and the aforementioned aspects, we believe that future personal trainers should be informed about the most important theoretical and methodological aspects of their prevention and management.

For a conceptual delineation of the terms used, we will also describe trauma, defined as an injury caused by aggressive external physical (temperature, water, sunlight, etc.), chemical (acids, bases, etc.), or mechanical (impact, fall, cutting, etc.) factors.

Classification

In physical or sports activities, the primary injuries may occur as a result of traumas, which are classified according to specific criteria into well-defined categories. Depending on the mechanism of occurrence, injuries are categorized as acute, generally resulting from macrotraumas causing damage to human body tissues, and chronic injuries, which are repetitive injuries, due to overuse of the musculoskeletal system, resulting from biomechanical errors in technique, as well as training mistakes.
Based on the affected tissue, there are:
- Soft tissue injuries (contusion, wounds, muscle injuries, ligament injuries, myositis, tendinitis, tenosynovitis);
- Joint injuries (sprains, dislocations, meniscal injuries of the knee);
- Bone injuries (periostitis, fractures).
The following are descriptions of the most common injuries that can occur among non-athletes engaging in physical and sports activities.

1.1. Soft Tissue Injuries

Contusion is the most common injury; it is classified into mild contusions where the clinical picture is dominated by local post-traumatic vasomotor disturbances, and severe contusions that can lead to the crushing of joint structures (Buzescu A. et al., 2005).

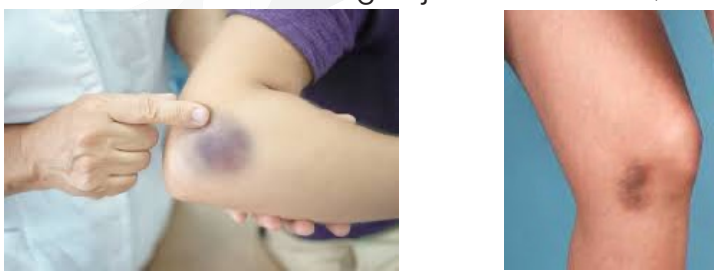


Figure 1. Contusion of the elbow (A), knee (B)

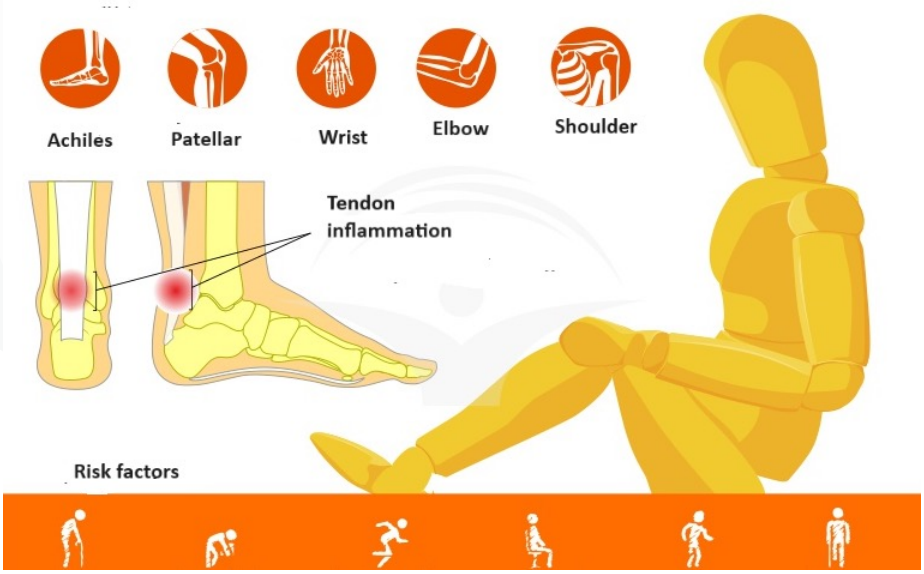
A wound is characterized by the interruption of skin continuity, involving the cutting of the skin with or without affecting the underlying tissues.

Muscle injuries are internal macro-traumas caused by a sudden contraction of a muscle in favourable and predisposing situations. Predisposing causes may include the presence of spasmophilia, local poor blood circulation, or a series of biological or tumor-related deficiencies. Among the contributing factors, sudden effort without prior preparation, in conditions of low temperatures, and normal activity performed on an exhausted muscle can be listed.

Depending on the extent, muscle ruptures (tears) can be classified as: fibrillar (involving a few muscle fibres), fascicular (affecting several fascia), and total (involving all or a significant part of the muscle).

Tendinitis is an inflammation of the tendon caused by an initial trauma or overuse over (repetitive) a certain period. Most often, these two causes contribute to the development of tendinitis. Tendinitis can occur in the ankle, knee, wrist, elbow, or shoulder. (Figure 2)

Co-funded by the European Union



1.2. Joint Injuries

A sprain is one of the most common injuries in the musculoskeletal system during physical and sports activities. It represents a traumatic joint injury resulting from abnormal stress on the capsulo-ligamentous apparatus, resulting from a movement that exceeds the normal range of motion without causing a permanent loss of contact between joint surfaces. It can occur in the ankle or knee. (Figure 3)

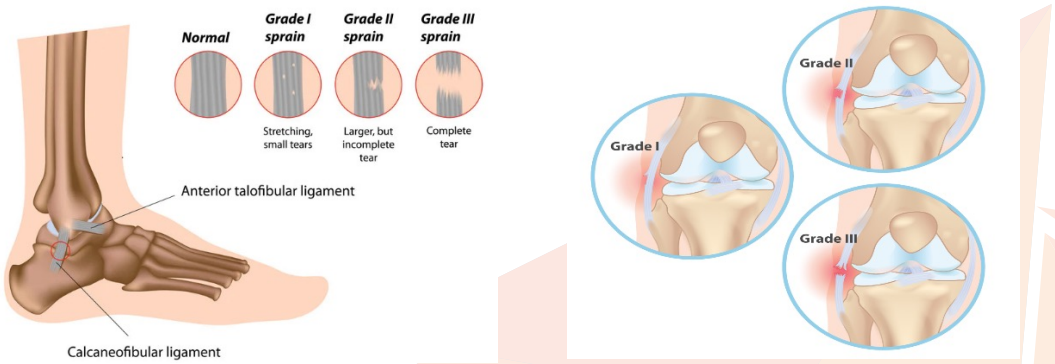


Figure 3. Ankle Sprain (A), Knee Sprain (B)

Depending on the type of injuries caused by a sprain at the capsulo-ligamentous apparatus level, they are classified as follows: Grade I sprain, which involves stretching of the capsulo-ligamentous apparatus; Grade II sprain, where partial tearing of the capsulo-ligamentous apparatus occurs; Grade III sprain is a severe sprain, with total ruptures of the capsulo-ligamentous apparatus. The ruptures can be clear-cut or irregular. Ligament detachments, with the tearing of a smaller or larger bone fragment, may also occur. The joint capsule can be torn, especially at the point where the ruptured ligament adheres to the joint capsule (Buzescu A. et al., 2005).

Dislocation is a complex joint injury, representing the displacement of bone ends that come into contact in a joint, resulting in a permanent alteration of their ratio.
In sports activities, dislocations have become more common due to the overuse of the musculoskeletal system, especially in the shoulder and elbow (Figure 4). The occurrence of dislocations is favoured by the exaggeration of physiological joint range of motion, imbalance of forces between antagonistic and agonistic muscles, lack of specific training, or insufficient warm-up before training or competition.

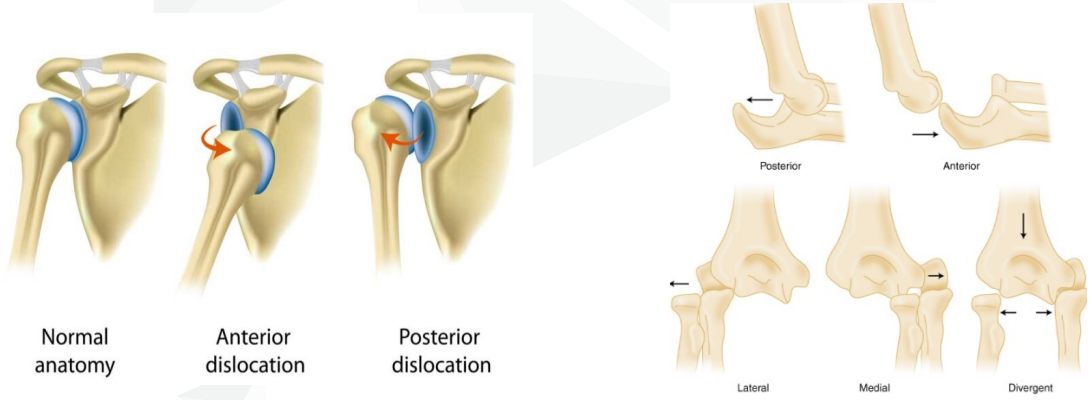


Figure 4. Shoulder Dislocation (A), Elbow Dislocation (B)

Dislocations can occur in both individual and team sports. Physical contact with an opponent is one of the contributing factors, but it is not necessarily mandatory, as dislocations can also occur in their absence, especially in individual sports (Buzescu A. et al., 2005).
Based on the relationship between joint surfaces, dislocations are classified into:
- Incomplete dislocations, where joint surfaces remain partially in contact (subluxations), and
- Complete dislocations, where joint surfaces are no longer in contact (Buzescu A. et al., 2005).
Depending on the manner in which a joint surface moves, dislocations can be:

• Regular dislocations, where the movement of a joint surface occurs predictably, imposed by weak areas of the joint capsule and the position of ligaments in relation to the direction of movement, and
• Irregular dislocations, where the movement of a joint surface occurs unpredictably, and the direction of displacement is atypical.
Based on the integrity of the skin, there are:
• Closed dislocations, where the skin is intact, and
• Open dislocations, where the skin is injured.

Co-funded by the European Union

Depending on the age of the dislocation, there are recent dislocations, old dislocations, and inveterate dislocations (very old).

Based on the possibility of reduction, dislocations can be reducible, through orthopaedic manoeuvres, and irreducible, not reducible through orthopaedic manoeuvres, requiring surgical reduction.

Based on their frequency, there are:
• Recurrent dislocations, occurring from time to time at shorter or longer intervals, and
• Habitual dislocations, occurring with each movement of a certain type from the respective joint (Buzescu A. et al., 2005).

In a recent dislocation, injuries to the joint capsule, ligaments, bones, and soft tissues can occur. Capsular and ligamentous injuries are more common, while injuries to soft tissues and bones are rarer and generally occur in severe dislocations.
Capsular injuries occur during the displacement of an articular head, which can rupture the joint capsule in the direction of movement, creating a "capsular gap" that is often longitudinal, parallel to the long axis of the joint, in the direction of the orientation of capsular fibres. Capsular rupture is always accompanied by synovial rupture at the same level and of the same size.

Ligamentous injuries occur when ligaments are overstressed during dislocation. Ligaments can be detached or torn, while antagonistic ligaments remain intact. Ruptured ligaments together with a ruptured joint capsule are the cause of chronic joint instability if their injuries do not heal correctly. Intact ligaments impose a characteristic position on the limb, pathognomonic for each type of dislocation (Buzescu A. et al., 2005).

Bone injuries are rarer in the case of dislocations. They can range from partial fractures of joint surfaces or pulling off bone chips at the insertion points of the joint capsule or ligaments to compression of joint surfaces or even fractures - dislocations.

Soft tissue injuries occur during the displacement of joint surfaces against each other, resulting in soft tissue injuries such as contusions or tendon injuries.

Depending on the position of arteries, veins, and nerves in relation to the direction of movement of the bone extremities, arterial, venous, or nervous contusions or elongations can occur, leading to peripheral circulation disorders, venous drainage disorders, or paresthesias and paralysis in the territory of the traumatized nerve.

In soft tissue injuries, skin injury is a feared complication, transforming a closed dislocation into an open dislocation, with a much more reserved functional prognosis (Buzescu A. et al., 2005).

Complications that may arise must be identified before attempting an orthopaedic reduction of the dislocation. Complications of dislocations can be nervous, vascular, bony, and cutaneous. Most commonly, nervous complications arise from the compression of a nerve by a bony extremity, leading to the occurrence of temporary paresthesias or paralysis in the territory of the affected nerve.
Other complications occur less frequently, manifesting as characteristic complications only in certain types of dislocations (Buzescu A. et al., 2005).

Co-funded by the European Union

1.3. Bone Injuries

Fractures represent a disruption in the continuity of the bone. In sports, fractures are more common in activities where physical contact is intense (martial arts, judo, rugby, soccer, handball) or in those where traumatic agents can act with significant force.
In sports traumatology, fractures are preferentially located in the bones of the forearm, hand, knee, leg, and foot, specifically in the radius, ulna, metacarpals, phalanges, patella, tibia, fibula, and metatarsals (Buzescu A. et al., 2005).

Fractures are classified based on various criteria. Depending on the integrity of the skin, fractures can be closed (intact skin) or open (skin injury). Depending on the ratio with the bone cortical, there are incomplete fractures (involving a single bone cortical) and complete fractures (involving both bone cortices). Based on the number of fracture pathways, there are unifocal fractures (a single fracture pathway), bifocal fractures (two fracture pathways), and comminuted fractures (multiple fracture pathways). Depending on the displacement of bone fragments, there are displaced fractures and non-displaced fractures (Buzescu A. et al., 2005). (Figure 5)

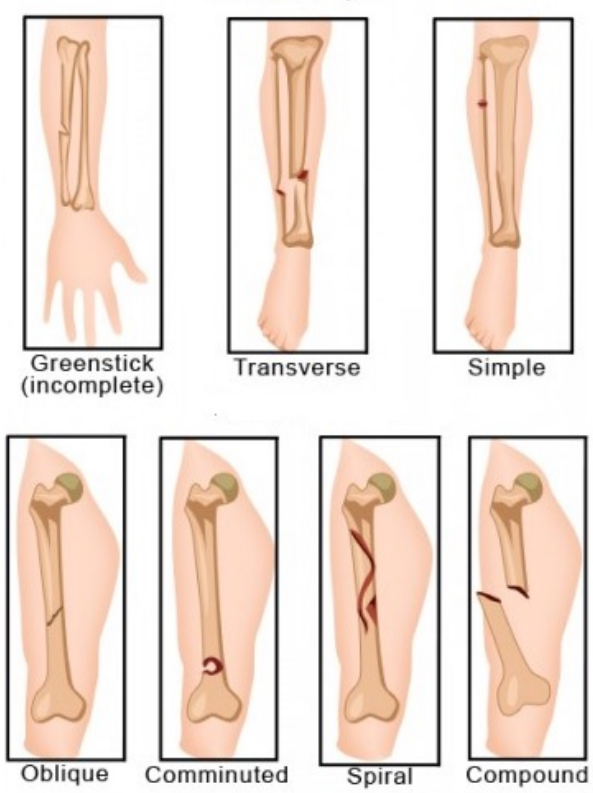


Figure 5. Types of Fractures

Co-funded by the European Union

Fractures present two types of complications: immediate and delayed. Local immediate complications include open fractures, nerve injuries, and vascular injuries. An open fracture represents a surgical emergency and should be treated within the first 6 hours of occurrence; after this time interval, it is considered infected, and the surgical treatment is entirely different. Nerve injuries are quite common because, in their occurrence, the traumatic agent acts with significant energy, causing not only bone injuries but also soft tissue injuries. On the other hand, even bone fragments, during their displacement, can cause injuries to the soft tissues they traumatize.

The most common nerve injuries found in fractures are: external popliteal sciatic nerve injury in fibular neck fracture, ulnar nerve injury in humeral blade fractures and radial nerve injury in middle 1/3 humeral diaphysis fracture. (Buzescu A. et al., 2005).
The most common vascular injuries are: brachial artery injury in supracondylar humeral fractures, popliteal artery injury in proximal tibial metaphyseal fractures, and unsystematized arterial injuries that occur in open fractures.

In general, most injuries sustained during physical exercise can be treated effectively, with the possibility of returning to a satisfactory functional level after an injury.
Injuries occurring during physical and sports activities can be prevented by adhering to appropriate preventive measures.

Co-funded by the European Union

2. Incidence of injuries by the type of physical exercise

To understand the real impact of injuries among non-athletes, a review of overuse injury epidemiology based on practiced sports is necessary. Baxter-Jones et al. (1993) found a prevalence of overuse injuries of 15% for soccer players and 33% for gymnasts, while Yang and colleagues (2012) showed an incidence of overuse injuries of 2.0 per 1000 hours of activity among basketball players. Although these studies indicate that overuse injuries are common in athletes, they may underestimate the overall extent of the problem.
According to the U.S. Consumer Product Safety Commission's National Electronic Injury Surveillance System (NEISS) (Figure 6), over 1.9 million people suffered an injury while participating in sports in 2012.

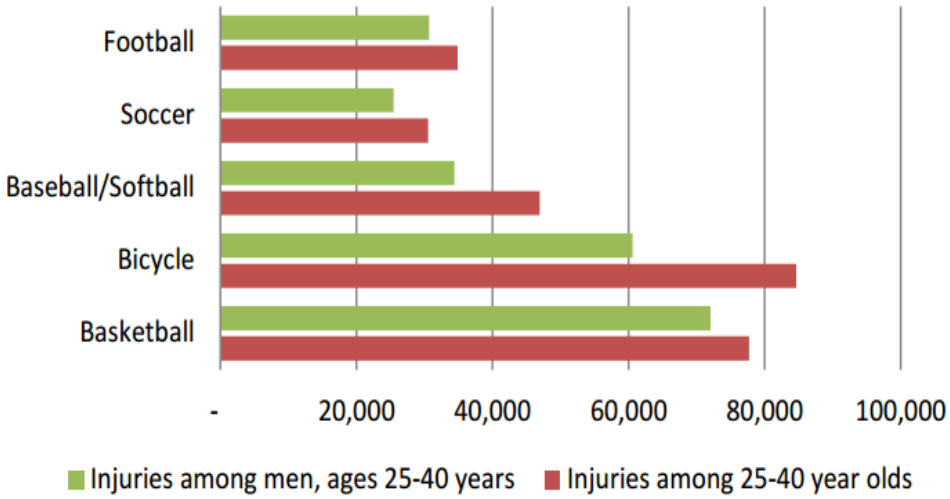


Figure 6. Types of Injuries in Sports by Gender, 25-40 year-olds
According to the same source, NEISS (Figure 7), the most common injuries in basketball and soccer were fractures and sprains of the ankles and knees, followed by facial and finger injuries. The most prevalent injuries in bicycle accidents were head injuries and fractures or dislocations of the shoulder. In soccer, injuries included fingers, shoulders, or knees, as well as less frequent but more severe head injuries. In baseball and softball, fractures, ankle, and knee sprains were the most common injuries, followed by facial injuries.

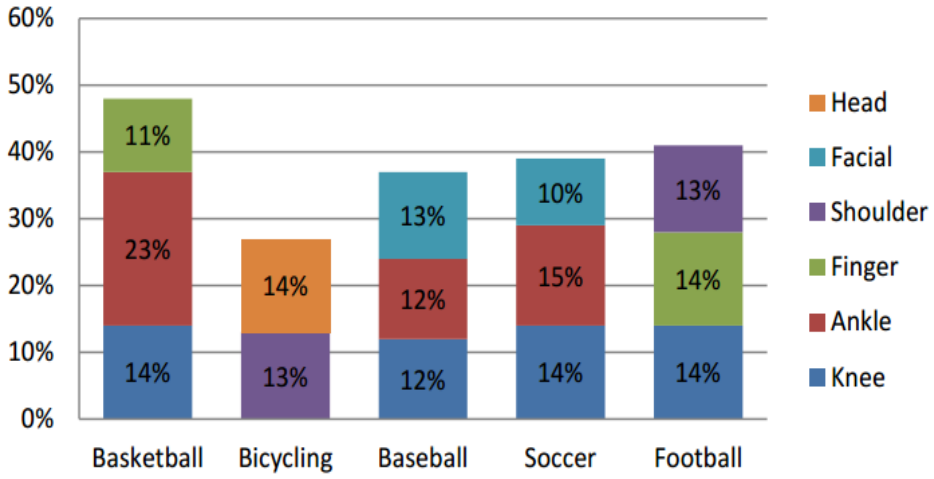


Figure 7. Types of Injuries in Sports, by Body Segments, 25 – 40-year-olds

In the case of acute injuries resulting from sports accidents, a study highlights that 62% of subjects reported injuries during a training season. Regarding the body segments, the most common acute injuries were at the ankle (18.8%), knee (16.1%), and foot (12.5%). The most frequent locations for overuse injuries were the knee (20.3%), foot (11.9%), lumbar spine (8.5%), and heel (8.5%). The incidence of acute injuries was 8.6 per 1000 hours of athlete activity (Richardson, 2017).

The highest incidence was observed in adolescents participating in pivoting sports such as soccer, basketball, and handball, with women experiencing a 3–5 times higher incidence than men. These injuries can have serious consequences for the injured athlete, not only in terms of treatment costs and recovery time but also with a significantly increased risk of early osteoarthritis (Bahr, Krosshaug, 2005).

Most injuries reported in CrossFit are acute in nature, with participants not reporting a history of discomfort or injuries to the body segments subsequently affected. Most injuries were minor, with participants reporting some inflammation/pain or sprain/strain.
Another study, in 2014, involving fitness participants, presented a total injury rate of 19.4%, with men experiencing injuries more frequently than women (Benjamin M., et al. 2014). Some studies have reported a high injury rate among fitness participants due to the repetitive use of technical exercises at high intensity and with minimal recovery time (Bergeron M.F. et al., 2011).

Some studies attribute the increased injury rate in physical activity and sports practitioners to anatomical differences based on gender, such as joint laxity, bone structures, and limb alignment (Hewett T.E. et al., 1999). Other studies have suggested that female hormones are directly involved in injury rates among women engaged in physical activity and sports (Hewett T.E. et al., 2007). Especially after the onset of adulthood, differences in circadian sex hormone levels are considered risk factors for injuries in physical activities and sports (Hewett T.E. et al., 2004).

In the case of fitness practitioners, the location of injuries in body segments varies significantly, with the shoulder, lumbar spine, and knee being the most common injury spots. Shoulder injuries most commonly occurred during gymnastics exercises, while lumbar spine injuries occurred most frequently in weightlifting exercises (Benjamin M., et al. 2014). The low level of supervision in fitness gyms and lack of instruction before performing exercises in a workout are risk factors for injuries, with the overall injury rate being approximately 20% (Benjamin M., et al. 2014).

the presented scenario, injury prevention programs become a common and essential aid to physical activities and sports (Bergeron M.F., et al. 2011). To design an effective injury prevention program, it is important to have accurate data on injury rates and associated risk factors (Nilstad A. et al., 2014).

Co-funded by the European Union

3. Risk factors associated with engaging in physical exercise

Injuries identified in non-athletes primarily arise from fatigue and overuse. Other contributing factors to injuries in sports include improperly used techniques, inadequate equipment, the presence of prior injuries, specific anatomical features, and, not least, the use of certain medications.
Concerning fatigue as a determining factor in sports injuries, it is essential to distinguish between pathological and physiological fatigue.

Pathological fatigue represents a state of physiological discomfort, decreased physical or mental performance, or a combination of both. Physiological fatigue occurs during sports efforts and can be prevented through specific means.

Generally, overuse injuries, defined as injuries without a specific, identifiable event responsible for onset (Richardson A., 2017), are considered a significant issue for non-athletes.
Injuries that may occur in non-athletes are most commonly caused by inadequate training methods, alterations in the structures involved (architectural or functional), and the environmental conditions of physical activity.

A training plan not aligned with the physical condition and actual training conditions may result in injuries. It is known from the literature that muscles need 48 hours of rest after intense training, and failure to respect a gradual increase in physical effort intensity, performed continuously in the presence of pain, can also cause injuries.

Another cause that can lead to injuries is the bone structure, which may vary from person to person. Generally, one or two points of reduced resistance in the bone or muscle structure may be present, predisposing to injuries.

Predisposing factors with a high frequency of injuries in the ankles, feet, knees, and hips include:
- Difference in the length of the lower limbs.
- Modification of the foot support surface, excessive pronation of the foot (flat foot), or cavus foot (exaggeration of the plantar arch).
- Modification of knee alignment, the occurrence of deviations in the sagittal, frontal, or combined planes.

The difference in the length of the lower limbs can lead to uncomfortable running and increase the chance of injuries.

Excessive pronation of the foot can disrupt the level of stress on the muscles and ligaments located superior to the foot. An excessively flexible foot can cause excessive pronation.

In the case of these changes, the feet are not efficient in cushioning the shock upon impact with the ground, increasing the risk of fractures in the segments located superior to the foot.

Other structural conditions that can frequently facilitate injuries in physical activities include the presence of spinal deficiencies, lumbar lordosis or altered patella position (higher).

Co-funded by the European Union

Muscle imbalance, where some muscles are very strong, and antagonists are weak, can also be a frequent cause of injuries in non-athletes. If the quadriceps muscle is very strong, it can increase the risk of stretching or tearing the hamstrings.

Injuries that can occur in physical activities usually fall into two categories, acute or chronic, and can result from direct impact, loading (putting more force on a joint than it can bear), or overuse (repetitive stress).

Repetitive stress (overuse) injuries are caused by repeated, microscopic injuries to a part of the body. Long-distance runners often face overuse injuries, the cause being running on hard surfaces.

An acute injury results from an incident or trauma that leads to visible symptoms. It is important to note that while some injuries are inherent in physical activities, others can be avoided with proper equipment and safety conditions.
A chronic injury manifests over a longer term. It may start as an acute injury that does not heal completely or can be caused by excessive or improper stress. Physical activities and sports practiced in the presence of pain can lead to chronic injuries.
Contusions most commonly result from direct trauma, a blow with a blunt object, crushing, or falling. When the force applied is tangential, soft tissue injuries are more extensive, and when the force of action is perpendicular, the injuries are severe, deep, and localized.
For muscle injuries, a series of risk factors can lead to their occurrence: inadequate preparation before starting a physical activity and sports program, reduced muscle flexibility, muscle fatigue, low muscle tone, inappropriate equipment for the respective activity, inadequate environment (hard or uneven terrain), and, last but not least, incomplete recovery after an injury.

In the case of tendinitis, the most frequent cause is overuse and repetitive motion during physical and sports activities or occupational activities. Risk factors include repetitive motion, trauma, and thermal action on the tendon. Tendinitis can also occur in individuals with certain pathologies such as rheumatoid arthritis, obesity, and diabetes.
Sprains can be caused by direct or indirect traumas, overloading the joint during extreme movements. Mechanisms that can cause sprains include sudden changes in direction or landing after jumps, slipping, or falling, trauma by direct mechanism to the limbs. Sprains can occur at any age, regardless of gender, in active or sedentary individuals. Risk factors for sprains include a history of sprains, poor physical condition, obesity, intense physical effort on uneven surfaces, and muscle fatigue.

Regarding age categories, it is considered that young individuals involved in physical development programs present a high risk of both overuse injuries (Richardson A. 2017) and acute injuries. In this population segment, studies have shown that a high training volume and overprogramming are risk factors for overuse injuries.
Other risk factors acting among adolescent athletes may include the fact that the musculoskeletal system at this age is not fully developed, which can increase the risk of injury (Hawkins D. Et al. 2001).

Changes induced by physical and sports activities in the growth process of adolescents (limb length, body mass), as well as changes in moments of inertia, can affect coordination and movement patterns. These physical changes can have a significant impact on increasing the risk of injuries (Feeley B.T. et al. 2016).

