

.....
**PRECISION-BASED EXERCISE
TRAINING PROTOCOLS
IN CHILDREN WITH CANCER
– PEDIATRIC ONCOLOGY –**
.....



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ON BEHALF OF THE FORTEe CONSORTIUM

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TRAINING PROTOCOLS IN
CHILDREN WITH CANCER
- PEDIATRIC ONCOLOGY -**
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FONDAZIONE
Monza e Brianza
per il BAMBINO
e la sua MAMMA.
onlus



Centro
Maria Letizia Verga
PER LO STUDIO E LA CURA DELLA LEUCEMIA DEL BAMBINO

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ON BEHALF OF THE FORTEe CONSORTIUM

The protocols presented in this book are scientifically endorsed
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I never thought that exercise
could be fun and useful.
Especially for us vulnerable kids,
I thought it was a useless thing,
and it was better to focus
on something else. I was wrong.

L.K. a young bone marrow
transplant patient





ABOUT THE FORTEe EU PROJECT

FORTEe is an international multicentre scientific research project involving 16 institutions in 8 European countries – Spain, Italy, Germany, England, France, Romania, Slovenia and Denmark – coordinated by the Universitätsmedizin der Johannes Gutenberg-Universität Mainz, Mainz (Germany).

Fondazione Monza e Brianza per il bambino e la sua mamma, Monza (Italy), is the leader of the clinical trial testing and intervention protocol. There will be 450 children, adolescents and young adults – the so-called 'CAYA-c' – with blood or solid organs cancer recruited in the centres participating in the project in various countries, with the aim of demonstrating that precision-based exercise is safe and can support cancer treatment.

During cancer treatments CAYA-c face problems related to the disease itself, cancer treatments and forced immobility (bed rest). Exercise and sports, supervised and adapted daily to the clinical conditions of these patients, seem to be a valuable aid in their course of therapy. However, the impact of precision training in CAYA-c with cancer has not yet been definitively demonstrated.

The FORTEe research project fits into this knowledge gap and aims to demonstrate that exercise and sports are a safe and potentially effective therapy to counteract fatigue, maintain strength, aerobic capacity, coordination, and agility, and to improve the quality of life of CAYA-c. In addition, there is preliminary evidence that improved efficiency of the systems that serve to perform exercise, such as the heart, lung, and skeletal muscle system, can support the immune system in the fight against cancer, in synergy with oncology drugs and treatments.

In addition, FORTEe also aims to develop innovative digital technologies, such as augmented reality, to increase motivation and engagement of CAYA-c, and to implement guidelines for the realisation of exercise and sports as therapy in children's hospitals in Europe and worldwide.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 945153.



**ABOUT THE FORTEe TEAM AT
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EXERCISE PROFESSIONALS



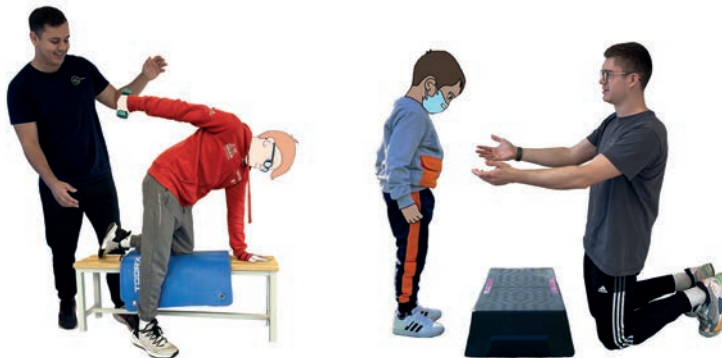
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EXERCISE PROFESSIONALS

**ABOUT THE FORTEe TEAM AT
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COPENHAGEN (DENMARK)**



EXERCISE PROFESSIONALS



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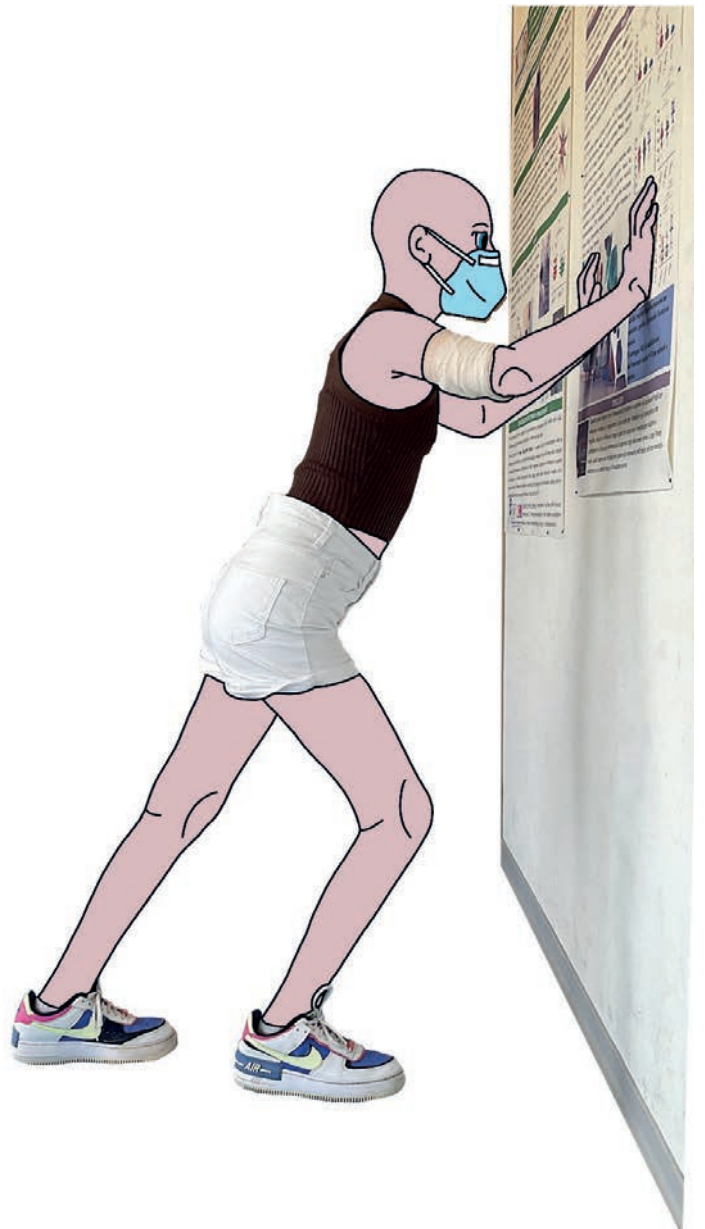
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IN-PATIENT AND OUT-PATIENT PRECISION-BASED EXERCISE PROGRAMS AND SPORTS FOR CHILDREN, ADOLESCENTS AND YOUNG ADULTS WITH CANCER

Children, adolescents and young adults with cancer (CAYA-c) face severely reduced exercise tolerance while undergoing treatment, which places an additional burden on their health (Hovi et al, 1993; Nysom et al, 1999; Hogarty et al, 2000; Harila-Saari et al, 2001; Kaste et al, 2001; Jenney et al, 2005; Haupt et al, 2007; Niinimaki et al, 2007; Marchese et al, 2008; Hartman et al, 2009; Amigoni et al, 2010; Akyay et al, 2014; Moustoufi-Moab et al, 2019; Lanfranconi et al, 2020; Morales et al, 2019 and 2020). The fate of CAYA-c ends up being reduced opportunities for professional and social integration, including those related to participation and competition in sport: exercise capacity remains reduced at the end of cancer treatment, after they have been off therapy for 1 to 5 years, and even after 15 years of follow-up, ultimately limiting individuals' full self-realization in society and jeopardizing their transition to adulthood (Lanfranconi et al, 2014; Ness et al, 2015; Deisenroth et al, 2016; Haupt et al, 2018; Elnaggar et al, 2021). Patients worldwide share with their family a common journey of uncertainty due to long-term exercise limitations beyond their cancer treatment throughout survivorship.

The increasing survival trends in CAYA-c are the result of a concerted effort to combat childhood cancer throughout the world since the 1970s: effective therapies, multicentre randomized clinical trials, biological stratification, and tailored therapies based on the assessment of treatment response have contributed to a progressive improvement in outcomes. There are an estimated 500,000 childhood cancer survivors in Europe and this figure is expected to rise to 750,000 by 2030, but their remarkable resilience will be tested by the lasting effects of cancer treatment, i.e. chronic diseases affecting their exercise tolerance and, mostly, their quality of life (Mody et al, 2008; Hudson et al, 2013; Zardo et al, 2022). Of these, two-thirds of long term CAYA-c survivors will have some health issues related to late effects of treatment, that are severe in half of the cases and have a strong impact on the patients daily life (van Brussel et al, 2005; Wilson et al, 2018; Winker et al, 2022). International childhood cancer societies around the world are committed to raising awareness among childhood cancer survivors to take responsibility for their own care and to encourage stakeholders and national health systems to address the issues of their long-term follow-ups (Teuffel et al, 2016).



One of the potential issues to face is also the most emergent: defining the right amount of physical activity and/or tailored exercise in CAYA-c, during active phases of cancer treatment, or even in those situations when sequelae are present. Precision-based exercise programs (PEX), as a new therapeutic option for CAYA-c, can be most definitely influenced by access to safe, affordable, and appropriate management, including experienced exercise professionals and appropriate and dedicated places to be physically active.

Early introduction of PEX in the disease course, shortly after its diagnosis, may help in reducing the negative impact of cancer treatment side effects and bed rest during and after treatment. Therefore, it may be useful to introduce PEX as soon as possible after diagnosis, which could be done directly in the cancer centres where CAYA-c already spend a long time for their treatment as in or outpatients (Senn-Malashonak et al, 2019).

International childhood cancer societies have strong alliances in governmental and non-governmental institutions to collaborate in support of CAYA-c and their families: implementation of innovative action plans targeting rights of CAYA-c to have access to PEX should foster collaborations across institutions, guided by a shared vision to realize the multiplicative benefits of a more active world, including in hospital settings (Lie et al, 2003).

Are physical activity, exercise programs and sports a right for children, adolescents and young adults with cancer?

In November 2020, the World Health Organization (WHO) published the *WHO guidelines on physical activity and sedentary behaviour* accompanied by the slogan **Every move counts**. Recommended levels of physical activity to achieve health benefits were revised and updated, stratified both by age group and by specific population groups. The importance of movement, which must be tailored specially for each medically fragile child, to promote processes of inclusion and social cohesion is evident. Such activities allow for the exploration of deep traits of self through interaction with the difficulties and peculiarities of other peers, offering meaningful experiences that enrich individual and collective growth. In addition to the general beneficial effects on health, physical activity in children aids learning, provides an outlet for the liveliness typical of young age, stimulates socialization, and accustoms them to managing different daily commitments. Unfortunately, CAYA-c are not mentioned in the **Every move counts** position statement, and their specific needs regarding the therapeutic amount of PEX, are neglected. The topic will hopefully be considered an unmet need of pivotal importance: the *Physical activity strategy for the WHO European region 2016–2025* has a specific priority in ensuring that opportunities for physical activity are included in care planning and practice, and are available in long-term residential care settings.

In response, international medical and patients' organizations have developed recommendations on the amount and intensity of physical activity for different



diseases and age groups, accompanied by documents providing policy guidance to national governments. At the national level, many governments have developed their own physical activity promotion policies in accordance with these public health recommendations.

From another important perspective, although the health benefits of increasing energy expenditure (including its maximum expression, i.e. sports participation) are undoubtedly recognized worldwide, no clear strategy has yet emerged for its recognition as a human right. The Council of Europe, stated in the *European Sports Charter* (Article 10): “All human beings have the inalienable right to access to sport in a safe environment [...], which is essential for their personal development and instrumental in the exercise of the rights to health, education, culture and participation in the life of the community.” It was not until 2009, with the entry into force of the Lisbon Treaty, that the European Union (EU) received a clear mandate to build up and implement an EU-coordinated sports policy supported by a specific budget and to develop cooperation with international bodies in the area of sport. Accordingly to the European Parliamentary Research Service in the document *EU sports policy. Going faster, aiming higher, reaching further*, the EU competence in sport allows them to support, coordinate, or complement sports policy measures taken by national governments. The EU has therefore opted to act via “soft” policy tools, such as guidelines, recommendations and – most importantly – funding, to support its sport-related objectives.

The broadening of the benefits of increasing energy expenditure and of promoting the culture of movement have not yet been fully guaranteed as a right for children and for the frailest ones among them, including our CAYA-c. Some European countries are embracing the EU policies as written in the European Sports Charter. On September 20, 2023, a dedicated paragraph was included in Article 33 of the Italian Constitution, reporting that “*The Republic recognizes the educational, social and promotion value of psychophysical well-being of sporting activity in all its expressions.*” As indicated in the document *Sports enters the Italian Constitution*, the Italian government's sports department affirmed that sports represent the first stage of a path that can be summarized by the hope of ‘sport for all and of all’ and an important contribution to improve the quality of life of people and communities. The Italian Constitution, like others across Europe, recognizes the value of physical activity and sport, but does not determine it a right. Therefore, it becomes a collective responsibility, individual and institutional, to transform physical activity and sports into a right to be guaranteed to all, starting with the people most in need, due to either social criticality and/or physical frailty.

In addition, the right to be physically active is linked to the right to rest and leisure, enshrined in Article 24 of the *Universal Declaration of Human Rights* and Article 7 of the *International Covenant on Economic, Social and Cultural Rights*. The right to rest and leisure is also part of other conventions: Article



31 of the *Convention on the Rights of the Child*, for example, makes a link with the right “to engage in play and recreational activities appropriate to the age of the child.” In its general commentary on this right, the Committee on the Rights of the Child emphasizes the importance of play and recreation for children and notes that play involves physical activity and that recreation includes participation in sports. In addition, the Committee draws attention to children who require special attention for the realisation of this right, such as girls (who generally have a higher prevalence of insufficient physical activity), children living in poverty, children with disabilities, children in institutions, children in indigenous and minority communities, and children in conflict situations and humanitarian and natural disasters. For children, participation in sports and games is also emphasized by organisations that advocate for children’s rights (Messing et al, 2021).

Precision-based exercise in children, adolescents and young adults with cancer

For healthy children and adolescents (5-17 years), the recommended physical activity levels include at least 60 minutes per day of moderate to vigorous intensity, predominantly aerobic exercise. At least 3 times a week, vigorous intensity aerobic activity should be incorporated, as well as activities for musculoskeletal strengthening. Sports activity falls within the latter indications, and those who exceed the recommended levels of physical activity may gain additional health benefits. In 2019, WHO published the *Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age*: recommendations on the amount of time young children should devote each day to physical activity and sleep and the maximum amount of time tolerable for sedentary activities, such as screen time or sitting in a stroller.

The use of PEx for CAYA-c requires a cultural shift that includes exercise as an essential part of treatment from the day of diagnosis. PEx are the new frontier in clinical exercise physiology, helping to induce more efficient oxidative metabolism (i.e., the main system of energy supply within cells) and to boost the adaptive response of bones in vulnerable patients. PEx are preventive in nature, fighting against the possible effects of cancer or oncological treatment on skeletal muscle, cardiorespiratory system, and bone tissue (San Juan et al, 2007; Cox et al, 2009; Chamorro-Viña et al, 2010 and 2017; Takken et al, 2009; Perondi et al, 2012; Kabak et al, 2016; Fiuza-Luces et al, 2017; Morales et al, 2019; Davis et al, 2020). Its benefits extend beyond a simple improvement in exercise capacity and include improved feelings of physical self-perception and satisfaction with life (Ross et al, 2018; Schmidt-Andersen et al, 2022; Pouplier et al, 2022 and 2024). PEx works on intensity, volume, frequency, and recovery, and optimizes individual physiological and psychological adaptations (San Juan et al, 2007, 2008 and 2011; Sasso et al, 2015).



The heterogeneity in response creates the strong hypothesis that PEx can't be a generic exercise prescription, which may actually be masking the full therapeutic potential of exercise treatment in the oncological setting. Essentially, the adjusting of training variables, such as volume, intensity, frequency, and recovery, is an attempt to systematically structure training through phases to optimize physiological and psychological adaptations in an athlete who may well also be a patient with cancer. Finally, work recovery and rest are fundamental to restore the availability of nutrients and energy substrates which replace the components needed by the systems (proteins in the muscle) (Jones et al, 2015; Kabak et al, 2016).

Energy expenditure: also a powerful medicine for cognitive performance

Among the scientific research questions needed to assess the impact of PEx on many outcomes such as cancer-related fatigue, oxidative metabolism, strength, quality of life, and prognosis of life, there is also an increasing interest in its possible role on the academic performance of CAYA-c. In other words, could the fact that CAYA-c have reduced physical performance affect both the ability to achieve age-related developmental goals as well as academic performance?

Moreover, **precision exercise therapy** is a **personalised**, but simultaneously **highly-standardised treatment concept** and thus comparable to drug therapies. Analogous to the correct choice and dosage of a pharmaceutical agent (e.g. antiemetics, analgesics...), the exercise type and training load have to be individually adapted to the patient's condition and needs. **Prescribing exercise** like a **pill** in the right **dosage**, might become a highly effective instrument in childhood cancer care for the **prevention, treatment and management** of the acute side-effects of anti-cancer treatment and its sequelae. Its efficacy is well known in preventing and treating multiple disorders (bone density, hypercholesterolemia, hypertension, cardiovascular health) and the improvement of a variety of functional abilities, such as balance, strength, and exercise tolerance, even in frail patients. In addition, more recent studies associate exercise with improved brain function, such as through increased secretion of neuroprotective factors (Zoladz et al, 2009). Furthermore, exercise improves profiles related to cellular markers of aging by increasing autophagy phenomena that are found to be protective against diseases such as cancer, neurodegenerative diseases, infections, inflammatory diseases, aging, and insulin resistance (He et al, 2012).

Human beings develop sophisticated motor skills in the first few years of life, although one feature of our species compared to other primates is that we have a childhood in which motor skill acquisition is relatively slow. Some children as early as 18 months are already able to walk without holding on to anything or anyone, scrabble, climb down from a couch or chair without help



(*CDC's developmental milestones*, from the US Centres for disease control and prevention). Humans can achieve motor mastery that enables them to perform complicated evolutions in sports and work activities. During early childhood, the cognitive abilities of humans reach similar levels of extreme sophistication. Children can memorize entire poems, learn complex rules of play, and be able to perform multiple tasks at once.

How do motor and cognitive development interact and affect each other? Musculus et al (2021), argue that “movement matters!” implying that motor development is a crucial driver of cognitive development, much more impactful than previously recognized. There is growing scientific evidence that exercise has marked importance for physical and psychological health in adolescents and young adults as well, including emotional stability and cognitive performance (Hogan et al, 2013).

Disparity and frustration of children, adolescents and young adults when accessing exercise programs and sports activities in hospital

Cancer treatment is associated with fluctuations of symptoms and moods during the course of the illness that can greatly influence an individual's motivation to train. In CAYA-c, some physical activity barriers included physical complaints and safety concerns that were more pronounced in on-therapy CAYA-c but also persisted off-therapy. Collectively, these fluctuations emphasize the critical need for PEx to be prescribed by experienced exercise professionals that can promptly adapt the level of exercise in response to individual clinical conditions (Spreafico et al, 2014 and 2019; Gaser et al, 2022; Goette et al, 2022; Fiuza-Luces et al, 2017, 2021, 2023 and 2024).