4. Signs and symptoms of injuries

Signs and symptoms in the case of injuries in physical activities can manifest rapidly at the time of trauma, or gradually over several hours or days. Symptoms of chronic or overuse injuries tend to develop over time. However, acute conditions in old injuries can be common.

The symptoms of a sports injury include:
- Pain is the primary symptom in an injury; it can have different characteristics depending on the type of trauma, and is challenging to quantify.
- Edema (swelling) is an inflammation sign, indicative of how the injured structure responds and initiates the healing process of that structure.
- Limited range of motion of the joint can be an indication of the injury's severity, especially measurable in limb injuries, as the injured joint can be compared to the healthy opposite one.
- Joint Instability is often a sign of a ligament injury.
- Muscle Fatigue: The onset of an injury can reduce the strength of the affected area, indicating structural damage to a muscle or tendon hindering normal function.
- Numbness or tingling are signs of nerve irritation or injury. Nerves can be directly affected or irritated by surrounding inflammation.
- Redness at the injury site is caused by inflammation or abrasion, allergy, or infection.
- Confusion or Headache: A mild head injury can lead to a concussion, manifesting cognitive symptoms such as confusion, concentration difficulties, memory problems, as well as headaches, dizziness, nausea, and irritability. A concussion can have serious consequences and should not be ignored.

For a better understanding of signs and symptoms, the following will describe the signs and symptoms that occur in the most common sports injuries.

4.1 Contusion

The clinical picture is dominated by injuries to periarticular soft tissues and joint bone extremities. The clinical picture of joint contusions includes:
- Pain: localized at the bruised joint area.
- Partial joint functional impotence:

Post-traumatic, within a few hours, the bruised joint area swells, the skin becomes congested and warm, and localized bruising appears.
Depending on the intensity of the traumatic agent, reactive hydrarthrosis may occur.

4.2 Wound

In the case of a wound, pain is the constantly reported symptom, disappearing after a variable period, either spontaneously or following analgesic medication. In the evolution of a wound, persistent pain signals possible complications (infection, hematoma, etc.).
Haemorrhage is also a specific sign of a wound, with severity depending on the size of the damaged blood vessels or the presence of pre-existing (haemophilia) or drug-induced coagulation disorders.
Functional impotence is another symptom and can express possible tendon, muscle, osteoarticular, or nervous injuries.

4.3 Signs and symptoms in muscle injuries

Varied and of different intensity, depending on the type of muscle injury, they can range from mild pain, in the case of muscle strains, to the inability to contract the muscle in complete injuries.
The most common signs and symptoms in muscle injuries are:
- Sudden, burning pain:
- A painful point or area on palpation:
- Local edema (swelling):
- Presence of a hematoma:
- Functional impotence of the injured muscle.

4.4 Signs and symptoms in sprain

After a sprain, greater or lesser tension of the joint capsulo-ligamentous apparatus leads to the excitation of proprioceptive receptors, which are abundant in these structures.
As a result, pain occurs, leading to reflex vasodilation with increased vascular permeability and posttraumatic reflex swelling (Leriche).

Vasodilation leads to local hyperaemia, which often lasts for 8-10 days. If transient, it has a positive influence, facilitating the healing of the injury.

If it becomes chronic, it causes the appearance of villous nodular synovitis, responsible for recurrent hydarthrosis, resistant to treatment, and localized osteoporosis at the ends of the bones, participating in joint formation.

Clinically, the following signs and symptoms appear after a sprain:
- Pain: In the first hours after trauma, pain is minor, which is why many athletes continue their activity, risking worsening their local injuries. After a few hours from trauma, it becomes increasingly intense, localized at the level of affected structures.
- Edema (swelling): Local edema appears in the first hours post-trauma, making the clinical examination of the joint difficult.
- Hyperthermia is always present, indicating the local vasomotor reaction.
- Tender points. The search for these during the local examination is extremely important because it can give us an idea of the severity of the injuries and the capsulo-ligamentous structures affected. They are sought through palpation at specific points, where each joint ligament attaches.
- Abnormal movements should be sought with great care and gentleness since their mobilization produces pain. When they exist, they indicate a grade III sprain.
- Muscular hypotonia appears after a period of time, in chronicized sprains or recurrent sprains, where it is a constant sign.

Co-funded by the European Union

4.5 Signs and symptoms of dislocation

The clinical examination of the athlete highlights the following signs and symptoms:
- Pain. At the moment of dislocation, the pain is intense. Over time, it diminishes and becomes diffuse.
- Functional impotence. Initially it is total, due to reflex muscle contraction generated by pain. Gradually, with decreasing pain, functional impotence becomes partial.
- Malposition is often pathognomonic for each type of dislocation. It is permanent and can only disappear with the reduction of the dislocation. The reproducibility of the malposition is characteristic of a dislocation. It consistently reappears if an attempt is made to reduce it, in contrast to a fracture, where the reduction manoeuvre changes the position of the affected segment.
- Joint deformity is another characteristic clinical sign of a dislocation, guiding toward a probable diagnosis, especially in superficial joints dislocation. In the case of deep joints, malposition directs us to consider a dislocation.

4.6 Signs and symptoms of fractures

Regardless of the location, the clinical picture of a fracture includes signs of probability and signs of certainty.

• Signs of probability are those that make us think about the possibility of a fracture:
- Pain is intense and well-localized. Exacerbated by mobilizing the segment, causing movement of bone fragments against each other.
- Bruising is evident and immediate, especially if the fractured bone is superficial under the skin. If the bone is deep, bruising appears after a longer interval.
- Deformation of the region is a clinical sign present in fractures with displacement.
- Segment shortening is diagnostically valuable if it occurs between two joints; however, it can be deceptive if it is near an articular surface, as it may be confused with a dislocation (luxation).

• Signs of certainty are those that point to a positive diagnosis. In the case of a displaced fracture, these signs are:
- Abnormal mobility is present in all fractures with displacement but absent in non-displaced fractures.
- Bone crepitus are characteristic noises heard when mobilizing bone fragments, resulting from their rubbing against each other.
- Disruption of bone continuity is an extremely important sign, detected through palpation.
- Non-transmission of bone movement appears in the local examination of fractures with displacement. Mobilizing one bone fragment does not affect the other.

Co-funded by the European Union

5. Strategies for preventing injuries during physical exercises

Safety in sports and physical activity is a crucial prerequisite for maintaining physical activity and a healthy lifestyle. Therefore, preventing, reducing, and controlling sports injuries are important objectives for teachers, coaches, clinicians, and researchers. Prevention is essential to avoid pain, treatment costs, and potential sequelae.

An essential part of preventing injuries in sports and physical activity is understanding the risks and aetiology of injuries to apply preventive measures. Well-known injury prevention models include those formulated by van Mechelen et al. (1992) and Meeuwisse (1994). Van Mechelen et al. (1992) developed a four-step model for a proactive approach to sports injuries: identifying the incidence of injuries in the specific sport, the main injuries, and their severity; understanding risk factors and mechanisms of sports injuries; implementing measures to reduce future risk and/or severity of sports injuries; analysing injury patterns for an individual, if necessary.

Meeuwisse's (1994) theoretical model, also called epidemiological, considers internal and external risk factors involved in injury occurrence, and their complex interaction. Internal factors include age, gender, body composition, overall health, fitness level, sports training level, and various psychological factors. External factors refer to the quality and integrity of equipment used in sports, the quality of protective gear (helmet, gloves, shin guards, etc.), shoe adherence and friction with the floor, weather conditions during sports activities, integrity and quality of exercise surfaces, room lighting, and proper endowment of sports facilities (locker rooms, showers). The mere presence of these risk factors is not sufficient to cause an injury, but their interaction can create predisposing conditions for the occurrence of injuries.

Studies suggest that sports injuries represent 10-19% of all acute cases treated urgently, and that the most common types are knee and ankle injuries. The same studies claim that it is possible to reduce the incidence of these injuries in adults and adolescents through various training programs. However, prevention programs address many aspects related to the risk of injury (agility, balance, strength, awareness of vulnerable knee and ankle positions, sports technique).

To prevent injuries, improving neuromuscular control is recommended to help the exercise practitioner position their foot correctly on the ground before full weight support and, consequently, weight transfer to the ankle. For exercise practitioners, especially in sports like soccer and volleyball, with a history of previous injuries, a balance-oriented training program seems to reduce the risk of injury at the same level as healthy ankles. This approach should be used for each type of injury in a specific sport.

Other recommendations contributing to injury prevention include:

- Gradual body preparation for effort with appropriate exercises allowing a gradual entry into major body functions' effort and performing specific exercises for segments affected by previous injuries.
- Balanced nutrition with adequate intake of macro- and micronutrients. Following correct eating habits throughout the year provides the basics for a healthy body and excellent sports performance.
- Proper hydration before, during, and after physical effort.
- Paying proper attention to any signs and symptoms that may indicate the onset of an injury.

Co-funded by the European Union

- Proper use of suitable equipment and constant checking of its integrity. Inappropriate use or use of damaged equipment increases the risk of injury.
- Maintaining a positive, optimistic attitude towards engaging in physical exercises without pursuing performance beyond one's actual motor abilities. Enjoyment in different forms of physical activity is essential for continuity.

During the recovery period, after an injury:

- Maintaining physical activity, even with an existing injury, by mobilizing the valid segments. This activity will enable a quicker return to physical activity after a period of rest.
- Resumption of specific effort, gradually engaging the injured segment. Compliance with the medical instructions is mandatory to avoid recurrence.

In addition to the measures listed, which are related to incidents mainly involving the locomotor system, specialists should be aware that other types of incidents may occur during physical exercise.

Special measures to prevent injuries and even worse, cases of lipothymia, will be taken in special summer weather conditions. To this end, exercise will be practised outdoors during the cooler part of the day, i.e. early morning, or evening. The ratio of temperature and relative humidity will also be taken into account when determining the duration of the training lessons. It has been suggested that if the sum of temperature and relative humidity are greater than or equal to 160, precautions should be taken. If the sum is greater than 180, training and/or games should be cancelled. (Janda, 2003)

The intensity and density of the effort (the ratio of effort to rest) change. Rest should be taken in shaded areas, helmets removed, and shirts loosened or removed. Rest periods should last 15 minutes for every hour of training, and if the temperature and humidity are over 160, breaks should occur every 30 minutes.

Hydration should be regularly ensured. Cold water should be available in unlimited quantities. Scheduled water breaks should be strictly adhered to. In physical effort, fluid losses are significant, going up to approximately 2 litres, especially when the ambient temperature rises. These losses lead to a decrease in functional capacity and a good mood or commitment to physical activity. Therefore, it is recommended as the main source of fluids - water - at 10-15 degrees C, as it is more quickly assimilated even than hot drinks (tea, milk).

Fluid intake must be balanced with the fluid loss. An effective general rule refers to consuming two cups of water two hours before physical activity, plus half a bottle of water at each break. For every kilogram of weight loss, three cups of water should be consumed after activity. A good way to monitor water loss during physical effort is to weigh the person before and after exertion. A weight loss of more than 3% indicates substantial risk, and 5% indicates significant danger (Janda, 2003). Moreover, since minerals are also lost with fluids, additional intake of these is also recommended.

Special attention should be paid to equipment, which should allow proper skin ventilation. Wet shirts (from sweating) should be changed frequently because they retain heat, and helmets should be used moderately in warm weather.

Co-funded by the European Union

It is imperative that all teachers, coaches, exercise practitioners pay attention to signs of fatigue - lethargy, lack of focus, stupor, and/or clumsiness. In such situations, physical effort should be interrupted, and the person should be placed in the shade.
The prevention of incidents during exercise is based on a specialist medical check-up, which indicates or discourages a person's physical exertion. A specialist check-up by a sports doctor is recommended every year. Studies show that around 6-20% of people will need further testing, and 2% will be at risk of sudden cardiac death. (Janda, 2003).
In addition to good specialized training, instructors/teachers/coaches must have knowledge of medical first aid, and training rooms should be equipped with first aid kits to allow minimal assistance measures for the injured until the arrival of specialized medical personnel or transportation to the nearest medical facility.

References

Bahr, R., Krosshaug, T. (2005) Understanding injury mechanisms: a key component of preventing injuries in sport. Br J Sports Med; 39:324–329. doi: 10.1136/bjsm.2005.018341

Baxter-Jones A., Maffulli N., Helms P. (1993) Low injury rates in elite athletes. Arch Dis Child; 68:130–2.doi:10.1136/adc.68.1.130

Benjamin M., Weisenthal B.A., Christopher A,. Beck M,A,, Michael D., Maloney M.D., Kenneth E., DeHaven M.D., Brian D. Giordano. (2014) Injury Rate and Patterns Among CrossFit Athletes, Orthopaedic Journal of Sports Medicine, Volume 2, Issue 4, April 2014 https://doi.org/10.1177/2325967114531177

Bergeron M.F., Nindl B.C., Deuster P.A., Baumgartner N., Kane S.F., Kraemer W.J., Sexauer L.R., Thompson W.R., O'Connoral F.G. (2011) Consortium for Health and Military Performance and American College of Sports Medicine consensus paper on extreme conditioning programs in military personnel. Curr Sports Med Rep. 2011; 10:383–389.

Burt CW, Overpeck MD (2001). Emergency visits for sports-related injuries. Ann Emerg Med, 37 (3): 301–8

Buzescu, A., Anton, B., (2005) Traumatologie sportivă. Editura Cartea Universitară, Bucureşti

Feeley B.T., Agel J., LaPrade R.F. (2016) When is it too early for single sport specialization? Am J Sports Med; 44. doi: 10.1177/0363546515576899

Janda, D. H., 2003. Preventing sports-related injuries. USA Today, 131, 51-53. https://www.proquest.com/magazines/preventing-sports-related -injuries/docview/214615472/se-2

Hawkins D., Metheny J. (2001) Overuse injuries in youth sports: biomechanical considerations. Med Sci Sports Exerc; 33:1701–7; doi:10.1097/00005768-200110000-00014

Hewett T.E., Lindenfeld T.N., Riccobene J.V., Noyes F.R. (1999) The effect of neuromuscular training on the incidence of knee injury in female athletes. A prospective study. Am J Sports Med; 27:699706.doi:10.1177/03635465990270060301

Hewett T.E., Zazulak B.T., Myer G.D. (2007) Effects of the menstrual cycle on anterior cruciate ligament injury risk: a systematic review. Am J Sports Med; 35: 659–68. doi:10.1177/03635465062956

Hewett T.E., Myer G.D., Ford K.R. (2004) Decrease in neuromuscular control about the knee with maturation in female athletes. J Bone Joint

8.doi:10.2106/00004623-200408000-00001

Meeuwisse, W.H. (1994). Assessing causation in sport injury: a multifactorial model. Clin J Sport Med; 4:166–70.

Nilstad A., Andersen T.E., Bahr R., Holme I., Steffen K. (2014) Risk factors for lower extremity injuries in elite female soccer players. Am J Sports Med. 2014;42:940–948.

Park, H. J., Park, J. O., Hyo, R. J., Park, H. A., Wang, S. J., & Lee, C. A. (2022). Extremity injuries during sporting activities according to life course: Focusing on fractures. Iranian Journal of Public Health, 51(7), 1585-1593. doi:https://doi.org/10.18502/ijph.v51i7.10092

Richardson A., Clarsen B., Verhagen E.A.L. M., Stubbe J.H. (2016) High prevalence of self-reported injuries and illnesses in talented female athletes. BMJ Open Sport Exerc Med; 3:e000199. doi:10.1136/bmjsem-2016- 000199

Van Mechelen, W., Hlobil, H., Kemper, H.C. (1992) Incidence, severity, aetiology and prevention of sports injuries: a review of concepts. Sports Med; 14: 82-99

Verhagen, Evert A.L.M., van Stralen, Maartje M., van Mechelen, W. (2010) Behaviour, the Key Factor for Sports Injury Prevention. Sports Med; 40 (11): 899-906 0112-1642/10/0011-0899/$49.95/0

Yang J., Tibbetts A.S., Covassin T., Cheng G., Nayar S., Heiden E. (2012) Epidemiology of overuse and acute injuries among competitive collegiate athletes. J Athl Train; 47:198–204.doi:10.4085/1062-6050-47.2.198

Co-funded by the European Union

HEPALIS

Interactive Tool: Injuries Prevention And Management

Module 4

2023

1. What is an injury?
A. Any morphological, pathological, or traumatic alteration that occurs at the tissue or cellular level.
B. A disruption of muscular or bone activity.
C. An injury occurring at the osteo-articular and muscular level due to trauma.
D. An incident resulting from incorrect physical exercise performance.
Correct answer: A.

2. Based on the mechanism of occurrence, injuries can be:
A. Immediate and delayed-onset.
B. Acute and chronic.
C. Mild and severe.
D. Real and apparent.
Correct answer: B.

3. Based on the affected tissue, there are:
A. Muscular and bone injuries.
B. Soft tissue, joint, and bone injuries.
C. Ligament and bone injuries.
D. Muscular and ligament injuries.
Correct answer: B.

4. Soft tissue injuries include:
A. Contusion and tendinitis.
B. Wound and muscle rupture.
C. Muscle injuries.
D. Contusion, wound, muscle injuries, tendinitis.
Correct answer: D.

5. Joint injuries include:
A. Sprain and dislocation.
B. Sprain.
C. Dislocation.
D. Fracture.
Correct answer: A.

6. What characterizes the clinical picture of a mild contusion?
A. Local post-traumatic vasomotor disturbances.
B. Crushing of joint structures.
C. Inflammation of tendons.
D. Redness of the skin.
Correct answer: A.

7. What characterizes the clinical picture of severe contusion?
A. Redness of the skin.
B. Local post-traumatic vasomotor disturbances.
C. Crushing of joint structures.
D. Inflammation of tendons.
Correct answer: C.

8. What is muscle strain?
A. Fibrillar affection of the muscle during maximal effort.
B. Indirect injury that can occur due to muscle fatigue and overuse.
C. Disruption of muscle fibres due to overuse.
D. Muscle reaction to overuse.
Correct answer: B.

9. What is tendinitis?
A. Rupture of the tendon due to overuse.
B. Tendon condition following muscle rupture or fracture.
C. Tendon injury resulting from repetitive muscle stress.
D. Inflammation of the tendon caused by initial trauma or prolonged overuse.
Correct answer: D.

10. A sprain is:
A. Traumatic joint injury caused by an abnormal stress on the capsulo-ligamentous apparatus, following a movement that exceeds the limit of normal range of motion, without loss of permanent contact between the joint surfaces;
B. Traumatic joint injury caused by an abnormal stress on the capsulo-ligamentous apparatus as a result of a movement not exceeding the limit of normal range of motion, without loss of permanent contact between joint surfaces;
C. Traumatic joint injury caused by an abnormal stress on the capsulo-ligamentous apparatus, following a movement exceeding the limit of normal range of motion, with loss of permanent contact between the joint surfaces;
D. Traumatic joint injury caused by an abnormal stress on the capsulo-ligamentous apparatus as a result of a movement not exceeding the limit of normal range of motion.
Correct answer: A.

11. Dislocation (Luxation) involves:
A. a displacement of the bone extremities that does not result in a permanent change in their relationship to each other;
B. a displacement of bone extremities coming into contact in a joint, resulting in a permanent change in the relationship to each other;
C. a displacement of bone extremities resulting in a permanent change in the relationship to each other;
D. a displacement of bone extremities coming into contact in a joint which does not result in a permanent change in their relationship to each other.
Correct answer: B.

Co-funded by the European Union

12. Types of fractures are:
A. Closed and open.
B. Complete and incomplete.
C. Displaced and non-displaced.
D. Correct answer: A, B, C.
Correct answer: D.

13. Risk factors for injuries include:
A. Fatigue, overuse, inadequate equipment.
B. Lack of specialized assistance.
C. Acute conditions of the person exercising;
D. Repeated injuries during practice of physical exercise.
Correct answer: A.

14. Signs and symptoms of an injury include:
A. Bleeding, pain, numbness.
B. Pain and change in skin colour.
C. Pain, swelling, limited range of motion, joint instability, numbness, redness.
D. Redness, pain, reduced joint mobility.
Correct answer: C.

15. Localized pain at the injured joint area and partial joint functional impotence are signs of:
A. Contusion.
B. Fracture.
C. Tendinitis.
D. Muscle rupture.
Correct answer: A.

16. Joint deformation is a sign of:
A. Muscle rupture.
B. Tendinitis.
C. Sprain.
D. Dislocation (Luxation).
Correct answer: D.

17. Predisposing factors for injuries in the ankles, legs, knees, and hips include:
A. Difference in the length of upper limbs.
B. Modification of the foot's support surface.
C. Correct alignment of lower limbs.
D. Modification of the alignment of upper limbs.
Correct answer: B.

Co-funded by the European Union

18. Bone crepitus represents:
A. Bone fragments following a fracture.
B. Post-traumatic sequelae, in case of fractures.
C. Characteristic noises heard when mobilizing bone fragments, caused by friction between them.
D. Reactions of the bone in the post-traumatic phase.
Correct answer: C.

19. Certain signs in the case of a fracture include:
A. Interruption of bone continuity.
B. Localised pain.
C. Abnormal mobility.
D. Correct answer: A and C.
Correct answer: D.

20. Measures to prevent injuries focus on:
A. Improving neuromuscular control and balance.
B. Correct answer: A, C, D.
C. Rest, proper nutrition, and hydration.
D. Correct execution of physical exercises.
Correct answer: B.

Co-funded by the European Union

HEPALIS

Self-Assessment Test: Injury Prevention And Management

Module 4

2023

1. The injury is:
A. Morphological, pathological, or traumatic alteration (1 point)
B. Morphological, pathological, or traumatic alteration occurring at the tissue or cellular level (3 points)
C. Morphological, pathological alteration occurring at the tissue level (2 points)

2. Soft tissue injuries include:
A. Contusion, wound (1 point)
B. Wound, muscle injuries, tendinitis (2 points)
C. Contusion, wound, muscle strain, muscle rupture, tendinitis (3 points)

3. Sprain is:
A. Traumatic joint injury (1 point)
B. Traumatic joint injury caused by abnormal stress on the capsulo-ligamentous apparatus, without loss of permanent contact between joint surfaces (3 points)
C. Joint injury caused by a movement exceeding the limit of normal amplitude, without loss of contact between joint surfaces (2 points)

4. Dislocation is:
A. Complex joint injury, involving the displacement of bone ends in an articulation, resulting in a permanent change in their relationship (3 points)
B. Displacement of bone ends in an articulation (2 points)
C. Complex joint injury (1 point)

5. Fracture classification is based on the following criteria:
A. Skin integrity; relationship with the bone cortex; number of trajectories; displacement of bone fragments (3 points)
B. Unifocal, bifocal, and comminuted fractures; displacement of bone fragments; relationship with the bone cortex (2 points)
C. Closed and open fractures, based on the relationship with the bone cortex (1 point)

6. Pathological fatigue refers to:
A. Decreased physical performance (2 points)
B. A state of physiological discomfort, decreased physical and mental performance, or a combination of both (3 points)
C. A state of discomfort (1 point)

7. Predisposing factors to lower limb injuries include:
A. Excessive foot pronation; muscular imbalance (1 point)
B. Difference in lower limb length; deviations in the sagittal or frontal plane of the knees (2 points)
C. Difference in lower limb length; alteration of knee alignment; modification of foot support surface (3 points)

8. Acute injury is:
A. Result of trauma (1 point)
B. Result of an incident or direct trauma leading to visible symptoms (3 points)
C. Outcome of trauma causing the appearance of symptoms (2 points)

Co-funded by the European Union

9. Chronic injury:
A. Manifests in the long term (1 point)
B. Does not fully heal; can be caused by sports activities practiced in the presence of pain (2 points)
C. Can start as an acute injury that does not fully heal or can be caused by excessive or improper activity (3 points)

10. Symptoms of a sports injury include:
A. Pain, main symptom; edema, sign of inflammation; limitation of joint range of motion, joint instability; muscle fatigue; numbness or tingling, confusion or headache (3 points)
B. Redness at the site of injury; pain of different character; limitation of joint range of motion; confusion or headache (1 point)
C. Edema, sign of inflammation; muscle fatigability, joint instability; pain, redness at injury site; limitation of joint range of motion (2 points)

11. Recommendations contributing to injury prevention are:
A. Body preparation for effort with appropriate exercises; proper nutrition; adequate hydration before, during, and after physical activity; appropriate equipment; maintaining a positive attitude towards exercise (3 points)
B. Enjoyment of engaging in various forms of physical activity; use of proper equipment; adequate hydration; attention to signs and symptoms indicating the onset of an injury; proper nutrition (2 points)
C. Adequate hydration; proper nutrition; appropriate equipment (1 point)

12. Main rules regarding hydration are:
A. Fluid intake must balance with the fluid loss (1 point)
B. Regular hydration is essential, scheduled water breaks must be strictly followed, and water is recommended as the primary fluid source at 10-15 minute intervals (3 points)
C. An effective general rule is to consume two cups of water two hours before physical activity (2 points)

Co-funded by the European Union

Comment 1 (1-12 points range): Congratulations on completing the self-evaluation! Your score falls within the 1-12 point range, indicating that there might be some areas where you could enhance your understanding of Injury Prevention and Management. Consider revisiting the module's content, paying special attention to key principles and strategies. Continuous learning is key to providing effective and inclusive services.

Comment 2 (13-24 points range): Great job! Your score falls within the 13-24 point range, suggesting a solid understanding of the key concepts covered in the module. There might be a few areas where you could delve deeper or refine your knowledge, so consider revisiting specific sections for a more comprehensive understanding. Keep up the good work, and don't hesitate to explore further to enhance your expertise.

Comment 3 (25-36 points range): Fantastic performance! Your score falls within the 25-36 point range, indicating a strong grasp of the material covered in the training module. You have demonstrated a comprehensive understanding of Injury Prevention and Management. Your commitment to continuous improvement and staying informed is commendable. Keep up the excellent work in promoting inclusive and effective practices in the field of fitness.

Co-funded by the European Union

HEPALIS

Nutrition And Lifestyle Education

Module 5

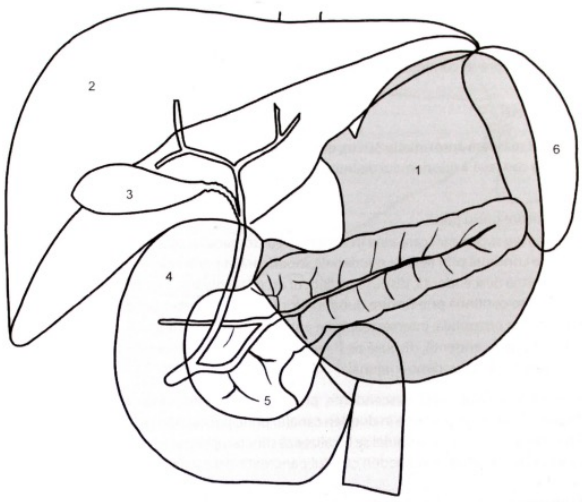
2023

Contents

1. Digestive system -structure 4
2. Digestion and 6
nutritional balance 6
2.1. Buccal, Gastric, and Intestinal Digestion 7
2.2. Energetic underlays 11
2.3. Intestinal absorption of foods 13
3. The impact of food on health maintenance 15
3.1. Quantitative nutritional imbalances 17
3.2. Qualitative Nutritional Imbalances 18
4. Healthy nutrition 19
practices for various 19
population groups 19
4.1. Nutrition recommendations for children 20
4.2. Recommendations on teenage nutrition 23
4.3. Nutrition recommendations for pregnant women 25
4.4. Recommendations concerning weight gain or loss 26
5. Nutritional strategies for individuals engaged in physical exercises 28
5.1. Carbohydrate consumption 29
5.2. Lipid consumption 30
5.3. Protein consumption 30
5.4. Dietary supplements to compensate for nutrient deficiency 31
5.5. Recommendations for maintaining body weight 31
6. Importance of sleep, stress management, and 33
other lifestyle factors for overall health and wellbeing 33
References 38

1. Digestive system -structure

Nutrition of the body is carried out through the digestive system. The digestive system is made up of "an irregular cylindrical tube, called the digestive tube, and a series of glandular formations, which develop around it, called the appendages of the digestive tube" (Buzescu, 2002). The segments that make up the digestive system are the oral cavity, pharynx, esophagus, stomach, small intestine and large intestine (figure 1). Each segment is "adapted to its particular functions, some only for the simple passage of food (such as the esophagus), others for the storage of food (such as the stomach), and others for digestion and absorption (such as the small intestine)" (Guyton, 1996).



Legend
1 – Stomach
2 – Liver
3 – Bile
4 – Duodenum
5 – Pancreas
6 – Spleen

Figure 1. Segments of the digestive system (Ghizdavăț, A., ș.a., 2019)

The appengades glands of the digestive tract participate in the process of feeding the body, through the multiple roles they have. These are:
- the salivary glands (parotid, sublingual and submaxillary) are found around the oral cavity;
- the liver located in the abdominal cavity, under the diaphragmatic vault, with numerous roles in metabolism, as well as in digestive periods, through the exocrine secretion of bile, which is eliminated in the duodenum (the first part of the small intestine);
- the pancreas, located transversely between the duodenum and the spleen, produces and secretes enzymes such as amylase, lipase and proteases, which help break down carbohydrates, fats and proteins in the small intestine. These enzymes are essential for proper digestion and absorption of nutrients from food. It is also responsible for the production and release of two main hormones, insulin and glucagon. These hormones are essential for regulating the level of glucose in the blood and maintaining the energy balance of the body.

2. Digestion and nutritional balance

2.1. Buccal, Gastric, and Intestinal Digestion

Ingested foods are not directly assimilated due to their physicochemical structure being different from that of the body's constituents. To traverse the digestive mucosa and enter metabolic processes, foods must be broken down into simple, non-specific compounds (amino acids, monosaccharides, fatty acids, and glycerol) that can be easily assimilated (Teodorescu Exarcu, et al., 1999). Therefore, digestion involves "mechanical, physical, and chemical processes that ensure the transformation of ingested foods into assimilable products, which, from the internal environment (blood), pass into tissues and cells" (Crăciun, & Crăciun, 1989). These transformations result from the successive action of enzymatic systems present in digestive juices. Enzymatic systems act slowly and are specific to each type of substance that needs to be degraded (Bota, 2002): proteolytic enzymes for proteins, amylolytic (glycolytic) enzymes for carbohydrates, and lipolytic enzymes (lipases) for lipids.

Buccal Digestion
In the oral cavity, foods undergo mechanical processing through mastication and are impregnated with saliva.
Mastication is a complex process in which solid and semisolid foods are mechanically processed through cutting, crushing, and grinding due to the movement of the jaw, coordinated with the movements of the lips, tongue, cheeks, and teeth.
Mastication contributes to the formation of the food bolus, triggers the activity of salivary glands, and stimulates taste and olfactory receptors that initiate the secretion of other digestive glands. Simultaneously, it promotes the actual digestion processes as the mechanical processing increases the contact surface of foods with the digestive enzymes.
Saliva is secreted by large and small salivary glands in the oral cavity. An individual can secrete 800-1500 ml/day (Popescu, 2014). Saliva is slightly acidic (pH 6-7) and contains water, dry residue (consisting of inorganic substances: potassium salts, sodium, calcium, etc.), and organic substances (enzymes, lysozyme, etc.). Saliva secretion is continuous, with a higher quantity during food intake.

Bota (2002) mentions two enzymes in saliva:
1. Ptyalin (or alpha-amylase; Popescu, 2014), which hydrolyses prepared starch into dextrins and maltose.
2. Lingual lipase, which acts on lipids.
In digestion, saliva plays important roles: it moistens some of the food constituents, cleans and moistens the oral mucosa, protects the body through lysozyme (antibacterial protection), contributes to the formation of the food bolus, and aids in swallowing.
Swallowing involves a chain of reflexes through which the food bolus, formed in the oral cavity, passes through the pharynx and esophagus into the stomach. Depending on the segment the food bolus passes through, three successive stages of swallowing can be differentiated:

1. Buccal time, partially voluntary, involves collecting the buccal content on the dorsal surface of the tongue, followed by pushing the bolus from the mouth into the pharynx by the contraction of the tongue muscles and the palate;
2. Pharyngeal time, voluntary, ensures pushing the food bolus into the esophagus, closing other pathways in the pharynx during this moment;
3. Esophageal time, involuntary, involves the movement of the food bolus along the esophagus due to peristaltic movements of the muscles at this level. The food bolus enters the stomach through the cardia opening, equipped with a sphincter, which contracts during digestion, preventing gastroesophageal reflux.

Gastric digestion

The stomach is a reservoir where food is stored. Simultaneously, it is a structure where significant physicochemical changes occur to prepare for intestinal digestion. All changes in the stomach are the result of the secretory and motor activity of the stomach.
Secretory function involves the abundant secretion of gastric juice produced by the gastric glands when food enters the mouth.

Gastric juice is a colourless, slightly opalescent liquid (Bota, 2002), consisting of 99% water and 1% dry residue (Popescu, 2014), represented by organic substances (enzymes and mucus) and inorganic substances. The “most important inorganic substance is the hydrochloric acid, which activates pepsinogen, the main gastric enzyme” (Bota, 2002). Hydrochloric acid also has antibacterial action, preventing the growth of bacteria introduced into the stomach with the ingested food, acts on food proteins, making them more easily digestible, and promotes iron absorption, among other functions. Gastric juice also contains enzymes such as pepsin (secreted as an inactive form - pepsinogen and activated in the stomach by the hydrochloric acid; it hydrolyses proteins, resulting in polypeptides), renin, gelatinase, and lipase.

Gastric mucus serves as protection for the gastric mucosa against the harmful actions of various substances in the stomach, especially against the action of pepsin and hydrochloric acid.

The purpose of gastric digestion is the formation of chyme, a semiliquid, acidic product that passes into the small intestine.

Motor function is provided by the smooth muscles in the walls of the stomach. The empty stomach is devoid of contractions. The prolongation of this period leads to the onset of contractions, coinciding with the sensation of hunger.

Once food enters the stomach, its motor function involves the temporary storage of ingested food, mixing it with gastric juice until chyme is formed, and its slow and gradual evacuation into the duodenum (Guyton, 1996; Popescu, 2015).

Intestinal digestion
Foods undergo digestive action as soon as they enter the oral cavity or when they reach the stomach. However, they have not been completely hydrolysed for absorption by the body. Therefore, actual digestion takes place in the small intestine under the combined action of pancreatic and intestinal juices, and bile, and the resulting simple elements are absorbed up to the ileocecal valve in over 90% proportion (Popescu, 2014).

Co-funded by the European Union

The pancreatic juice contains organic substances - enzymes and inorganic substances, including bicarbonate, which contributes to neutralizing the gastric chyme.

The enzymes in the pancreatic juice include:
- Pancreatic amylase, which has a stronger action than salivary amylase and hydrolyses raw and prepared starch into oligosaccharides (e.g., maltose);
- Pancreatic lipase, which hydrolyses neutral fats into glycerol and fatty acids;
- Trypsin, secreted as an inactive form of trypsinogen, activated by enterokinase from the duodenal mucosa. Trypsin, in turn, activates chymotrypsin, carboxypeptidase, and elastase (all secreted in inactive forms), which act on undegraded proteins up to the small intestine, breaking them down into oligopeptides and amino acids.

Bile is produced by the continuous secretion of hepatocytes in quantities of 800-1000 ml/day (Popescu, 2014). Between meals, with the Oddi sphincter closed, bile is collected and concentrated in the gallbladder, from where it is released into the duodenum during digestion. Bile is an alkaline liquid (pH = 7-8), bitter, containing 97-98% water, certain electrolytes, biliverdin, bilirubin (haemoglobin degradation products), bile salts, cholesterol, and lecithin.

Bota (2002) emphasizes that bile salts play a crucial role in lipid digestion. These salts emulsify lipids by reducing surface tension, facilitating their digestion by activating lipase. In these conditions, bile salts combine with fatty acids to form micelles, and cross the intestinal barrier. Subsequently, bile salts return to the intestine, where they are absorbed and reach the liver (hepato-entero-hepatic circulation of bile salts; Bota, 2002). The absence of bile salts in the intestine results in the loss of 40% of lipids ingested through faeces.

Bile is expelled from the gallbladder during digestion by relaxing the Oddi sphincter simultaneously with the contraction of the smooth muscle of the gallbladder.

Intestinal juice, produced by the glands in the duodenal mucosa, is liquid rich in mucus, enzymes, and inorganic substances - bicarbonate, which neutralizes the acidity of the gastric chyme (Teodorescu Exarcu, et al., 1999). Secretion from these glands is stimulated by local chemical factors, hormonal factors, and nervous factors.
Enzymes found in the intestinal juice include:
- Peptidases, which act on polypeptides resulting from the action of trypsin, hydrolysing them into amino acids;
- Disaccharidases, which break down disaccharides in the intestinal contents into monosaccharides: glucose, fructose, and galactose;
- Intestinal lipase, with action similar to the pancreatic lipase, transforms lipids into fatty acids and glycerol.
The motor function of the small intestine is highlighted by four types of movements (Bota, 2002):
- Peristaltic movements, circular contractions that propagate along the intestine, from the duodenum to the jejunum and ileum (Figure 3).
Ensure the propulsion of the intestinal contents.

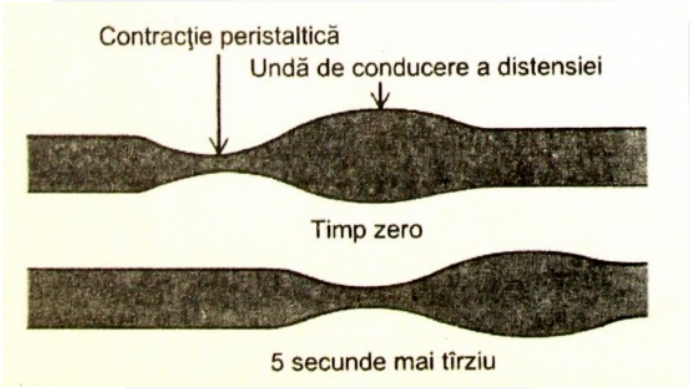


Figure 3. Peristalsis (Guyton, 1996) (peristaltic contraction; distension conduction wave; Zero time;5 seconds later)

- Segmentation movements – ring-like contractions that occur at specific intervals along the intestine, followed by relaxations. The subsequent ring-like contractions occur at the midpoint of the segments from the preceding contractions (Figure 4)

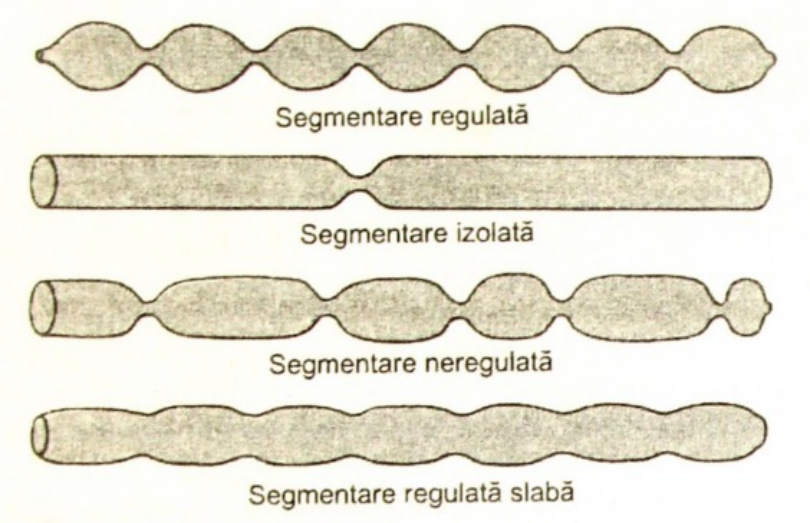


Figure 4. The segmentation movements in the small intestine (regular segmentation; isolated segmentation; irregular segmentation; weak regular segmentation)

Through these movements, the content of the intestine moves alternately, mixes more thoroughly, and facilitates absorption by improving the contact between the intestinal content and the mucosal surface;
- Pendulum movements – contractions and elongations of the intestine that ensure mixing of the intestinal content.
- Shortening and elongation movements of the intestinal villi – movements induced by the hormone vilikinin (Bota, 2002), which is secreted in the first part of the intestine during digestion. These movements have the role of 'pushing the absorbed substances toward the blood and lymphatic vessels, in particular' (Bota, 2002).

Co-funded by the European Union

Digestion in the large Intestine

The colon receives, through the ileocecal valve, approximately 200-300 ml of intestinal chyle /24 hours (Popescu, 2015), consisting of indigestible or undigested food residues and electrolyte-rich liquids ingested or secreted by the digestive glands. In the proximal half of the colon, water and some electrolytes are reabsorbed. The colon synthesizes vitamins K and B and secretes mucus. The mucus mixes with the remaining faecal matter (approximately 80-250g), stored in the distal half of the colon until elimination through defecation.

The absorptive function of the colon is crucial, actively recovering important quantities of sodium and chloride, while water is passively absorbed. The colic mucosa structure restricts absorption to substances that haven't been digested or absorbed earlier. However, these substances are subject to the action of fermentation or putrefactive bacterial flora (Teodorescu Exarcu, et al., 1999). Under these conditions, undigested carbohydrates undergo fermentation processes in the proximal colon under the action of aerobic bacteria. Plant polysaccharides cannot be digested in the colon, but constitute important residues for the maintenance of normal peristalsis, as evidenced by the constipation present in people who lack these substances in their diet. In the colon, "unresorbed amino acids are decarboxylated or deaminated under the action of anaerobic putrefactive flora and result in amines, ammonia, etc. which are resorbed and reach the liver where they are detoxified" (Teodorescu Exarcu, et al., 1999).

Motor function of the colon - in the proximal colon contractions are segmental, facilitating water resorption. In the distal colon, motor activity is more intense and consists of segmental (mixing) movements and peristaltic ('mass') movements. Peristaltic ('mass') movements are rare, strong, and present in the descending and sigmoid colon and serve to propel a significant portion of the colonic contents into the rectum.

Defecation is a reflex act through which faecal matter is eliminated from the rectum. In 'most instances, the rectum is devoid of faecal matter' (Guyton, 1996). Mass movements propel faecal material into the rectum, triggering the sensation of defecation. 'Upon entry of the faecal matter into the rectum' (Guyton, 1996), contractions of the distal colon and rectum occur, propelling faeces into the anal canal. If conditions permit, internal and external anal sphincters relax (the latter under voluntary control; Guyton, 1996), leading to defecation. Abdominal muscles and the diaphragm assist in creating abdominal pressure.

2.2. Energetic underlays

Various types of ingested foods play a crucial role in our lives, particularly for those actively engaged in physical activities. In this context, achieving a balance between the actual nutritional needs of individuals practicing physical exercises and the quantity of food consumed becomes essential for supporting effort and facilitating post-exertion recovery of their bodies.

Dietary balance encompasses both the quantitative aspect, referring to the number of calories, and the qualitative aspect, involving the macro- and micronutrients consumed daily. The objectives of a healthy diet are tailored to each person and the periods or stages proposed for exercise. These objectives influence physiological and homeostatic changes related to the depletion of energetic underlays (primarily glycogen), dehydration, and even potential muscle injuries resulting from the protein catabolism.

Macronutrients

Carbohydrates: Especially glycogen, constitute the primary source of energy required during physical exercises, regardless of whether the effort is sustained through aerobic or anaerobic pathways. Sugars are rapidly digested, elevating blood sugar levels—the carrier of glycogen (a glucose polymer) to the organs involved in exertion, particularly to muscle fibres where energy-intensive processes such as the Krebs cycle and glycolysis occur.

Carbohydrates, including monosaccharides (sugar) or polysaccharides (fibres and starch), should represent approximately 60% of daily nutrition (Shephard, 2007). They are easily accessible (glycogen is stored in muscles 400g, in the heart and liver cytosol 70g) and are partially or fully replenished during rest, providing energy not only for physical activities but also for intellectual pursuits. In terms of potential energy, the glycogen quantity in the body can release approximately 1600-2000 kcal, sometimes without the individual needing additional food on a given day.

As esters of fatty acids, lipids serve as another significant energy source, improving the transport of O2 and nutrients to cells, contributing to muscular metabolism, and preventing injuries (anti-inflammatory role).

In a balanced diet, the role of fats in the body extends beyond accelerating energetic metabolism to structural or plastic functions (present in the membranes of cellular organelles, certain hormones, and nerve cells), immune support, mechanical roles, and thermal regulation functions.

Constituting approximately 20% of the body weight, proteins are essential components of tissues and cells in muscles, hair, internal organs, skin, or nails. Proteins play a role in hormone and enzyme production, neurotransmission, and enhance physical performance, sleep, and fat burning. Sources include meat (especially turkey, chicken, or fish), eggs, cheese, and legumes. Proteins can be absorbed from protein drinks, releasing amino acids rapidly, in less than 2 hours, or from casein (milk phospholipids), which releases protein “blocks” in a maximum of 5-7 hours.

Micronutrients

,Vitamins, minerals, and antioxidants ensure the normal development of the body, playing roles in various physiological processes, some of which facilitate energy release. However, an excessive intake of these substances does not increase metabolic contributions.

Co-funded by the European Union

2.3. Intestinal absorption of foods

Intestinal absorption is the process by which simple products resulting from digestion "pass through the digestive mucosa into the internal environment (blood and lymph)" (Popescu, 2014). The absorption of certain constituents can occur in the stomach (water, chlorides, alcohol, etc.) and the colon (water and electrolytes), but the absorption of food principles takes place in the small intestine. At this level, the presence of intestinal villi significantly increases the absorption surface, and their movements "evacuate blood and lymph, along with the absorbed substances" (Bota, 2002). Thus, the fluid passing through the ileocecal orifice is devoid of nutrients.

The transfer of different constituents from intestinal epithelial cells to blood or lymph occurs through three mechanisms (Popescu, 2014):

1 - Passive transfer based on physical mechanisms (osmotic pressure, diffusion, etc.) without energy consumption.
2 - Active transfer involves the chemical combination of the substance to be absorbed (glucose, amino acids, etc.) with a membrane system of transport, a mechanism that requires energy consumption.
3 - Transport through pinocytosis vesicles is a less significant process that occurs at the membrane level, present in infants and young children.

Absorption of Carbohydrates. Carbohydrates, constituting 50-60% of the daily diet, approximately 250-800g/day (Bota, 2002). Their breakdown begins in the oral cavity under the action of salivary amylase and continues in the small intestine under the action of pancreatic amylase and disaccharides in the intestinal juice (Popescu, 2014). At the end of these degradation processes, glucose, fructose, and galactose are obtained. Glucose absorption actively occurs by coupling it with a "common transport protein" (Popescu, 2014) that is also involved in Na+ absorption, and the transport protein dissociates at the opposite pole. The transport protein resumes activity, and glucose passes into the blood capillaries, reaching the liver through the portal blood. At this level, glucose is stored as polysaccharides (glycogen), ‚approximately 150g of glucose, representing a relatively constant metabolic mass of the liver' (Popescu, 2015). Glucose absorption requires energy derived from the degradation of the ATP molecules under the action of the ATPase enzyme.

Absorption of Proteins. The protein intake in a day is 30-40g/day, representing 0.5-0.7g/kg body weight (Bota, 2002). Their breakdown occurs under the action of proteolytic enzymes in the gastric juice, pancreatic juice, and intestinal juice, resulting in amino acids. Their absorption occurs through an active mechanism, dependent on Na+ (Bota, 2002). After entering the cells of the intestinal mucosa, amino acids then pass from these cells into the blood through passive diffusion.

Co-funded by the European Union

Absorption of Lipids. The lipid intake is 25-160g/day (Bota, 2002). Triglycerides, the main part of dietary fats, transform under the action of digestive enzymes and are absorbed in the form of fatty acids and glycerol (glycerine) without requiring energy consumption. The absorption of fatty acids is possible only after they combine with bile salts, forming water-soluble micelles. When they reach the edge of the intestinal cells, fatty acids enter the intestinal cells, while bile salts return to the intestinal lumen to form new micelles (Bota, 2002).
Fatty acids will enter circulation differently. Short-chain fatty acids (less than 12 C atoms) pass directly into the portal blood, being "transported in a free state" (Popescu, 2014), while long-chain fatty acids (over 12 C atoms) combine with glycerol and are transformed into triglycerides, being transported via the lymphatic system.
Glycerol is easily absorbed into blood and lymph, being water-soluble.

The absorption of vitamins is different because their absorption depends on the solubility of each vitamin. Water-soluble vitamins are quickly reabsorbed (Popescu, 2014), while the absorption of fat-soluble vitamins is deficient in the absence of bile salts or pancreatic enzymes in the intestine. Most vitamins are reabsorbed in the upper segments of the small intestine (Popescu, 2015).

Absorption of Ions and Water. Sodium (Na+) is actively absorbed in the small intestine and colon, "involving passive absorption of chloride and, probably, other ions" (Popescu, 2014).

Calcium (Ca) is actively absorbed (in the upper segments of the small intestine, absorption being controlled by vitamin D) and passively in the rest of the intestine.
Iron is actively absorbed mostly in the duodenum, with the absorbed quantity depending on the body's needs.

Potassium can be actively absorbed in the lower segments of the small intestine (jejunum and ileum), "but can be secreted or absorbed in the colon" (Popescu, 2014).
Water moves passively through the digestive mucosa depending on the tonicity of the content of the small and large intestine until the osmotic pressure in the lumen equals that in the plasma (Teodorescu Exarcu, et al., 1999).

Co-funded by the European Union

3. The impact of food on health maintenance

Over 2500 years ago, the father of medicine, Hippocrates, asserted that “diseases result from the imbalance between nature and the body, and the goal of medicine is to ensure health through proper diet and hygiene.”

Nutrition has evolved increasingly as a science, starting from the normal and pathological physiology of the human body, and studying the biochemical reactions of food in the body. The rules of proper nutrition have become scientific principles used by medicine as effective therapeutic means in maintaining health.

In 1967, the World Health Organization declared that health represents “the complete state of physical, mental, and social well-being, not merely the absence of disease or infirmity,” contributing to personal comfort and balance. Health is maintained when all aspects of a person’s life act in an integrated and balanced manner.

In any biological system, maintaining homeostasis involves the constant and permanent circulation of energy provided by the degradation of compounds from food. The body contains nine categories of molecules: carbohydrates, lipids, proteins, vitamins, oligo-minerals, macro-minerals, dietary fibres, bioactive substances, and water. For normal bodily processes and maintaining health, it is necessary for the dietary intake to include all nine categories of nutrients in appropriate quantities.

Each category of nutrients serves specific functions and has well-defined relationships with the body. The chemical substances in these categories do not act independently; they are involved in providing energy (carbohydrates, lipids) or organic material necessary for tissue growth and repair (proteins), directly or indirectly regulating biochemical (enzymes, vitamins, minerals) and physiological processes, or cellular detoxification.

Nutritive principles represent the category of substances in the daily diet that ensures the development, maintenance, and reproduction of the body under normal conditions. The quantities can vary from individual to individual based on age, weight, sex, climate conditions, nature of activities, and health status.

The nutritional needs of an organism correspond to its energy expenditures and are imposed by maintaining the constant body temperature, synthesizing specific constituents, the mechanical work of the contractile system, membrane transport of substances, nerve impulse transmission, and vital functions. All these are more pronounced during the growth period and lessened in advanced age (the rate of anabolism decreases).

In principle, the energy needs of an organism in a “maintenance state” relate to its energy consumption. The “maintenance state” corresponds to the balance between anabolic and catabolic processes, ensuring that the functional constituents of the body remain at the same level. The determination of energy expenditures has highlighted the following:

Co-funded by the European Union

• The energy consumed by the organism (released as heat) is equivalent to the energy value of the ingested food.
• At rest, basal metabolism consumes all the energy to maintain the vital functions.
• Energy consumption is directly proportional to the volume of oxygen consumed (1 liter of oxygen consumed is equivalent to 4.83 kcal of energy).

In a healthy organism in a "maintenance state," the energy provided by the diet perfectly balances total energy expenditure. Whenever intake exceeds energy consumption, body weight increases (the body gains weight; a potential energy of 3500 kcal corresponds to a quantity of 0.45 kg of adipose tissue). Conversely, when energy needs are lower than the expenditure, the body loses weight. Extreme situations in these conditions are obesity and malnutrition.

Nutritional requirements vary depending on immediate somatic characteristics (weight, height), age, physical activity, climatic conditions, and health status. Severe catabolic stress, characteristic of certain diseases, leads to an increase of over 100% in normal energy expenditures. There is also a nitrogen metabolic imbalance that requires protein supplements.

Rational nutrition is one of the factors contributing to maintaining health and must correspond quantitatively (quantity of food) and qualitatively (nutrient content) to the body's needs. It must also ensure:
- Storage of energy substances (carbohydrates, lipids) in the body.
- Building, maintenance, and cell repair through the supply of water, proteins, and some minerals (Ca, P, Mg, Na, K).
- Synthesis of enzymes to regulate cellular chemical reactions through the supply of vitamins and minerals (Cu, Fe, Ca, I).

Dietary balance induces nutritional balance, manifested through overall well-being, maximum psychophysical performance, and achieving and maintaining optimal weight. A healthy diet is based on both quantitative and qualitative nutritional balance in an individual's habitual diet.

3.1. Quantitative nutritional imbalances

Overeating (quantitative excess) has harmful effects on health and effort capacity. The excess of food imposes additional digestion and metabolism, leading to fatigue and discomfort.

The resulting energy surplus forces the body to store unused energy in the form of reserve lipids. Adipocytes (fat cells) infiltrate between muscle fibres or even replace them, and in the liver, a fatty infiltration called hepatic steatosis occurs. Body weight increases due to fatty tissue, leading to obesity. Consequently, the heart's workload increases. Steatosis reduces liver functions, and physical performance decreases.
Underfeeding (malnutrition) develops due to self-imposed or externally influenced food intake deficiency. Malnutrition results in an insufficient energy underlayer, early fatigue, and a decrease in physical and intellectual performance. Persistent malnutrition due to a lack of essential nutrients can lead to excessive weight loss with severe and permanent disorders.

3.2. Qualitative Nutritional Imbalances

These imbalances refer to nutrient intake.
a) Excessive simple carbohydrate intake leads to hyperglycaemia, followed by nervous hyperexcitability and, over time, disruptions in pancreatic secretory function. Excessive intake of polysaccharides (especially starchy foods) leads to the development of fermentation colitis, and in the long term, obesity.
Lack of carbohydrates reduces the energy substrate and physical endurance capacity.
b) Excessive protein intake (especially meat and derivatives) increases the acidity of the internal environment, leading to putrefaction colitis and the accumulation of metabolic derivatives toxic to the liver and kidneys (urea, uric acid, urates).
Protein deficiency in the diet reduces muscle mass and slows down the growth process. It also reduces immunity, as antibody support is protein-dependent.
c) Excessive lipid intake generates acidosis, as lipids cannot be fully broken down to the final stage of CO2 and H2O. Additionally, it results in an increase in blood cholesterol (hypercholesterolemia).