The risk of falling, parental fears, impaired clinical conditions and cultural prejudices of the parents and health professionals (“exercise is not a priority for CAYA-c”; “CAYA-c are medically fragile children, not athletes”; “CAYA-c can't climb stairs”; “CAYA-c can't exercise outdoors”; “my child is tired, he/she can't exercise today”; “you can't train CAYA-c when they're on oxygen”), create a multifaceted scenario that needs to be taken into account when organizing PEx in a hospital (Speyer et al, 2010; Spreafico et al, 2021 and 2022).

In younger children, the main influencing factor in physical activity participation is family involvement and support, while in adolescents, external figures such as peers, hospital staff, and the community, can play an equally crucial role. The inclusion process, in this context, requires the commitment of various actors, including physicians, nurses, psychologists, social workers, and, last but not least, the parents themselves. It is essential that all of these characters increase their awareness regarding the positive effects of a patient training program. As CAYA-c beyond treatment are to leave the hospital setting and re-enter the community, it is critical to promote a cultural change that encourages access to and participation in physical activity and sports. The goal, then, is not just to modify physical activity to suit people with disa-



bilities, but to review and re-purpose proposed activities to ensure maximum inclusion, allowing everyone to actively participate, regardless of physical ability or age.

FORTEe research project: an opportunity to promote the right to sporting activity in the hospital

As mentioned in the *WHO global disability action plan 2014–2021: better health for all people with disability*, disability is a global public health issue because people with disability, throughout the course of their life, face widespread barriers to accessing health related services, such as rehabilitation, and have worse health outcomes than people without disability in high- as well as in low-income countries. The action plan calls for member states to remove barriers and strengthen/extend rehabilitation, provide assistive devices, and support community-based rehabilitation. Accordingly, the action plan asks for the enhanced collection of relevant and internationally comparable data on disability research.

PEx is inclusive in nature and can produce relevant and internationally comparable data by using a careful evaluation of the impact of exercise on physiological and social outcomes. This is where the international research project FORTEe steps in to promote PEx, which aims to make CAYA-c stronger in fighting childhood cancer. Our research goals are to:

- Conduct one of the world's largest, randomised controlled clinical trials on exercise intervention.
- Evaluate the personalised and standardised exercise interventions in paediatric oncology.
- Create high evidence for an innovative, patient-centred exercise treatment.
- Pool and connect the leading expertise on a European level.
- Promote exercise oncology and stimulate translational research.
- Implement paediatric exercise oncology as an evidence-based standard in clinical care for all childhood cancer patients across the EU and beyond.

As part of the FORTEe research project there are also technologies to increase motivation. CAYA-c face barriers when engaging with exercise, such as treatment-related side effects, psychosocial burdens and lack of individualised provisions. Digital health tools, such as smartphone applications, have emerged as a promising driver to support healthcare provisions in exercise prescription among patients. It is vital to explore how such technologies can be developed more effectively in order to strengthen the evidence supporting their use and for more appropriate implementation within healthcare (Bratteteig et al, 2024; Straun et al, 2024).

Fondazione Monza e Brianza per il Bambino e la sua Mamma,
Monza (Italy)





THE POWER OF DIDACTIC PHYSICAL ACTIVITY GAMES

What is playing?

Playing is the highest form of learning – natural, spontaneous and deeply effective. It fosters the development of a wide range of skills and abilities, providing a comprehensive impact on children's growth and development.

Play evolved as a mean of survival – it makes brain smarter and more adaptable. It forms the foundation of social interaction, encouraging empathy, which lies at the heart of creativity and innovation.

Through play, children become smarter and more creative. They learn more about the world than genetics alone could teach, gaining the tools to adapt to an ever-changing environment. In a world filled with unique challenges and uncertainties, play equips children with the resilience to thrive on a constantly evolving planet.

What is a didactic physical activity game?

A Didactic Physical Activity Game (DPAG) is a comprehensive teaching method that supports a child's holistic development. It promotes growth across all dimensions of the psychosomatic system through complex, engaging, and problem-based movement tasks.

What makes a DPAG unique is its focus on the child – it is rooted in the developmental needs and nature of the child, emerging from the child's own experience. It is not just about movement, but about meaningful, intentional play that nurtures the whole person.

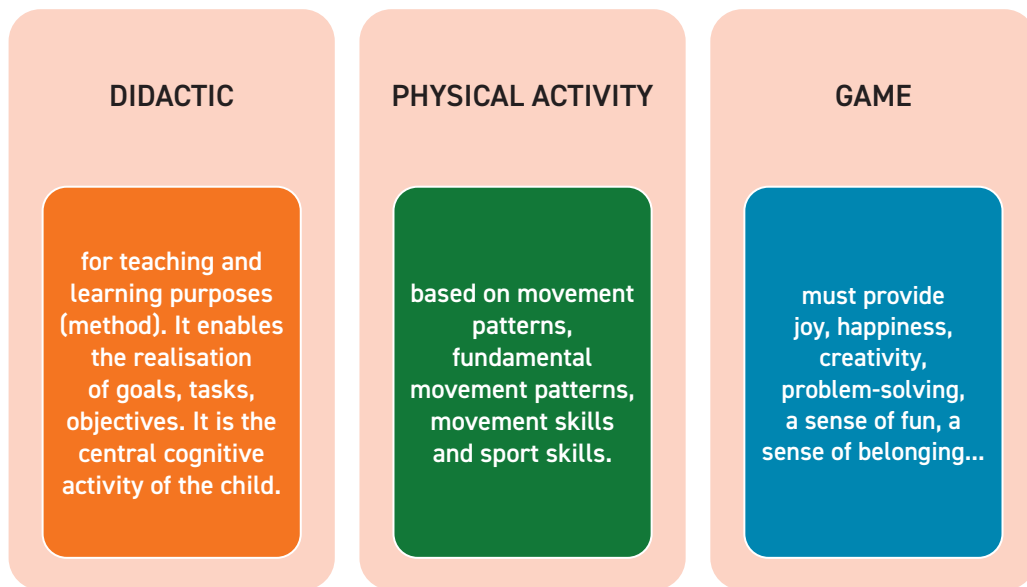
Motivating children to engage in didactic physical activity games

Why Do Children Do What They Do? Children often behave in ways that appear irrational to adults: spinning in circles until they fall, jumping into muddy puddles, or climbing at risky heights. Such behaviour frequently prompts questions like, "What were you thinking?" or "Why would you do that?". The answer lies in motivation – a subject that has fascinated people for centuries.

The roots of motivation

Understanding why children behave the way they do requires looking at their intrinsic motivation. In the early 20th century, developmental psychologists believed that child development mirrored the evolutionary history of the hu-





man species. Herbert Spencer (1820-1903) notably stated, "Education is the repetition of civilisation in a small way." This idea – that ontogenesis (individual development) recapitulates phylogeny (species development) – influenced educational theory for decades, although it has largely been discredited by modern science.

Today, motivation is understood as a complex interaction of biological, cognitive, and emotional factors. Children are naturally driven to explore, test limits, and challenge their abilities. These behaviours are not just random – they are essential for learning and development.

The power of didactic physical activity games

Developmentally appropriate physical activity games that are presented in a meaningful context with effective teaching strategies can significantly support a child's development. These games are not just about movement – they are about learning through movement.

Such activities enhance central executive functions, which are crucial for:

- Inhibition (self-control).
- Working memory (holding and manipulating information).
- Cognitive flexibility (adapting to new rules or environments).
- Persistence (continuous effort despite challenges).
- Willingness to try and take initiative.

These executive functions are critical not just on the playground or in therapy, but also in academic settings and daily life. Engaging in DPAG can help children develop these essential skills, leading to better outcomes in school, relationships, and personal growth.



Motivating children to engage in physical activity through well-designed games taps into their natural curiosity and desire to move. By doing so, we nurture their physical, cognitive, and emotional development in ways that are both enjoyable and profoundly impactful.

Children's motivation

Definition: motivation is a physiological or psychological state that drives behaviour toward achieving a goal. When a child's homeostasis (the body's balanced internal state) is disrupted, such as feeling hunger, the brain initiates actions to restore balance. For example, hunger motivates a child to find and consume food.

Cognitive perspective

Jean Piaget's theory of cognitive development emphasises the motivational energy stemming from a child's cognitive imbalance. New experiences present unfamiliar information, causing disequilibrium. Children instinctively strive to restore balance by engaging in goal-directed behaviour, often seen in repetitive actions as they attempt to understand their world. This natural drive is a powerful form of motivation.

Intrinsic vs. extrinsic motivation

Intrinsic motivation:

- Originates internally.
- Driven by enjoyment, curiosity, satisfaction, and the inherent pleasure of an activity.
- Promotes creativity, deep engagement, and long-term interest.

Extrinsic motivation:

- Comes from external rewards (e.g., prizes, money, praise).
- Encourages short-term engagement for the sake of a reward.

Examples:

- A child plays basketball for the joy of it (intrinsic).
- A child plays to win a prize or scholarship (extrinsic).

Impact of motivation types

Intrinsic motivation is crucial for healthy cognitive and emotional development. It fosters creativity and self-driven learning. In contrast, extrinsic motivation can:

- Undermine intrinsic motivation.
- Reduce creativity and performance.
- Encourage unethical behaviour (e.g., cheating, shortcuts).
- Foster dependency and short-term thinking.



Teresa Amabile's principle

According to Teresa Amabile (Harvard Business School):

- Intrinsic motivation is essential for creativity.
- Controlled extrinsic motivation ("carrot and stick" methods) harms the heuristic, creative processes of the brain.

Encouraging intrinsic motivation in children is vital for their development. While extrinsic rewards may provide short-term results, they can have long-lasting negative consequences, ultimately diminishing a child's natural curiosity and love for learning.

Didactic physical activity games and pleasure

Both children and adults experience feelings and emotions during and after actions. Success feels good, while failure causes disappointment. The imbalance and changes that come with a steady state affect both the body and the mind. With every movement, sensations arise, which are the basic building blocks of emotions and moods.

Researchers define emotions as short-lived positive or negative affective reactions to objects (whether real or imagined) (Wells & Matthews, 1994). A mood is a general and widespread negative or positive emotional state that can influence thinking and behaviour. Unlike emotions, which are brief, moods last longer and can affect how children see their world (the colouring of emotions). Moods can serve as a kind of background filter that determines whether a child chooses to participate in a game, how much energy he or she will put into the game and how long he or she will persist in it.

Emotions and mood, which influence what children pay attention to and how much they engage, are linked to motivation. Children's behaviour during play can give us (teachers, practitioners, parents) insights into the motivational effectiveness of play. Research on children's emotions has revealed specific behavioural patterns that they show when preparing to engage in didactic play and games.

The emotions children show during play indicate that their actions are inherently pleasurable. The feelings that arise during play stimulate children's intrinsic motivation to seek out games that are challenging.

Initiation and persistence are behaviours that have been extensively studied by developmental psychologists. Albert Bandura has developed an influential theory of self-efficacy that focuses on how people's beliefs affect their motivation and persistence (Bandura, 1997). Unlike feelings of self-efficacy, which reflect a global belief about one's ability to cope with difficulties, beliefs about self-efficacy are closely linked to specific tasks.

Self-efficacy, which is the belief that one can act appropriately in a given situation, plays a central role in determining children's willingness to engage in play, the intensity of their behaviour and the persistence of their behaviour. Children's motivation is linked to what they have learned about themselves



and their perception of their own abilities. A child may have a high sense of self-efficacy when playing the position of a goalkeeper on the football field, but a low sense of self-efficacy when solving mathematical problems in the classroom.

At any point in time, a child's self-efficacy and level of motivation are the result of several factors. Four sets of experiences leading to self-efficacy are integrated: achievement in performance, verbal persuasion (speech persuasion), vicarious experiences and emotional arousal.

The moment the child decides to engage in the DPAG, they have established expected outcomes, i.e. the outcomes he expects to happen. Self-efficacy precedes the onset of the behaviour, and outcome expectations play an important role in determining whether they will develop positive, adaptive views of their abilities and skills or negative, maladaptive views.

For this reason, a firm approach by the Exercise Professional or the teacher, which gives the child the opportunity to participate through sustained communication, rather than the other way around, is particularly important. There is no "can't do", it is just a matter of finding the right game and adapting it to the child's specific needs.

Forma 3D LTD, Ljubljana (Slovenia)



**EXERCISE
INTERVENTIONS IN
COMPLEX CLINICAL
SETTINGS:
FROM ADAPTATION
TO RESEARCH**





1. KEY FACTORS INFLUENCING ADHERENCE TO EXERCISE PROGRAMS IN CHILDREN, ADOLESCENTS AND YOUNG ADULTS WITH CANCER

Fluctuating clinical conditions and emotional states during cancer treatment represent a major barrier to regular participation in exercise programs among children, adolescents and young adults with cancer (CAYA-c). In CAYA-c, some overprotection of normal feeling (by parents) and lack of medical clearance (by pediatricians) create a major anxiety environment where safety concerns can prevail on everything. Although this can be more pronounced in on-therapy CAYA-c it also persists when off-therapy. In pediatric oncology, concerns and potential fears related to the safety and physical demands of exercise may influence the acceptance of exercise interventions among patients, families, and healthcare professionals (Speyer et al 2010; Spreafico et al 2021 and 2022). In daily clinical practice, exercise professionals frequently encounter concerns such as the risk of falling, parental fears, and cultural perceptions among parents and health professionals (e.g., “exercise is not a priority for CAYA-c”; “CAYA-c are medically fragile children, not athletes”; “CAYA-c can’t climb stairs”; “CAYA-c can’t exercise outdoors”; “my child is tired, he/she can’t exercise today”; “you can’t train CAYA-c when they are on oxygen”). Together, these recurring perceptions create a multifaceted scenario that must be taken into account when organizing precision-based exercise programs (PEX) in hospital settings.

In clinical practice, exercise professionals frequently encounter recurring perceptions that may limit participation, such as concerns about the risk of falls or the belief that exercise is not a priority during cancer treatment. Statements such as “CAYA-c are medically fragile children” or “my child is too tired to exercise today” illustrate how protective attitudes can shape behaviours and expectations regarding physical activity in hospital settings.

Support networks vary across age groups and should be considered when designing exercise interventions. For younger children, family involvement is fundamental, as parents strongly influence motivation and perceived safety. For adolescents and young adults, peer relationships, social acceptance and encouragement from healthcare staff become increasingly important.

Promoting PEX in CAYA-c therefore requires a coordinated multidisciplinary approach involving oncologists, exercise professionals, physiotherapists, psychologists, nurses, educators and families. Such collaboration helps integrate PEX into routine care, ensure medical safety and encourage sustainable physical activity habits beyond hospital treatment.



1. KEY FACTORS INFLUENCING ADHERENCE TO EXERCISE PROGRAMS IN CHILDREN, ADOLESCENTS AND YOUNG ADULTS WITH CANCER



TREATMENT-RELATED FACTORS

- Fluctuating symptoms and side effects (e.g. nausea, mucositis)
- Fatigue and pain
- Low mood / emotional changes
- Critical health conditions
- Physical limitations
- Psychological distress
- Fear or anxiety associated with activity



FAMILY & MEDICAL-RELATED BARRIERS

- Parental overprotection
- Lack of medical clearance for any type of exercise
- Anxiety and safety concerns (e.g., fear of falls, dislodging of central line)
- Barriers persisting both during and after treatment

KEY FACTORS LIMITING EXERCISE ADHERENCE



ENVIRONMENTAL & ORGANISATIONAL LIMITS

- Lack of facilities or adequate exercise spaces
- Lack of equipment / sport kits
- Shortage of experienced exercise professionals





**FAMILY SUPPORT PLAYS AN
IMPORTANT ROLE IN PARTICIPATION**



**EXERCISE PROFESSIONAL
SUPERVISION**

**KEY FACTORS
IMPROVING
EXERCISE
ADHERENCE**



**PEERS, HOSPITAL STAFF AND
COMMUNITY PLAY A KEY ROLE**



2. WORKLOADS INTENSITY ACCORDINGLY TO THE CANCER TREATMENT INTENSITY AND VITAL SIGNS MONITORING

The process began when pediatric oncologists notified the exercise team of a new cancer diagnosis. This initial referral activated the pathway for potential inclusion in the PEx and represented the first step in the integration of PEx within the clinical care trajectory. Participation required written consent signed by the family, authorising the child's involvement in the research project. In the case of young adults who had reached legal age, consent was signed directly by the CAYA-c. This step ensured ethical compliance, transparency, and voluntary participation, in accordance with clinical research standards and institutional regulations into the FORTEe project (Neu et al., 2025).

Once consent was obtained, a structured evaluation was performed in order to collect key medical information and exercise tolerance necessary to safely design an individualised PEx intervention. The first element assessed was the type of cancer diagnosis, which could include solid tumours, haematological malignancies, or relapse conditions as it directly influenced both treatment burden and functional status. Different diagnoses were associated with therapeutic protocols, potential organ toxicities, and variable impacts on physical functioning.

The intensity of cancer treatment, classified according to the Intensity of Treatment Rating Scale (ITR-3) (Kazak et al., 2012) was used to stratify CAYA-c in 3 different cohorts of training, with workloads ranging from very low (for the most intensive cancer treatment) to moderate-high (for the very and moderately intensive cancer treatment). The ITR-3 is a classification based on objective treatment-related factors, including chemotherapy regimen, radiation therapy, hematopoietic stem cell transplantation, surgical history, and the overall expected toxicity of the treatment plan. The scale provides a structured estimation of treatment burden and anticipated physiological impact, including degree of immunosuppression, risk of medical complications, fatigue severity, and frequency of hospitalisation.

By stratifying patients according to treatment intensity, the ITR-3 supports risk-informed clinical decision-making and facilitates the adaptation of exercise prescription to ensure safety and individual appropriateness within pediatric oncology care. This classification helped exercise professionals to anticipate potential fluctuations in patients' health status and adjust exercise recommendations accordingly throughout the treatment trajectory.

Another step was the identification of specific limitations to PEx participation. These included medical restrictions indicated by the pediatric oncologist or additional precautions recommended by the multidisciplinary team. Limita-



2. WORKLOADS INTENSITY ACCORDINGLY TO THE CANCER TREATMENT INTENSITY AND VITAL SIGNS MONITORING

tions could be temporary or condition-specific and might include factors such as severe fatigue, cardiotoxicity, infection risk, musculoskeletal complications, or the presence of medical devices. All restrictions were carefully considered to ensure the safety of CAYA-c during PEx participation and to prevent potential adverse events.

This stratified approach allowed exercise professionals to modulate both the quantity and the quality of exercise in a flexible and individualised manner. PEx quantity referred to parameters such as frequency, duration, and overall workload of the sessions, while exercise quality included the type of activity performed, its complexity, neuromuscular demand, and the recovery time required between sessions. Through this framework, each component of physical fitness as cardiorespiratory, strength, flexibility, and balance could be progressively adapted to the CAYA-c's clinical condition, treatment phase, and functional capacity.



2. WORKLOADS INTENSITY ACCORDINGLY TO THE CANCER TREATMENT INTENSITY AND VITAL SIGNS MONITORING

FAMILY AGREEMENT AND WRITTEN INFORMED CONSENT SIGNED TO ATTEND EXERCISE PROGRAM AND EVALUATION



1. CHILDHOOD CANCER DIAGNOSIS

- Solid tumor
- Liquid tumor
- Relapse



2. CANCER TREATMENT INTENSITY

Accordingly to Intensity of Treatment Rating Scale (ITR-3)

- Least
- Moderately
- Very
- Most



3. ARE THERE EXERCISE LIMITATIONS?

Follow the prescription of:

- Pediatrics oncologist
- Sports medicine doctors

EXERCISE PROTOCOLS (3 TIMES/WEEK)

- 1 SESSION OF 20-50 MIN ACCORDINGLY THE CLINICAL CONDITION
 - IN THE WARD ROOM OR IN THE HOSPITAL GYM
 - GROUP OR INDIVIDUAL SESSIONS
 - SUPERVISED BY EXERCISE PROFESSIONALS
 - VITAL SIGNS MONITORED





CARDIORESPIRATORY



RESISTANCE



FLEXIBILITY

1. MODERATELY INTENSIVE

60-90% of HRR¹

20-30 min/session

300-450 MET² min*wk-1

60-70% of 1RM³

20 min/session

8-12 repetitions, 3-4 sets

Stretch to feel tightness

5 min/session

30 s each exercise

2. VERY INTENSIVE

40-60% of HRR

8-10 min/session

96-120 MET min*wk-1

50% of 1RM

8-10 min/session

8-12 repetitions, 3-4 sets

Stretch to feel tightness

2-5 min/session

30 s each exercise

3. MOST INTENSIVE

< 40% of HRR

8-10 min/session

48-60 MET min*wk-1

< 50% of 1RM

8-10 min/session

8-12 repetitions, 2-3 sets

Stretch to feel tightness

2-5 min/session

30 s each exercise

¹ Heart rate reserve: max heart rate – rest heart rate / ² Metabolic equivalent of task / ³ One repetition maximum.



NEUROMOTOR AND BALANCE

1. MODERATELY INTENSIVE: 5 min/session

2. VERY INTENSIVE: 2-5 min/session

3. MOST INTENSIVE: 2-5 min/session



3. WORKFLOW OF RISK MANAGEMENT

The workflow of risk management was designed to systematically identify, monitor, and minimise potential challenges that could affect the safety, quality, and feasibility of the PEx intervention. This structured approach prioritised proactive prevention over reactive correction, supporting both participant protection and scientific rigor.

A primary focus was the risk of injury or training overload. Given the clinical vulnerability of pediatric oncology CAYA-c, exercise intensity and volume were carefully controlled. Training load was continuously supervised and adjusted according to the child's medical condition, fatigue level, and daily tolerance. Qualified exercise professionals monitored each session, ensuring that physiological responses remained within safe limits. Observation of vital sign and individualised workload modulation were essential to prevent excessive strain while maintaining therapeutic effectiveness.

Another important risk concerned the potential for inexperienced personnel. Delivering PEx interventions in a clinical oncology setting required specific competencies. To mitigate this risk, extensive and dedicated staff training was implemented before and during the FORTEe study. Exercise professionals, coordinators, and supporting staff received continuous education on clinical protocols, safety procedures, and CAYA-c-specific adaptations. Ongoing supervision and refresher training sessions ensured that high professional standards were consistently maintained.

The risk of low data quality was also carefully addressed. Accurate and reliable data collection was fundamental for both clinical monitoring and research outcomes. Standard operating procedures were developed by highly experienced exercise professionals to guarantee methodological consistency. Standardised tools and calibrated equipment were used across sessions and centres. Furthermore, close monitoring of study procedures, database management, and protected hardware was performed regularly. Data entry processes were verified, and corrective actions were promptly implemented if inconsistencies were detected. When necessary, additional targeted staff training was provided to reinforce protocol adherence and data accuracy.

Low recruitment represented another potential challenge in clinical PEx. Engaging children and adolescents undergoing cancer treatment required tailored communication strategies. Recruitment approaches were therefore specifically designed to appeal to young participants and their families. Clear informational leaflets helped increase awareness and accessibility to PEx. As a strategy to promote to participation among young people, the PEx included technology-assisted activities such as Augmented Reality.



3. WORKFLOW OF RISK MANAGEMENT

If recruitment numbers fell below expectations, corrective measures were activated, including strengthening promotional activities, extending the recruitment period, and involving additional clinical centres to broaden outreach. Finally, the risk of low pediatrician compliance while recruiting CAYA-c was addressed through structured coordination. Active collaboration with pediatric oncologists was essential to ensure consistent referral and CAYA-c enrolment. Regular monitoring by the coordination and clinical trial teams helped maintain engagement and motivation. Dedicated training sessions on clinical trial protocols, often conducted through on-site visits, reinforced awareness of the programs benefits and procedures. This collaborative approach fostered shared responsibility and strengthened interdisciplinary commitment. Overall, this comprehensive risk management workflow promoted safety, quality control, and operational sustainability. By anticipating potential barriers and implementing targeted preventive strategies, the program maintained high standards of clinical care and research integrity throughout its implementation.



3. WORKFLOW OF RISK MANAGEMENT



RISK OF INJURY OR TRAINING OVERLOAD

- Control of the training load
- Monitoring by exercise professionals

**HOW
TO MINIMISE
RISKS**



RISK OF INEXPERIENCED HUMAN RESOURCES

- Extensive and dedicated staff training



RISK OF LOW DATA QUALITY

- Development of procedures by highly experienced exercise professionals
- Use of standardised methods and equipment
- Close monitoring of:
 - study procedures
 - database
 - protected hardware
- Additional staff training if required



RISK OF LOW RECRUITMENT

- To promote participation and engagement among adolescents they were informed about the use of technologies such as Augmented Reality
- If recruitment is below expectations:
 - enhancing study promotion
 - extending recruitment period
 - inclusion of additional clinical centres



RISK OF LOW PEDIATRICIAN COMPLIANCE

- Regular monitoring by coordination and clinical trial teams to motivate them to enroll children and adolescents
- Dedicated training on the clinical trial protocols, through on site visits, by coordination and clinical trial teams to raise awareness and motivation



4. DISSEMINATION

The dissemination strategy is designed to ensure that the project's results, experiences, and impact are effectively shared with multiple target audiences. A structured and multi-level communication plan maximises visibility, promotes engagement, and supports the integration of findings into clinical practice and policy.

For families and survivors, dissemination focuses on accessible and meaningful communication. Storytelling plays a central role, including written narratives and video testimonials that highlight personal experiences and program benefits. Educational brochures and newsletters provide clear information about the intervention, outcomes, and practical guidance. Family days and open events create opportunities for direct interaction, strengthening community involvement and fostering trust.

Healthcare professionals represent another key audience. Internal clinical presentations, such as clinical meetings, allow structured discussion of results within hospital settings. Dedicated training sessions and practical toolkits support knowledge transfer and facilitate implementation in daily practice. Peer-to-peer sharing of best practices further enhances professional engagement and encourages adoption of evidence-based exercise interventions.

Within the scientific community, dissemination occurs through publication of journal articles, conference presentations, and participation in collaborative research networks. These activities ensure methodological transparency, promote academic dialogue, and stimulate future multicentre collaborations. Communication with the public and media aims to increase awareness and societal impact. Social media campaigns, including the use of project hashtags and short videos, broaden outreach and engage younger audiences. Press releases mark key milestones, while podcasts, interviews, and television segments help translate scientific findings into accessible language for broader audiences.

Finally, policy makers and institutional stakeholders are engaged through evidence-based policy briefs, meetings with hospital boards and health authorities, and formal recommendations for integration into standard care. This structured dissemination approach supports long-term sustainability and real-world implementation of the project's outcomes.

Fondazione Monza e Brianza per il Bambino e la sua Mamma,
Monza (Italy)



4. DISSEMINATION



FAMILIES & SURVIVORS

- Storytelling (written, video testimonials)
- Educational brochures / newsletters
- Family days and open events



HEALTHCARE PROFESSIONALS

- Internal clinical presentations ('clinical meetings')
- Training sessions and toolkits
- Peer-to-peer sharing of best practices

FORTEe DISSEMINATION



SCIENTIFIC COMMUNITY

- Journal articles
- Conference presentations
- Collaborative research networks



POLICY MAKERS & INSTITUTIONS

- Policy briefs with evidence summaries
- Meetings with hospital boards/health authorities
- Recommendations for integration into standard care

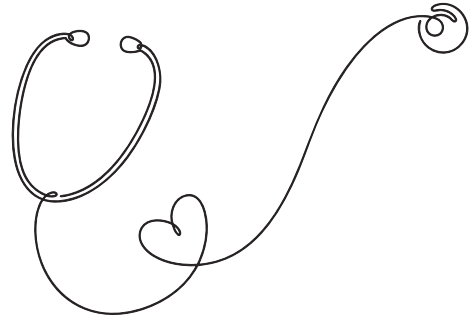


PUBLIC & MEDIA

- Social media campaigns (#FORTEeProject, short videos)
- Press releases for key milestones
- Podcasts / interviews / TV segments



.....
**TRAININGS FOR SPECIFIC
CLINICAL CONDITIONS**
.....





THE CLINICAL PERSPECTIVE

When I was first approached with the idea of a structured program of precision-based exercise for children and adolescents with onco-haematological diseases, I must admit that I was skeptical. Us all who work with extremely fragile patients know that their bodies are challenged by intensive chemotherapies and treatment-related complications and their mood is often jeopardized by hospitalization, isolation from peers and fear to fail treatment.

As physicians, our absolute priority has always been to protect our patients. To protect them from infections, complications and any avoidable risk. Even more as pediatricians. In this context, the concept of physical training, even if adapted and carefully supervised, could initially seem like a step too far.

Over time, however, my perspective deeply changed. Based on my daily clinical practice. Day after day, I observed the effects of carefully designed and safely performed tailored exercise, which was progressively implemented into each patient treatment strategy. The improvements involved not only physical abilities (strength, coordination and mobility) but also deeper, equally important aspects, such as mood, self-confidence, body awareness and ability to face the challenges of treatment with greater energy and engagement. What initially appeared to be a potential risk has proven to be a valuable resource, when driven by specific expertise. This is not just about 'doing sports' in its conventional sense, but about supporting children and adolescents through a process which aims in the direction of enhancing the ability to move, in order to restore independence and normality, which are inevitably taken away by the disease.

The FORTEe exercise protocols' book is the result of this realisation, offering a structured, thoughtful and scientifically sound approach to support precision-based exercise in children and adolescents with onco-haematological diseases. The exercises presented here are the result of rigorous work and are designed to respect the clinical limits of patients while enhancing their potential.

I can now claim that precision-based exercise program are an unmissable part of our medical approach. Each child or adolescent is not just his disease, is not just a patient, but is a potential athlete, competing to gain his life back against his disease. Treating a patient as a whole person also means restoring movement, autonomy and hope. Which should always be possible.

Let's take the field. In this kind of sport competition the winner won't be just the best athlete, but them all. Our societies will win, as our cancer survivors will ultimately become adults who have learned how to improve their abilities and respect their competitors.

Adriana Cristina Balduzzi

Head of the Pediatric Haematology-Oncology Unit, Monza



THE FUTURE IS ACCOMPANIED BY ACTS OF CARE

What makes our model of care for pediatric haematological and oncological diseases unique is our belief that every child should be at the centre of their own journey through illness, from diagnosis throughout treatment and beyond. This principle is based on a partnership between families, clinicians, and researchers. The dream of making children feel safe and allowing them to stay in hospital without fear – knowing they would find competence, attention, respect, and total acceptance of their situation – led to the launch of the Sport Therapy project shortly after the Maria Letizia Verga Centre was established.

The idea of doing sport – or rather, devising personalised training programs adapted to each child's clinical condition – really meant 'throwing our hearts over the obstacle', trusting in the dream that started our journey over forty-five years ago and still drives us today when families experience a 'break in normality' due to diagnosis.

Physical exercise is a concrete way of giving children back what illness and therapeutic treatments take away: the strength to move, run and jump, and with it, their thoughts about the future.

What initially seemed like a bold idea has, in recent years, proved to be a valuable resource thanks to a multidisciplinary team of professionals, including pediatric oncologists, sports medicine physicians, exercise professionals, osteopaths, child neuropsychomotor therapists, psychologists and educators. This team has been able to transform physical exercise into a valuable tool to support the treatment process.

At this moment of greatest fragility, when families feel the need to protect their children from every possible risk, physical exercise becomes an integral part of their journey together. It is a personalised intervention that is carefully supervised and adapted to each child's clinical condition. This is only possible thanks to constant and reassuring dialogue with pediatric oncologists, who can help parents to transform fear into confidence. This allows their children and young people to participate in training programs with awareness and serenity.

In the Centre's gym, on the equipped terrace, and even in hospital rooms when clinical conditions prevent patients from leaving bed, our exercise professionals provide daily support tailored to each child's or young person's clinical needs and capabilities. This training practice generates not only psychological and physical well-being, but also becomes a metaphor for facing the challenge of illness. It teaches individuals to think of themselves as capable of enduring pain and fear, and above all, it shows them that they are not alone in facing illness.



THE FUTURE IS ACCOMPANIED BY ACTS OF CARE

This is why the FORTEe project confirms to us that all of this is possible and can become standard practice. The exercise protocol manual is a valuable scientific achievement and a concrete sign of what can happen when clinicians, researchers and parents share the same vision: that even during illness, it is important to continue caring for each child's life project and safeguarding their desire for the future.

Mariapaola Verga

Vice-President of the Maria Letizia Verga Foundation, for the study and treatment of childhood leukaemia



WHEN THE RESPIRATORY SYSTEM IS NOT EFFICIENT

WHY?

Acute conditions: infection, fluid overload, cytokine release syndrome, acute pulmonary graft-versus-host disease.

Chronic conditions: chronic pulmonary graft-versus-host disease.

OUR FEAR

Hypoxia.
Fatigue.

ADAPTATION

Small skeletal muscle groups exercises are allowed in all conditions. Moderate cardiopulmonary exercise allowed in chronic conditions.

RECOMMENDED

Use the pulse oximeter during the training.
Seated position.
Do not lie totally on your back for more than 2 minutes at a time.



Step up, eyes open, alternative
20 sec exercise and 40 sec recovery,
in total 5 min
on p. 77



Calf raise
6-8 reps for 3 sets
on p. 120



WHEN THE RESPIRATORY SYSTEM IS NOT EFFICIENT



Adduction
6-8 reps for 3 sets
on p. 124



Clamshell
6-8 reps for 3 sets
on p. 126



Elastic band rear raise
6-8 reps for 3 sets
on p. 154



Bench press
6-8 reps for 3 sets
on p. 160



Shoulder external rotation
6-8 reps for 3 sets
on p. 162



Bipedal posture on balance disc
10 sec exercise for 4 sets
on p. 218



Chandelier
45 sec
on p. 250



Padlock
30 sec each leg
on p. 252



WHEN THE CARDIAC OUTPUT IS NOT EFFICIENT

WHY?

Acute conditions: infections, sepsis, anthracycline damage, fluid overload, cytokine release syndrome.

OUR FEAR

Hypoxia.
Hypotension.
Fatigue.
Heart failure.

ADAPTATION

Small skeletal muscle groups exercises are allowed in all conditions. Moderate cardiopulmonary exercise allowed in heart failure.

RECOMMENDED

Use the pulse oximeter during the training.
Seated position.



Leg extension
6-8 reps for 3 sets
on p. 132



Leg curl
6-8 reps for 3 sets
on p. 134



WHEN THE CARDIAC OUTPUT IS NOT EFFICIENT



Lateral raise
6-8 reps for 3 sets
on p. 174



One arm dumbbell row
6-8 reps for 3 sets
on p. 144



Dumbbell shrug
6-8 reps for 3 sets
on p. 166



Triceps extension
6-8 reps for 3 sets
on p. 177



Wrist curl
6-8 reps for 3 sets
on p. 184



Stepping over obstacles
version alternative
10 sec of exercise - repeat
again after 30 sec of
recovery for 3 sets
on p. 243



Scorpion
30 sec each leg
on p. 260



OSTEONECROSIS

WHY?

Chemotherapy
side effects.

OUR FEAR

Joint pain.
Risk of fracture.
Exercise makes pain worse.
Accidental falls.

ADAPTATION

Partially loading exercise.

RECOMMENDED

Use the pulse oximeter
during the training.
Seated position.



Recumbent bike
6 min of exercise - repeat again after
3 min of rest
on p. 110



Leg extension
8 reps for 3 sets
on p. 132



OSTEONECROSIS



Calf raise from sitting position
8 reps for 3 sets
on p. 121



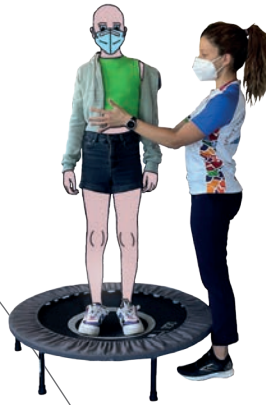
Overhead press
8 reps for 3 sets
on p. 168



Bicep curl
8 reps for 3 sets
on p. 180



Wrist curl modification
8 reps for 3 sets
on p. 186



Bipedal posture with eyes open on trampoline, with direct support from the EP
10 sec of exercise - repeat again after 30 sec of recovery for 4 sets
on p. 224



Police man
30 sec for each arm
on p. 264



NEUROMUSCULAR DISEASES

WHY?

Chemotherapy-induced toxicity, traumatic lumbar puncture, CNS relapse, localised vertebral disease.

OUR FEAR

Accidental falls.
Pain.

ADAPTATION

No monopodal exercises, partially loading.

RECOMMENDED

Use the pulse oximeter during the training.



Recumbent bike

3 min of exercise - repeat again after 3 min of recovery for 3 sets
on p. 110



Barbell squat alternative
6-8 reps for 3 sets
on p. 113



NEUROMUSCULAR DISEASES



Clamshell
6-8 reps for 3 sets
on p. 126



Straight arm pulldown
alternative
6-8 reps for 3 sets
on p. 153



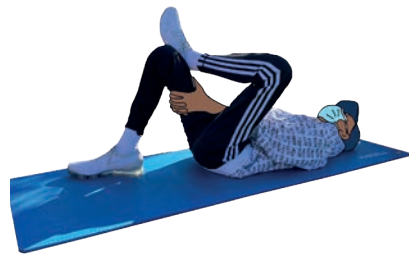
Bench dip alternative
6-8 reps for 3 sets
on p. 179



Crunch feet on fiball
6-8 reps for 3 sets
on p. 190



Bipedal posture
with eyes open
on trampoline
10 sec of exercise - repeat
again after 30 sec of
recovery for 3 sets
on p. 234



Padlock
30 sec of exercise
for each leg
on p. 252



LOW OXYGEN SATURATION

WHY?

Acute or chronic anemia due to myelotoxic chemotherapy, infections, hemoglobinopathies.

OUR FEAR

Hypoxia.
Hypotension.
Fatigue.
Cardiac failure.

ADAPTATION

Intense exercise is allowed but for a few seconds (alactacide metabolism).
Mild cardiopulmonary exercise is allowed.

RECOMMENDED

Use the pulse oximeter during the training.



Mini trampoline walk
20 sec of exercise and 40 sec of recovery for 5 min - repeat again after 5 min rest
on p. 68



Lunge
6-8 reps for 3 sets
on p. 114



LOW OXYGEN SATURATION



The skater
6-8 reps for 3 sets
on p. 138



Dumbbell kickback
6-8 reps for 3 sets
on p. 188



Front raise
6-8 reps for 3 sets
on p. 170



Lat pulldown on fitball
6-8 reps for 3 sets
on p. 150



Woodchopper
6-8 reps for 3 sets
on p. 208



One leg posture with eyes
open on trampoline
10 sec of exercise - repeat
again after 30 sec of
recovery for 4 sets
on p. 224



Prayer
40 sec
on p. 256



CARDIORESPIRATORY EXERCISE



All the exercises described below can be combined with the motivational games suggested in the section 'Didactic physical activity games in the frame of exercise therapy', on pp. 269-302.

MINI TRAMPOLINE WALK



STARTING POSITION

Standing in the centre of trampoline.