Total absence of fats (especially unsaturated ones) leads to a decrease in antioxidant factors, and the absorption of fat-soluble vitamins is compromised.
d) Excessive and combined consumption of carbohydrates and lipids increases blood lipid levels with serious consequences for artery structure (arteriosclerosis), leading over time to severe complications (hypertension, myocardial infarction, etc.).

Co-funded by the European Union

4. Healthy nutrition practices for various population groups

4.1. Nutrition recommendations for children

During childhood, growth and development processes proceed at different rates and involve specific nutritional needs: calorie intake and food structure. The development of the individual human being is characterised by specific and different anatomical and functional characteristics depending on age. For children and adolescents, growth occurs in leaps corresponding to changes in appetite and nutritional intake (Table 1).

Table 1. Periodisation of development in children and adolescents

Infancy (early childhood)	1 – 3 year olds
Second childhood	3 – 6 year olds
Third childhood • Prepubertal phase • pubertal phase • postpubertal phase (adolescence)	6-18/22 year olds Girls: 6 – 11 year olds Boys: 6 – 12 year olds Girls: 11 – 15 year olds Boys: 13 – 16 year olds Girls: 15 – 18/20 year olds Boys: 16 – 21/22 year olds

During childhood, however, body composition remains relatively constant. In the early years, adiposity is reduced and reaches a minimum value at the age of 6, after which there is a period of rebound which prepares the child for the onset of puberty. The limbs also grow faster than the trunk or head. Functional development depends on the mechanisms of adaptation and continuous improvement within the biological parameters imposed by the environment and by specific activities (mental, intellectual, or physical). Nutritional status can be assessed periodically by measuring somatometric parameters: waist and weight.
In children, energy and nutrient requirements are kept high due to anatomical and functional growth and development. The energy requirement (ER) is the sum of basal and growth and development needs (Table 2), and is calculated according to the formula:
ER (kcal/day) = 1000 + 100 x age (years)

Co-funded by the European Union

Table 2. Energy requirements in children

Age (years)	Average calorie requirement (kcal/day)	Possible caloric variations (kcal/day)
1 - 3	1300	900 - 1800
4 – 6	1800	1300 – 2300
7 - 10	2300	1700 - 3300

In terms of nutrient intake, it is important to ensure a balanced proportion of nutrients: 55-60% carbohydrates, 25-30% fat and 15-18% protein. The recommended carbohydrate requirement is 10 g/kg body/day (150 g) covered from: pasta, fruit, vegetables. Whole-meal bread richer in B vitamins is preferred (Table 3).

Table 3. Recommended carbohydrate requirements for children

Age (years)	Carbohydrate requirement (g/day)	Possible carbohydrate variations (g/day)	% of carbohydrate value
1 – 3	143 – 168	100 – 222	45 - 53
4 - 6	220 - 240	174 – 309	50 – 56
7 - 10	322 - 351	228 – 483	55 - 60

The recommended lipid requirement is 2-3 g/kg body/day of animal and plant origin, of which 1-3% should be provided by essential fatty acids (Table 4).

Table 4. Recommended lipid requirement for children

Age (years)	Lipid requirement (g/day)		Possible lipid variation (g/day)		% of lipid value	
1 – 3	49 – 60		34 – 77		35 – 40	
	37-45 animal	12-15 plant	26-58 animal	8-19 plant	75% animal	25% plant
4 – 6	58 – 68		42 – 87		30 – 35	
	44-51 animal	14-17 plant	32-65 animal	10-22 plant	75% animal	25% plant
7 – 10	65 – 77		46 – 106		25 – 30	
	49-58 animal	16-19 plant	35-80 animal	11-26 plant	75% animal	25% plant

Co-funded by the European Union

The recommended protein requirement is 1.2 g/kg body/day in early childhood and 1 g/kg body/day in prepubertal period. Two-thirds of the total protein should be of animal origin with the main sources being dairy products, meat, and eggs (1 egg every 2 days). Protein deficiency can occur in children from low socio-economic families, in vegetarian diets, in children with food allergies or eating disorders (Table 5).

Table 5. Recommended protein requirements in children

Age (years)	Protein requirement (g/day)		Possible protein variation (g/day)		% of protein value	
1 – 3	44 - 51		31 – 70		14 – 16	
	31-36 animal	13-15 plant	22-49 animal	9-21 plant	70% animal	30% plant
4 – 6	61 – 70		44 – 90		14 – 16	
	40-46 animal	21-24 plant	29-59 animal	15-31 plant	65% animal	35% plant
7 – 10	82 – 94		58 – 129		25 – 30	
	49-56 animal	33-38 plant	35-77 animal	23-52 plant	60% animal	40% plant

The recommended water requirement is 80 ml/kg body/day and the vitamin requirement should be covered by the food in case of a balanced diet, except for vitamin D which should be supplemented for rickets prophylaxis, until the age of 5-7 years, in periods not accompanied. Vitamin D is necessary for intestinal absorption of calcium and its binding to bones.
Supplementation of minerals can be done safely if the daily requirement is not exceeded. Calcium aims to mineralize and maintain bone growth. The recommended intake is 500 mg/day for children aged 1-3 years and 800 mg/day for children aged 4-6 years. Calcium requirements are influenced by the rate of intestinal absorption and the structure of the diet: protein, vitamin D and phosphorus intake. Urinary calcium excretion is extremely low in childhood. Calcium intake during this period of rapid growth is 2-4 times higher than in adults.
Magnesium is recommended at 5 mg/kg body/day especially in the prepubertal period when the child's growth is accelerated. Iron is the mineral element whose quantity can cause febrile anaemia in children aged 1-3 years, with decreased resistance to infections and possible behavioural disorders.

Co-funded by the European Union

The promotion of rational and correct nutrition in children should be based on:
- informing parents about healthy eating (Table 6) at home or at school;
- explaining to children the importance of healthy eating and the development of healthy eating skills as early as possible;
- promoting physical activity with its long-term benefits in maintaining health;
- limiting and correcting obesity from childhood, reducing the risk of developing cardiovascular and metabolic diseases in adulthood.

Table 6. Recommended foods and foods limited in quantity

Recommended foods: • cereals (bread, rice, pasta) • meat, milk, eggs • meat, fish oil, egg yolk, cheese, mushrooms • milk, yoghurt, cheese • vegetables, fruit	 • preferably "wholemeal" varieties • qualitative source of protein • sources of vitamin D • main source of calcium • main sources of vitamins and minerals
Quantitatively limited foods • sugary drinks • sweets and snacks • salt	 • high calorie content and low nutrient intake • limitation of salty foods or cooking

4.2. Recommendations on teenage nutrition

Adolescence, the most important period of human development, is characterised by profound biological, physical, psychological, and moral changes. Childhood traits disappear, secondary sexual characteristics emerge and the future adult takes shape. The nutrient requirements specific to this period change due to particular circumstances: eating behaviour, sport or exercise, lifestyle.

Puberty is marked by important psychological and behavioural changes and lasts for 2 years; it begins 2 years earlier in girls than in boys. The growth spurt during puberty completely transforms the child's physical appearance: the waistline increases by an average of 5 cm per year at pre-puberty and 7-9 cm at puberty. Both sexes experience changes in body composition: girls accumulate more body fat (up to 22-26% during puberty) and boys develop muscle mass. The location of adipose tissue is different and characteristic for each sex.

The psychological and behavioural changes of this period are rapid and are characterised by the development of abstract capacity and self-image. The definition of a new identity often takes place through opposition to the adult image and the adoption of social norms similar to those of young people of the same generation.

Energy requirements vary according to age, gender, degree of physical activity and stage of sexual maturity. It is 50% higher than in adults due to an increased basal metabolism imposed by increased tissue activities (estimated 25 kcal/day for the growth process) (Table 7).

Table 7. Calorie requirements in adolescents

Age (years)		Energy requirement (kcal/day)	Possible caloric variation (kcal/day)
Girls	11 – 14	2600	1800 – 3000
	15 – 19	2800	2000 – 3000
Boys	11– 14	3100	2200 – 3700
	15 – 19	3500	3000 - 3900

The need for nutrients is higher during this period of life, especially for those nutrients that are essential in the growth and development processes of adolescence.
Proteins ensure cellular replenishment, and their intake is more related to the stage of development than to chronological age. The recommended average requirement is 45-72 g/kg body/day (Table 8); any decrease in quantity can lead to growth slowing and a decrease in muscle mass (in the case of chronic diseases or eating disorders). Excessive intake may interfere with calcium metabolism and increase fluid requirements.

Table 8. Recommended protein requirements in adolescents

	Girls		Boys	
Age (years)	11 – 14	15 – 19	11 – 14	15 – 19
Proteins	89 – 101 g	96 – 109 g	106 – 121 g	120 – 137 g
Animal proteins	49 – 55 g	48 – 54 g	52 – 55 g	60 – 69 g
Plant proteins	40 – 46 g	48 – 55 g	54 – 66 g	60 – 69 g
% of total proteins	55% animal 45% plant	50% animal 50% plant	55% animal 45% plant	50% animal 50% plant

The need for food fibre is closely linked to its role in lowering the risk of developing dyslipidaemia and colon cancer in adulthood. Vitamin requirements are higher due to energy needs. Supplementation with vitamins involved in energy-generating processes is recommended: niacin, riboflavin, thiamine. Also, increased vitamin D intake between 100 000 - 200 000 IU during the cold season is recommended.

Co-funded by the European Union

Mineral salts (especially iron and calcium) are essential for the growth and development of adolescents. The recommendation to supplement iron intake is due to hypervolaemia proportional to the increase in muscle mass in males and due to monthly losses through menstrual blood in females. Iron deficiency in 8% of adolescent girls, through poor diet, can lead to iron deficiency anaemia with decreased immune response to various forms of infections, slowed weight gain and decreased ability to concentrate with negative effects on school performance. Many adolescents have an iron intake well below the recommended minimum (15-18 mg/day).

Calcium needs to be supplemented in adolescence due to increased muscle and bone mass, specific endocrine changes. During peak puberty calcium deposition is twice as high as during the rest of the pubertal period. An intake of 1300 mg/day is therefore recommended, which can be provided by consumption of dairy products (e.g. 4 glasses of milk/day). Sometimes, inadequate consumption of dairy products or excessive consumption of high phosphorus soft drinks (which alter the phosphorus/calcium ratio) can develop a calcium deficiency in adolescence with an increased risk of osteoporosis in adulthood. Low zinc intake may affect growth and maturation of secondary sex characteristics.

Nutritional disorders associated with adolescence are related to both excess (obesity) and deficiency (anorexia) with major risks in later adult development. Thus, the onset of obesity coincides with adolescence. In girls, it presents a higher risk due to changes in the distribution of adipose tissue. The onset and development of obesity must therefore be prevented and monitored, especially in families at risk (diabetes, dyslipidaemia, obesity). Malnutrition is associated with rapid growth in height, insufficient caloric intake, or lack of appetite. The cause is often psychological and needs to be quickly identified. Trying to force feed can lead to anorexia, which has become one of the most serious health problems among young girls.

4.3. Nutrition recommendations for pregnant women

During pregnancy the emphasis is on optimal weight gain and adequate intake of calories, vitamins and minerals needed to develop the foetus and maintain maternal health. Energy intake is a minimum of 36 kcal/kg body/day and should be calculated so that weight gain remains optimal. (NOT eating for two!).

The nutrient requirements are as follows:
- Carbohydrates - it is recommended that sugars cover 50-60% of daily expenditure;
- Lipids - it is recommended that lipids cover 30-35% of daily caloric needs;
- Protein - higher requirement due to tissue structuring processes; intake should be higher than 10 g/day; proteins should be of high biological value.

Water intake should be a minimum of 2.5 l/day, which is the optimal level required throughout pregnancy to prevent premature birth. Insufficient fluid intake increases the production of oxytocin which stimulates uterine contractions.

The need for vitamins (folic acid) and minerals (calcium, iron, zinc) is increased.

4.4. Recommendations concerning weight gain or loss

Body weight is a very accurate indicator of health status and risk of illness. At birth, boys weigh on average 3250 g and girls 3000 g; this triples within a year of birth. Between the ages of 1 and 11 years there is a linear increase of 2 kg/year in weight, while from 11 to 16 years it increases by 2-3 kg/year.

Each organ and tissue (skin, neural system, viscera, skeleton) contributes significantly to body weight, representing the relatively fixed component. Fluctuations in weight depend on structural and quantitative changes in the variable component (muscle, fat, and water).

Normally, adipose tissue should represent between 10-18% of total body weight in men and between 18-25% in women. Anything over these limits is called overweight, even though the actual weight may be within normal limits. In other words, although the weight in kg is normal, the percentage of fat contributing to these kg may be too high. On the other hand, the opposite situation is also possible: an excess weight in kg without the fat percentage being above the normal limits. Any excess fat is harmful, and exceeding the ideal weight by more than 20% will put the body's health at serious risk.

In a 60 kg young person, the fixed component is 20 kg and the variable component is 40 kg (30 kg muscle mass and 10 kg fat tissue). For children and adolescents, muscle mass should be 27% for 7-8 year olds, 32% for 10-16 year olds and 44% for 17 year olds.

At the same height and weight, somatic appearance may be different. A distinction should be made between hyperweight with excess fat but a developed muscle and ligament system and normal weight with a low percentage of active mass and more than 20% more fat tissue, with muscle hypotonia. Excess weight may favour performance, provided that this excess is through muscular hypertrophy and only through excess adipose tissue.

Regular exercise reduces weight (on average by 70-90 g/week), increases muscle and cortical tone, prevents obesity and cardiovascular disease (e.g. brisk walking consumes 5 kcal/minute). Weight loss is the result of the correlation between physical activity and a low-calorie diet.

Any attempt to reduce weight (especially in children and adolescents) is carefully monitored to reduce the risk of serious functional and metabolic disorders. Specialists in the field warn against attempts to reduce body weight rapidly (by daily use of: sauna, steam baths, diuretics, laxatives, or heat insulating clothing) because of the negative effects on health:

- decreased plasma volume and renal blood flow;
- reduction of muscle strength with early onset of fatigue;
- rapid depletion of glycolytic stores;
- disturbance of oxygen transport and consumption;
- altered cardiorespiratory function;
- dehydration of more than 3% of the body.

Co-funded by the European Union

Table 9. Example of hypocaloric ration (1100-1200 kcal/day)

Breakfast	• 40 g black bread • 50 g cottage cheese • 5-10 radishes, peppers, tomatoes • sweetened tea or black coffee (1 teaspoon of sugar)
Lunch	• 200 g lean meat • 40 g black bread • lettuce or raw cabbage, tomatoes, peppers/cucumbers with vinegar and a tablespoon of oil • 300 g fruit
Dinner	• raw vegetable salad with 1 boiled egg • 250 ml yoghurt • 200 g fruit

Gaining or maintaining weight, in terms of muscle mass, can be achieved by a caloric excess of 2500 kcal to gain an excess of 0.450 kg. If 1000-1500 kcal/day is added to the normal diet over a period of 5 days, the weight will be 1-1.5 kg/week higher.

5. Nutritional strategies for individuals engaged in physical exercises

5.1. Carbohydrate consumption

Carbohydrates should be consumed within 45 minutes before the beginning of physical activity. Otherwise, the development of hypoglycaemia and rapid onset of fatigue may be observed (Platonov, 2015). If, on a particular day, physical activity is conducted in a competitive or recreational manner (thus involving high and demanding effort), the carbohydrate supercompensation strategy (carb-loading) can be employed.

This is not a new methodical strategy; it has been used since the 1960s when Scandinavian researchers found that a low-carbohydrate diet gradually diminishes the possibilities of exertion. They further noted that a carbohydrate-rich diet maintained for a few days, specifically for three days before competition, can significantly enhance the capacity for effort compared to its normal level. From this point, glycogen reserves increase by approximately 20% above the initial values. Thus, individuals engaging in physical activities are advised to consume 5-7 g of sugars/kg body weight, six days before the competition, and in the last three days, with a decrease in effort, increase carbohydrate intake to 8-10 g/kg body weight.

After strenuous effort, it is crucial to implement another consumption strategy. Following intense or prolonged exertion, approximately 50 g of carbohydrates, with a medium or high glycaemic index, should be administered every 2 hours for 20 hours to replenish glycogen reserves and prevent the depletion of other macronutrients - fats and proteins. Otherwise, if carbohydrate reserves are not replenished through diet, subsequent efforts will heavily consume fats and even proteins, gradually depriving the body of energy.

For a rapid glycogen recovery, it is recommended to administer approximately 1672 kJ (400 kcal) of carbohydrates over 15-30 minutes post-exertion, and other losses should be replenished by consuming approximately 418 kJ (100 kcal) every 2-4 hours (Jonson et al., 2009).

The daily carbohydrate requirement is 7-11 g/kg body weight (Iwasa-Madgen, K., 2018). It should be noted that regardless of whether we are referring to normal-weight or even underweight individuals, excessive carbohydrate consumption can lead to obesity, cardiovascular and cerebrovascular conditions, diabetes, etc.

5.2. Lipid consumption

Although appreciated by everyone for enhancing food flavours, lipid consumption should not be exaggerated, considering the numerous negative effects associated with rapid storage, especially in the form of adipose tissue. An appropriate amount should constitute approximately 30% of the daily requirement, taking into account the context of different types of fats:

- Saturated fats, which are solid and associated with arteriosclerosis (e.g., red meat). These fats include LDL or "bad" cholesterol found in butter, cheese, and meat fat. A distinct component of saturated fats is HDL or "good" cholesterol , present only in animal fats, not in vegetable fats. HDL plays a role in sexual hormone synthesis, immunity, and digestion;
- Trans fats (trans fatty acids), originating from the industrial processing of vegetable oils (fast food, pastries), with no nutritional value.
- Unsaturated fats (mono- and polyunsaturated), referring to omega-3 fatty acids with heart benefits and omega-6 with a role in reducing LDL, providing protection against cardiovascular diseases, and athletic benefits due to anti-inflammatory properties. Omega-3 can be found in pumpkin seeds, nuts, salmon, or herring. Omega-6 is present in sunflower, rapeseed, corn or soybean oils, beef and chicken meat, almonds, walnuts, cereals, etc.

5.3. Protein consumption

Proteins play an important plastic and reconstructive role in body activities, developing tissues (including muscular tissue) or repairing them following micro-trauma. In this framework, pre- or post-exercise protein balance is just as important as carbohydrate balance, maximising the benefits of training and enhancing recovery.

Frequent strength training or prolonged aerobic exercises (cardio training) influence protein metabolism through various processes: strength exercises increase muscle mass, and endurance exercises enhance oxidative enzymes. In both situations, protein synthesis is favoured. This proteolysis is essential for maintaining or even developing body mass. However, excessive proteolysis not only leads to the oxidation of amino acids with functional-reconstructive roles but also to the accumulation of nitrogen in muscles and increased urea production, which significantly acidifies the internal environment (Rennie et al., 1981). The protein balance becomes negative, and the energy expenses must be covered by intake. In these specific conditions, some amino acids are susceptible to oxidation, and although they serve as energy substrates themselves, they should not be consumed to the same extent as sugars or lipids. Amino acids should not be consumed excessively or disproportionately during effort.

The recommended daily protein ratio is approximately 1.5-1.7 g for every kilogram of body weight (Mujik, C., 2013). This ensures the repair of muscle injuries and adaptation to effort stimuli.

Co-funded by the European Union

5.4. Dietary supplements to compensate for nutrient deficiency

Dietary supplements, also known as performance enhancers, play a crucial role in supporting efforts, with the most well-known supplement being the category of protein drinks, primarily designed for muscle reconstruction. For instance, Vitargo, a product based on refined starch. A variant, Vitargo S2, has a shorter gastric emptying time, resulting in a faster rate of muscle glycogen recovery.

Regarding vitamins (micronutrients), there is evidence correlating favourable supplementation of vitamin D with the prevention of injuries and fractures. Research has revealed that sustained supplementation with antioxidants (spirulina, turmeric , blueberries, blackberries, cranberries) reduces symptoms of exercise-induced muscle injuries, muscle pain, inflammation, and promotes protein function. Concerning minerals, numerous studies have indicated a correlation between increased calcium intake and a decrease in stress fractures, along with an increase in bone mineral density. According to specialized studies, lists of healing foods are incomplete, requiring further medical research. For example, kefir is an antibacterial, anti-inflammatory, and bioactive food recently brought back to the attention of specialists in physical education and sports.

5.5. Recommendations for maintaining body weight

For those engaging in physical exercises, proposals for maintaining body mass, “body weight, which is also closely related to daily energy consumption” (Wierman, 2007), can include the following;

- Balanced diets should not only serve as a means to stimulate the functional capacity of the body but also accelerate the recovery process.
- Rational nutrition should be consistently maintained, not just during stressful periods in life. Individuals engaging in physical activities need to pay increased attention to food, hydration, and rest.
- Consumed foods should be nutritious, rich in proteins and carbohydrates.
- Foods containing chemicals or excessive saturated fatty acids, excess sugar, etc., should be avoided.
- Normally, foods should be ingested in at least three meals per day.
- According to the National Institute of Public Health in Romania (INSP), breakfast should be taken regularly, containing a substantial nutritional intake of vitamins, minerals, and fibres.
- As the intensity of effort increases, the role of carbohydrates as a fuel source also increases. However, vitamins and minerals are also needed.
- Nutrition and performance enhancers play a crucial role in physical activity. These two elements are particularly necessary, especially for individuals in growth, as well as for older age groups, which may sustain increasingly intense efforts.
- Improving body composition and weight management involve losing fat and gaining muscle mass.
- Reduction of adipose tissue and maintenance of lean tissue occur in the long term. Weight loss is a gradual process, and while going through it, an individual integrated into physical activities may have less available fuel, impacting short-term motor performance (adapted from Mullen, 2018).

• When calorie intake cannot meet expenditure, the individual will experience a net loss of body mass. This could be a loss of body fat, muscle tissue or both;
• When calorie intake exceeds energy expenditure lean tissue or body fat or both may develop. A proportionately greater gain in one type of tissue may occur, as well as a simultaneous loss in another. This scenario is associated with a short-term optimisation of physical performance, but the gain needs to be monitored so as not to alter body composition in the long term.

Thus, appropriate nutrition will include:
- cereals: bread, rice, pasta (in small portions);
- vegetables and fruit - sources of vitamins and minerals, including vitamin C - contribute, among other things, to good iron absorption;
- meat and eggs - sources of high-quality protein, which provide the essential amino acids needed;
- dairy - milk, yoghurt, cheese - sources of calcium.
Not recommended:
- carbonated drinks, choosing water, milk, and natural fruit juices (without added sugar and preservatives) as the main fluids for proper hydration;
- sweets (high in calories and low in nutrients);
- salt - choose less salty foods and add only small amounts of salt to what you eat or cook.

Co-funded by the European Union

6. Importance of sleep, stress management, and other lifestyle factors for overall health and wellbeing

Sleep is a physiological state of the body during which a series of processes take place, influencing both the physical and mental health of an individual. The duration of sleep is determined by the person's age and the demands placed on the body. Consequently, a 13-year-old child requires 8 hours of sleep, while an adult sleeps for 7 hours, and an elderly person for 5-6 hours (Sabău, 2005).

Sleep offers numerous benefits for both children and adults, including stress and anxiety reduction, metabolism regulation, maintenance of circulatory system function, memory improvement, energy replenishment, increased alertness, immune system maintenance and strengthening, and nervous system recovery. Furthermore, in adults, sleep helps in cell regeneration and growth due to the secretion of growth hormone (STH) during the night.

Daytime sleep is not as restful as nighttime sleep because "periods of paradoxical sleep are diminished" (Bota & Prodescu, 1997, p. 127).

To ensure restful sleep, it is recommended to establish an evening routine that prepares the body for sleep. This routine should be consistently followed, not only during the week. While exceptions can be made, they should not become permanent. Additionally, it is advisable to avoid consuming food, alcoholic beverages, coffee, or chocolate late in the afternoon and to minimize exposure to bright lights (phone, computer, TV) before bedtime. For good health and well-being in general, it is recommended that those who engage in physical activities ensure a restful sleep of at least 8 hours. Sleep plays important roles in the body's recovery, particularly attributed to deep sleep, the fourth stage of sleep (Stage I, with light sleep – 5-10 minutes; Stage II, when eye movements cease and brain waves slow down; Stage III, with deep sleep, where the body is responsive to stimuli; Stage IV, with REM sleep).

Deep sleep:
• Intensifies the circulation of STH, contributing to muscle tissue reconstruction (nighttime STH concentration is higher than during the day). "After a day of intense physical activity, sleep is deeper, and STH concentration increases in the blood" (Davenne, D., 2004).
• Reduces nervous excitability. By slowing EEG waves, brain cells induce general muscle relaxation, lower heart rate, and respiratory rate.
• Stimulates the immune system. Physicians recommend immunization and "sanitization through sleep," and in recent decades, relationships between immunity mechanisms and slow-wave sleep have been confirmed.

According to the literature, deep sleep constitutes 20-25% of the total night's sleep (Sejbuk, Mironczuk-Chodakowska, & Witkowska, 2022), while REM sleep, with dreams and irregular cardiorespiratory activity, represents 25% and ensures the ionic, metabolic, and protein recovery of neurons. ,It is the sleep phase that enhances memory, processes emotions, and supports brain development' (Ciubotaru, 2022).

It is important to note that lack of sleep affects psychomotor and cognitive performance and disrupts physical and physiological capacities. The cardiovascular system, thermoregulation, breathing, enzymatic activity in muscles, and more are negatively impacted. (Walsh et al., 2021; Dedhia, & Maurer, 2022) However, restful sleep ensures a sense of well-being.

Co-funded by the European Union

In relation to exercise, sleep has a number of particular characteristics, depending on the age of the person practising physical activity. For example, people of different ages who report better sleep quality show lower levels of fatigue when exercising. On the other hand, those who are more physically active have better sleep quality. (Sejbuk, Mironczuk-Chodakowska, & Witkowska, 2022). Also, relationships between exercise duration and intensity and sleep quality have been observed. Physically active individuals sleep better and longer than sedentary individuals, while moderate and intense physical activities have stronger positive effects on sleep quality as opposed to low intensity physical activities (Murray et al., 2017).

Sufficient physical activity outdoors (e.g. walking, running, cycling, skiing, swimming, etc.) improves sleep quality without the need for pharmacological products (Tsunoda et al., 2015).

A significant relationship impacting the quality of life for the exercise practitioners is the connection between sleep and the time of day when physical activities are undertaken. It has been found that high-intensity physical exercises decrease the melatonin secretion (a hormone that naturally induces sleep) when practiced late in the evening. (Bisson, Robinson & Lachman. 2019) Conversely, moderate to high-intensity physical exercises performed during the night cause a delay in melatonin secretion the following night. It has also been observed that late-night physical exercises accelerate major bodily functions (breathing, circulation) and may cause sleep disturbances.