ACTION

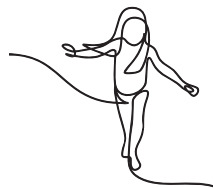
Raise your left and right leg alternately. Your arms should be raised and flexed at 90°.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling when
you raise your
legs.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



MINI TRAMPOLINE WALK / ALTERNATIVE

1



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Rotating your torso.
Looking down.
Holding your breath.



MINI TRAMPOLINE JUMP



STARTING POSITION

Standing in the centre of trampoline.



ACTION

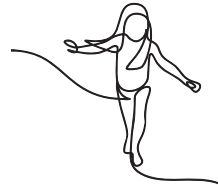
Jump up with your feet together.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling when
you jump.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



MINI TRAMPOLINE JUMP / ALTERNATIVE

2



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Rotating your torso.
Looking down.
Holding your breath.



UP & DOWN STAIRS



STARTING POSITION

Standing in front of a flight of stairs.



ACTION

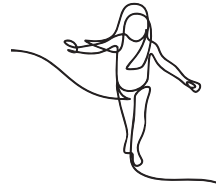
Walk up and down the stairs.



1 min recovery after each flight of stairs.



Exhaling when you climb a step.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



UP & DOWN STAIRS / ALTERNATIVE



KEEPING THE HAND ON HANDRAIL AND WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Holding your breath.
Taking two or more steps at a time.



WALKING THROUGH OBSTACLE COURSE



STARTING POSITION

Standing in front of the course at start line.



ACTION

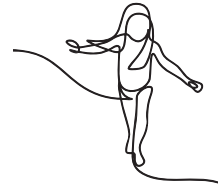
Walk along the corridor without touching the obstacles. The obstacles could be cones, speed ladder or other fitness equipment.



Carry out for at least 6 min continuously.



Exhaling during all movement.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



WALKING THROUGH OBSTACLE COURSE / ALTERNATIVE

4

CARDIORESPIRATORY EXERCISE



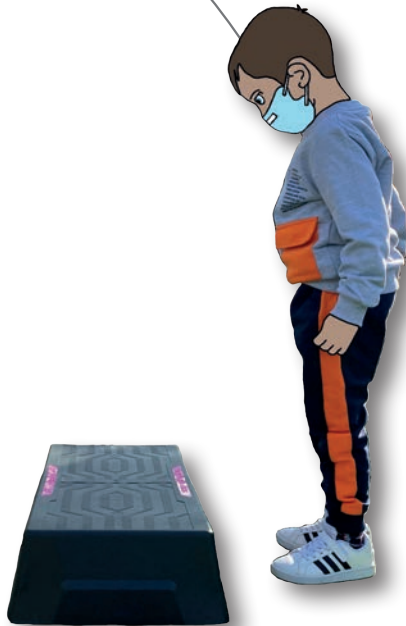
WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Holding your breath.



STEP UP, EYES OPEN, RIGHT LEG UP FIRST



STARTING POSITION

Standing in front of the step.



ACTION

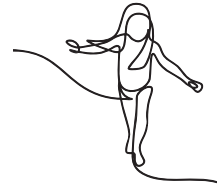
Step up onto the step, keeping your eyes open. Step up and down with your right leg first.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step up.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



STEP UP, EYES OPEN, RIGHT LEG UP FIRST / ALTERNATIVE



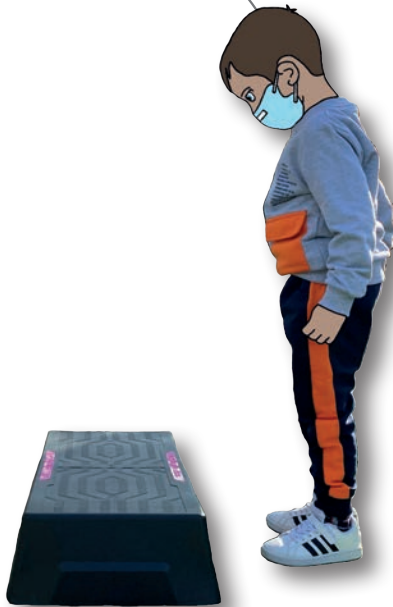
FROM SITTING POSITION

AVOID!

Rotating your torso.
Looking down.
Holding your breath.



STEP UP, EYES OPEN, LEFT LEG UP FIRST



STARTING POSITION

Standing in front of the step.



ACTION

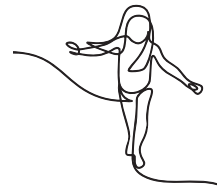
Step up onto the step, keeping your eyes open. Step up and down with your left leg first.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step up.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



STEP UP, EYES OPEN, LEFT LEG UP FIRST / ALTERNATIVE



FROM SITTING POSITION

AVOID!

Rotating your torso.
Looking down.
Holding your breath.



STEP UP, EYES CLOSED, RIGHT LEG UP FIRST



STARTING POSITION

Standing in front of the step with the help of an exercise professional.



ACTION

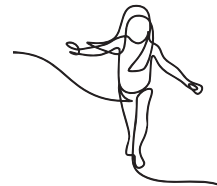
Step up onto the step keeping your eyes closed. Step up and down with your right leg first, with the help of an exercise professional.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step up.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



**STEP UP, EYES CLOSED, RIGHT LEG UP FIRST /
ALTERNATIVE**



FROM SITTING POSITION

AVOID!

- Rotating your torso.
- Looking down.
- Holding your breath.



STEP UP, EYES CLOSED, LEFT LEG UP FIRST



STARTING POSITION

Standing in front of the step with the help of an exercise professional.



ACTION

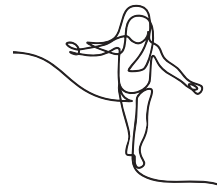
Step up onto the step, keeping your eyes closed. Step up and down with your left leg first, with the help of an exercise professional.



30-60 sec exercise;
30-60 sec recovery;
total time from 2
to 20 min.



Exhaling as you
step up.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



STEP UP, EYES CLOSED, LEFT LEG UP FIRST / ALTERNATIVE



FROM SITTING POSITION

AVOID!

Rotating your torso.
Looking down.
Holding your breath.

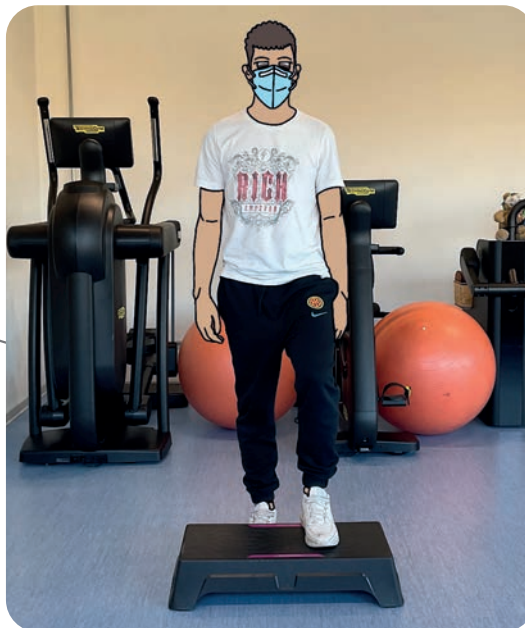


STEP DOWN, EYES OPEN, RIGHT LEG DOWN FIRST



STARTING POSITION

Standing on the step with your feet in the middle of the step.



ACTION

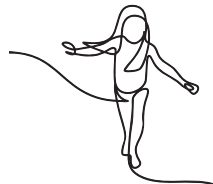
Step down off the step with your right leg first, keep your eyes open. Then step back up again with your right leg first.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step down.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



**STEP DOWN, EYES OPEN, RIGHT LEG
DOWN FIRST / ALTERNATIVE**



FROM SITTING POSITION

AVOID!

- Rotating your torso.
- Looking down.
- Holding your breath.



STEP DOWN, EYES OPEN, LEFT LEG DOWN FIRST



STARTING POSITION

Standing on the step with your feet in the middle of the step.



ACTION

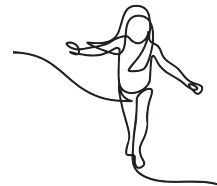
Step down off the step with your left leg first, keeping your eyes open. Then step back up again with your left leg first.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step down.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



**STEP DOWN, EYES OPEN, LEFT LEG
DOWN FIRST / ALTERNATIVE**



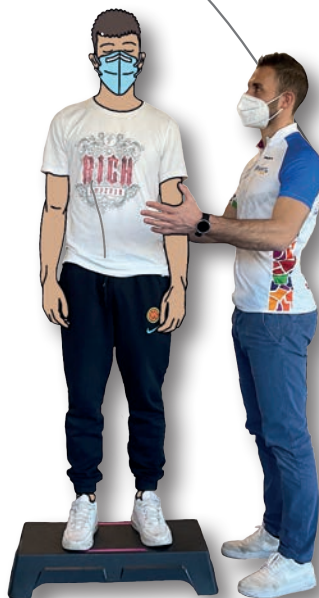
FROM SITTING POSITION

AVOID!

Rotating your torso.
Looking down.
Holding your breath.



STEP DOWN, EYES CLOSED, RIGHT LEG DOWN FIRST



STARTING POSITION

Standing on the step with your feet in the middle of the step with the help of an exercise professional.



ACTION

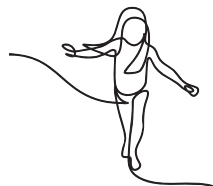
Step down off the step with your right leg first, keeping your eyes closed. Then step back up again with your right leg first, with the help of an exercise professional.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step down.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



**STEP DOWN, EYES CLOSED, RIGHT LEG
DOWN FIRST / ALTERNATIVE**



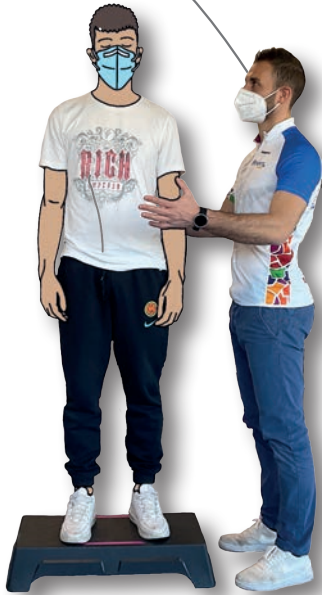
FROM SITTING POSITION

AVOID!

- Rotating your torso.
- Looking down.
- Holding your breath.



STEP DOWN, EYES CLOSED, LEFT LEG DOWN FIRST



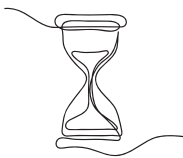
STARTING POSITION

Standing on the step with your feet in the middle of the step with the help of an exercise professional.



ACTION

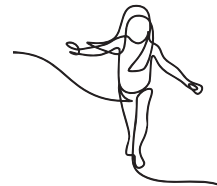
Step down off the step with your left leg first, keeping your eyes closed. Then step back up again with your left leg first, with the help of an exercise professional.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step down.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



STEP DOWN, EYES CLOSED, LEFT LEG DOWN FIRST / ALTERNATIVE



FROM SITTING POSITION

AVOID!

Rotating your torso.
Looking down.
Holding your breath.



LATERAL STEP, EYES OPEN, RIGHT LEG UP FIRST



STARTING POSITION

Standing with both your feet next to the step.



ACTION

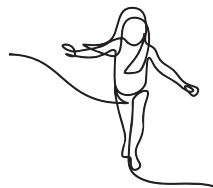
Step up onto the step keeping your eyes open. Step up and down with your right leg first.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step up.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



**LATERAL STEP, EYES OPEN,
RIGHT LEG UP FIRST / ALTERNATIVE**



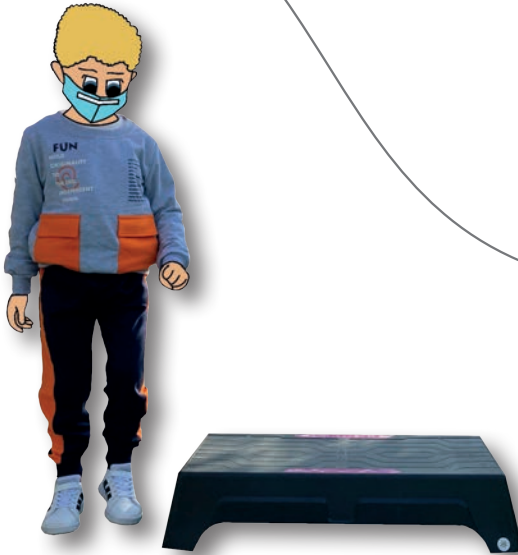
FROM SITTING POSITION

AVOID!

- Rotating your torso.
- Looking down.
- Holding your breath.



LATERAL STEP, EYES OPEN, LEFT LEG UP FIRST



STARTING POSITION

Standing with both your feet next to the step.



ACTION

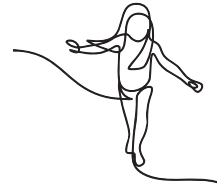
Step up onto the step keeping your eyes open. Step up and down with your left leg first.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step up.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



**LATERAL STEP, EYES OPEN,
LEFT LEG UP FIRST / ALTERNATIVE**



FROM SITTING POSITION

AVOID!

- Rotating your torso.
- Looking down.
- Holding your breath.



LATERAL STEP, EYES CLOSED, RIGHT LEG UP FIRST



STARTING POSITION

Standing with both your feet next to the step with the help of an exercise professional.



ACTION

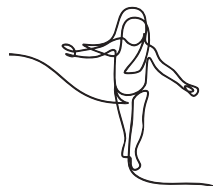
Step up onto the step keeping your eyes closed. Step up and down with your right leg first, with the help of an exercise professional.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step up.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



**LATERAL STEP, EYES CLOSED,
RIGHT LEG UP FIRST / ALTERNATIVE**



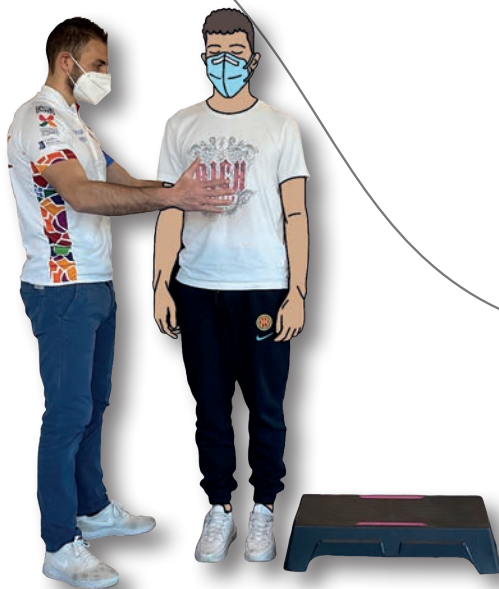
FROM SITTING POSITION

AVOID!

- Rotating your torso.
- Looking down.
- Holding your breath.



LATERAL STEP, EYES CLOSED, LEFT LEG UP FIRST



STARTING POSITION

Standing with both your feet next to the step with the help of an exercise professional.



ACTION

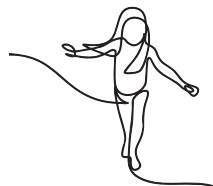
Step up onto the step keeping your eyes closed. Step up and down with your left leg first, with the help of an exercise professional.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step up.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



**LATERAL STEP, EYES CLOSED,
LEFT LEG UP FIRST / ALTERNATIVE**



FROM SITTING POSITION

AVOID!

- Rotating your torso.
- Looking down.
- Holding your breath.



STEP UP, EYES OPEN, ONE LEG UP, CLAPPING HANDS



STARTING POSITION

Standing in front of the step.



ACTION

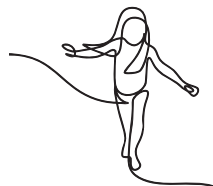
Step up with only one leg while keeping your other leg behind you. Keep your eyes open. Swap legs while clapping your hands.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step up.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



**STEP UP, EYES OPEN, ONE LEG UP,
CLAPPING HANDS / ALTERNATIVE**



FROM SITTING POSITION

AVOID!

- Rotating your torso.
- Looking down.
- Holding your breath.



STRADDLE STEP UP AND DOWN, EYES OPEN



STARTING POSITION

Standing with the step between your feet.



ACTION

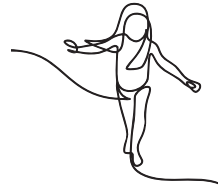
Step up with one foot keeping your eyes open. Then step up with your other foot. Return to the starting position and switch your starting leg.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step up.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



STRADDLE STEP UP AND DOWN, EYES OPEN / ALTERNATIVE

5
14

CARDIORESPIRATORY EXERCISE



FROM SITTING POSITION

AVOID!

Rotating your torso.
Looking down.
Holding your breath.



STRADDLE STEP UP AND DOWN, EYES CLOSED



STARTING POSITION

Standing with the step between your feet with the help of an exercise professional.



ACTION

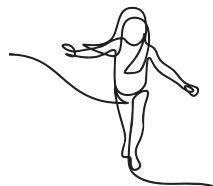
With the help of an exercise professional step up with one foot keeping your eyes closed. Then step up with your other foot. Return to the starting position and switch your starting leg.



30-60 sec exercise;
30-60 sec recovery;
total time from 2 to
20 min.



Exhaling as you
step up.



Stabilise by:

- keep your spine in a neutral position;
- keep your chest high and keep your core strong.



STRADDLE STEP UP AND DOWN, EYES CLOSED / ALTERNATIVE

5
15

CARDIORESPIRATORY EXERCISE



FROM SITTING POSITION

AVOID!

Rotating your torso.
Looking down.
Holding your breath.



ROWING ERGOMETER



STARTING POSITION

Bend your knees until your body is closer to the front of the machine; hold the bar with both hands and make sure your back is straight.

ACTION

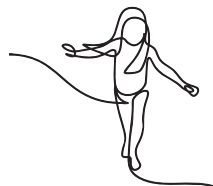
Firstly push on the foot plates with both your feet and extend your legs. When the legs are fully extended, lean back at an approximate angle of 45°, bringing your arms in towards your chest. In the second phase, extend the arms while you bend your knees to bring you back to the starting position.



Carry out for at least
2-6 min continuously.



Exhaling during
the first phase.



Stabilise by:
• keep your spine
in a neutral position.



ROWING ERGOMETER / ALTERNATIVE

6

CARDIORESPIRATORY EXERCISE



AVOID COMPLETE KNEES FLEXION

AVOID!

Rotating your torso.
Looking down.
Holding your breath.



ELLIPTICAL MACHINE



STARTING POSITION

Carefully get on the elliptical machine by stepping on the lower foot plate first. Make sure you hold the handles while climbing on.



ACTION

Legs: move in an elliptical motion, pushing forward and down with one foot while the other moves back and up.

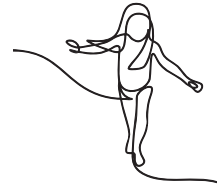
Arms: push and pull opposite to leg motion (right leg forward = left arm forward).



Carry out for at least
2-6 min continuously.



Exhaling every
two steps.



Stabilise by:

- keep your spine in a neutral position.



ELLIPTICAL MACHINE / ALTERNATIVE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Rotating your torso.
Looking down.
Holding your breath.



RECUMBENT BIKE



STARTING POSITION

Position yourself on the recumbent bike resting your back properly against the backrest; then place your feet on the pedals using the foot straps. Find the correct position by adjusting the seat.



ACTION

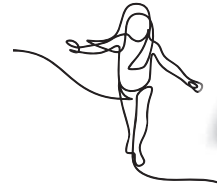
Push your feet against the pedals and start cycling. While the left knee is fully extended, the right knee is flexed, performing an alternating leg movement.



Carry out for at least
2-6 min continuously.



Exhaling during
the movement.

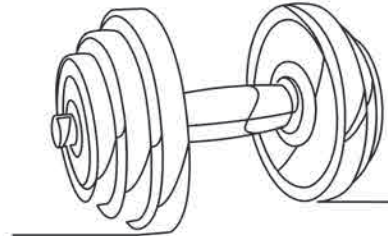


Stabilise by:
• keep your spine in a neutral
position.

AVOID!
Holding your
breath.



STRENGTH EXERCISE



All the exercises described below can be combined with the motivational games suggested in the section 'Didactic physical activity games in the frame of exercise therapy', on pp. 269-302.

BARBELL SQUAT



STARTING POSITION

Stand with your feet shoulder-width apart, barbell resting on upper back (not neck).

ACTION

Push your hips back and bend your knees, lowering yourself as if sitting in a chair. Then push through your heels, extending your knees and hips to stand back up.

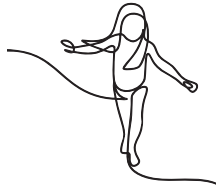


MOVEMENT PATH

Ascend and descend.



Exhaling while squatting.



Stabilise by:

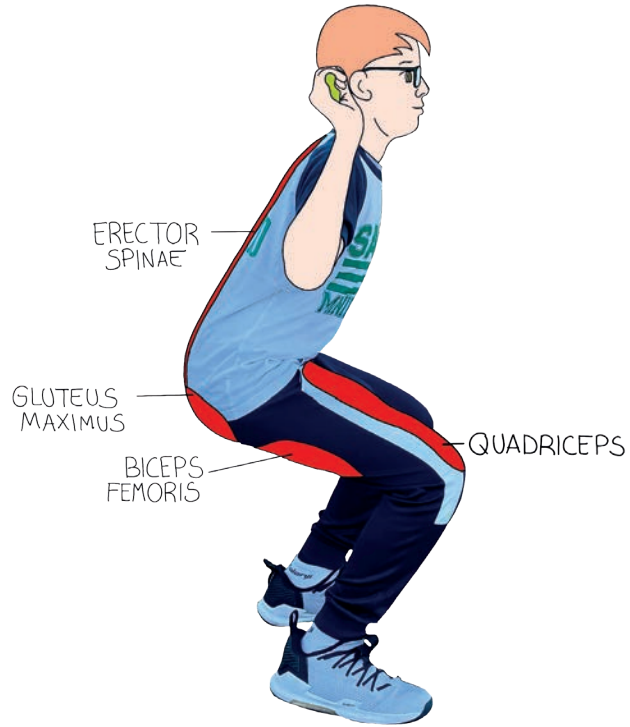
- relaxing your shoulders;
- keeping your core engaged;
- keeping your knees parallel and straight above your toes.



BARBELL SQUAT

BEST FOR

Biceps femoris.
Erector spinae.
Gluteus maximus.
Quadriceps.



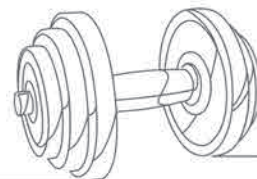
AVOID!

Extending your knees beyond your toes.
Holding your breath.
Looking down.



ALTERNATIVE

Place a bench or chair behind you to sit back on.



LUNGE



STARTING POSITION

Stand tall with your feet close together and your hands on your hips.

ACTION

Keep your head up and your hands on your hips. Take a step forward, bend the front knee to 90°. Keep your front knee aligned over your ankle and back knee hovering just above the ground. Then return to the starting position.

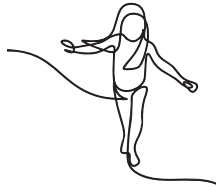


MOVEMENT PATH

Forward and descending.



Exhaling when you take the step forwards.



Stabilise by:

- keep your chest high;
- keep your core strong;
- keep your spine in a neutral position.



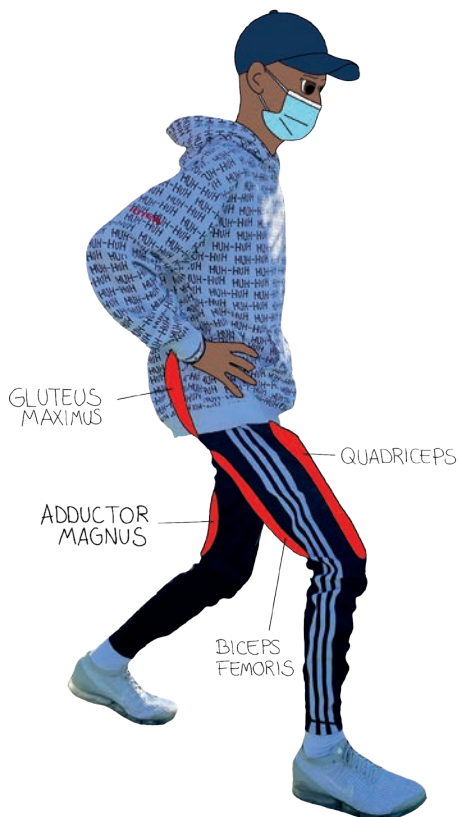
LUNGE

BEST FOR

Adductor magnus.
Biceps femoris.
Gluteus maximus.
Quadriceps.

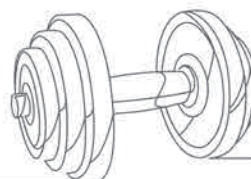
AVOID!

Rotating your torso.
Looking down.
Holding your breath.



ALTERNATIVE

Bend the front knee
to 45°.



LATERAL LUNGE



STARTING POSITION

Stand tall with your feet hip width apart with your hands on your hips.

ACTION

Step laterally out to the side. As your chest moves forward and your hips retract, extend your arms in order to ensure balance. Push back the stepping leg and return to the starting position.

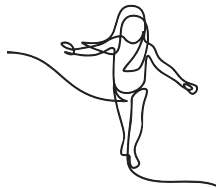


MOVEMENT PATH

Lateral and descending.



Exhaling while you take the step forward.



Stabilise by:

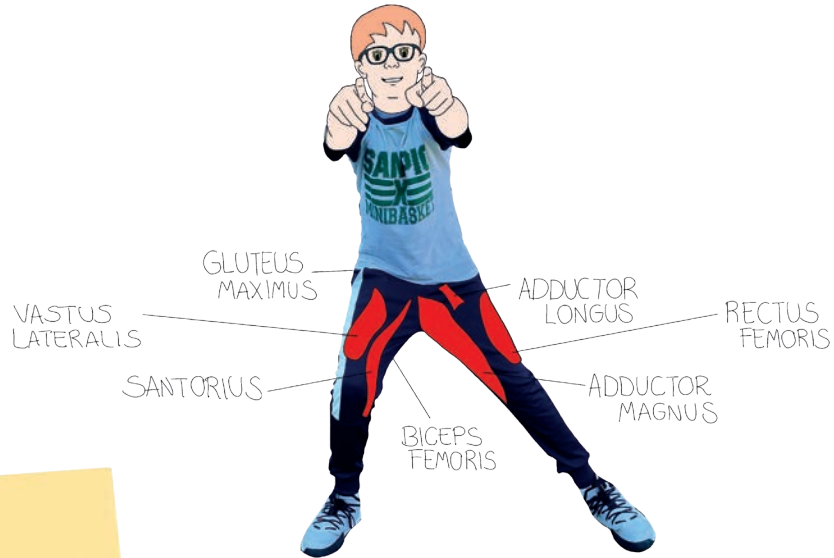
- using arms to maintain balance;
- keeping the opposite leg in contact with the floor and maintain tension on your quadriceps and hamstring.



LATERAL LUNGE

BEST FOR

Adductor longus.
Adductor magnus.
Biceps femoris.
Gluteus maximus.
Rectus femoris.
Santorius.
Vastus lateralis.



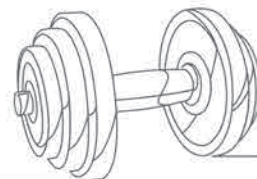
AVOID!

Extending your knees forward beyond your toes.
Leaning forward more than 45°.



ALTERNATIVE

Step a few centimeters out to the side.



STEP UP



STARTING POSITION

Place one foot on a step in front of you. Hold the dumbbells by your side.



ACTION

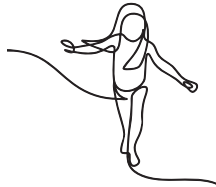
Keeping one leg straight, push using the leg on the step, extending your hips simultaneously to drive your body up the step. The dumbbells are held in both hands.

MOVEMENT PATH

Slightly forward and directly upwards.



Exhaling when stepping up.



Stabilise by:

- keeping your shoulders relaxed;
- keeping your head and torso upright.



STEP UP

BEST FOR

Gluteus maximus.
Hamstrings.
Soleus.
Vastus medialis.

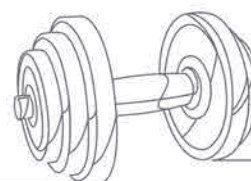
AVOID!

Fully extending your
other knee.
Moving your knee too
far forward or to the side.



ALTERNATIVE

Push using the leg on the floor and
step up while sitting on the bench.



CALF RAISE



STARTING POSITION

Standing with the front half of your foot on a step: the heel and arch of each foot will be behind the edge of the step. Hold a dumbbell in one hand. Hold onto a steady surface or the exercise professional for support.



ACTION

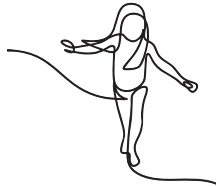
Push through the balls of your feet to lift your heels off the step. Rise onto your toes as high as possible, contracting the calf muscles at the top.

MOVEMENT PATH

Descent and ascent.



Exhaling when ascending.



Stabilise by:

- resting your other foot on the heel of the exercising leg;
- keep your spine in a neutral position.



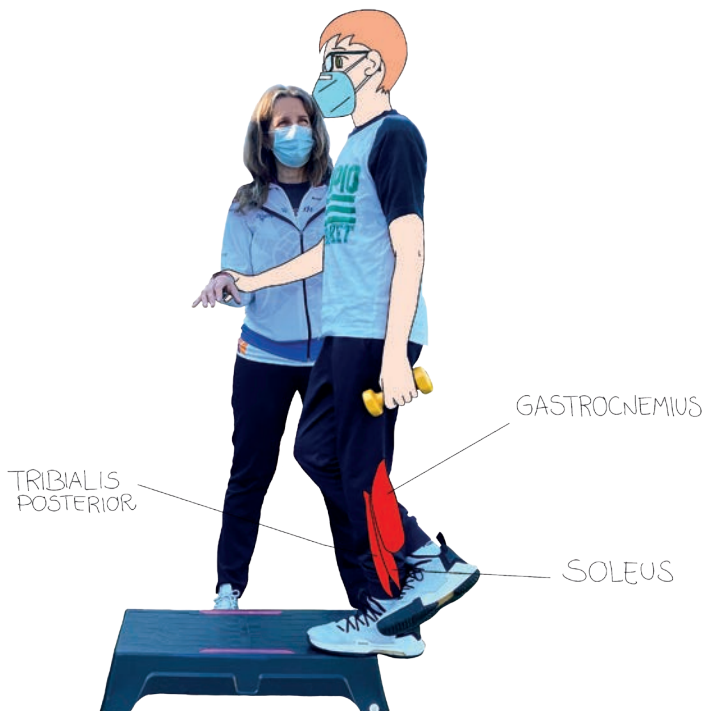
CALF RAISE

BEST FOR

Gastrocnemius.
Soleus.
Tibialis posterior.

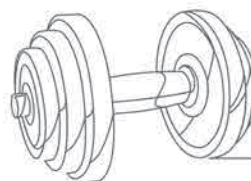
AVOID!

Rotating your torso.
Looking down.
Flexing your knee.
Holding your breath.



ALTERNATIVE

Place both hands on the wall
to balance yourself.



ELASTIC BAND ABDUCTION



STARTING POSITION

Standing with the elastic band around your lower legs. Hold the exercise professional's shoulder or a stable surface to help you balance.



MOVEMENT PATH

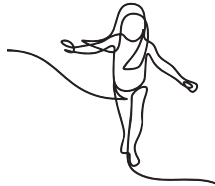
Lateral and ascending.

ACTION

Allow the leg touching the elastic band to rise slightly so that the foot attached to the cable does not bear your weight. Abduct your leg out to the side keeping it straight. Allow the weight and leg to slowly return to the starting position.



Exhaling while
extending your legs.



Stabilise by:
• maintaining a neutral spine position.



ELASTIC BAND ABDUCTION

BEST FOR

Gluteus maximus.
Gluteus medius.
Piriformis.
Superior gemellus.
Tensor fasciae latae.

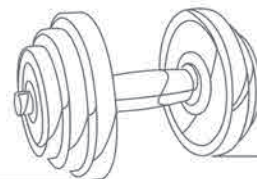
AVOID!

Excessive knee bending.
Rotation of your hip or shoulder.
Swinging or creating momentum in the band.



ALTERNATIVE

Try the same movement without a elastic band.



ADDUCTION



STARTING POSITION

Lying on your side, the leg that is in contact with the floor should be stretched out on the floor. The opposite leg should be crossed in front of the leg stretched out on the floor.



ACTION

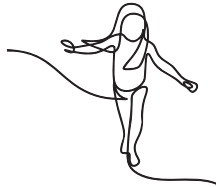
Lift up the leg stretched out on the floor.

MOVEMENT PATH

Move the outstretched leg upward.



Exhaling while the leg is raised.



Stabilise by:

- using the opposite leg by placing it on the floor/gym mat;
- putting both hands on the floor/gym mat;
- keeping the upper body straight and the spine in a neutral position.



ADDUCTION

BEST FOR

Adductor brevis.
Adductor longus.



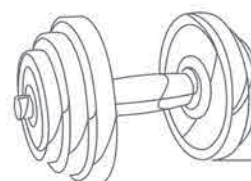
AVOID!

Bending your back.
Making rapid movements.



ALTERNATIVE

Try a smaller range
of movement.



CLAMSHELL



STARTING POSITION

Lying on your side with your knees bent so that your shoulders, hips and ankles are in a straight line. Hold a weight firmly against your thigh.



ACTION

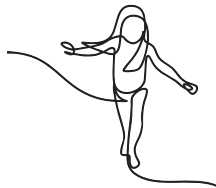
Raise the upper knee by rotating the hip towards the ceiling, contracting your gluteals. Return to the starting position by lowering the knee.

MOVEMENT PATH

Opening and closing.



Exhaling while opening the legs.



Stabilise by:

- keeping your core muscle contracted;
- keeping the ankle on the active leg locked in a fixed position;
- firmly controlling the hip joint on the active side.



CLAMSHELL

BEST FOR

Gluteus medius.
Gluteus minimus.
Obturator externus.
Piriformis.
Superior gemellus.

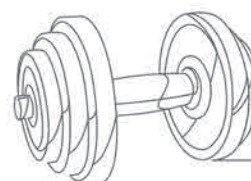


AVOID!

Spinal movement.
Pelvic movement.

ALTERNATIVE

Without any weight against
your thigh.



SINGLE LEG DEADLIFT



STARTING POSITION

Standing on your right leg and bend your left leg to a 45° angle. Keep your torso upright and squeeze your shoulder blades together.

Hold dumbbells in both hands.

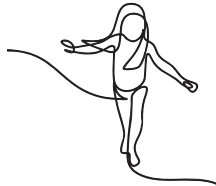


MOVEMENT PATH

Descends vertically.



Exhaling when going down.



Stabilise by:

- looking and focusing on a spot in front of you as you bend down, balancing on one leg;
- contracting your quadriceps on the eccentric movement and your hamstrings and gluteal muscles on the concentric movement.



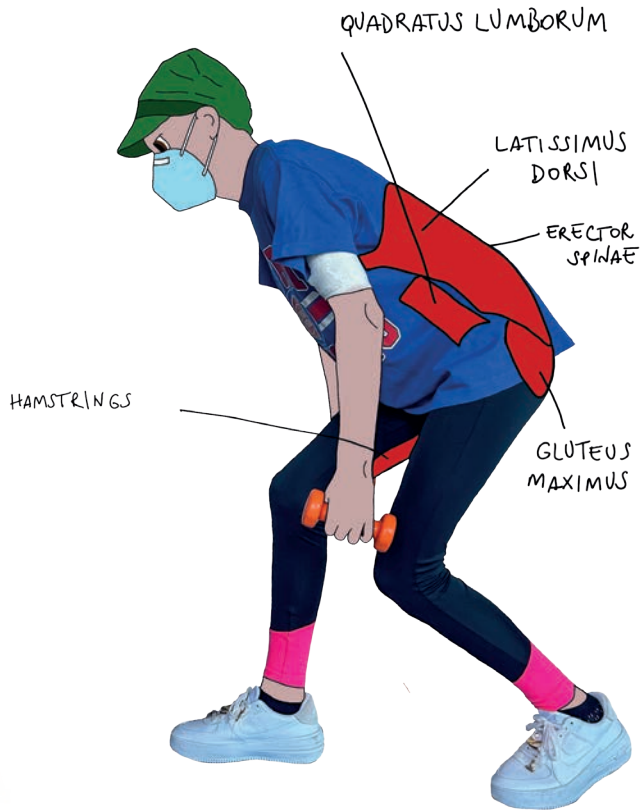
SINGLE LEG DEADLIFT

BEST FOR

Erector spinae.
Gluteus maximus.
Hamstrings.
Latissimus dorsi.
Quadratus lumborum.

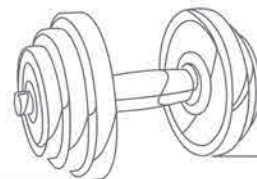
AVOID!

Rounding your back.
Pulling shoulder blades forward.



ALTERNATIVE

Only bend your front leg a little.



PLIÉ**STARTING POSITION**

Standing with a bar in hand, placed vertically and resting on the floor between your legs, keeping your head up, and hands resting on the bar. Slightly point your feet outwards.

ACTION

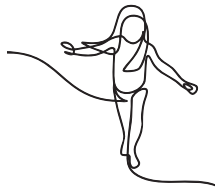
Keep the feet externally rotated, bring the hip slightly back, bend the knees and descend. Inhale allowing your knees, hips and feet to return to the starting position.

**MOVEMENT PATH**

Ascend and descend.



Exhaling while descending.



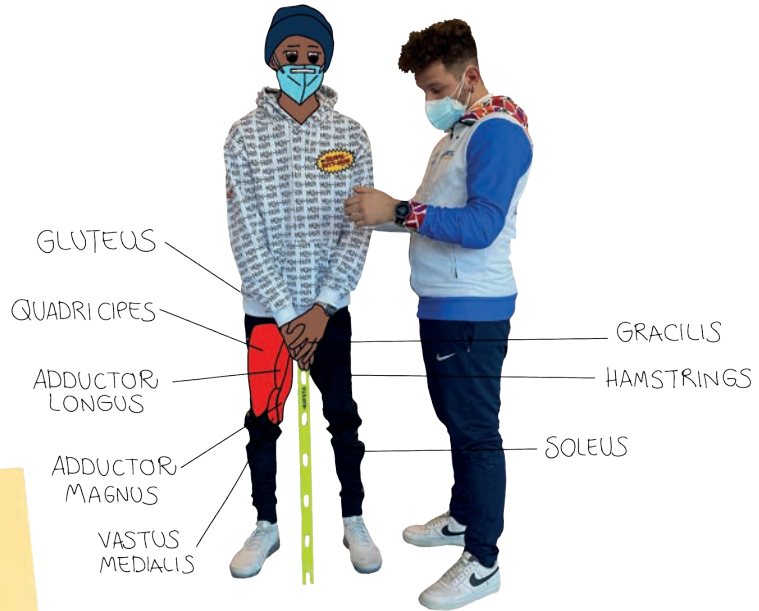
Stabilise by:
• resting the bar on the floor.