Positive effects of physical exercise on sleep have been identified with respect to children's development and health. Sleep has positive effects on the health and harmonious development of children. Studies show that nowadays young children (1-5 years old) sleep less than children of the same age 100 years ago (Janssen et al., 2020), leading to various negative consequences for their health, such as an increased likelihood of weight problems in the years to come.

Involving young children and preschoolers in physical activities has a positive effect on the quality and stability of their sleep (Sejbuk, Mironczuk-Chodakowska, & Witkowska, 2022). Nevertheless, the intensity of effort must be taken into consideration. Janssen et al. (2020) suggest that light effort intensity leads to surpassing the bedtime, while moderate to high intensity is associated with delaying bedtime and shortening its duration. On the other hand, young children with more intense physical activity sleep better, a shorter time until they fall asleep, and better sleep quality (Janssen et al., 2020).

Outdoor physical activities, where movement harmoniously combines with natural toughening factors, have a beneficial effect on sleep in young children, especially preschoolers (Yoong et al., 2019).

For adolescents (11-19 years old), engaging in moderate to high-intensity physical activity for 60 minutes enhances sleep quality and shortens its duration (Collier et al., 2014).

In adults, physical activities and time spent outdoors positively influence both the quality and duration of sleep (Stefan et al., 2018). Simultaneously, engaging in physical activities and quality sleep positively correlate with the cognitive function (Sejbuk, Mironczuk-Chodakowska, & Witkowska, 2022).

For elderly individuals, sleep quality positively correlates with physical activity (Christie, Seery, & Kent, 2016), which should have moderate to high intensity. Elderly individuals who are physically active experience better, longer sleep, and require a shorter time to fall asleep (Reid et al., 2010).

Insomnia leads to various negative effects on the body, such as weakened immunity, lack of energy, hypertension, diabetes, obesity, reduced muscle mass, inefficiency in weight loss programs, and diminished performance during physical activities.

Stress is a condition in which external influences (work overload) or mental and emotional states (anxiety) alter the functioning of the body and can affect hormonal balance (Dictionary of Sport and Exercise Science, 2008). Actually, stress is the body's response to various stressors, which can originate externally or internally.

Stress arises from one or a combination of factors in a person's life, making them feel timid and anxious (Dictionary of Sport and Exercise Science, 2008). Stress influences the daily activities of individuals, regardless of age, gender, profession, social position, etc.

There are numerous causes leading to the onset of stress, including relationships with people around us, concern for health, self-confidence, and self-esteem, adapting to new changes in a person's life, work, financial situation, pollution, and the foods consumed, among others.

When a person is stressed, the body secretes large amounts of stress hormones (adrenaline and cortisol), leading to reactions such as increased blood pressure, higher respiratory rate, weakened immunity, reduced memory capacity, panic attacks, insomnia, etc.

In small quantities, stress is beneficial - eustress (Bienertova-Vasku, Lenart, & Scheringer, 2020). It is necessary for achieving success, providing the energy to move forward, continue an activity, solve a problem, and attain one's desires.

In large quantities - distress (Bienertova-Vasku, Lenart, & Scheringer, 2020), stress destabilizes the body, having negative effects. It is felt as pressure that can alter perceptions, behaviours, thoughts, and feelings. If the stressful situation persists for an extended period, distress has severe consequences on the body.

It is crucial for a person to identify stress, recognize its cause, and find solutions to counteract its negative effects. Means that can be employed include physical exercise, keeping a journal, engaging in leisure activities in nature, socializing, and communication. Through physical exercise, as the main means of motor activities, stress is significantly reduced. These actions are voluntary motor activities, specifically selected and performed according to certain rules, with the aim of achieving specific objectives.

Dragnea & Bota (1999) define physical exercise as a "motor action with instrumental value, designed and programmed to achieve the objectives of various motor activities."

Co-funded by the European Union

Not all movements, however, can be considered physical exercises; only those closely related to the purpose for which they are practiced are considered as such. The content depends on the intention for which physical exercises are practiced and the intended purpose. Physical effort, mental effort, and body movements constitute the content of physical exercises.

Physical exercises must be continuously adapted to the age, gender, physical condition, interests, etc., of the person practicing them. “Exercise must be carefully directed so that physical exercises improve the quality of life, counteract the negative effects of sedentary behaviour, stress, and technology, and address the two registers through which health manifests itself, namely the absence of diseases and the cultivation of health” (Epuran, 2013).

References

Apostu, M. (2010). Nutriţie-medicaţie-doping în antrenamentul copiilor şi juniorilor. Discobolul.

Apostu, M., (2010). Biochimie. Editura Moroşan.

Apostu, M., (2013). Biochimie, ed. IIa. Printech.

Benardot, D., (2006). Advanced Sports Nutrition, Human Kinetics.

Bienertova-Vasku, J., Lenart, P., Scheringer, M. (2020). Eustress and Distress: Neither Good Nor Bad, but Rather the Same? Bioessay, Volume 42, Issue 7, DOI 10.1002/bies.201900238

Bisson, A. N.S., Robinson, S. A., & Lachman, M. E. (2019). Walk to a Better Night of Sleep: Testing the Relationship Between Physical Activity and Sleep. Sleep Health, 5(5), 487. https://doi.org/10.1016/j.sleh.2019.06.003

Bota, C. (2002). Fiziologie generală. Aplicații la efortul fizic. Medicală.

Bota, C., & Prodescu, B. (1997). Fiziologia educației fizice și sportului – ergofiziologie. Antim Ivireanul.

Christie, A.D., Seery, E., Kent, J.A. (2016). Physical activity, sleep quality, and self-reported fatigue across the adult lifespan. Exp Gerontol. May;77:7-11. doi: 10.1016/j.exger.2016.02.001

Collier, S., Fairbrother, K., Cartner, B., Alley, J.R., Curry, C.D., Dickinson, D.L., Morris, D.M. (2014). Effects of exercise timing on sleep architecture and nocturnal blood pressure in prehypertensives. Vasc. Health Risk Manag. 10, 691–698

Crăciun, T., Crăciun, L.L. (1989). Dicționar de biologie. Albatros.

Dedhia, P., Maurer, R. (2022). Sleep and health – A lifestyle medicine approach. The Journal of Family Practice, Supplement, Vol. 71, No. 1, p. S30-S34. doi: 10.12788/jfp.0295.

Dictionary of Sport and Exercise Science (2008). A&C Black Publishers Ltd.

Dragnea, A., Bota, A. (1999). Teoria activităţilor motrice. Didactică şi Pedagogică, R.A.

Epuran, M. (2013). Motricitate şi psihism în activităţile corporale. Prolegomene la o metateorie a activităţilor corporale, vol. 2. FEST.

Guyton, A.C. (1996). Fiziologie. Medicală Amaltea.

Hirshkowitz, M., Whiton, K., Albert, S.M., Alessi, C., Bruni, O., DonCarlos, L., Hazen, N., Herman, J., Katz, E.S., Kheirandish-Gozal, L., Neubauer, D.N., O'Donnell, A.E., Ohayon, M., Peever, J., Rawding, R., Sachdeva, R.C., Setters, B., Vitiello, M.V., Ware, J.C., Adams Hillard, P.J. (2015). National Sleep Foundation's sleep time duration recommendations: methodology and results summary. Sleep Health. Mar;1(1):40-43. doi: 10.1016/j.sleh.2014.12.010.

Iwasa-Madgen, K. (2018). Nutrition (capitol) în Swimming Science, Chicago: The University of Chicago Press, published by Mullen, J., Pages: 124-152

Janssen, X., Martin, A., Hughes, A.R., Hill, C.M., Kotronoulas, G., Hesketh, K.R. (2020). Associations of screen time, sedentary time and physical activity with sleep in under 5s: A systematic review and meta-analysis. Sleep Med Rev. Feb;49:101226. doi: 10.1016/j.smrv.2019.101226.

Mullen, J. (2018). Swimming Science, Chicago: The University of Chicago Press, e-book

Murray, K., Godbole, S., Natarajan, L., Full, K., Hipp, J.A., Glanz, K., Mitchell, J., Laden, F., James, P., Quante, M., Kerr, J. (2017) The relations between sleep, time of physical activity, and time outdoors among adult women. PLoS One. Sep 6; 12(9): e0182013. doi: 10.1371/journal.pone.0182013.

Platonov, V.N. (2015). Periodizarea antrenamentului sportiv. Teoria generală și aplicațiile ei practice, Editura Discobolul, București

Popescu, A.D. (2014). Fiziologie – sisteme de nutriție și de reproducere. Bren.

Popescu, A.D. (2015). Fiziologie – curs în tehnologie IFR. Discobolul.

Reid, K.J., Baron, K.G., Lu, B., Naylor, E., Wolfe, L., Zee, P.C. (2010). Aerobic exercise improves self-reported sleep and quality of life in older adults with insomnia. Sleep Med. Oct;11(9):934-40. doi: 10.1016/j.sleep.2010.04.014

Sabău, E. (2005). Mijloace de refacere și recuperare în activitatea sportivă. Bren.

Sejbuk, M., Mironczuk-Chodakowska, I., Witkowska, A.M. (2022). Sleep Quality: A Narrative Review on Nutrition, Stimulants, and Physical Activity as Important Factors. Nutrients, Volume 14, Issue 9, 1912. https://doi.org/10.3390/ nu14091912

Shepherd, J. (2007). Sports training: the complete guide, Firefly books (US) Inc.

Stefan, L., Vrgoc, G., Rupcic, T., Sporis, G., Sekulic, D. (2018). Sleep Duration and Sleep Quality Are Associated with Physical Activity in Elderly People Living in Nursing Homes. Int J Environ Res Public Health. Nov 9;15(11):2512. doi: 10.3390/ijerph15112512

Teodorescu Exarcu, I., Ciuhat, I., Gherghescu, S., Șolgal, M. (1999). Biologie - manual pentru clasa a XI-a. Didactică și Pedagogică.

Tsunoda K, Kitano N, Kai Y, Uchida K, Kuchiki T, Okura T, Nagamatsu T. Prospective study of physical activity and sleep in middle-aged and older adults. Am J Prev Med. 2015 Jun;48(6):662-73. doi: 10.1016/j.amepre.2014.12.006.

Tupita, N. (2019). Ghid de nutriție, de la prevenție la terapie. University Press.

Walsh, N.P., Halson, S.L., Sargent, C., et al. (2021). Sleep and the athlete: narrative review and 2021 expert consensus recommendations. British Journal of Sports Medicine, Volume 55, Issue 7, p. 356-368. doi:10.1136/ bjsports-2020-102025

Wierman, T. (2007). Nutrition for swimmers. Eat to swim, American Swimming, no. 4, pp 25-30

Yoong, S.L., Grady, A., Stacey, F., Polimeni, M., Clayton, O., Jones, J., Nathan, N., Wyse, R., Wolfenden, L. (2019). A pilot randomized controlled trial examining the impact of a sleep intervention targeting home routines on young children's (3-6 years) physical activity. Pediatr Obes. Apr;14(4):e12481. doi: 10.1111/ijpo.12481.

Co-funded by the European Union

HEPALIS

Interactive Tool: Nutrition And Lifestyle Education

Module 5

2023

1. Which structures form the digestive system?
A. Oral cavity, esophagus, pharynx, stomach, duodenum, and large intestine
B. Oral cavity, pharynx, esophagus, stomach, small intestine, and large intestine
C. Esophagus, pharynx, stomach, accessory glands, small intestine, and large intestine
D. Oral cavity, pharynx, stomach, accessory glands, small intestine, and large intestine

Correct answer: B. Oral cavity, pharynx, esophagus, stomach, small intestine, and large intestine

2. Which are the accessory glands of the digestive tract?
A. Liver, pancreas, spleen
B. Salivary glands, bile, liver, spleen
C. Salivary glands, liver, pancreas
D. Salivary glands, liver, pancreas, spleen

Correct answer: C. Salivary glands, liver, pancreas

3. What is the role of bile salts?
A. Bile salts contain enzymes that facilitate their involvement in protein degradation
B. Bile salts play an important role in the absorption of vitamins
C. Bile salts contain enzymes that cause the breakdown of carbohydrates and their absorption
D. Bile salts play important roles in lipid digestion by emulsifying lipids, reducing surface tension, facilitating lipid digestion by activating lipase

Correct answer: D. Bile salts play important roles in lipid digestion by emulsifying lipids, reducing surface tension, facilitating lipid digestion by activating lipase

4. How is the degradation of carbohydrates achieved, and what are the final products?
A. Carbohydrate degradation occurs in the stomach and small intestine where pancreatic amylase and intestinal disaccharides act in the intestinal juice to produce glucose
B. Carbohydrate degradation begins in the oral cavity under the action of salivary amylase and continues in the small intestine under the action of pancreatic amylase and intestinal disaccharides in the intestinal juice to produce glucose, fructose, galactose
C. Carbohydrate degradation begins in the oral cavity under the action of salivary amylase and continues in the small intestine under the action of pancreatic amylase and intestinal disaccharides in the intestinal juice to produce glucose
D. Carbohydrate degradation begins in the oral cavity under the action of salivary amylase and continues in the small intestine under the action of pancreatic amylase until glucose, fructose, and galactose are obtained

Correct answer: B. Carbohydrate degradation begins in the oral cavity under the action of salivary amylase and continues in the small intestine under the action of pancreatic amylase and intestinal disaccharides in the intestinal juice to produce glucose, fructose, galactose

Co-funded by the European Union

5. Which statement about the absorption of vitamins is correct?
A. Vitamin absorption occurs in the presence of water
B. Vitamin absorption occurs in the presence of bile salts
C. Vitamin absorption occurs in the presence of water and bile salts in the large intestine
D. Vitamin absorption depends on the solubility of each vitamin

Correct answer: D. Vitamin absorption depends on the solubility of each vitamin

6. What are the nutritional principles?
A. The category of substances in the daily diet that ensures the development, maintenance, and reproduction of the body under normal conditions
B. The category of substances that complements the daily diet, ensuring the development of the body based on age, gender, and health status
C. The category of substances that complements the daily diet necessary for the development of the body up to 18 years old
D. The category of substances in the daily diet that ensures the development of the body for individuals who regularly engage in physical activities

Correct answer: A. The category of substances in the daily diet that ensures the development, maintenance, and reproduction of the body under normal conditions

7. Rational nutrition?
A. Contributes to maintaining health
B. Qualitatively corresponds to the needs of the body
C. Contributes to maintaining health and must correspond quantitatively and qualitatively to the needs of the body
D. Contributes to maintaining health and must correspond quantitatively to the needs of the body, while qualitative needs are secondary

Correct answer: C. Contributes to maintaining health and must correspond quantitatively and qualitatively to the needs of the body.

8. Which statement about overeating is correct?
A. It has harmful effects on health but stimulates effort capacity
B. It has harmful effects on health and effort capacity
C. It has harmful effects on digestion
D. It has harmful effects on metabolism

Correct answer: B. It has harmful effects on health and effort capacity

9. Qualitative dietary imbalances refer to?
A. Excess or lack of carbohydrates
B. Excess or lack of proteins
C. Excess or lack of lipids
D. All options are correct

Correct answer: D. All options are correct

Co-funded by the European Union

10. Assessing the nutritional status of children?
A. Can be done periodically by measuring certain somatometric parameters
B. Can be done periodically by measuring some parameters established by doctors based on different criteria depending on gender
C. Can be done whenever a child starts an educational activity to be placed in a group adapted to their characteristics
D. Can be done every 5 years

Correct answer: A. Can be done periodically by measuring certain somatometric parameters

11. How is the energy requirement (ER) in children calculated?
A. Using the formula: ER (kcal/day) = 1000 - 100 x age (years)
B. Using a formula that takes into account the child's gender
C. Using the formula: ER (kcal/day) = 1000 + 100 x age (years)
D. Using the formula: ER (kcal/day) = 1000 +/- 100 x age (years)

Correct answer: C. Using the formula: ER (kcal/day) = 1000 + 100 x age (years)

12. Which is the correct nutrient intake for children?
A. 65-70% carbohydrates, 10-15% lipids, and 20-25% proteins
B. 55-60% carbohydrates, 20-25% lipids, and 20-18% proteins
C. 50-55% carbohydrates, 30-35% lipids, and 15-18% proteins
D. 55-60% carbohydrates, 25-30% lipids, and 15-18% proteins

Correct answer: D. 55-60% carbohydrates, 25-30% lipids, and 15-18% proteins

13. Nutrient requirements for adolescents?
A. Are identical to the nutrient intake of adults
B. Are lower than the nutrient intake of adults
C. Are 50% higher than the nutrient intake of adults
D. Are the same for both girls and boys

Correct answer: C. Are 50% higher than the nutrient intake of adults

14. Which statement is correct?
A. Nutritional disorders associated with adolescence are linked to both excess (obesity) and deficiency (anorexia), with major risks in the subsequent evolution of adults
B. Nutritional disorders associated with adolescence are mainly linked to excess (obesity), which has major effects on the subsequent evolution of adults
C. Nutritional disorders associated with adolescence are linked to both excess (obesity) and deficiency (anorexia), are normal and do not affect the health of future adults
D. Nutritional disorders associated with adolescence are linked to deficiency (anorexia), but the subsequent risks are minor

Correct answer: A. Nutritional disorders associated with adolescence are linked to both excess (obesity) and deficiency (anorexia), with major risks in the subsequent evolution of adults

Co-funded by the European Union

15. Energy intake for pregnant women?
A. Depends on the trimester of pregnancy
B. Minimum 36 kcal/kg body weight/day
C. Should be increased because pregnant women eat for two people
D. Minimum 20-25 kcal/kg body weight/day

Correct answer: B. Minimum 36 kcal/kg body weight/day

16. Muscle mass of children aged 10-16?
A. 27%
B. 44%
C. 32%
D. 40%

Correct answer: C. 32%

17. Is excess weight harmful?
A. If it exceeds 20% of the ideal weight
B. If it exceeds 15% of the ideal weight
C. If it exceeds 25% of the ideal weight
D. None of the statements is correct

Correct answer: A. If it exceeds 20% of the ideal weight

18. The hypocaloric diet restricts the intake by?
A. 100 kcal
B. 800-1000 kcal
C. 500 kcal
D. 200-300 kcal

Correct answer: D. 200-300 kcal

19. Which statement about sleep is correct?
A. Insomnia has negative effects on children, but it is beneficial for adults
B. Sleep duration is determined by the person's age and the demands placed on the body
C. All individuals, regardless of age and gender, need a minimum of 8 hours of sleep
D. Daytime sleep has the same benefits for the body as night time sleep

Correct answer: B. Sleep duration is determined by the person's age and the demands placed on the body

20. Which statement about stress is incorrect?
A. Stress has negative effects only on adults, with children being immune to stress due to their age
B. It is caused by internal and external factors
C. It triggers the secretion of stress hormones - adrenaline and cortisol
D. In small quantities, stress is good
Correct answer: A. Stress has negative effects only on adults, with children being immune to stress due to their age

Co-funded by the European Union

HEPALIS

Self-Assessment Test: Nutrition And Lifestyle Education

Module 5

2023

1. What is the structure of the digestive system?
a. The digestive system consists of an irregular cylindrical tube and a series of glandular formations that develop around it, called the accessories of the digestive tube. (3 points)
b. The digestive system consists of an irregular cylindrical tube and salivary glands and the liver, which develop around it, called the accessories of the digestive tube. (2 points)
c. The digestive system consists of a regular cylindrical tube and a series of glandular formations that develop around it, called the accessories of the digestive tube. (1 point)

2. Where does digestion take place?
a. Digestion occurs in the small intestine under the combined action of pancreatic, intestinal juices, and bile, and the resulting simple elements are absorbed up to the ileocecal valve in a proportion of over 80%. (2 points)
b. Digestion occurs in the small intestine under the combined action of pancreatic and bile juices and the resulting simple elements are absorbed up to the ileocecal valve in a proportion of over 60%. (1 point)
c. Digestion occurs in the small intestine under the combined action of pancreatic, intestinal juices, and bile and the resulting simple elements are absorbed up to the ileocecal valve in a proportion of over 90%. (3 points)

3. Protein degradation?
a. It occurs under the action of proteolytic enzymes in the intestinal juice, resulting in amino acids. (1 point)
b. It occurs under the action of proteolytic enzymes in the pancreatic and intestinal juices, resulting in amino acids. (2 points)
c. It occurs under the action of proteolytic enzymes in the gastric, pancreatic, and intestinal juices, resulting in amino acids. (3 points)

4. Health represents
a. Total physical well-being, contributing to personal comfort and balance. (1 point)
b. Total physical and social well-being, not the absence of disease or disability, contributing to personal comfort and balance. (2 points)
c. Total physical, mental, and social well-being, not the absence of disease or disability, contributing to personal comfort and balance. (3 points)

5. What is a healthy diet based on?
a. A healthy diet is based on the nutritional balance provided by the quantity of consumed food. (1 point)
b. A healthy diet is based on the nutritional balance provided by the quality of consumed food. (2 points)
c. A healthy diet is based on both quantitative and qualitative nutritional balance in the individual's habitual diet. (3 points)

Co-funded by the European Union

6. What do qualitative dietary imbalances refer to?
a. Excess or deficiency of carbohydrates, proteins, and lipids. (3 points)
b. Excess or deficiency of carbohydrates and proteins. (2 points)
c. Excess or deficiency of carbohydrates. (1 point)

7. The promotion of rational nutrition in children should be based on:
a. Informing parents about healthy eating, informing children about the importance of proper nutrition, promoting physical activity with long-term health benefits. (2 points)
b. Informing parents about healthy eating and informing children about the importance of proper nutrition. (1 point)
c. Informing parents about healthy eating, informing children about the importance of proper nutrition, and instilling habits early on, promoting physical activity with long-term health benefits. (3 points)

8. Iron deficiency encountered in some adolescents:
a. Can lead to iron-deficiency anaemia with decreased immune response to various infections and decreased concentration capacity, negatively affecting academic performance. (2 points)
b. Can lead to iron-deficiency anaemia with decreased immune response to various infections, slowed weight gain, and decreased concentration capacity, negatively affecting academic performance. (3 points)
c. Can lead to iron-deficiency anaemia with decreased concentration capacity, negatively affecting academic performance. (1 point)

9. Adipose tissue:
a. Represents between 10-18% of the total body weight in men and between 18-25% in women and anything beyond these limits is called overweight. (2 points)
b. Represents between 10-18% of the total body weight in men and between 18-25% in women, and anything beyond these limits is called overweight, even if the actual weight may be within normal limits. (3 points)
c. Represents between 10-18% of the total body weight in men and between 18-25% in women. (1 point)

10. Regular physical exercise:
a. Increases muscle and cortical tone. (1 point)
b. Reduces weight, increases muscle and cortical tone, prevents obesity, and the onset of cardiovascular diseases. (3 points)
c. Reduces weight, prevents obesity, and the onset of cardiovascular diseases. (2 points)

Co-funded by the European Union

Note: Scores within the 1-12 range will receive Comment 1, 13-24 range will receive Comment 2, and 25-36 range will receive Comment 3 for interpretation.

Comment 1 (1-12 points range): Congratulations on completing the self-evaluation! Your score falls within the 1-12 point range, indicating that there might be some areas where you could enhance your understanding the Exercise Programming and Instruction. Consider revisiting the module's content, paying special attention to key principles and strategies. Continuous learning is key to providing effective and inclusive services.

Comment 2 (13-24 points range): Great job! Your score falls within the 13-24 point range, suggesting a solid understanding of the key concepts covered in the module. There might be a few areas where you could delve deeper or refine your knowledge, so consider revisiting specific sections for a more comprehensive understanding. Keep up the good work, and don't hesitate to explore further to enhance your expertise.

Comment 3 (25-36 points range): Fantastic performance! Your score falls within the 25-36 point range, indicating a strong grasp of the material covered in the training module. You have demonstrated a comprehensive understanding of the Exercise Programming and Instruction in personal training, with a particular focus on low-income individuals. Your commitment to continuous improvement and staying informed is commendable. Keep up the excellent work in promoting inclusive and effective practices in the field of fitness.

Co-funded by the European Union

HEPALIS

Business And Entrepreneurship Skills

Module 6

2023

Contents

1.Introduction 4
1.1 Background and Rationale..... 5
1.2 Importance of Business and entrepreneurship skills 5
2.Module content..... 6
2.1 Developing a Business plan and Networking in the Industry..... 7
2.2 Financial Management and Budgeting..... 8
3.Marketing and 10
Promotion..... 10
3.1 Creation of Brand and Brand Awareness..... 11
3.2 Target Market, Demographics and Price Setting..... 11
3 .3 The Imperative of Social Media Marketing 12
3.4 Fitness Networking 15
4.EREPS & Ethical code 16
4.1 Registration in ERES 17
4.2 The ERES ethical code of Practice..... 17
5.Conclusion 20
References 22

1. Introduction

1.1 Background and Rationale

In response to the evolving demands of the fitness industry, this module serves as a guide, delving into key areas such as client acquisition, marketing strategies, financial management, and effective communication. By prioritizing the development of a robust skill set in these domains, ensuring that personal trainers are not only adept at enhancing their clients' physical well-being but also at navigating the intricacies of the business side of the fitness industry, propelling them toward sustained success.

Purpose of the Module

The primary goal of this module is to empower personal trainers with essential business and entrepreneurship skills, ensuring their success within the dynamic landscape of the fitness industry. By providing training in areas such as marketing strategies, financial management, and effective communication, this module aims to cultivate a well-rounded skill set. Through a strategic focus on business development, aspiring and existing personal trainers will be equipped to navigate the challenges and opportunities inherent in the fitness sector, ultimately fostering their professional growth and long-term success.

1.2 Importance of Business and entrepreneurship skills

The Gap in "Standard training Education"
When referring to Standard - Traditional personal training education it denotes the conventional or typical approach taken in many fitness education programs. In such programs the primary focus is often on teaching trainers the technical aspects of fitness, including exercise physiology, anatomy, program design, and client training techniques. These programs tend to prioritize the development of trainers' knowledge and skills related to physical exercise and health and neglect the crucial business and entrepreneurship skills required for success in the competitive fitness industry.

The Importance of Businesses and entrepreneurship skills
This module's purpose is to empower personal trainers with the tools and knowledge needed to not only deliver effective workouts but also to build and sustain a thriving fitness business. Business skills enhance a personal trainer's ability to attract clients, manage finances, make strategic decisions, and navigate the complexities of the fitness industry.

A Holistic Approach
This holistic approach ensures that trainers are well-equipped to navigate the complexities of client management, marketing, financial planning, and communication, fostering a more comprehensive and successful career in the fitness field.

2. Module content

2.1 Developing a Business plan and Networking in the Industry

A business plan is vital as it serves as a roadmap for entrepreneurs, providing clarity of vision and strategic goals. It is an essential tool for planning, managing, and steering a business toward success. In this module, we will focus on the basic steps of creating a business plan:

Write your mission statement.
It is important to start by writing down what is your purpose and core values and your target audience.

Assess the fitness industry.
The fitness industry is a constantly evolving industry. So it is of paramount importance to keep educating yourself about all new developments in your area of expertise. That will set a high bar of quality for your business.

Assess your competition.
It is also necessary to research other similar businesses in your area and try to keep up with your competition.

Map out your revenue streams.
Since a Personal trainer is not a standard 9-5 occupation, it is easy to lose track of your finances. As such it is absolutely necessary to have steady and down to earth projections of your income.

Plan for operating costs.
In continuation of Step 4 plan out all possible operating costs of your business. Whether that is material costs for equipment or travel costs to locations it is crucial to attempt to plan for all eventualities.

Create your sales and marketing plan.
Quite possibly the most time consuming step of your business plan. It requires constant management to make certain that your business is at the forefront of your audience's mind.

Honestly assess your risk.
Sometimes it is easy to dream about success, but one must be prepared for failure. As such, one must honestly assess the possible dangers (i.e. debt) of not achieving your initial goals.

2.2 Financial Management and Budgeting

Starting Up a Personal Trainer Business
As with any business it is necessary to complete certain tasks in order to be legally compliant with your local government. Following is a list with such tasks. Please note that not all of them might be needed depending on the country you are located in. It is also possible that there might be more regulations that you might need to follow. You should consult with someone knowledgeable to avoid legal traps that would set your business venture back both in time and in money.

Register with your national regulatory body (e.g. CIMSPA, REPS, EREPS, etc.).
Each country has its own regulatory body. Registration in that body is most certainly necessary for your business to legally exist. It also gives you access to certain tax benefits and business credibility, both to clients and partners or investors.

Open a business account
Creating a specifically business account (i.e. different than your own personal account) is actually a requirement for creating a business in some countries. Consult with a professional to be aware of your local laws. Besides that, business accounts usually have built-in systems for credit card payments and processes, which saves you considerable time from setting one up on a personal account. In addition to that, it makes you and your business to look more professional, to both your clients and your other businesses and banks you may interact. It will also help with maintaining proper books and records, since all transaction will be collected in one place.

Maintain and retain proper books and records
While having a business account is helpful, in your record keeping, it is not the only solution. There are dedicated services in every country in the world that could help you manage your records as well as software that could help you do it yourself. Keeping proper records helps to maximise all the expenses you claim and reduce your tax obligations will help out, should you be investigated by your local tax agency. It will also make it quicker to prepare your accounts at the end of the year, as well as help you plan tax payments. On a personal level proper record keeping helps you access the information you need to run your business and help it grow. It can help you easily identify your strengths and weaknesses and help you manage changes and possible improvements to your business. And if a need arise, proper books can help you get a loan or some other assistance.

Prepare accounts at least once a year
Depending on your growth, you may need to check your accounts more than once a year. However, when starting out a yearly account planning will inform you of where your business is financially at that moment. Then you can make note of any issues that arise, make changes or double down on successful strategies.

Co-funded by the European Union

Prepare a tax return once a year
Again, not all countries will have that same financial system, but most have some sort of tax return. Depending on your age, income and status, you may be eligible for money returns on your taxes, or you may qualify for credits or deductions on your taxes or even financial aid. Being diligent will also help you avoid interest and penalties, protect your credit score and generally give you peace of mind when dealing with your local tax agency.

Pay any tax due
It goes without saying that all taxes should be paid in full, if you have the necessary funds. If not, you should apply for a payment plan and be punctual to avoid additional interest or penalties.

Register for and pay National Insurance Contributions
Since you are self-employed no one is paying for your national insurance benefits. So it falls to you to register and pay the appropriate amount to your National Insurance planner. It may be the case that you apply to Private insurance, whatever the case you have the responsibility to apply to the correct payment bracket, depending on your income. Access to medical services, pension, maternity benefits and a number of other issues are directly linked to your Insurance Payments.

3. Marketing and Promotion

3.1 Creation of Brand and Brand Awareness

3.1.1 Find your Niche.

Defining a specific focus as a personal trainer offers numerous benefits, but it also means navigating a potentially crowded landscape. It's crucial to determine the type of training you'll offer and the specific clientele you aim to serve. When selecting your niche, opt for one with clients who are a good fit and easy to collaborate with.

To guide your decision on the target audience and the key focus of your business, you can initiate the decision-making process by responding to the following questions:
• Where are you going to carry out your personal training business?
• Do you want to serve a specific group of people (e.g., seniors, young athletes)?
• Do you have some area of expertise due to experience or interest (e.g., in-home training, weight loss, weight gain, functional training)?
• What type of Personal Trainer Certification will you choose?
• Will you carry out all of the personal training, or will you have partners or employees?

3.1.2 Build your Brand.

Establishing a distinct niche among the people you train makes brand-building more straightforward. By tailoring your marketing materials and communication style to cater specifically to this group, you create a strong association between you and that particular demographic. Consequently, individuals are more likely to think of you when someone within that group, such as a friend or family member, is seeking training or coaching services.

3.2 Target Market, Demographics and Price Setting.

Depending on your niche, you should identify your target market. It consists of those potential clients who inhabit your niche. You should tailor your media presence as well as your marketing efforts to cater to your target market as well as the particular demographic. Weight loss for middle ages individuals is not targeted the same was as weight loss for people in their twenties. Thus it is important to avoid investing time and resources in marketing your products to a broad, and non-targeted audience through avenues like social media links and other costly marketing techniques, since it will most likely end up in a net-loss. Finally, you should decide the value of your services. The pricing policy of your competitors should be considered, but should not be the only meter used to set your prices. Again, your target market in combination with your demographic should be considered. Older individuals tend to have more disposable income that teens and those that live in more high-class areas usually have more to spend that those in trailer parks. Your prices should reflect that. Once you decide though, it is advisable to try and stay at that price range and target market. Great changes could lead to brand confusion and be, eventually, counterproductive.

3 .3 The Imperative of Social Media Marketing

Strategic Audience Engagement
Social media provides a unique platform for personal trainers to directly engage with their target audience. Understanding the demographics of platforms like Facebook, Instagram, and TikTok, trainers can tailor their marketing approaches to connect with specific groups ranging from millennials to Gen Z, crafting messages that resonate with their lifestyle and fitness goals.

Branding and Consistency
The power of a strong, consistent brand on social media cannot be overstated. Whether it's the image of a wellness-focused organic nutritionist or a high-energy, motivational trainer, social media allows for the crafting and reinforcing of this personal brand identity across a wide audience.

Building an Online Community
More than just a marketing tool, social media enables trainers to create an interactive community. This can be achieved through a mix of inspirational stories, engaging fitness challenges, and interactive content, fostering a sense of belonging and motivation among followers.

Goal-Oriented Marketing Strategy
Successful social media marketing is not random; it is goal-driven. Setting specific objectives, like increasing the number of online coaching clients or expanding the social media follower base, provides direction and measurable outcomes for a trainer's social media efforts.

Content Diversification
A dynamic content strategy is key to maintaining an engaging social media presence. This involves a balance of educational content, fitness tips, client success stories, and personal insights, each serving to educate, inspire, and engage the audience.

Platform Specificity
Choosing the right social media platform is critical. Each platform, from the visually-driven Instagram to the informative nature of YouTube, serves a different purpose and reaches different segments of the fitness market.

Measuring Success
The effectiveness of social media marketing is reflected in tangible metrics such as the growth of followers, engagement rates, and the conversion of online interactions into actual client relationships.

In conclusion, social media marketing is an indispensable element for personal trainers in the digital age. It's not just about being visible online; it's about creating meaningful connections, establishing a trustworthy brand, and utilizing these platforms to grow and sustain a successful fitness business

Co-funded by the European Union

3.3.1 Social Media Marketing Platforms

Facebook
• Users: 1.9 billion daily active users worldwide
• Audience: An even spread of Generation X and Millennials
• Industry impact: B2C
• Best for: Brand awareness; advertising

Facebook is the largest social media platform and the most established. Since its launch in 2004, it has become an invaluable tool for B2C businesses, offering advanced advertising tools as well as organic opportunities.

TikTok
• Users: 1 billion active monthly global users
• Audience: Primarily Gen Z followed by Millennials
• Industry impact: B2B and B2C
• Best for: Short-form, creative video content; user-generated content; brand awareness
When you think of short-form video, you probably think of TikTok. The platform rose in popularity in 2020 and shows no signs of slowing down. It's one of the best platforms for community building, with marketers ranking it in second place behind YouTube.

Instagram
• Users: 1 billion monthly active users
• Audience: Primarily Millennials
• Industry impact: B2C
• Best for: High-quality images and videos; user-generated content; advertising

Instagram launched only 12 years ago, the platform has taken the world by storm. When it comes to sharing visually compelling content, Instagram is where brands go. Another thing that sets the platform
apart is its advanced ecommerce tools. Today, users can discover brands, browse their products and/or
service, and complete a purchase without ever leaving the app, making Instagram a hard platform to beat.

Twitter
• Users: 211 million daily active users worldwide
• Audience: Primarily Millennials
• Industry impact: B2B and B2C
• Best for: Public relations; customer service; community building

While Instagram focuses on visuals, Twitter focuses on words. Since the early days of 140-character Tweets, the platform has now expanded to include an audio tool called Twitter Spaces, a community- building tool called Twitter Communities, and Twitter Moments to share interesting content with your followers.

LinkedIn
• Users: 774 million active users worldwide
• Audience: Baby boomers, Generation X, and Millennials
• Industry impact: B2B
• Best for: B2B relationships, business development, and social selling

LinkedIn is Facebook's professional cousin. It's perhaps the only platform where its audience is clearly defined: Working professionals looking to network and seek out new opportunities. That makes it the ideal platform for B2B companies looking to identify key decision-makers and build an industry-specific community.

YouTube
• Users: Over 315 million daily active users worldwide
• Audience: Primarily Millennials but has a strong audience across gender and age demographics
• Industry impact: B2C and B2B
• Best for: Brand awareness; long-form entertainment, and how-to videos

YouTube is the second most visited website in the world. In addition, marketers name it the best platform to build community. In addition to being an incredibly popular platform, its users also tend to stay longer on it making it an ideal platform to share educational content.

Snapchat
• Users: 306 million daily active users worldwide
• Audience: Primarily Generation Z
• Industry impact: B2C
• Best for: Brand awareness; advertising

When Snapchat came out in 2011, leading the charge in ephemeral content. It introduced content that you could share with your friends and that would expire after 24 hours. The platform peaked in 2015 and has held strong since then. Many thought the brand would disappear once Instagram introduced Stories, the same feature with a different name. Snapchat continues to be popular among young adults.

Pinterest
• Users: 444 million monthly active users worldwide
• Audience: Primarily Millennials with a solid audience in Gen Z, Gen X and Baby Boomers
• Industry impact: B2C
• Best for: Visual advertising; inspiration

Think of Pinterest like a visual storyboard that allows users to get inspiration for everything from fashion to home decor. 85% of Pinners say Pinterest is where they go to start a new project. In addition, 80% of weekly Pinners say they've discovered a new brand or product on the platform. So, not only is it a great discovery tool but it's also a way for brands to build their narrative through visual stories.

Co-funded by the European Union

Clubhouse
• Users: 10 million weekly active users worldwide
• Audience: Primarily Millennials
• Industry impact: B2B and B2C
• Best for: Visual advertising; inspiration

Clubhouse made a strong impression as soon as it entered the social media world in 2020. The audio- only platform allows people to start interesting conversations with followers as well as strangers and build community. The platform also gained some buzz for its invitation-only set up when it was in beta testing. Today, the platform is open to everyone globally and on both IOS and Android devices. Another big selling point to this platform is that it works well for both B2B and B2C businesses and leverages audio, which has made a huge comeback in recent years.

3.4 Fitness Networking

Establishing a network is a crucial aspect of building a successful small business, especially in the field of personal training. Fitness networking involves creating connections and relationships within the fitness industry that can benefit your personal training business in various ways.
• Reach out to local gyms, fitness studios, and wellness centres to establish partnerships. Building relationships with these establishments can open up opportunities for collaboration, such as offering your personal training services to their members or conducting workshops and classes on-site. Cross-promotion with other fitness professionals and businesses can help expand your reach and attract new clients.
• Attend industry events, workshops, and conferences that can provide valuable networking opportunities. These gatherings allow you to connect with fellow fitness professionals, potential clients, and even suppliers of fitness-related products or services. Building a strong presence in the fitness community can enhance your credibility and increase your visibility within the industry.
• Utilize social media to connect with other trainers, fitness influencers, and potential clients. Joining relevant online communities and participating in discussions can help you establish yourself as an expert in your niche. Collaborate on content, share success stories, and engage with your audience to build a supportive online community around your personal training business.
• Nurture relationships with existing clients. Word of mouth is a powerful marketing tool in the fitness industry. Encourage satisfied clients to refer friends and family, and consider implementing a referral program to incentivize them. Happy clients can become ambassadors for your business, helping you attract a steady stream of new clients through their recommendations.

In summary, fitness networking is about building and maintaining meaningful connections within the fitness industry. Whether it's through partnerships with local businesses, participation in industry events, or engagement on social media, a strong network can contribute significantly to the success and growth of your small business personal training venture.

4. EREPS & Ethical code

The European Register of Exercise Professionals (EREPS) serves as an impartial and inclusive platform for registering instructors, trainers, and exercise specialists within the European fitness and physical activity sector. Registration signifies that an exercise professional has met established minimum standards of good practice, embracing the Code of Ethical Practice, and is dedicated to advancing standards through ongoing personal and professional development. Being a part of the European Register of Exercise Professionals (EREPS) holds several advantages for fitness and exercise professionals in the European region such as: Professional Recognition, High ethical standards and Professionalism, Networking Opportunities, Access to Resources, Alignment with Global Standards etc.

4.1 Registration in ERES

ERES has the following guide on how to join:
1. Visit the main site and select a membership category. EREPS offers various membership levels for fitness instructors, personal trainers, and specialized professionals.
2. Complete the online application and submit all the necessary documents (fitness qualifications, certifications and experience).
3. Wait for the review and approval. EREPS will review your application and ensure that you meet their standards and criteria.
4. Pay Membership Fees.
5. Adhere to code of Ethical Practice

4.2 The ERES ethical code of Practice

The ERES ethical code of Practice underscores the paramount principles of rights, relationships, responsibilities, and standards in the fitness and physical activity domain. EREPS aligns itself with the United Nations' Universal Declaration of Human Rights (UDHR), Sustainable Development Goals (SDG), and the European Union's foundational values, promoting human dignity, human rights, freedom, democracy, equality, and the rule of law. In accordance with these principles, EREPS and its members commit to upholding diversity, tolerance, and the dignity of every individual, fostering a conducive environment for meritocracy, innovation, and competitiveness. Additionally, EREPS members must adhere to the specific laws and requirements of the countries they operate in and, when necessary, possess appropriate liability insurance.

There are four principles to the Ethical Code:

PRINCIPLE 1 – RIGHTS
Exercise professionals will be respectful of their customers and of their rights as individuals' Compliance with this principle requires exercise professionals to maintain a standard of professional conduct appropriate to their dealings with all client groups and to responsibly
demonstrate:
1. Respect for individual difference and diversity.
2. Good practice in challenging discrimination and unfairness.
3. Discretion in dealing with confidential client disclosure.

PRINCIPLE 2 – RELATIONSHIPS
Exercise professionals will nurture healthy relationships with their customers and other health rofessionals
Compliance with this principle requires exercise professionals to develop and maintain a relationship with customers based on openness, honesty, mutual trust and respect and to responsibly demonstrate:
1. Awareness of the requirement to place the customer's needs as a priority and promote their welfare and best interests first when planning an appropriate training program.
2. Clarity in all forms of communication with customers, professional colleagues and medical practitioners, ensuring honesty, accuracy and cooperation when seeking agreements and avoiding misrepresentation or any conflict of interest arising between customers' and own professional obligations.
3. Integrity as an exercise professional and recognition of the position of trust dictated by that role, ensuring avoidance of any inappropriate behaviour in all customer relationships.

PRINCIPLE 3 – PERSONAL RESPONSIBILITIES
Exercise professionals will demonstrate and promote a clean and responsible lifestyle and Conduct Compliance with this principle requires exercise professionals to conduct proper personal behaviour at all times and to responsibly demonstrate:

1. The high standards of professional conduct appropriate to their dealings with all their client groups and which reflect the particular image and expectations relevant to the role of the exercise professional working in the fitness industry, and not to smoke, drink alcohol or take recreational drugs before or whilst instructing.
2. That they never advocate or condone the use of prohibited drugs or other banned performance or image enhancing substances.
3. An understanding of their legal responsibilities and accountability when dealing with the public and awareness of the need for honesty and accuracy in substantiating their claims of authenticity when promoting their services in the public domain.
4. A responsible attitude to the care and safety of client participants within the training environment and in planned activities ensuring that both are appropriate to the needs of the
clients.

Co-funded by the European Union

5. That at all times there is adequate and appropriate liability and indemnity insurance in place to protect their clients and any legal liability arising.
6. An absolute duty of care to be aware of their working environment and to be able to deal with all reasonably foreseeable accidents and emergencies – and to protect themselves, their colleagues and clients.

PRINCIPLE 4 – PROFESSIONAL STANDARDS

Exercise professionals will seek to adopt the highest level of professional standards in their work and the development of their career. Compliance with this principle requires exercise professionals to commit to the attainment of appropriate qualifications and ongoing training to responsibly demonstrate:
1. Engagement in actively seeking to update knowledge and improve their professional skills in order to maintain a quality standard of service, reflecting on their own practice, identifying development needs and undertaking relevant development activities.
2. Willingness to accept responsibility and be accountable for professional decisions or actions, welcome evaluation of their work and recognize the need and when it is appropriate to refer to another professional or specialist.
3. A personal responsibility to maintain their own effectiveness and confine themselves to practice those activities for which their training and competence is recognized by the Register.

5. Conclusion

In conclusion, embarking on the journey of establishing a personal training business involves a multifaceted approach that requires careful consideration and strategic planning. By setting up the business with a clear vision and mission, managing finances judiciously, and implementing effective budgeting strategies, a solid foundation is laid for sustained growth and success.

Finding your niche and deciding on a target market is a pivotal step that shapes the direction of the business. Understanding the specific needs and preferences of the target audience enables the personal trainer to tailor their services, fostering stronger client-trainer relationships and increasing client satisfaction.

Marketing plays a crucial role in attracting and retaining clients. Leveraging social media platforms and other marketing channels allows for a broader reach and engagement with the target audience. Crafting a compelling online presence, sharing valuable content, and utilizing industry networking opportunities contribute to building a strong and reputable brand within the fitness community.

Furthermore, ethical considerations are paramount in the personal training business. Upholding professional standards, respecting client confidentiality, and prioritizing the well-being of clients are essential elements of ethical conduct. Establishing trust and credibility not only enhances the reputation of the personal trainer but also fosters long-term client loyalty.

In the dynamic landscape of personal training, the ability to adapt, innovate, and stay attuned to industry trends is key to long-term success. Integrating these elements into the business framework, a personal training venture is poised for growth, client satisfaction, and a positive impact on the overall well-being of the community it serves. Only through a holistic approach that encompasses financial acumen, strategic marketing, ethical practices, and industry networking, can the personal training business thrive in a competitive and evolving market.

References

1. Start Your Own Personal Training Business Jacquelin lynn , 5th edition 2010 Canada Entrepreneur Media Inc

2. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses Paperback – International Edition, October 6, 2011

3. Ignite the Fire: The Secrets to Building a Successful Personal Training Career (Revised, Updated, and Expanded) Paperback Jonathan Goodman – February 10, 2015 ,

4. THE CURRENT STATE OF PERSONAL TRAINING: MANAGERS' PERSPECTIVES

Human Performance and Leisure Studies Department, North Carolina A&T State University, Greensboro, North Carolina.Department of Health and Exercise Science, Wake Forest University, Winston-Salem, North Carolina; and University of Rochester School of Medicine, James P. Wilmot Cancer Center, Rochester, New York 2010

5. How to build an online personal traing business , Presented by The National Academy of Sports Medicine

6. The Business of Personal Training: Essential Guide for the Successful Personal Trainer by Andrea Oh , August 20, 2013

7. AFPA(American Fitness Professionals and Associates) Personal Trainer

Career Guide , 2023

8. Social Media Marketing : The Ultimate Guide

(https://blog.hubspot.com/marketing/social-media-marketing)

9. How to Build an Online Personal Trainer Business, Nasm (National Academy of Sports and Medicine

10. NSCA'S Essentials of Personal Training 3rd Edition , pHuman Kinetics Publishers, December 2021

11. Personal Training Business Bible, Jason Grossman

12. Permission Marketing , Seth Godin

13. Personal Trainer Pocketbook: A Handy Reference for All Your Daily Questions– January 28, 2015

14. Start Your Own Business, Fifth Edition The Only Start-Up Book Youll Ever Need by The Staff of Entrepreneur Media

15. Functional Training and Beyond , Adam Sinicki

16. Social Media Marketing 2nd Edition , Tuten Tracy L.

17. 101 Personal Trainer Marketing Secrets: Get More Clients. Make More Money. Keep Doing What You Love – September 22, 2015

18. This Is Marketing: You Can't Be Seen Until You Learn to See Hardcover by Seth Godin – Illustrated, November 13, 2018

19. 1-Page Marketing Plan Paperback by Allan Dib – May 5, 2018

20. The Ultimate Sales Letter, 4th Edition: Attract New Customers. Boost your Sales. by Dan S Kennedy – February 14, 2011

21. Building a StoryBrand: Clarify Your Message So Customers Will Listen by Donald Miller

22. The IRS website. (https://www.irs.gov/filing/individuals/who-should-file) and (https://www.irs.gov/businesses/small-businesses-self-employed/why-should-i-keep-records)

23. Why every business needs a business bank account (https://www.chase.com/business/knowledge-center/start/why-bank-account)

24. The Importance of Making an Annual Financial Plan (https://www.investopedia.com/articles/investing/100116/importance-making-annual-financial-plan.asp)

25. How to find your target market. (https://www.fitsw.com/blog/target-market-for-personal-training/)

26. How to identify your target audience. (https://www.ptdistinction.com/blog/how-to-identify-your-target-audience-a-guide-for-personal-trainers)

27. Your guide to networking. (https://classpass.com/afterclass/your-guide-to-networking-in-the-fitness-industry/)

Co-funded by the European Union

HEPALIS

Interactive Tool: Business And Entrepreneurship Skills

Module 6

2023

1. Developing business and entrepreneurship skills is crucial for personal trainers. (True)
2. Personal trainers can succeed without having a clear business plan. (False)
3. Traditional personal training education often neglects business skills. (True)
4. Technical fitness skills are more important than business skills for personal trainers. (False)
5. Social media marketing is essential for promoting personal training businesses. (True)
6. Networking within the fitness industry can provide valuable opportunities for personal trainers. (True)
7. Adherence to ethical standards is necessary for maintaining professionalism as a personal trainer. (True)
8. Membership in the European Register of Exercise Professionals (EREPS) is mandatory for all personal trainers. (False)
9. Building brand awareness is optional for personal trainers. (False)

What is the primary focus of this module?
A) Enhancing technical fitness skills
B) Developing business and entrepreneurship skills
C) Exploring the history of fitness technology
D) Understanding the psychology of fitness clients
Answer: B) Developing business and entrepreneurship skills

Why is it essential for personal trainers to develop business skills?
A) To impress clients with their knowledge
B) To navigate the complexities of the fitness industry
C) To compete with other personal trainers
D) To avoid networking with clients
Answer: B) To navigate the complexities of the fitness industry

What is the importance of creating a business plan for personal trainers?
A) To impress potential investors
B) To set strategic goals and clarify vision
C) To focus only on technical fitness skills
D) To avoid social support and peer networks
Answer: B) To set strategic goals and clarify vision

Which of the following is NOT a step in developing a business plan?
A) Assess the fitness industry
B) Map out revenue streams
C) Plan for operating costs
D) Focus solely on technical skills
Answer: D) Focus solely on technical skills

Why is social media marketing important for personal trainers?
A) To avoid client interactions
B) To build brand awareness and engage with clients
C) To discourage referrals from satisfied clients
D) To limit networking opportunities
Answer: B) To build brand awareness and engage with clients

What is the primary purpose of fitness networking?
A) To avoid collaboration with other fitness professionals
B) To establish connections and relationships within the industry
C) To only focus on individual client sessions
D) To limit professional growth opportunities
Answer: B) To establish connections and relationships within the industry

What is the European Register of Exercise Professionals (EREPS)?
A) A regulatory body for financial management
B) A social media platform for personal trainers
C) A platform for registering fitness professionals
D) A networking event for fitness enthusiasts
Answer: C) A platform for registering fitness professionals

What are the principles of the EREPS ethical code of Practice?
A) Discipline, punishment, and exclusion
B) Rights, relationships, personal responsibilities, and professional standards
C) Competition and profit
D) Exclusion, bias, and favoritism
Answer: B) Rights, relationships, personal responsibilities, and professional standards

Why is it important for personal trainers to adhere to ethical standards?
A) To limit client options
B) To maintain professionalism and trust
C) To discourage client referrals
D) To attract investments
Answer: B) To maintain professionalism and trust

Co-funded by the European Union

HEPALIS

Self-Assessment Test: Business And Entrepreneurship Skills

Module 6

2023

1. Why is it important for personal trainers to develop business and entrepreneurship skills?
a. These skills are irrelevant in the fitness industry (1 point)
b. To enhance their ability to attract clients, manage finances, and navigate the industry (3 points) c. Business skills are only necessary for gym owners (2 points)

2. What is a key step in creating a business plan for a personal training venture?
a. Focusing solely on exercise physiology and anatomy (1 point)
b. Mapping out revenue streams and operating costs (3 points)
c. Ignoring competition analysis (2 points)

3. Why should personal trainers maintain proper books and records for their business?
a. Proper record-keeping is unnecessary (1 point)
b. To maximize expenses and reduce tax obligations (3 points)
c. Record-keeping is only important for large fitness corporations (2 points)

4. How can personal trainers utilize social media for marketing and promotion?
a. Crafting a strategic content strategy and engaging with the audience (3 points)
b. Avoiding social media platforms altogether (1 point)
c. Social media is only for personal use (2 points)

5. What are the benefits of establishing a network within the fitness industry?
a. Networking has no impact on personal training success (1 point)
b. Networking is only relevant for experienced trainers (2 points)
c. Building partnerships and collaborations can expand client base and opportunities (3 points)

6. How can personal trainers ensure ethical conduct in their business practices?
a. Igoring ethical considerations (1 point)
b. Adhering to professional standards and respecting client rights (3 points)
c. Ethical conduct is only necessary for high-profile trainers (2 points)

7. Why is continuous professional development important for personal trainers?
a. To stay updated on industry trends and enhance skills (3 points)
b. Professional development is only for trainers with advanced certifications (2 points)
c. Professional development is irrelevant in the fitness industry (1 point)

8. What is a potential barrier to effective financial management for personal trainers?
a. Financial management is only relevant for business owners, not trainers (2 points)
b. Limited understanding of financial principles and planning (3 points)
c. Financial management is straightforward and requires no effort (1 point)

9. How can personal trainers establish a strong brand identity in the fitness industry?
a. Not focusing on brand identity (1 point)
b. Defining a niche and tailoring marketing materials accordingly (3 points)
c. Branding is only for large fitness corporations (2 points)

Co-funded by the European Union

10. Why should personal trainers assess the impact of their business strategies?
a. Assessment is unnecessary in business planning (1 point)
b. Assessment is only relevant for trainers with extensive experience (2 points)
c. To understand effectiveness and make necessary adjustments (3 points)

11. What role does customer feedback play in business improvement?
a. Ignoring feedback is acceptable (1 point)
b. Incorporating feedback to enhance services and client satisfaction (3 points)
c. Feedback is irrelevant in personal training (2 points)

12. Why is it important for personal trainers to balance virtual and in-person support?
a. Balancing is only relevant for trainers with large client bases (2 points)
b. Balancing support methods is unnecessary (1 point)
c. To meet diverse client preferences and needs (3 points)

Comment 1 (1-12 points range): Congratulations on completing the self-evaluation! Your score falls within the 1-12 point range, indicating that there might be some areas where you could enhance your understanding of the integration of technology and social support in personal training. Consider revisiting the module's content, paying special attention to key principles and strategies. Continuous learning is key to providing effective and inclusive services.