PLIÉ

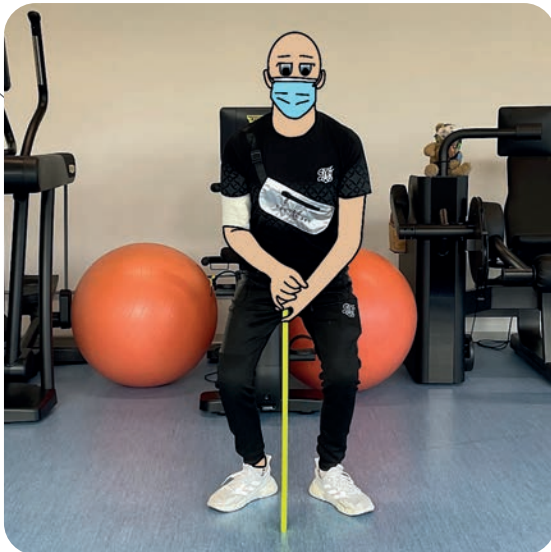
BEST FOR

- Adductor longus.
- Adductor magnus.
- Gluteus.
- Gracilis.
- Hamstrings.
- Quadriceps.
- Soleus.
- Vastus medialis.



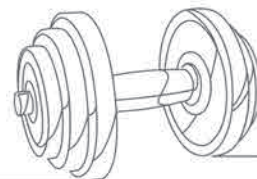
AVOID!

- Leaning forward with the upper body.
- Tilting the bar.
- Going too low.



ALTERNATIVE

Reduce flexion of the knees.



LEG EXTENSION



STARTING POSITION

In a seated position, ensure that the backs of your knees rest directly against the edge of the seat. Your knee joints should be directly adjacent and bent at least 90° to the machine's pivot arm. The resistance pad should lie just above ankle height. Grasp the handles firmly, with your torso upright and your hips pulled down securely into the seat.

ACTION

Extending your knees until they are completely extended. Allow your lower legs to drop while inhaling to return to the starting position.

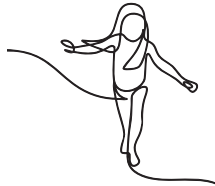


MOVEMENT PATH

Ascent and descent.



Exhaling when
extending legs.



Stabilise by:

- keeping your hips firmly down into the seat;
- maintaining an upright torso right against the seat.



LEG EXTENSION

BEST FOR

Quadriceps.

QUADRICEPS



AVOID!

Allowing any space between the back of your knees and the edge of the seat.

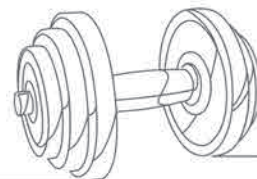
Elevating your shoulders.

Allowing your hips or gluteal muscles to go off the seat.



ALTERNATIVE

Extend your knees without weight.



LEG CURL



STARTING POSITION

Lying flat on the floor face down with your hands under your forehead.

Place a fitball on your back, at the base of the thighs.



ACTION

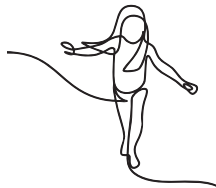
Bring the heel of one foot against the fitball, alternating your feet. During the descent, try to avoid letting your feet touch the floor.

MOVEMENT PATH

Your lower leg swings up in an arc towards your hips.



Exhaling while
kicking the fitball.



Stabilise by:

- keeping your hips in contact with the floor;
- resting hands on your forehead.



LEG CURL

BEST FOR

Hamstrings.

AVOID!

Making extremely fast movements.

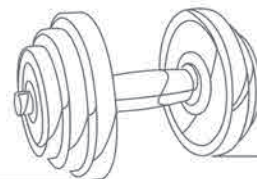
Turning your head.

Moving your torso.



ALTERNATIVE

During the starting position, move the ball towards your feet.



WALL SIT

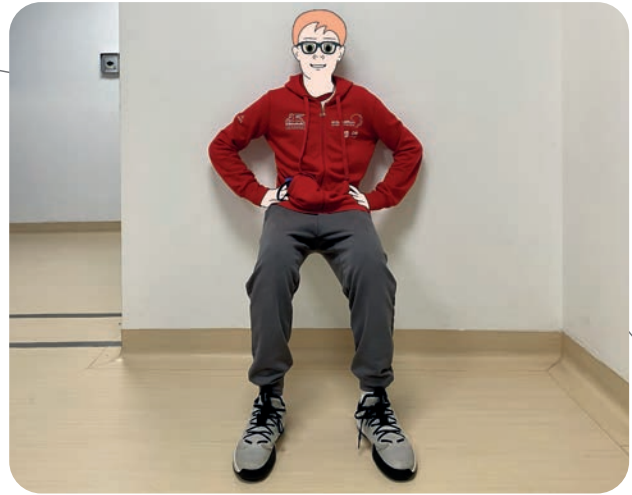


STARTING POSITION

Place your back against a wall in an upright position. Keep your spine in a neutral position, your hands on your hips and your head straight.

ACTION

Move your feet forward and slowly slide your torso down the wall until your hips, knees and ankles are all at 90°. Maintain the position until the hold is no longer comfortable.

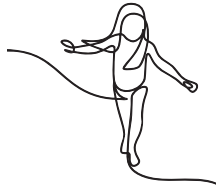


MOVEMENT PATH

None.



Exaling during the exercise.



Stabilise by:

- keeping your shoulders, hips and upper back pressed firmly against the wall;
- keeping your feet flat and the pressure evenly distributed;
- keeping your abdomen tight;
- keeping your knees in straight alignment with your feet.



WALL SIT

BEST FOR

Biceps femoris.
Gluteus maximus.
Quadriceps.

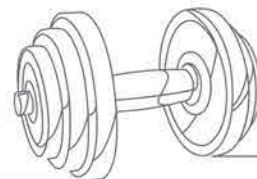
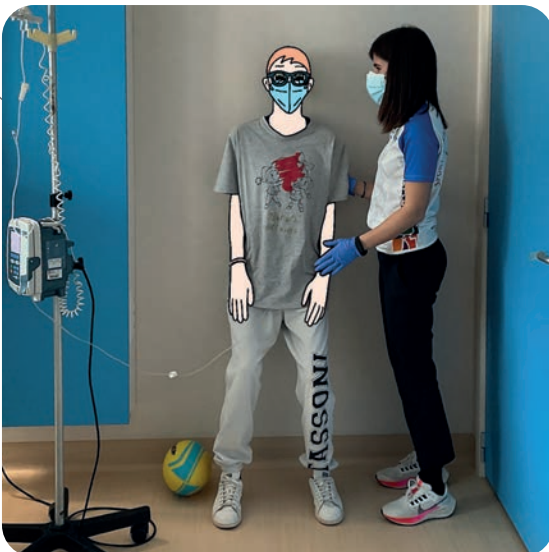


AVOID!

Any body movement.
Holding the position too long that you are unable to stand back up.

ALTERNATIVE

Bend the knees at 45°.



THE SKATER



STARTING POSITION

Bend your knees so that your torso is at a 45°. Place the elastic band on the ankle and lift the leg involved slightly off the floor.



ACTION

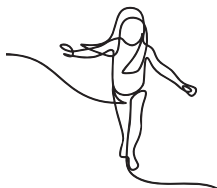
Your knee extends as the active hip both moves and rotates externally, until your hip and knee are fully extended. Return to the starting position.

MOVEMENT PATH

Backward and forward.



Exhaling while the leg is pushed outward.



Stabilise by:

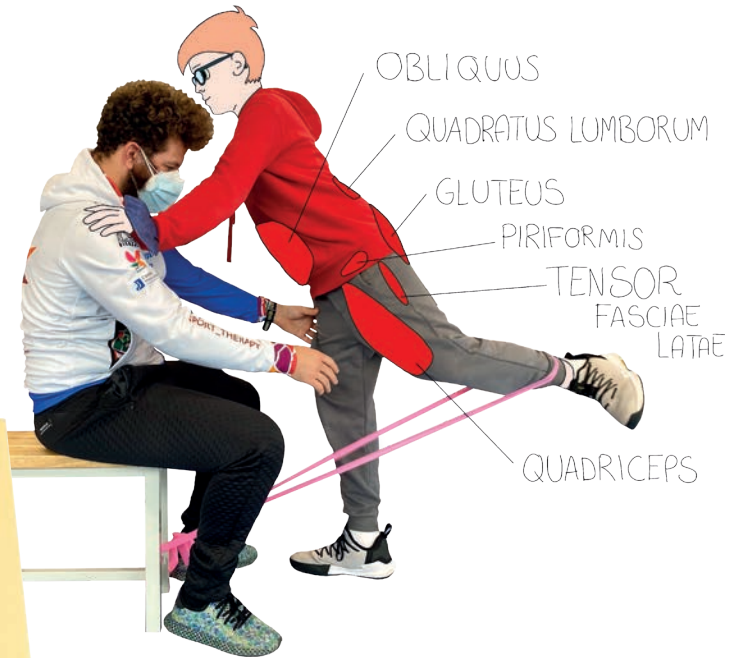
- keeping your spine in a neutral position;
- keeping the standing leg in a fixed position and your weight evenly distributed.



THE SKATER

BEST FOR

Gluteus.
Obliquus.
Piriformis.
Quadratus lumborum.
Quadriceps.
Tensor fasciae latae.



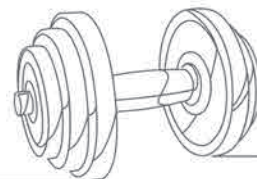
AVOID!

Rotating your upper body.
Excessively arching your back.



ALTERNATIVE

Do not use any resistance.



PLOUGH



STARTING POSITION

Put your hands on the floor, with your legs extended so that your legs rest on the fitball.



ACTION

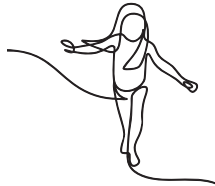
Pull your knees up towards your chest while flexing your feet, balancing your toes on the fitball, driving your hips towards the ceiling and retracting your abdomen. Slowly return to the starting position.

MOVEMENT PATH

Backward and forward.



Exhaling when your legs go forward.



Stabilise by:

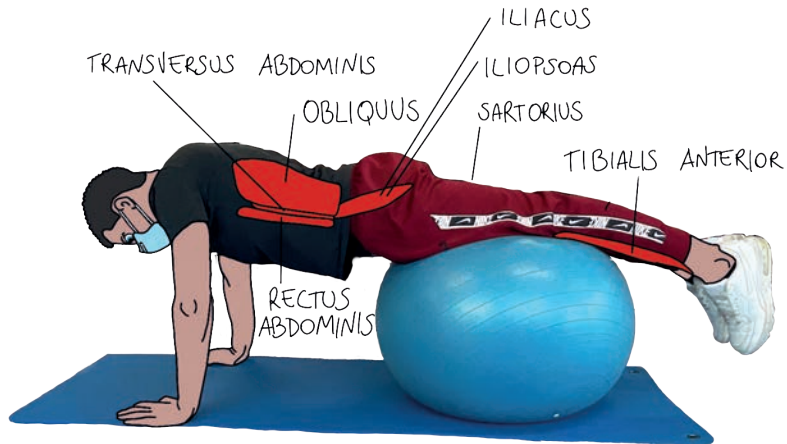
- keeping your chest high and tight;
- elongating your neck and extending your elbows throughout the movement.



PLOUGH

BEST FOR

Iliacus.
Iliopsoas.
Obliquus.
Rectus abdominis.
Sartorius.
Tibialis anterior.
Transversus abdominis.



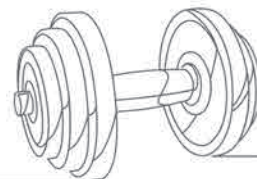
AVOID!

Dropping your knees towards the floor.
Bending your elbows.
Allowing your shoulder to either extend towards your ears or curl forward.



ALTERNATIVE

Keep your pelvis on the fitball.



BACK EXTENSION ON FITBALL



STARTING POSITION

Lying on your stomach on a fitball with your hands behind your head and legs apart. Keep your shoulder down, chin up and elbows pointing straight out in line with your shoulder.

ACTION

From the starting position, raise your chest from the fitball and extend your entire torso from your hips. Inhale as you return to the starting position.



MOVEMENT PATH

Your entire upper body moves from a vertical position in downwards arc and returns.



Exhaling while you move to extend your back.



Stabilise by:

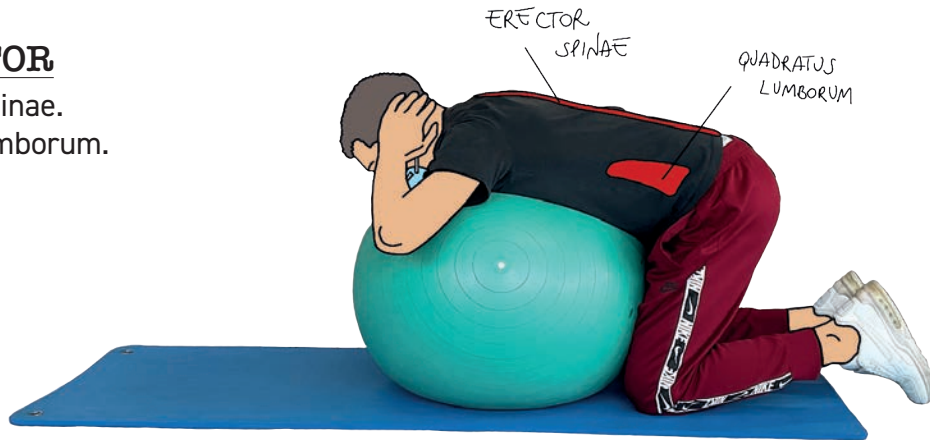
- contracting all of your leg muscles;
- keeping your chest up, your shoulders down and your head in a neutral position;
- keeping your abdomen pulled up and in.



BACK EXTENSION ON FITBALL

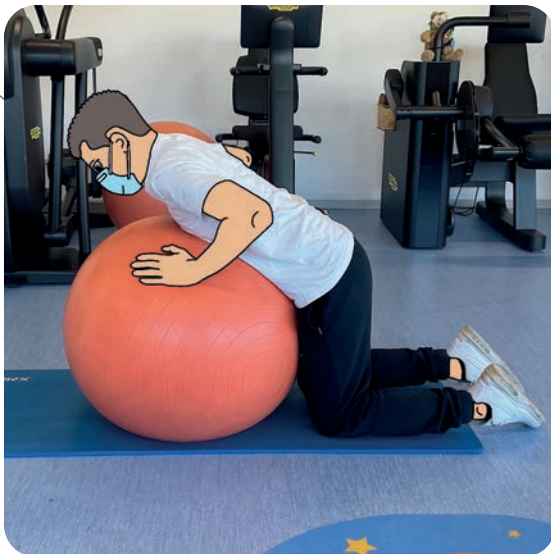
BEST FOR

Erector spinae.
Quadratus lumborum.



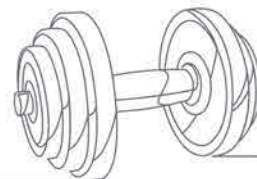
AVOID!

Lifting your shoulders towards your ears.
Looking to the side.
Excessively arching your back.

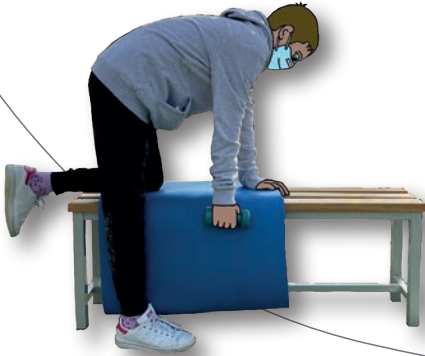


ALTERNATIVE

Keep your knees on the floor.



ONE ARM DUMBBELL ROW



STARTING POSITION

Place one knee and one hand on a bench. Place the opposite foot on the floor, bending the knee slightly.

Hold a dumbbell in your free hand and let your arm hang perpendicular to the floor.



ACTION

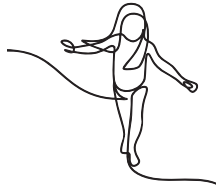
Push your elbow straight up towards the ceiling by retracting your shoulder blade and flexing your elbow joint. Inhale and lower your elbow.

MOVEMENT PATH

Upwards and downwards in an arc, past the torso until your hand is adjacent to the ribcage.



Exhaling when you bring your dumbbell near to your chest.



Stabilise by:

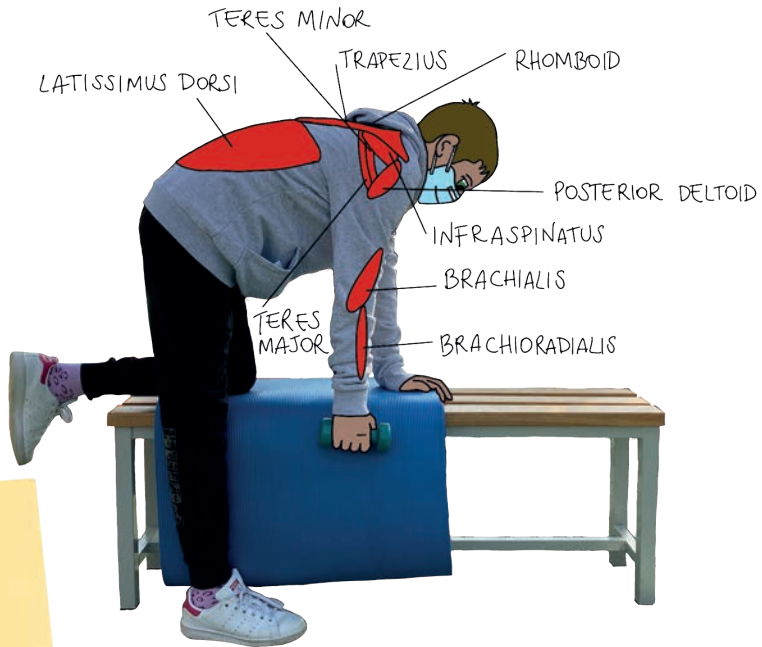
- keeping your hips and shoulders even;
- keeping your hand and knee firmly on the bench, and foot well planted on the floor;
- keeping your chest high and maintaining a neutral spine position.



ONE ARM DUMBBELL ROW

BEST FOR

Brachialis.
Brachioradialis.
Infraspinatus.
Latissimus dorsi.
Posterior deltoid.
Rhomboid.
Teres major.
Teres minor.
Trapezius.



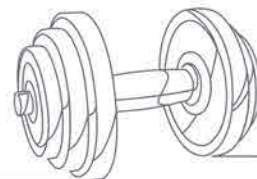
AVOID!

Any spinal movement.
Any hip rotation.



ALTERNATIVE

Try the exercise
in a sitting position.



ROMANIAN DEADLIFT



STARTING POSITION

Stand with feet hip-width apart, toes pointing forward, and weight evenly distributed.

Hold a bar in front of your thighs with an overhand grip, hands just outside your legs. Look forward with your arms fully extended.

ACTION

Push through your heels and engage your glutes to return to a standing position. Keep the bar close to your legs and maintain a neutral spine to return to the starting position.

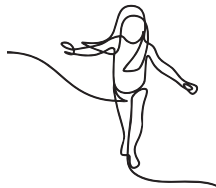


MOVEMENT PATH

Your centre of mass moves vertically upwards.



Exhaling when you get up.