Comment 2 (13-24 points range): Great job! Your score falls within the 13-24 point range, suggesting a solid understanding of the key concepts covered in the module. There might be a few areas where you could delve deeper or refine your knowledge, so consider revisiting specific sections for a more comprehensive understanding. Keep up the good work, and don't hesitate to explore further to enhance your expertise.

Comment 3 (25-36 points range): Fantastic performance! Your score falls within the 25-36 point range, indicating a strong grasp of the material covered in the training module. You have demonstrated a comprehensive understanding of how to integrate technology and social support in personal training, with a particular focus on low-income individuals. Your commitment to continuous improvement and staying informed is commendable. Keep up the excellent work in promoting inclusive and effective practices in the field of fitness.

Co-funded by the European Union

HEPALIS

Use Of Technology And Social Support

Module 7

2023

Contents

1. Introduction 4
1.1 Background and Rationale 5
1.2 Importance of Technology and Social Support 5
1.3 Target Audience: Low-Income Individuals 6
2. Integrating technology into personal training services 7
2.1 Overview of Fitness Technology 8
2.2 Benefits and Challenges of Using Technology 8
2.3 Selecting Appropriate Technology for Low-Income Clients 9
2.4 Practical Applications in Personal Training 9
2.5 Demonstrations and Hands-on Training 10
3. Strategies for using social support and peer networks 12
3.1 Understanding the Role of Social Support in Fitness 13
3.2 Building and Nurturing Peer Networks 13
3.3 Group Training Dynamics 14
3.4 Leveraging Social Media for Support 14
4. Identifying and overcoming barriers to technology and social support access 15
4.1 Recognizing Common Barriers for Low-Income Individuals 16
4.2 Developing Inclusive Approaches 17
4.3 Providing Affordable Technology Solutions 17
4.4 Addressing Digital Literacy Challenges 18
5. Practical implementation strategies 19
5.1 Creating Customized Training Plans 20
5.2 Monitoring Progress through Technology 22
5.3 Facilitating Supportive Group Sessions 23
5.4 Adapting Strategies to Diverse Client Needs 25
6. Ethical considerations in technology and social support 27
7. Evaluation and continuous improvement 29
8. Conclusion 31
References 33

1. Introduction

1.1 Background and Rationale

In contemporary fitness training, the integration of technology and the cultivation of social support have become pivotal components in enhancing the effectiveness of personal training services. The need to address the unique requirements of low-income individuals in this context is paramount.

Contemporary Fitness Landscape
The fitness landscape has evolved significantly with the advent of technology, offering a lot of tools and platforms that can revolutionize personal training. Simultaneously, recognizing the value of social support and community engagement has become a key aspect of holistic well-being.

Socioeconomic Considerations
Low-income individuals often face barriers that hinder their access to advanced fitness technologies and supportive social networks. Understanding these challenges is crucial for personal trainers aiming to provide inclusive and impactful services.
Purpose of the Module

This module is designed to equip personal trainers with the knowledge and skills required to bridge the gap between technology, social support, and fitness, with a specific emphasis on serving low-income individuals. By exploring the integration of technology and leveraging social networks, trainers can overcome socioeconomic barriers, fostering an inclusive fitness environment.

1.2 Importance of Technology and Social Support

Technological Advancements in Fitness
In the contemporary fitness landscape, technology has become a catalyst for change. Fitness technology, ranging from wearable devices to advanced applications, has revolutionized how individuals engage with their health. Personal trainers who harness the power of these tools gain a distinct advantage in crafting tailored fitness programs. From real-time performance tracking to personalized workout plans, technology enables a level of precision and adaptability that was once unimaginable.
Social Support as a Pillar of Wellness
Parallelly, the importance of social support in the fitness journey cannot be overstated. Beyond mere workout partners, social networks provide a framework for encouragement, motivation, and shared successes. In fitness, the sense of community can be a powerful driver, inspiring individuals to overcome challenges and persevere on their wellness journey. By integrating social support strategies, personal trainers can create an ecosystem where clients feel supported not just by their trainer but by a network of peers.
Bridging Gaps
For low-income individuals, the combination of technology and social support becomes a potent tool for overcoming barriers. Inexpensive technologies and accessible social platforms can be pivotal in making fitness resources available to a broader audience. This module explores how personal trainers can leverage these advancements to create fitness programs that are not only effective but also considerate of the unique circumstances and challenges faced by low-income individuals.

1.3 Target Audience: Low-Income Individuals

Understanding the Unique Challenges
As personal trainers embark on the journey of integrating technology and social support, a critical consideration is the diverse landscape of their customers. This section sheds light on the specific challenges faced by low-income individuals in accessing and benefitting from fitness services. From financial constraints to limited technology access, trainers will gain insights into tailoring their approach to meet the unique needs of this demographic.
Inclusivity in Fitness Services

The module underscores the importance of fostering an inclusive fitness environment. Personal trainers play a pivotal role in breaking down barriers that may hinder low-income individuals' participation in physical activity. By understanding the economic challenges and cultural considerations, trainers can create a supportive atmosphere conducive to the holistic well-being of their clients.

Addressing Disparities through Technology and Social Support
This segment explores how technology and social support can act as equalizers, bridging gaps in accessibility. It guides personal trainers on utilizing these tools to mitigate disparities, providing affordable alternatives, and fostering a sense of community and encouragement among low-income clients.

Cultural Competence in Training
Acknowledging and respecting cultural diversity is paramount in delivering effective fitness services. The module emphasizes cultural competence, offering insights into tailoring training approaches to align with the cultural nuances of low-income individuals.

Promoting Health Equity
Ultimately, personal trainers equipped with the knowledge from this section will be better positioned to contribute to the broader societal goal of promoting health equity. By understanding and addressing the unique needs of low-income individuals, trainers become advocates for accessible and inclusive fitness practices.

Co-funded by the European Union

2. Integrating technology into personal training services

2.1 Overview of Fitness Technology

The landscape of fitness technology has evolved significantly, shaping the way personal trainers engage with clients. Fitness technology encompasses a wide array of tools designed to enhance training experiences and outcomes. From mobile applications to wearable devices, the integration of technology has become instrumental in promoting a holistic approach to fitness.

Definition and Scope
Fitness technology, often referred to as "fit-tech," includes various digital solutions aimed at monitoring, tracking, and improving physical well-being. These technologies range from basic fitness apps that provide workout routines to advanced wearable devices that track biometric data in real-time.

Evolution of Technology in Personal Training
The evolution of fitness technology is marked by continuous innovation. Initially, fitness apps offered basic workout guidance, but modern applications now provide personalized plans, nutritional insights, and real-time progress tracking. Wearable devices, such as smartwatches and fitness trackers, have expanded beyond step counting to monitor heart rate, sleep patterns, and more.

2.2 Benefits and Challenges of Using Technology

Benefits and Challenges of Using Technology

Benefits
Fitness technology offers a multitude of benefits for personal trainers and clients alike. The following advantages underscore the positive impact of integrating technology into training services:

Personalization and Adherence: Technology facilitates personalized workout plans and real-time feedback, enhancing adherence to exercise routines.
Data-Driven Decision Making: Access to comprehensive health and fitness data allows trainers to make informed decisions and tailor programs based on individual needs.
Remote Monitoring and Engagement: Remote tracking of client progress fosters continuous engagement, especially beneficial for virtual training scenarios.

Challenges
Despite the numerous advantages, challenges exist that trainers must navigate when integrating technology into their services:

Technological Literacy: Both trainers and clients may face challenges related to technological literacy, impacting the seamless adoption of fitness tech.
Data Security Concerns: The collection and storage of health-related data raise concerns about privacy and security, necessitating robust safeguards.
Dependency and Accountability: Overreliance on technology may affect the development of intrinsic motivation and accountability for clients.

Co-funded by the European Union

2.3 Selecting Appropriate Technology for Low-Income Clients

To ensure the effective integration of technology for promoting physical activity among low-income clients, personal trainers must navigate several considerations in the selection process.

Affordability and Accessibility
Affordability is paramount. Choose for technologies with minimal financial barriers. Choose fitness apps or wearable devices that offer free versions or discounted subscriptions to make them economically viable for individuals with limited financial resources.

Inclusive Fitness Apps
Select fitness apps designed with inclusivity at their core. These apps often provide adaptive workouts suitable for various fitness levels and abilities. Inclusivity ensures that clients with diverse physical conditions can engage in physical activities tailored to their capabilities, fostering a more accessible fitness environment.

Community-Based Platforms
Prioritize platforms that foster a sense of community and peer support. Social support significantly contributes to motivation and adherence to physical activity routines. Platforms integrating community features can play a crucial role in enhancing engagement and overall success, especially important for low-income clients who may face additional challenges.

Customization for Diverse Needs
Look for technologies that allow customization based on diverse client needs. The ability to tailor workouts and wellness plans to individual requirements ensures that clients receive personalized support, considering factors such as health conditions, preferences, and fitness goals.

By carefully considering these aspects, personal trainers can select technology that not only maximizes engagement but also addresses the unique needs and challenges faced by low-income clients in promoting physical activity and healthy lifestyles.

2.4 Practical Applications in Personal Training

Implementing technology in personal training requires practical applications to ensure effective integration. Here are specific examples for personal trainers:
Integration into Individualized Training Plans

Incorporate technology seamlessly into individualized training plans by utilizing fitness apps that provide customized workout routines based on clients' fitness levels, preferences, and goals. For instance, apps like MyFitnessPal or Nike Training Club offer personalized training programs tailored to specific needs.

Real-Time Progress Monitoring
Utilize technology for real-time progress monitoring through wearable devices such as fitness trackers or smartwatches. For example, Fitbit and Apple Watch can track metrics like heart rate, steps, and calories burned during workouts, allowing trainers to assess clients' performance instantly.

Facilitating Supportive Group Sessions
Employ technology to facilitate supportive group sessions by organizing virtual fitness classes or challenges. Platforms like Zoom, Microsoft Teams, or fitness-specific apps like Peloton enable trainers to conduct interactive group workouts, fostering a sense of community and motivation among participants.

Adapting Strategies to Diverse Client Needs
Tailor technology applications to accommodate diverse client needs. For elderly clients less familiar with advanced technology, consider introducing user-friendly apps like SilverSneakers GO or incorporating basic pedometers for step tracking.

Assessing and Adjusting the Integration
Regularly assess and adjust the integration of technology based on client feedback and evolving needs. For instance, if clients express difficulty with a particular app, explore alternatives or provide additional guidance to ensure a smooth and positive experience.

By implementing these sample applications, personal trainers can enhance the training experience, monitor progress effectively, foster a sense of community, and adapt to the individual needs of their clients.

2.5 Demonstrations and Hands-on Training

Engaging clients through hands-on demonstrations is crucial for effective technology integration in personal training. This section focuses on practical guidance and training methodologies.

Technology Showcase
To familiarize clients with various fitness technologies, conduct a technology showcase session.

Fitness App Demonstrations: Walk clients through popular fitness apps, showcasing features such as workout libraries, progress tracking, and social community engagement.

Wearable Device Overview: Provide hands-on experience with wearable devices. Allow clients to explore functionalities like heart rate monitoring, step tracking, and sleep analysis.

Interactive Workshops
Host interactive workshops to deepen clients' understanding and proficiency in using technology.

Co-funded by the European Union

Virtual Group Training: Conduct live virtual group training sessions using video conferencing tools. Guide clients on setting up and participating in these sessions.

Nutrition Tracking: Explore nutrition-tracking apps. Guide clients on logging meals, interpreting nutritional data, and adjusting dietary habits accordingly.

Personalized Training Simulations
Create simulated scenarios to mimic real training situations using technology.

Smart Equipment Integration: Simulate the use of smart gym equipment. Guide clients on adjusting settings, tracking performance, and maximizing benefits.

Emergency Assistance Apps: Introduce safety-focused apps. Simulate emergency scenarios and guide clients on using apps for immediate assistance.

These hands-on approaches enhance clients' comfort with technology, empowering them to integrate it seamlessly into their fitness journeys.

3. Strategies for using social support and peer networks

3.1 Understanding the Role of Social Support in Fitness

Social support plays a crucial role in promoting and sustaining physical activity and healthy lifestyle habits. It encompasses various forms of assistance, encouragement, and companionship that individuals receive from their social networks. Understanding this role is fundamental for personal trainers working with low-income clients.

Emotional and Motivational Support
Social support provides emotional reinforcement, serving as a motivational factor for individuals to engage in physical activities. Positive reinforcement from friends, family, or peers can significantly impact an individual's commitment to their fitness journey.

Group Training Dynamics
Incorporating social support in the form of group training enhances the overall fitness experience. Group dynamics foster camaraderie and a sense of belonging, creating a supportive environment that motivates individuals to stay active.

Leveraging Social Media for Support
In the digital age, social media platforms offer additional channels for social support. Online fitness communities, challenges, and virtual support groups contribute to a sense of accountability and encouragement.

Understanding these facets of social support is essential for personal trainers to tailor their strategies effectively, fostering an environment conducive to the physical well-being of low-income clients.

3.2 Building and Nurturing Peer Networks

Building and nurturing peer networks is a pivotal aspect of fostering a supportive environment for individuals pursuing fitness goals. Personal trainers working with low-income clients can leverage various strategies to enhance the sense of community and encouragement.
Importance of Peer Networks
Peer networks contribute significantly to the success of individuals in achieving and maintaining their fitness objectives. Studies have shown that socializing during physical activities enhances adherence and enjoyment.
Group Training Dynamics
Incorporating group training sessions fosters a sense of friendship among participants. The shared experience and mutual encouragement within a group positively impact motivation and adherence to fitness routines.
Social Support Initiatives
Implementing social support initiatives, such as walking or running groups, can be particularly effective. These initiatives provide a platform for individuals with similar fitness aspirations to connect, share experiences, and motivate each other.
Building and nurturing peer networks is a powerful strategy for personal trainers to create an inclusive and supportive fitness community among their low-income clients.

3.3 Group Training Dynamics

Implementing group training dynamics is a powerful strategy in the realm of fitness, promoting a sense of community and motivation among participants. Personal trainers working with low-income clients can leverage various approaches to maximize the benefits of group training.

Enhancing Motivation through Shared Experience
Group training provides individuals with a shared fitness journey, fostering a supportive atmosphere where participants motivate each other. This shared experience can enhance motivation and adherence to fitness routines.

Social Facilitation in Group Settings
The concept of social facilitation suggests that individuals tend to perform better in the presence of others. Group training dynamics leverage this psychological phenomenon, encouraging participants to push their limits and achieve better results.

Inclusive and Supportive Environment
Group training sessions contribute to the creation of an inclusive and supportive fitness environment. Participants often form connections, offering encouragement and understanding that can positively impact their fitness journey.

Implementing group training dynamics is a valuable tool for personal trainers to create engaging and effective fitness experiences for low-income clients.

3.4 Leveraging Social Media for Support

In the digital age, leveraging social media platforms is a strategic approach for personal trainers aiming to provide enhanced support and engagement. Integrating social media into fitness programs for low-income clients offers numerous benefits.

Community Building through Online Platforms
Creating dedicated online communities on platforms like Facebook, Instagram, or specialized fitness apps fosters a sense of belonging. Low-income individuals can connect, share experiences, and receive support, overcoming geographical limitations.

Accessible Educational Content
Social media allows trainers to share educational content, including workout tutorials, nutritional tips, and motivational messages. This democratization of information ensures that low-income clients have access to valuable resources despite financial constraints.

Real-Time Support and Accountability
Platforms with real-time features facilitate instant communication and support. Trainers can provide encouragement, answer queries, and track clients' progress, enhancing accountability and motivation.

Leveraging social media for support aligns with the inclusive goals of personal trainers working with low-income individuals, breaking down barriers to access and creating a supportive digital fitness community.

Co-funded by the European Union

4. Identifying and overcoming barriers to technology and social support access

4.1 Recognizing Common Barriers for Low-Income Individuals

When it comes to accessing technology and social support, low-income individuals often face unique challenges that can limit their ability to participate fully in personal training programs. Some common barriers include:

Limited access to technology: Many low-income individuals may not have reliable access to smartphones, computers, or other digital devices that are necessary for utilizing technology-based resources such as fitness apps or online communities.

Lack of digital literacy: Some low-income individuals may lack the basic computer skills or familiarity with technology necessary to effectively use technology-based resources, creating a significant barrier to participation.

Limited Financial Resources: Many low-income individuals may have restricted budgets, making it difficult to afford high-cost fitness technology or gym memberships. This financial constraint can hinder their ability to access essential tools for a healthy lifestyle.

Digital Inequality and Limited Access to Devices: A significant portion of the low-income population may have limited access to smartphones, computers, or the internet, contributing to the digital divide. Without proper access to these devices, engaging in digital fitness platforms or apps becomes challenging.

Limited Time Availability: Individuals with low incomes may have demanding work schedules or multiple jobs, leaving little time for structured exercise or participation in social support activities. Finding ways to integrate fitness into their busy lives becomes essential. Inadequate Community Infrastructure: Some low-income communities may lack adequate infrastructure for physical activity, such as parks, sidewalks, or affordable fitness facilities.

Limited access to transportation: Low-income individuals may face challenges getting to and from training locations due to limited public transportation options or lack of access to reliable vehicles, making it difficult to attend in-person training sessions.

Work schedule conflicts: Low-income individuals may have non-traditional work schedules that conflict with traditional training times, making it difficult to find time to exercise or participate in group training sessions.

Childcare responsibilities: Low-income individuals with children may struggle to find childcare during training sessions, making it difficult to participate in group training or one-on-one training.

Cultural or language barriers: Low-income individuals from diverse backgrounds may face cultural or language barriers that prevent them from feeling comfortable participating in mainstream fitness settings or communicating effectively with trainers.

Co-funded by the European Union

To address these barriers, personal trainers can take several steps, such as offering flexible scheduling options, providing accessible and affordable technology solutions, and being mindful of cultural and language diversity when interacting with clients. By recognizing and addressing these common barriers, personal trainers can help ensure that all clients, regardless of income level, have equal opportunities to achieve their fitness goals.,

4.2 Developing Inclusive Approaches

Digital Literacy Support
Provide resources and training to improve digital literacy among both coaches and players from low-income backgrounds. This includes basic computer skills, internet usage, and familiarity with relevant software.

Collaboration with Community Organizations
Build partnerships with local community organizations to access resources and support for technology access and training initiatives. This helps bridge the gap between low-income communities and technological resources.

Flexible Training Modalities
Consider offering alternative training modalities, such as printed materials or offline resources, to accommodate individuals with limited access to technology.

Financial Assistance Programs
Explore opportunities for financial assistance programs or subsidies to help low-income individuals access necessary technology for training and development purposes.

4.3 Providing Affordable Technology Solutions

In order to make fitness technology accessible to low-income individuals, personal trainers can explore and recommend a variety of affordable solutions. Here are some strategies:

Free or Low-Cost Fitness Apps: There are numerous fitness apps available that offer free or low-cost versions. These apps often provide basic features such as workout routines, progress tracking, and nutritional guidance. Some popular examples include MyFitnessPal, Fitbod, and JEFIT.

Open-Source Software: Open-source software can be a cost-effective solution for fitness tracking and planning. These platforms are often free to use and can provide a range of features similar to those found in paid software.

Budget-Friendly Wearable Devices: While high-end fitness trackers and smartwatches can be expensive, there are more affordable options on the market. Brands like Xiaomi and Fitbit offer budget-friendly devices that provide basic fitness tracking features such as step counting and heart rate monitoring.

Online Resources: The internet is a vast resource for free or low-cost fitness content. Websites, YouTube channels, and social media platforms often provide workout videos, nutritional advice, and motivational content at no cost.

Partnerships with Community Centers and Non-Profits: Some community centers and non-profit organizations offer free or low-cost fitness programs and resources. Collaborating with these organizations can provide low-income individuals with access to fitness technology and support.

Group Training Sessions: Organizing group training sessions can be a cost-effective way to provide personal training services. By sharing the cost among a group, the price per individual can be significantly reduced.

DIY Fitness Equipment: Personal trainers can suggest DIY alternatives to expensive fitness equipment. For example, household items can be used for resistance training or yoga blocks, and apps can turn smartphones into pedometers.

4.4 Addressing Digital Literacy Challenges

Digital Literacy Education: The implementation of digital literacy training programmes is crucial. These initiatives aim to equip low-income individuals with the necessary skills to navigate technology for healthcare purposes and ensure that they are able to use digital resources effectively.

Community Workshops: Hosting community workshops specifically on digital literacy plays a crucial role. These workshops empower individuals by providing practical information, addressing barriers to using technology for health-related activities.

Support Networks: Building support networks and peer-assisted learning initiatives is crucial. These networks foster a collaborative environment where individuals can learn from each other, helping to overcome digital literacy challenges.

Multilingual Resources: Ensuring access to multilingual digital resources is an important consideration. This inclusion measure addresses language-related digital literacy barriers, making information more accessible to diverse populations.

Collaborations with Educational Institutions: Joint efforts with educational institutions are valuable. By working together on digital literacy programmes, sustainable solutions can be developed to address technology-related challenges for low-income individuals.

These strategies collectively contribute to improving digital literacy and closing the technology gap, enabling low-income individuals to effectively utilise technology for their health needs.

Co-funded by the European Union

5. Practical implementation strategies

5.1 Creating Customized Training Plans

Regular physical activity is crucial for maintaining overall health and well-being, and it's especially important for low-income individuals who may face additional challenges in accessing and affording fitness opportunities. This customized training plan aims to provide a safe, effective, and affordable exercise regimen that can be easily incorporated into even the busiest of schedules.

Warm-up (5 minutes)
Every workout session should begin with a thorough warm-up to prepare the body for physical activity and prevent injuries. This warm-up routine includes:
• Light jogging in place or brisk walking: Start with 5 minutes of light jogging or brisk walking to gradually increase your heart rate and warm up your muscles.
• Arm circles forward and backward: Perform 20 arm circles forward and 20 arm circles backward to improve shoulder mobility and range of motion.
• Leg swings forward and backward: Swing each leg forward and backward 20 times to warm up the hip flexors and hamstrings.
• Torso twists from side to side: Perform 20 torso twists from side to side to warm up the obliques and improve spinal flexibility.

Workout (30 minutes)
The workout portion of the plan consists of three alternating days, each focusing on a specific aspect of fitness:
Day 1: Strength training
Strength training is essential for building muscle mass, which in turn boosts metabolism and enhances overall strength. This strength training routine includes:
• Push-ups: Perform 3 sets of 10 repetitions of push-ups to target the chest, shoulders, and triceps.
• Squats: Perform 3 sets of 15 repetitions of squats to engage the quads, hamstrings, and glutes.
• Lunges: Perform 3 sets of 10 repetitions of lunges per leg to work the lower body muscles and improve balance.
• Plank: Hold a plank position for 3 sets of 30 seconds to strengthen the core muscles.

Day 2: Cardiovascular activity
Cardiovascular exercise is crucial for improving heart health, endurance, and overall fitness. This cardiovascular routine includes:
• Brisk walking: Engage in 30 minutes of brisk walking to elevate your heart rate and burn calories.
• Jogging: If you're comfortable with jogging, aim for 20 minutes of jogging to challenge your cardiovascular system.
• Jumping jacks: Perform 2 sets of 30 seconds of jumping jacks to elevate your heart rate and improve coordination.
• High knees: Perform 2 sets of 30 seconds of high knees to increase your heart rate and work your lower body muscles.

Co-funded by the European Union

Day 3: Rest
Allow your body to recover and rebuild muscle tissue with a day of rest. This will help prevent overtraining and ensure you're ready for the next workout.

Day 4: Core exercises
A strong core is essential for stability, balance, and proper posture. This core training routine includes:
• Crunches: Perform 3 sets of 20 repetitions of crunches to target the abdominal muscles.
• Russian twists: Perform 3 sets of 20 repetitions of Russian twists to strengthen the obliques and improve core stability.
• Bicycle crunches: Perform 3 sets of 20 repetitions of bicycle crunches to engage the core muscles and improve coordination.
• Bird dog: Perform 3 sets of 10 repetitions of bird dog per side to strengthen the core, glutes, and back muscles.

Day 5: Flexibility exercises
Flexibility exercises help improve range of motion, reduce muscle soreness, and prevent injuries. This flexibility routine includes:
• Hamstring stretch: Hold each hamstring stretch for 3 sets of 30 seconds per leg to improve hamstring flexibility.
• Quadriceps stretch: Hold each quadriceps stretch for 3 sets of 30 seconds per leg to enhance quadriceps flexibility.
• Calf stretch: Hold each calf stretch for 3 sets of 30 seconds per leg to improve calf flexibility.
• Butterfly stretch: Hold the butterfly stretch for 30 seconds to open up the inner thigh and release tension in the hips.

Cool-down (5 minutes)
Every workout session should end with a proper cool-down to gradually bring your heart rate down and allow your muscles to relax. This cool-down routine includes:
• Gentle stretching: Perform gentle stretches for major muscle groups to improve flexibility and reduce muscle soreness.
• Deep breathing exercises: Engage in deep breathing exercises, such as diaphragmatic breathing, to promote relaxation and reduce stress.

Additional tips:
Start slowly and gradually increase the intensity of your workouts over time.
Listen to your body and take rest days when needed.
Find an activity that you enjoy and stick with it.
Make physical activity a part of your daily routine.

Co-funded by the European Union

5.2 Monitoring Progress through Technology

1. The Importance of Physical Activity Monitoring:
Regular physical activity has numerous health benefits, including improved cardiovascular health, weight management, and reduced risk of chronic diseases. Monitoring physical activity progress helps individuals stay accountable, track their achievements, and identify areas for improvement. It also provides valuable data for healthcare professionals, researchers, and policymakers to understand trends and develop targeted interventions.

2. Technology Solutions for Physical Activity Monitoring:
Technology offers various solutions for monitoring physical activity, even on a limited budget. Here are some examples:
Smartphone Applications: Many smartphone apps provide features to track steps, distance, and calories burned. These apps can utilize the phone's built-in sensors or sync with wearable devices like fitness trackers.
Wearable Devices: Fitness trackers, smartwatches, and pedometers are increasingly affordable and offer features to monitor steps, heart rate, sleep patterns, and more. Some models also provide coaching and goal-setting features.
Online Platforms and Communities: Online platforms and communities focused on physical activity, such as fitness websites or social media groups, can provide support, motivation, and opportunities to track progress.
Low-cost Sensors: Affordable sensors, such as accelerometers or simple step counters, can be attached to clothing or shoes to monitor movement and provide basic activity data.

3. Benefits of Technology-enabled Physical Activity Monitoring:
Monitoring physical activity progress through technology offers several benefits for low-income individuals:
Self-awareness and Motivation: Technology enables individuals to track their activity levels, set goals, and monitor their progress, fostering self-awareness and motivation to stay active.
Goal Setting and Achievement: Setting achievable goals and tracking progress through technology helps individuals establish targets and celebrate milestones, enhancing their sense of achievement.
Accountability and Support: Technology can provide reminders, alerts, and notifications to encourage physical activity and hold individuals accountable to their goals. It can also connect them with online communities or support networks for additional motivation and guidance.
Data-driven Insights: Monitoring physical activity through technology generates data that individuals can use to analyze patterns, make informed decisions, and tailor their activity routines to optimize results.

Co-funded by the European Union

4. Overcoming Barriers and Challenges:
While technology can be a powerful tool for monitoring physical activity progress, it is essential to address barriers and challenges, particularly for low-income individuals:
Affordability: Consideration should be given to the cost of technology devices and data plans. Promoting affordable options or partnering with community organizations can help overcome financial barriers.
Digital Literacy: Providing education and support to enhance digital literacy among low-income individuals is crucial for effective use of technology for physical activity monitoring.
Accessibility: Ensuring that technology solutions are user-friendly, available in different languages, and compatible with various devices can enhance accessibility for low-income individuals.
Privacy and Data Security: Steps should be taken to protect personal information and ensure data privacy and security when using technology for physical activity monitoring.
Monitoring physical activity progress through technology can empower low-income individuals to take control of their health and well-being. By providing affordable and accessible tools, it supports them in achieving their physical activity goals and leading healthier lives.

5.3 Facilitating Supportive Group Sessions

Supportive group sessions play a vital role in promoting physical activities among low-income individuals. These sessions provide a supportive and inclusive environment where individuals can engage in physical activities, share experiences, and receive encouragement. Facilitators of such group sessions have the opportunity to create a positive and motivating atmosphere that fosters participation and helps individuals overcome barriers. Here are some key points on facilitating supportive group sessions for physical activities among low-income individuals:

1. Importance of Supportive Group Sessions:
Supportive group sessions offer numerous benefits for low-income individuals engaging in physical activities:
• Motivation and Accountability: Group sessions create a motivating atmosphere where participants can encourage each other, share successes, and hold each other accountable for their physical activity goals.
• Social Support: Engaging in physical activities as part of a group provides social support, which can boost confidence, enhance enjoyment, and create a sense of belonging.
• Knowledge and Skill Development: Group sessions offer opportunities for participants to learn from experts, share knowledge, and develop new skills related to physical activities.
• Barrier Identification and Solutions: Through group discussions, participants can identify common barriers to physical activity and collectively brainstorm solutions to overcome them.

2. Creating a Supportive Environment:
As a facilitator, there are several strategies to create a supportive environment during group sessions:
Establish Trust and Rapport: Begin each session by creating a welcoming environment where participants feel comfortable sharing their experiences and challenges.
Encourage Active Participation: Foster active participation by inviting participants to share their thoughts, experiences, and goals related to physical activities. Encourage everyone to contribute and ensure that no one dominates the conversation.
Promote Inclusivity: Emphasize the importance of inclusivity and respect for diverse perspectives and experiences within the group. Encourage participants to support and learn from one another.
Provide Positive Reinforcement: Acknowledge and celebrate participants' achievements and efforts, no matter how small. Offer words of encouragement and praise to build self-confidence and motivation.
Facilitate Group Dynamics: Help participants connect with one another by organizing icebreaker activities, team-building exercises, or group challenges that foster camaraderie and teamwork.

3. Tailoring Sessions to Low-income Individuals:
To address the specific needs and challenges of low-income individuals, consider the following when planning and facilitating group sessions:
Affordability: Discuss physical activities that are accessible and affordable, such as walking, jogging, or home-based exercises that require minimal equipment.
Resource Sharing: Encourage participants to share information about low-cost or free physical activity resources in the community, such as community centers, parks, or local organizations offering discounted programs.
Addressing Barriers: Dedicate time during sessions to discuss common barriers faced by low-income individuals, such as lack of time, transportation, or childcare. Brainstorm practical solutions as a group.
Empowering Self-efficacy: Help participants build self-efficacy by setting realistic goals, breaking them down into manageable steps, and celebrating progress.

4. Ongoing Support and Follow-up:
Ensure ongoing support and follow-up after group sessions to maintain participants' engagement and progress:
Provide Resources: Share relevant resources, such as websites, apps, or community programs that offer further support and information on physical activities.
Encourage Peer Connections: Facilitate opportunities for participants to continue connecting and supporting each other outside of the group sessions, such as creating a social media group or organizing regular walking groups.
Periodic Check-ins: Schedule periodic check-ins or follow-up sessions to assess participants' progress, address challenges, and provide additional guidance or resources as needed.
Facilitating supportive group sessions for physical activities among low-income individuals creates a positive and empowering environment where participants can thrive. By fostering motivation, social support, and skill development, these sessions contribute to improving overall physical well-being and enhancing the sense of community among participants.

Co-funded by the European Union

5.4 Adapting Strategies to Diverse Client Needs

When developing strategies for promoting physical activity among low-income individuals, it is essential to consider and adapt to different client needs. Low-income individuals may face unique challenges related to time, resources, and access, which require tailored approaches to engage them effectively. Here are some key points on adapting strategies regarding physical activity for low-income individuals to different client needs:
1. Understanding Client Needs:
To adapt strategies effectively, it is crucial to understand the diverse needs and circumstances of low-income individuals. Some factors to consider include:
Time Constraints: Low-income individuals often have demanding schedules due to work, family responsibilities, or multiple jobs. Strategies should accommodate their limited time availability for physical activity.
Financial Constraints: Economic limitations may restrict access to costly gym memberships or equipment. Strategies should focus on low-cost or no-cost activities that can be done with minimal resources.
Accessibility: Some low-income individuals may have limited access to safe and convenient exercise facilities or transportation. Strategies should consider activities that can be done at home, in the community, or with accessible transportation options.

2. Tailoring Strategies to Client Needs:
To adapt strategies effectively, consider the following approaches:
Flexible Programming: Offer flexible scheduling options, such as morning, evening, or weekend sessions, to accommodate diverse work and family schedules.
Affordability: Provide low-cost or free physical activity options, such as community-based programs, walking groups, or online workout resources that require minimal equipment.
Community Partnerships: Collaborate with local organizations, community centers, or schools to offer physical activity programs in accessible locations and promote outreach efforts.
Education and Support: Provide education on the importance of physical activity and its health benefits. Offer resources on how to engage in physical activity with limited resources, such as home-based exercises or utilizing public spaces.
Inclusive Programming: Offer a variety of physical activities that cater to different preferences and abilities. Consider activities that are adaptable to various fitness levels or provide options for modifications.

3. Cultivating a Supportive Environment:
Creating a supportive environment is essential for engaging low-income individuals in physical activity. Consider the following strategies:
Establish Trust: Build trust and rapport by demonstrating empathy, respect, and understanding towards the unique challenges faced by low-income individuals.
Peer Support: Facilitate opportunities for participants to connect with and support one another. Encourage the formation of exercise groups or buddy systems to enhance motivation and accountability.
Motivational Techniques: Use motivational techniques, such as goal-setting, progress tracking, and positive reinforcement, to inspire and encourage participants to stay engaged in physical activity.
Encourage Engagement: Involve participants in the decision-making process by seeking their input and feedback on program design, activities, and scheduling.

4. Continuous Evaluation and Adaptation:
Regular evaluation and adaptation of strategies are essential to ensure their effectiveness. Collect feedback from participants, monitor participation rates, and assess outcomes to identify areas for improvement and make necessary adjustments.
By understanding and adapting strategies to different client needs, physical activity programs for low-income individuals can effectively address barriers and increase engagement. Tailored approaches that consider time constraints, financial limitations, and accessibility concerns can empower low-income individuals to prioritize and engage in regular physical activity, leading to improved health and well-being.

Co-funded by the European Union

6. Ethical considerations in technology and social support

Ethical issues in technology and social support play a crucial role in ensuring the responsible and equitable use of these tools. Here are some key ethical considerations:

Privacy and Confidentiality

Maintaining privacy and confidentiality is essential when utilizing technology and social support platforms. Personal trainers should prioritize protecting the sensitive information of their clients and adhere to relevant privacy laws and regulations. This includes obtaining informed consent, securely storing data, and using encryption when transmitting sensitive information.

Ensuring Equity in Access

Ethical considerations also involve ensuring equitable access to technology and social support. Personal trainers should be mindful of potential disparities in access to technology and internet connectivity among low-income individuals. They should strive to provide alternative options for those who may not have access to certain technologies, ensuring that no one is excluded from receiving support due to financial constraints.

Balancing Virtual and In-Person Support

Finding the right balance between virtual and in-person support is another ethical consideration. While technology can enhance accessibility and convenience, it is important to assess the individual needs and preferences of clients. Some individuals may require or prefer in-person interactions for effective support. Personal trainers should be flexible and adaptable in providing both virtual and in-person options, ensuring that the chosen mode of support aligns with the client's best interests.

Fostering a Positive and Inclusive Environment

Creating a positive and inclusive environment is crucial in technology and social support settings. Personal trainers should promote respectful and inclusive communication, ensuring that all individuals feel valued and supported. They should actively address any discriminatory or harmful behavior and foster an environment that celebrates diversity and promotes equal opportunities for all clients.

By considering these ethical issues, personal trainers can ensure that their use of technology and social support is responsible, equitable, and respectful of individual needs and preferences.

Co-funded by the European Union

7. Evaluation and continuous improvement

Evaluation and continuous improvement are essential components of technology and social support programs. By assessing the impact of these initiatives, gathering feedback from clients, making iterative adjustments to strategies, and conducting case-based evaluations, personal trainers can enhance the effectiveness and quality of their services. Here's an explanation of these aspects:

Assessing the Impact of Technology and Social Support
Assessing the impact of technology and social support involves evaluating the outcomes and effectiveness of these interventions. It helps determine whether the implemented strategies are achieving the desired results. Evaluation methods can include quantitative measures such as tracking client progress and qualitative measures such as client feedback and satisfaction surveys. By assessing the impact, personal trainers can identify areas for improvement and make data-driven decisions.

Gathering Feedback from Clients
Gathering feedback from clients is crucial for understanding their experiences and perspectives. Personal trainers can use surveys, interviews, or focus groups to collect feedback on the effectiveness of technology and social support interventions. This feedback can provide valuable insights into the strengths and weaknesses of the program, allowing trainers to make informed adjustments and address any concerns or suggestions raised by clients .

Iterative Adjustments to Strategies
Continuous improvement involves making iterative adjustments to strategies based on evaluation findings and client feedback. Personal trainers should be open to adapting their approaches to better meet the needs of their clients. This may involve modifying the use of technology, refining support methods, or introducing new tools or resources. By continuously refining strategies, trainers can enhance the impact and effectiveness of their services over time.

Case-Based Evaluation
Case-based evaluation involves analyzing individual cases to gain insights into the effectiveness of technology and social support interventions. By examining specific client experiences, trainers can identify patterns, success factors, and areas for improvement. This approach allows for a more in-depth understanding of the impact of interventions on individual clients and can inform adjustments to strategies on a case-by-case basis.
By incorporating evaluation and continuous improvement practices into their work, personal trainers can ensure that their technology and social support initiatives are effective, responsive to client needs, and continuously evolving to deliver the best possible outcomes.

Co-funded by the European Union

8. Conclusion

In conclusion, this module has explored the importance of technology and social support in the personal training field, focusing on strategies to provide affordable solutions and ethical considerations. By leveraging technology, personal trainers can enhance accessibility, support, and inclusivity for individuals, including those with financial constraints.

Recap of Key Learnings

Throughout this module, several key learnings have emerged. Personal trainers have learned the significance of recommending free or low-cost fitness apps, exploring open-source software, and identifying budget-friendly wearable devices. They have also gained insights into the value of utilizing online resources, collaborating with community centers and non-profits, organizing group training sessions, and suggesting DIY equipment alternatives. These strategies can help personal trainers provide affordable technology solutions to their clients.

Empowering Personal Trainers for Inclusive Practices

It is essential to empower personal trainers to embrace inclusive practices. By considering privacy and confidentiality, ensuring equity in access, balancing virtual and in-person support, and fostering a positive and inclusive environment, trainers can create a safe and supportive space for clients from diverse backgrounds. This empowerment enables trainers to provide effective support and guidance to individuals seeking to improve their fitness journey.

Encouraging Ongoing Professional Development

To stay at the forefront of the industry and deliver the best possible support, personal trainers should engage in ongoing professional development. By assessing the impact of technology and social support, gathering feedback from clients, making iterative adjustments to strategies, and conducting case-based evaluations, trainers can continuously improve their services. This commitment to ongoing development ensures that trainers remain knowledgeable, adaptable, and responsive to the evolving needs of their clients.

In conclusion, technology and social support offer immense potential for personal trainers to provide affordable and inclusive services. By embracing these tools, trainers can enhance accessibility, support diverse populations, and drive positive outcomes for individuals on their fitness journey.

Co-funded by the European Union

References

Baum, E. E., Jarjoura, D., Polen, A. E., Faur, D., & Rutecki, G. (2003). Effectiveness of a group exercise program in a long-term care facility: a randomized pilot trial. Journal of the American Medical Directors Association, 4(2), 74-80.

Beauchamp, T.L. and Childress, J.F. (2013) Principles of Biomedical Ethics. 8th Edition, Oxford University Press, New York.

Berntsen, S., Hageberg, R., Aandstad, A., Mowinckel, P., Anderssen, S. A., Carlsen, K. H., & Andersen, L. B. (2010). Validity of physical activity monitors in adults participating in free-living activities. British journal of sports medicine, 44(9), 657-664.

Bort-Roig, J., Gilson, N. D., Puig-Ribera, A., Contreras, R. S., & Trost, S. G. (2014). Measuring and influencing physical activity with smartphone technology: a systematic review. Sports medicine, 44, 671-686.

Chang, C., Khurana, S., Strodel, R., Camp, A., Magenheimer, E., & Hawley, N. (2018). Perceived barriers to physical activity among low-income Latina women at risk for type 2 diabetes. The Diabetes Educator, 44(5), 444-453.

Dallinga, J. M., Mennes, M., Alpay, L., Bijwaard, H., & Baart de la Faille-Deutekom, M. (2015). App use, physical activity and healthy lifestyle: a cross sectional study. BMC Public health, 15(1), 1-9.

Davergne, T., Meidinger, P., Dechartres, A., & Gossec, L. (2023). The Effectiveness of Digital Apps Providing Personalized Exercise Videos: Systematic Review With Meta-Analysis. Journal of medical Internet research, 25, e45207.

Di Bartolomeo, G., & Papa, S. (2019). The effects of physical activity on social interactions: The case of trust and trustworthiness. Journal of Sports Economics, 20(1), 50-71.

Di Bartolomeo, G., & Papa, S. (2019). The effects of physical activity on social interactions: The case of trust and trustworthiness. Journal of Sports Economics, 20(1), 50-71.

Evans, D. (2017). MyFitnessPal. British Journal of Sports Medicine, 51(14), 1101-1102.

Exercise.com - How to Design Workout Programs for Clients (Tips + Guide): https://www.exercise.com/grow/how-to-design-workout-programs-for-clients/

Feehan, L. M., Geldman, J., Sayre, E. C., Park, C., Ezzat, A. M., Yoo, J. Y., ... & Li, L. C. (2018). Accuracy of Fitbit devices: systematic review and narrative syntheses of quantitative data. JMIR mHealth and uHealth, 6(8), e10527.

Fulton, J. E., Buchner, D. M., Carlson, S. A., Borbely, D., Rose, K. M., O'Connor, A. E., ... & Petersen, R. (2018). CDC's active people, Healthy NationSM: Creating an active America, together. Journal of Physical Activity and Health, 15(7), 469-473.

Gao, Z., & Lee, J. E. (2019). Emerging technology in promoting physical activity and health: challenges and opportunities. Journal of clinical medicine, 8(11), 1830.

Ghanvatkar, S., Kankanhalli, A., & Rajan, V. (2019). User Models for Personalized Physical Activity Interventions: Scoping Review. JMIR mHealth and uHealth, 7(1), e11098.

Haake, S., Quirk, H., & Bullas, A. (2020, June). The role of technology in promoting physical activity: a case-study of parkrun. In Proceedings (Vol. 49, No. 1, p. 80). MDPI.

Co-funded by the European Union

Hailey, V., Fisher, A., Hamer, M., & Fancourt, D. (2023). Perceived Social Support and Sustained Physical Activity During the COVID-19 Pandemic. International journal of behavioral medicine, 30(5), 651–662.

Hill-Briggs, F., Adler, N. E., Berkowitz, S. A., Chin, M. H., Gary-Webb, T. L., Navas-Acien, A., ... & Haire-Joshu, D. (2021). Social determinants of health and diabetes: a scientific review. Diabetes care, 44(1), 258.

Huhn, S., Axt, M., Gunga, H. C., Maggioni, M. A., Munga, S., Obor, D., Sié, A., Boudo, V., Bunker, A., Sauerborn, R., Bärnighausen, T., & Barteit, S. (2022). The Impact of Wearable Technologies in Health Research: Scoping Review. JMIR mHealth and uHealth, 10(1), e34384. https://doi.org/10.2196/34384

Ibrahim, L. (2016)Ethical Considerations in the Use of Advanced Technologies In Sports.

Kaiser, L., Martinez, J., Horowitz, M., Lamp, C., Johns, M., Espinoza, D., ... & de la Torre, A. (2015). Peer Reveiwed: Adaptation of a Culturally Relevant Nutrition and Physical Activity Program for Low-Income, Mexican-Origin Parents With Young Children. Preventing chronic disease, 12.

Kanamori, S., Takamiya, T., & Inoue, S. (2015). Group exercise for adults and elderly: Determinants of participation in group exercise and its associations with health outcome. The Journal of Physical Fitness and Sports Medicine, 4(4), 315-320.

Kennedy, R. A., McKenzie, G., Holmes, C., & Shields, N. (2022). Social support initiatives that facilitate exercise participation in community gyms for people with disability: a scoping review. International Journal of Environmental Research and Public Health, 20(1), 699.

Lisboa, T., Silva, W. R. D., Silva, D. A. S., Felden, É. P. G., Pelegrini, A., Lopes, J. D. J. D., & Beltrame, T. S. (2021). Social support from family and friends for physical activity in adolescence: Analysis with structural equation modeling. Cadernos de Saude Publica, 37.

Mayo Clinic - Fitness program: 5 steps to get started: https://www.mayoclinic.org/healthy-lifestyle/fitness/in-depth/fitness/art-20048269

Mittelstadt, B., Fairweather, B., Shaw, M., & McBride, N. (2014). The ethical implications of personal health monitoring. International Journal of Technoethics (IJT), 5(2), 37-60.

Molina, M. D., & Myrick, J. G. (2021). The 'how'and 'why'of fitness app use: investigating user motivations to gain insights into the nexus of technology and fitness. Sport in Society, 24(7), 1233-1248.

Noonan, M. (2018). Social media fitness influencers: innovators and motivators (Doctoral dissertation, University of Iowa).

Otto, M. (2018, September). Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation–GDPR). In International and European Labour Law (pp. 958-981). Nomos Verlagsgesellschaft mbH & Co. KG.

Peng, X., Menhas, R., Dai, J., & Younas, M. (2022). The COVID-19 pandemic and overall wellbeing: mediating role of virtual reality fitness for physical-psychological health and physical activity. Psychology Research and Behavior Management, 1741-1756.

Stasi, S., Spengler, J., Maddock, J., McKyer, L., & Clark, H. (2019). Increasing access to physical activity within low income and diverse communities: a systematic review. American Journal of Health Promotion, 33(6), 933-940.

Sullivan, A. N., & Lachman, M. E. (2017). Behavior change with fitness technology in sedentary adults: a review of the evidence for increasing physical activity. Frontiers in public health, 4, 289.

Tavares, B. F., Pires, I. M., Marques, G., Garcia, N. M., Zdravevski, E., Lameski, P., ... & Jevremovic, A. (2020). Mobile applications for training plan using android devices: A systematic review and a taxonomy proposal. Information, 11(7), 343.

Thompson, W. R. (2017). Worldwide survey of fitness trends for 2018: the CREP edition. ACSM's Health & Fitness Journal, 21(6), 10-19.

Tod, D., & Eubank, M. (Eds.). (2020). Applied Sport, Exercise, and Performance Psychology: Current Approaches to Helping Clients.

Wada, T., Matsumoto, H., & Hagino, H. (2019). Customized exercise programs implemented by physical therapists improve exercise-related self-efficacy and promote behavioral changes in elderly individuals without regular exercise: a randomized controlled trial. BMC Public Health, 19, 1-11.

Wan, L., & Zhang, C. (2020). Do Wearable Devices Change Behavior? A Study of Smart Fitness Trackers. The Journal of Information Systems, 29(1), 201-224.

Western, M. J., Armstrong, M. E., Islam, I., Morgan, K., Jones, U. F., & Kelson, M. J. (2021). The effectiveness of digital interventions for increasing physical activity in individuals of low socioeconomic status: a systematic review and meta-analysis. International Journal of Behavioral Nutrition and Physical Activity, 18(1), 1-21.

Wu, M., & Luo, J. (2019). Wearable technology applications in healthcare: a literature review. Online J. Nurs. Inform, 23(3).

Zhang, J., Zheng, S., & Hu, Z. (2022). The effect of physical exercise on depression in college students: the chain mediating role of self-concept and social support. Frontiers in psychology, 13, 841160.

Co-funded by the European Union

HEPALIS

Interactive Tool: Use of technology and social support

Module 7

2023

1. Low-income individuals may face unique challenges in accessing and benefiting from fitness services. (True)
2. Personal trainers should tailor their approach to meet the unique needs of low-income individuals. (True)
3. Fitness technology has not changed much in recent years. (False)
4. Wearable devices, mobile apps, and online platforms are some of the most popular types of fitness technology. (True)
5. Technology can provide many benefits to personal training, but it can also pose some challenges. (True)
6. Personal trainers should only recommend or use the latest and most expensive technology with their clients. (False)
7. Personal trainers should provide hands-on training and support to help their clients use technology effectively. (True)
8. Social support and peer networks can be powerful motivators and enablers of behavior change. (True)
9. Personal trainers should not offer alternative training modalities, such as printed materials or offline resources, to accommodate individuals with limited access to technology. (False)

1. What is the target audience of the training?
A) Elite athletes
B) Middle-aged adults
C) Low-income individuals
D) Children and teenagers
Answer: C) Low-income individuals

2. What are some of the most popular types of fitness technology?
A) DVDs and VHS tapes
B) Radio and TV programs
C) Wearable devices, mobile apps, and online platforms
D) Books and magazines
Answer: C) Wearable devices, mobile apps, and online platforms

3. What are some of the benefits of using technology in personal training?
A) Increased motivation, accountability, and feedback
B) Decreased costs, accessibility, and reliability
C) Reduced social support, peer networks, and inclusivity
D) Limited customization, personalization, and flexibility
Answer: A) Increased motivation, accountability, and feedback

4. What is the importance of demonstrations and hands-on training in using technology with clients?
A) To impress clients with our technical skills and knowledge
B) To save time and effort in explaining the technology
C) To ensure clients are comfortable and confident using the technology
D) To avoid liability and legal issues related to technology use
Answer: C) To ensure clients are comfortable and confident using the technology

Co-funded by the European Union

5. What is the guidance provided in the training for accommodating individuals with limited access to technology?
A) Ignore their needs and focus on clients who can use technology
B) Provide them with the latest and most expensive technology
C) Offer alternative training modalities, such as printed materials or offline resources
D) Encourage them to find their own solutions to technology access
Answer: C) Offer alternative training modalities, such as printed materials or offline resources

Co-funded by the European Union

HEPALIS

Self-Assessment Test: Technology Use And Social Support Module

Module 7

2023

1. What is a key consideration when integrating technology into personal training for low-income individuals?
a. Ensuring the latest technology is always recommended (1 point)
b. Tailoring technology recommendations to affordability and accessibility (3 points)
c. Focusing only on high-cost fitness devices (2 points)

2. How can personal trainers overcome limited digital literacy among low-income clients?
a. Ignoring digital literacy challenges (1 point)
b. Providing training sessions on how to use technology (3 points)
c. Assuming clients will figure it out on their own (2 points)

3. In the context of social support, what is the importance of building peer networks?
a. Peer networks are irrelevant in fitness (1 point)
b. Peer networks can positively influence physical activity and habits (3 points)
c. Peer networks only benefit high-income individuals (2 points)

4. Why is it crucial to assess the impact of technology and social support on clients?
a. Assessment is unnecessary in personal training (1 point)
b. To understand the effectiveness of interventions and make improvements (3 points)
c. Assessing impact is only relevant for high-income clients (2 points)

5. How can personal trainers ensure equity in access to technology?
a. Recommending only high-cost technology options (1 point)
b. Offering alternative means of support and considering affordability (3 points)
c. Assuming all clients have equal access (2 points)

6. What is a potential barrier to virtual support that personal trainers should consider?
a. Virtual support is always superior (1 point)
b. Limited time availability of clients (3 points)
c. Virtual support is only for high-income individuals (2 points)

7. Why is continuous professional development important for personal trainers?
a. Professional development is unnecessary in the fitness industry (1 point)
b. To stay informed about emerging technologies and research (3 points)
c. Professional development is only for certain types of trainers (2 points)

8. How can trainers foster a positive and inclusive environment in virtual interactions?
a. Ignoring potential biases in technology (1 point)
b. Promoting diversity and avoiding stereotypes (3 points)
c. Assuming virtual interactions are inherently inclusive (2 points)

9. What is a key aspect of case-based evaluation in personal training?
a. Case-based evaluation is irrelevant (1 point)
b. Examining specific cases to tailor interventions and identify patterns (3 points)
c. Case-based evaluation is only for experienced trainers (2 points)

Co-funded by the European Union

10. How should personal trainers respond to feedback from clients?
a. Ignore feedback as it is not important (1 point)
b. Incorporate feedback into adjustments and improvements (3 points)
c. Responding to feedback is only for specific types of clients (2 points)

11. In the context of ethical considerations, why is balancing virtual and in-person support important?
a. Balancing is unnecessary (1 point)
b. To meet the diverse needs and preferences of clients (3 points)
c. Balancing is only relevant for certain client demographics (2 points)

12. What is a key principle in protecting client privacy when using technology?
a. Ignoring privacy concerns (1 point)
b. Implementing secure platforms and transparent data usage policies (3 points)
c. Privacy is not a consideration in personal training (2 points)

Note: Scores within the 1-12 range will receive Comment 1, 13-24 range will receive Comment 2, and 25-36 range will receive Comment 3 for interpretation.

Comment 1 (1-12 points range): Congratulations on completing the self-evaluation! Your score falls within the 1-12 point range, indicating that there might be some areas where you could enhance your understanding of the integration of technology and social support in personal training. Consider revisiting the module's content, paying special attention to key principles and strategies. Continuous learning is key to providing effective and inclusive services.

Comment 2 (13-24 points range): Great job! Your score falls within the 13-24 point range, suggesting a solid understanding of the key concepts covered in the module. There might be a few areas where you could delve deeper or refine your knowledge, so consider revisiting specific sections for a more comprehensive understanding. Keep up the good work, and don't hesitate to explore further to enhance your expertise.

Comment 3 (25-36 points range): Fantastic performance! Your score falls within the 25-36 point range, indicating a strong grasp of the material covered in the training module. You have demonstrated a comprehensive understanding of how to integrate technology and social support in personal training, with a particular focus on low-income individuals. Your commitment to continuous improvement and staying informed is commendable. Keep up the excellent work in promoting inclusive and effective practices in the field of fitness.

Co-funded by the European Union

HEPALIS

Increasing the physical activity levels of low-income sedentary individuals under the guidance of personal trainers

101089438

MOBAD time to digital transformation

UCAM Universidad Católica de Murcia

CUS Padova

MindSpin

UNEFS

hepalis.com

Co-funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.