Stabilise by:

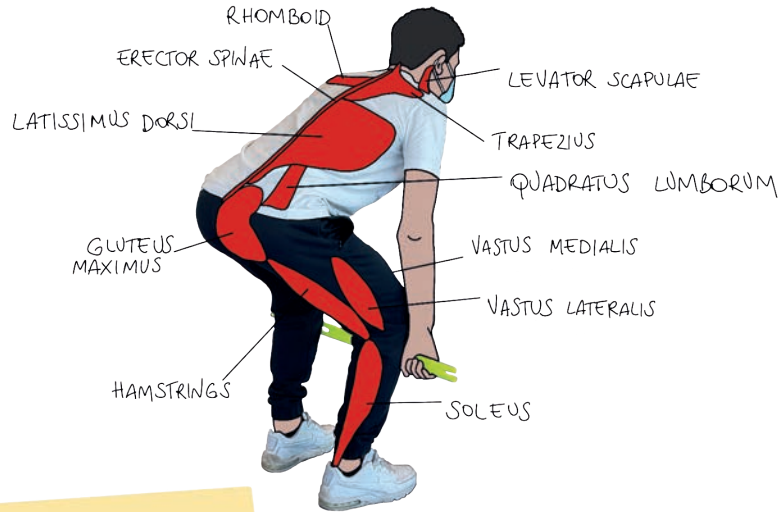
- keeping your chest high and your head up;
- pushing your shoulders down and back, keeping your back flat;
- keeping your knees directly over your feet.



ROMANIAN DEADLIFT

BEST FOR

- Erector spinae.
- Gluteus maximus.
- Hamstrings.
- Latissimus dorsi.
- Levator scapulae.
- Quadratus lumborum.
- Rhomboid.
- Soleus.
- Trapezius.
- Vastus lateralis.
- Vastus medialis.



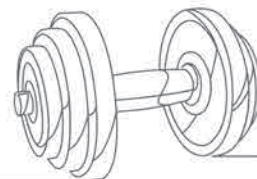
AVOID!

- Straightening your knees prior to extending your back and hips.
- Rounding your back.
- Elevating your shoulder to lower your head.
- Allowing your knees to migrate either inward or outward.

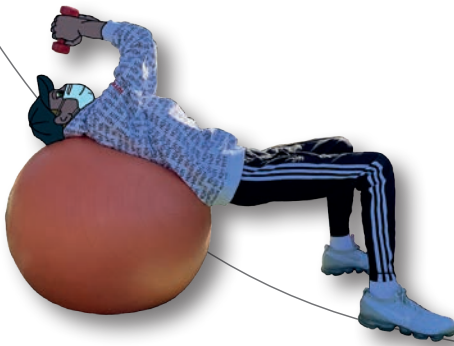


ALTERNATIVE

Try using a bench for added support.



PULL OVER ON FITBALL



STARTING POSITION

Lying on your back on a fitball, looking up. Start with your elbows flexed and the dumbbell in front of your face. Keep your feet flat on the floor with your legs apart.



ACTION

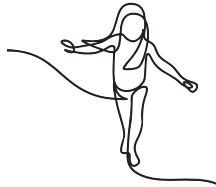
Keep your arms flexed, lower the dumbbell towards the floor behind and above your head.

MOVEMENT PATH

The dumbbell travels from in front of your face, overhead and back.



Exhaling when the arms return to the starting position.



Stabilise by:

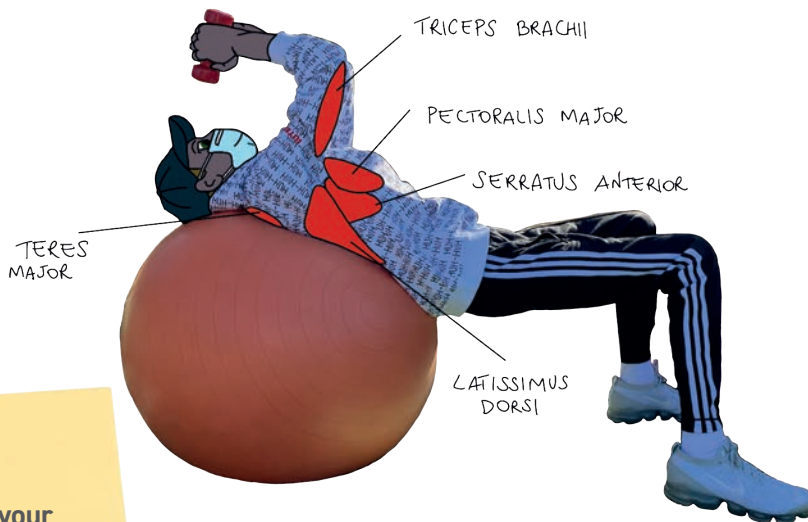
- contracting your chest and elevating your ribcage;
- keeping your abdomen pulled up and in;
- contracting your gluteal muscles;
- keeping your feet flat;
- contracting your arms so that the elbow angle remains fixed throughout the movement.



PULL OVER ON FITBALL

BEST FOR

Latissimus dorsi.
Pectoralis major.
Serratus anterior.
Teres major.
Triceps brachii.



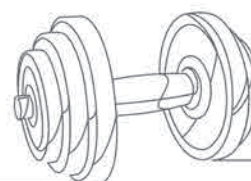
AVOID!

Excessive arching of your spine.
Bending your elbows as the dumbbell is lowered or extending your elbows as the weight is pulled up.
Allowing your shoulder to shrug during the movement.

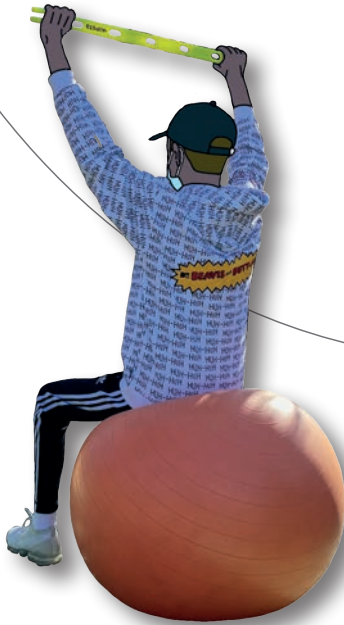


ALTERNATIVE

Try the exercise on a gym mat.



LAT PULLDOWN ON FITBALL



STARTING POSITION

Sitting on a fitball and holding the bar slightly wider than your shoulder width. Extend your arms upwards until your elbows are fully extended.

ACTION

Slightly lean back as you pull the bar down just in front of your face till it reaches your collarbone. Then slowly push the bar up to return to the starting position.

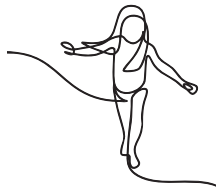


MOVEMENT PATH

The arms move in a vertical line.



Exhaling when the arms go towards the chest.



Stabilise by:

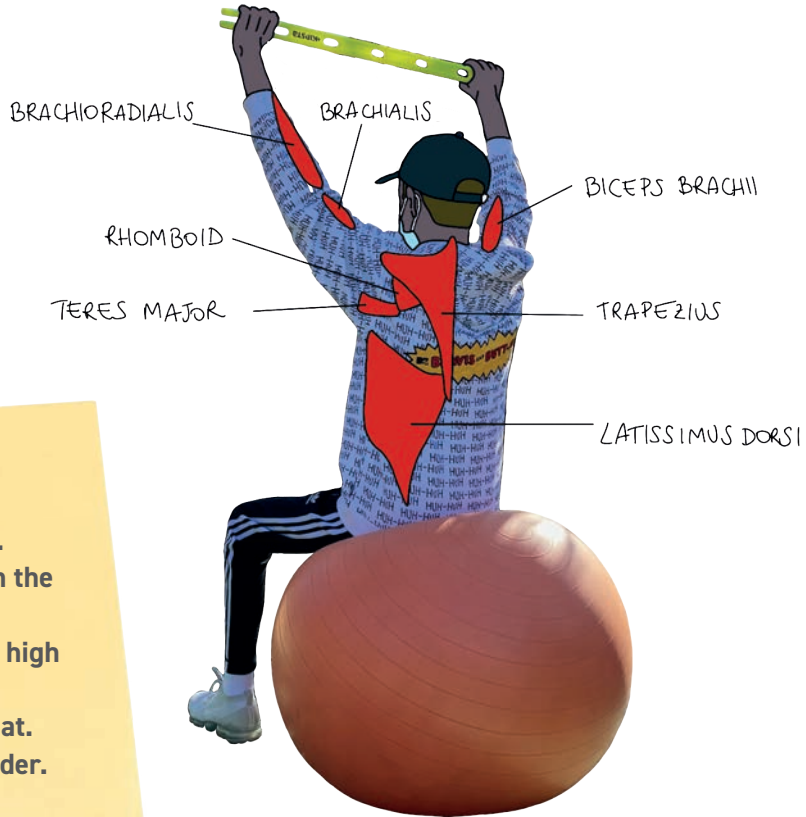
- using your abdominal and back muscles to maintain an upright posture.



LAT PULLDOWN ON FITBALL

BEST FOR

- Biceps brachii.
- Brachialis.
- Brachioradialis.
- Latissimus dorsi.
- Rhomboid.
- Teres major.
- Trapezius.



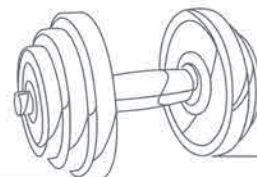
AVOID!

- Leaning back too far.
- A swinging motion in the torso.
- Raising your chin up high to clear the bar.
- Rising out of your seat.
- Elevating your shoulder.



ALTERNATIVE

Pull your arms without extending your elbows.



STRAIGHT ARM PULLDOWN



STARTING POSITION

Standing with your legs shoulder-width apart. Hold the bar in an overhand grip with your palms facing down and your arms extended. Your head should be in a neutral position with your eyes looking straight ahead.

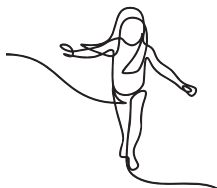
ACTION

Pull the bar straight down without flexing your elbows so that the palms face your thighs at the bottom of the movement. Return the bar slowly to the starting position.



MOVEMENT PATH

Your arms should extend down in a vertical line.



Exhaling when you pull the bar downwards.

Stabilise by:

- pulling your abdomen up and in;
- retracting your shoulder blades.



STRAIGHT ARM PULLDOWN

BEST FOR

Deltoid.
Latissimus dorsi.
Rhomboid.
Teres major.
Triceps brachii.



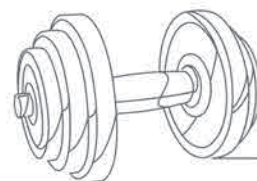
AVOID!

Elevating your shoulder towards your ears.
Arching your back.
Bending your arms.



ALTERNATIVE

Try the exercise sitting on a chair.



ELASTIC BAND REAR RAISE



STARTING POSITION

Standing with your legs shoulder width apart and your spine in a neutral position.

Hold the elastic band with your arms crossed in front of you.

ACTION

Pull your arms back and pull your shoulder blades together. Once fully extended slowly return to the starting position.

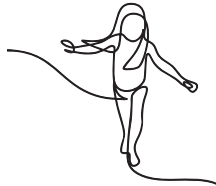


MOVEMENT PATH

Your torso, hips and legs remain stationary while your arms move in a horizontal, 90° arc from the front of your body out to both sides.



Exhaling when the arms go towards the chest.



Stabilise by:

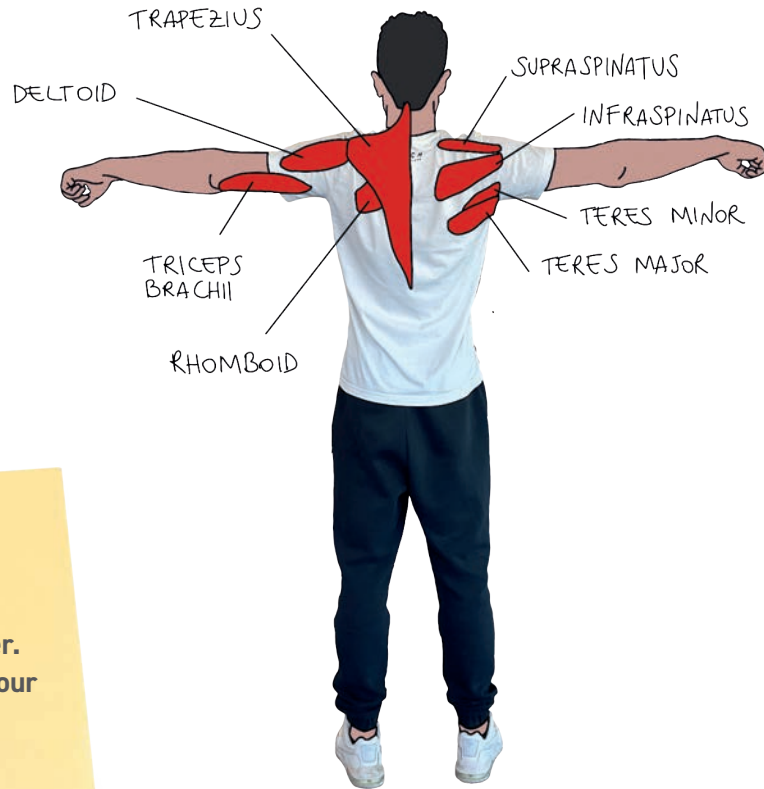
- keeping your chest high and your abdomen pulled tight;
- keeping your shoulder down and back throughout the movement;
- keeping your shoulder, hips, knees and feet in alignment.



ELASTIC BAND REAR RAISE

BEST FOR

Infraspinatus.
Posterior deltoid.
Rhomboid.
Supraspinatus.
Teres major.
Teres minor.
Trapezius.
Triceps brachii.



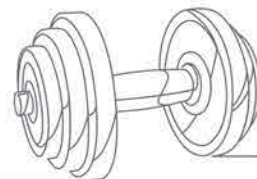
AVOID!

Bending your elbows.
Shrugging your shoulder.
Changing the plane of your arm movement.



ALTERNATIVE

Try the exercise without using an elastic band.



PUSH UPS ON FITBALL



STARTING POSITION

Lying down with your torso on a fitball, face down. Place your hands slightly wider than your shoulders. Place both feet straight out touching the floor with your toes.



ACTION

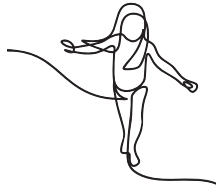
Flex your elbows as far as possible; then extend your arms, pushing up to lift your torso. Return to the starting position.

MOVEMENT PATH

The plane of your body rotates upwards in an arc.



Exhaling when you push into the floor.



Stabilise by:

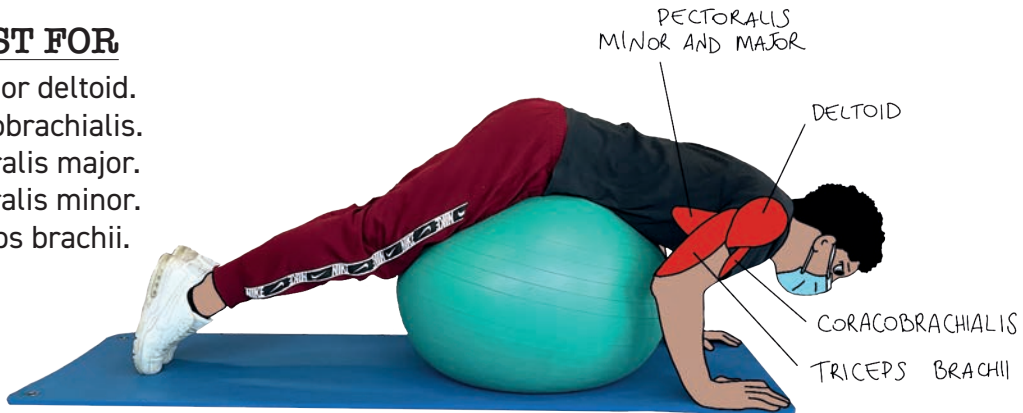
- keeping your knees together;
- fixing your ankles in a stable position;
- keeping your hips, abdominal muscles and lower back tight and straight.



PUSH UPS ON FITBALL

BEST FOR

Anterior deltoid.
Coracobrachialis.
Pectoralis major.
Pectoralis minor.
Triceps brachii.



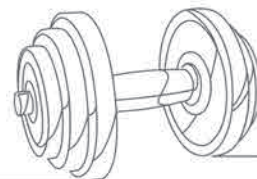
AVOID!

Segmental elevation, i.e. your shoulders rising before your hips or vice versa.
Elevating your shoulder towards your ears.
Moving your head forwards.



ALTERNATIVE

Carry out the exercise by starting your position with a lower degree of elbows flexion.



INCLINE DUMBBELL FLY ON FITBALL



STARTING POSITION

Lying on a fitball with your upper back resting on it and your arms stretched out in front of your face.

ACTION

Push your hands apart without bending your elbows too much, and without going below your shoulder line. Return to the starting position.

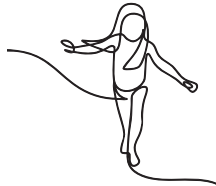


MOVEMENT PATH

Dumbbells draw an arc that begins vertically and drops to horizontally.



Exhaling when you return to the starting position.



Stabilise by:

- keeping your grip strong and your upper arms (both biceps and triceps) contracted;
- ensuring that your shoulder blades remain in contact with the fitball throughout the movement;
- keeping your feet flat and your neck extended.



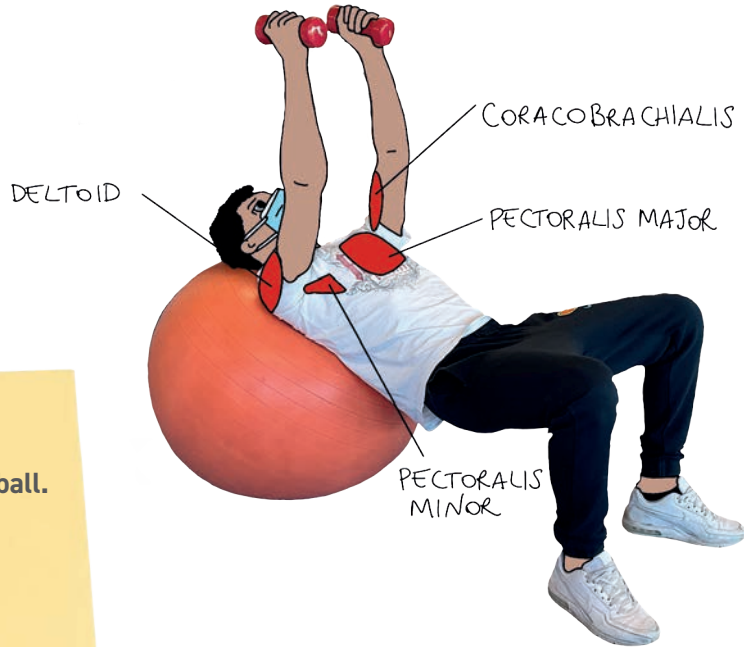
INCLINE DUMBBELL FLY ON FITBALL

BEST FOR

Anterior deltoid.
Coracobrachialis.
Pectoralis major.
Pectoralis minor.

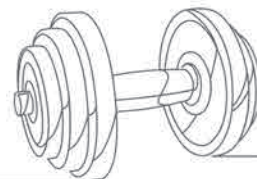
AVOID!

Lifting your head off the fitball.
Elevating your shoulders
towards your ears.
Bending your elbows
excessively as the weight
descends or flattening them as
the weight ascends.



ALTERNATIVE

Try the exercise lying
on a bench.



BENCH PRESS



STARTING POSITION

Lying on an exercise mat, hold two dumbbells keeping them perpendicular to the ground at elbow height. Legs should be motionless resting on the ground.



ACTION

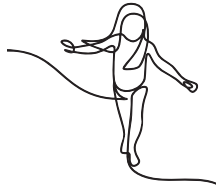
Extend your arms upward to push up to the ceiling. When you almost reach the full extension, perform a forearm pronation. Return to the starting position.

MOVEMENT PATH

Upwards and downwards.



Exhaling when you extend your arms.



Stabilise by:

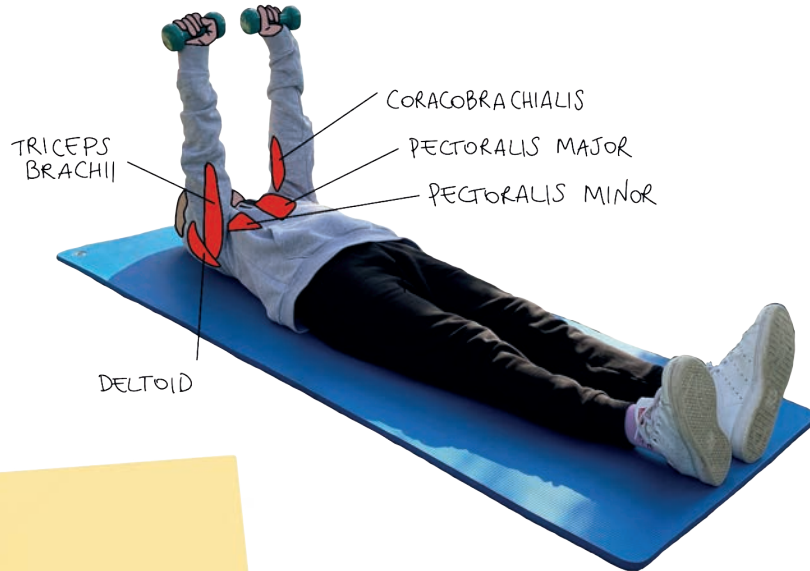
- keeping your spine in a neutral position and your forearms perpendicular to the dumbbells throughout the movement;
- ensuring that your shoulders, head and hips remain in contact with the bench/floor at all times.



BENCH PRESS

BEST FOR

Anterior deltoid.
Coracobrachialis.
Pectoralis major.
Pectoralis minor.
Triceps brachii.



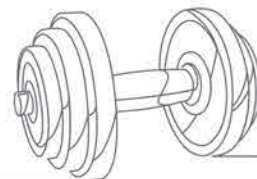
AVOID!

Lowering the weight quickly.
Bouncing the dumbbells off your chest.
Changing your spinal position during the movement.
Raising your feet up from the floor.



ALTERNATIVE

Try the exercise with two small balls.



SHOULDER EXTERNAL ROTATION



STARTING POSITION

Lie on your side supporting your head with one arm and keeping your free arm bent.

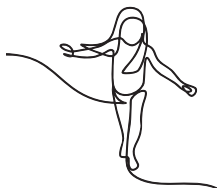


ACTION

Lift your hand and forearm by holding it up towards the ceiling, until it is perpendicular. Return to the starting position.

MOVEMENT PATH

Your hand moves directly upwards 180°, pivot using elbow as fulcrum.



Exhaling when you rotate the hand.

Stabilise by:

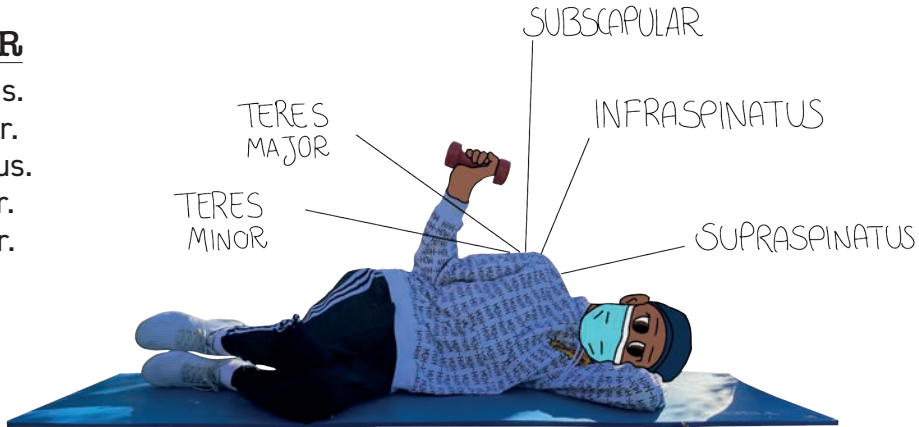
- keeping your shoulder in one position and your upper arm held tightly to your torso;
- keeping your spine in a neutral position.



SHOULDER EXTERNAL ROTATION

BEST FOR

Infraspinatus.
Subscapular.
Supraspinatus.
Teres major.
Teres minor.



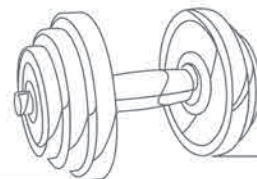
AVOID!

Raising your upper arm.
Moving your upper arm
from the torso.



ALTERNATIVE

Try the exercise
with a small ball.



UPRIGHT ROWS



STARTING POSITION

Stand with your feet apart and arms straight holding the dumbbells so that your palms are positioned towards your body while your knuckles point away.



ACTION

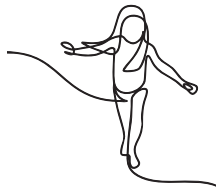
Pull your hands up until your elbows and forearms are virtually parallel to the ground. The dumbbells should end in front of your collar bones. Return the starting position.

MOVEMENT PATH

Pull your arms directly up.



Exhaling when you are bending the elbows and taking the dumbbells towards your collar bones.



Stabilise by:

- keeping your chest upright;
- maintaining the spine in a neutral position.



UPRIGHT ROWS

BEST FOR

Biceps brachii.
Brachioradialis.
Deltoid.
Trapezius.



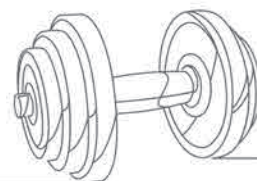
AVOID!

Excessive shrugging.
Rolling your shoulders.
Extending the elbows
away from your body in
front or from the lateral
plane of your body.



ALTERNATIVE

Pull your arms up
in front of your stomach.



DUMBBELL SHRUG



ACTION

Raise your shoulders towards your ears, keeping your head in a neutral position. Return to the starting position.

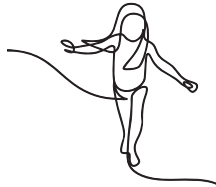


STARTING POSITION

Stand upright, holding the dumbbells by your side.

MOVEMENT PATH

Your shoulders move up and down.



Exhaling while you contract and elevate your shoulders.

Stabilise by:

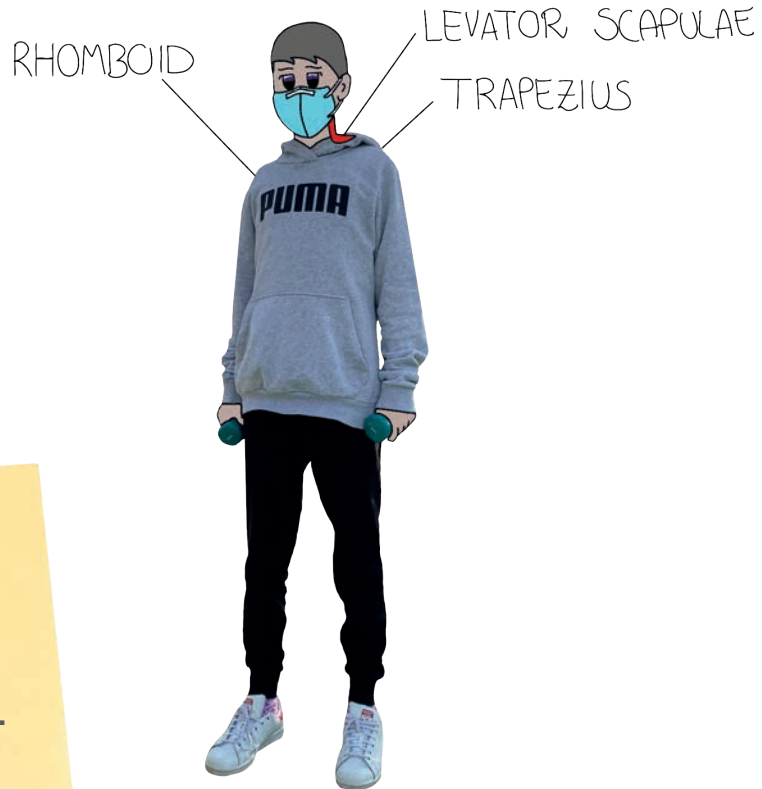
- keeping your head up;
- keeping your chest high;
- keeping the spine in a neutral position;
- bending your knees.



DUMBBELL SHRUG

BEST FOR

Levator scapulae.
Rhomboid.
Trapezius.



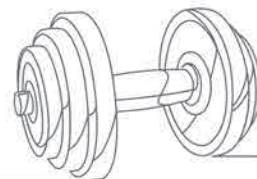
AVOID!

Tilting your head in any direction.
Bending your elbows.
Jutting your chin forward.



ALTERNATIVE

Try the exercise without dumbbells.



OVERHEAD PRESS



STARTING POSITION

Seated on a fitball, hands parallel with your collarbone and slightly wider than shoulder-width, elbows pointing down towards the floor.

ACTION

Push the palms of the hands directly upwards, bringing the dumbbells together. Return to the starting position.

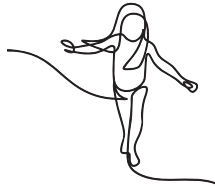


MOVEMENT PATH

Your hands should finish directly above your shoulders.



Exhaling when
you push up.



Stabilise by:

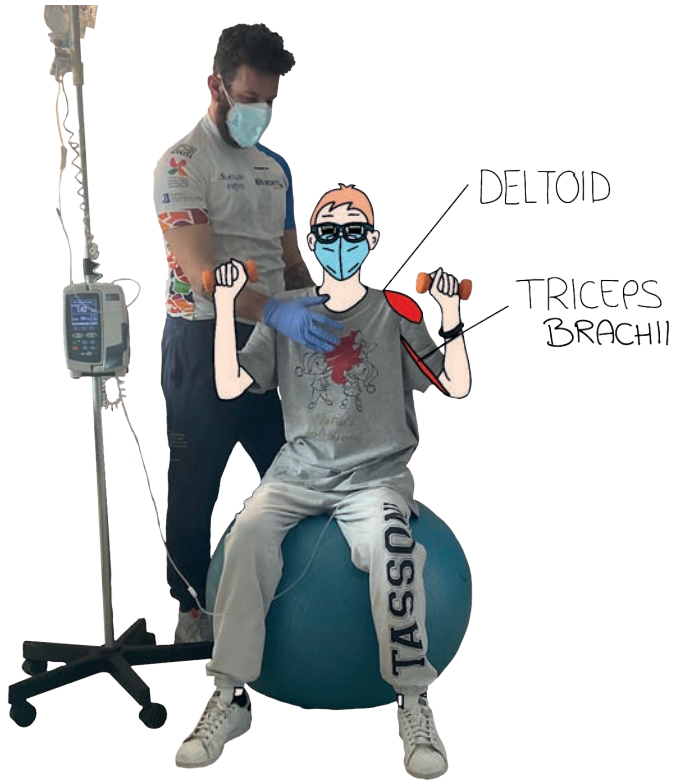
- keep your core strong;
- maintaining a neutral position of the spine;
- keeping your shoulder relaxed.



OVERHEAD PRESS

BEST FOR

Deltoid.
Triceps brachii.



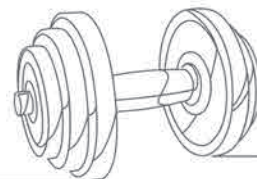
AVOID!

Extending your chin forwards.
Elevating shoulders.
Rounding your back.



ALTERNATIVE

Try the exercise without fully extending your elbows.



FRONT RAISE



STARTING POSITION

Stand upright with your arms beside you, with your palms facing your thighs.

ACTION

Raise your hands forward to a horizontal position with your thumbs facing up.
Return to the starting position.

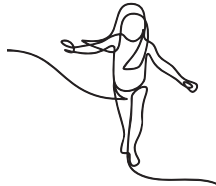


MOVEMENT PATH

Your arms should be raised in a frontal plane.



Exhaling while you elevate your arms.



Stabilise by:

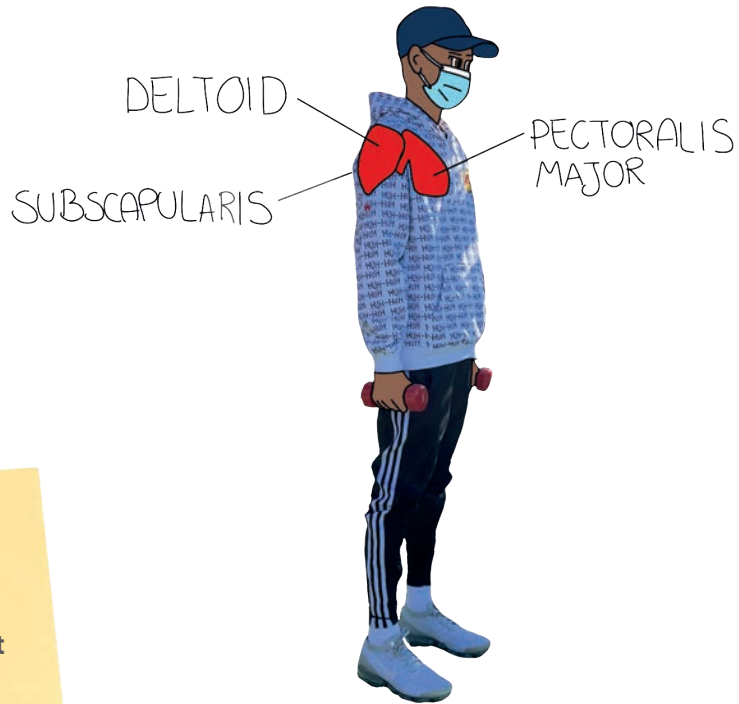
- keeping chest up and retracting shoulders;
- pulling your abdominal muscles in.



FRONT RAISE

BEST FOR

Deltoid.
Pectoralis major.
Subscapularis.



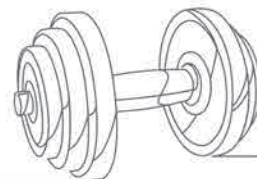
AVOID!

Shrugging.
Lifting the dumbbells past
shoulder height.



ALTERNATIVE

Stop the movement at 45°.



EMPTY CANS



STARTING POSITION

Stand with your feet shoulder width apart, holding the dumbbells with your thumb open and pointing towards your thighs. Chest high and shoulders relaxed with your arms straight.



ACTION

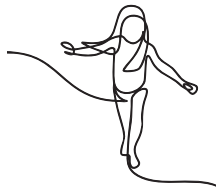
Lift your hands up and away from your body, pointing your thumbs towards the ground and keeping your wrists at a 45° towards your midline. Return to the starting position.

MOVEMENT PATH

45° raise; lift your hands until your arms are parallel to the ground.



Exhaling when you are elevating your arms.



Stabilise by:

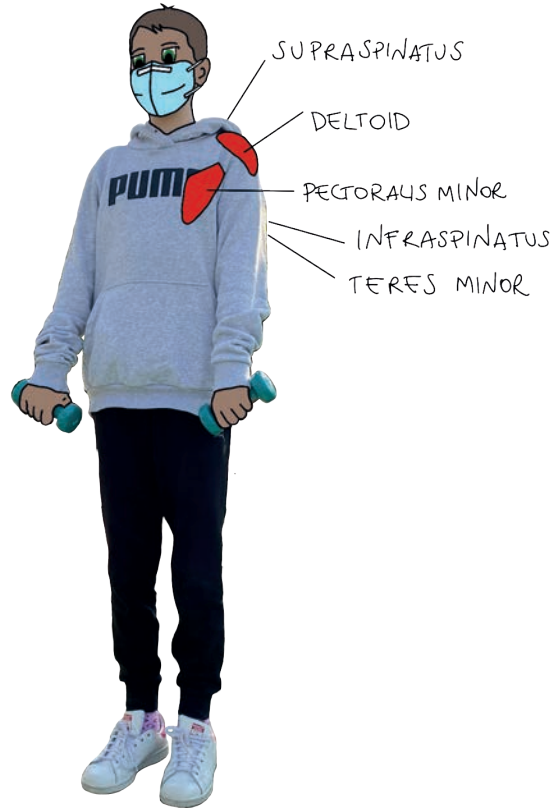
- keeping your chest and shoulders retracted and tight throughout the movement;
- pulling your abdominal muscles tight.



EMPTY CANS

BEST FOR

Deltoid.
Infraspinatus.
Pectoralis minor.
Supraspinatus.
Teres minor.

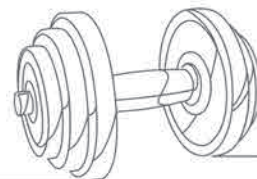


AVOID!

Shrugging.
Leaning forward.

ALTERNATIVE

Flex your shoulders until 45°.



LATERAL RAISE



STARTING POSITION

Sitting on a bench, with your hands by your sides.



ACTION

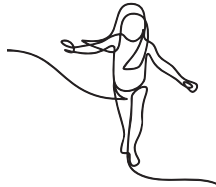
Lift your hands up by your sides until they reach a horizontal position. The palms should face the ground. Return to the starting position.

MOVEMENT PATH

Raise your arms laterally.



Exhaling while lifting.



Stabilise by:

- keeping your spine in neutral position.



LATERAL RAISE

BEST FOR

Deltoid.
Trapezius.

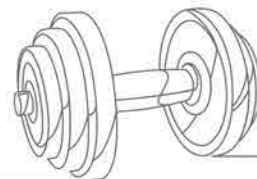


AVOID!

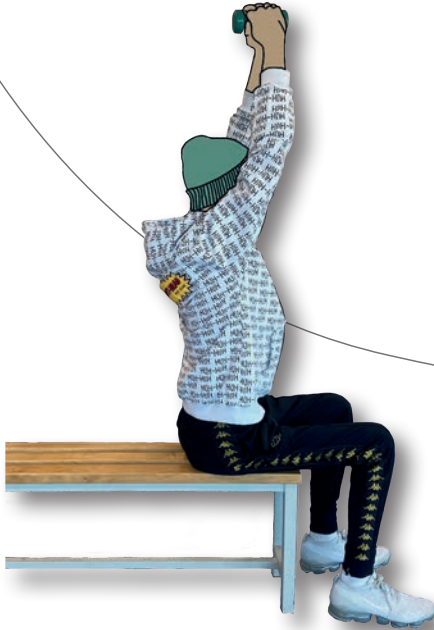
Shrugging.
Flexing or extending elbows
as your arms are raised.
Rotating hands in either
direction.
Extending your head
or chin forwards.

ALTERNATIVE

Stop the movement at 45°.



TRICEPS EXTENSION



STARTING POSITION

Sitting on a bench, extend your arms above over your head. Your hands should be shoulder-width apart with your palms facing the ceiling as you hold the dumbbell.



ACTION

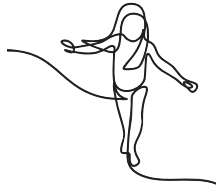
Lower the dumbbell behind your head by bending your elbows. Slowly extend your elbows to return to the starting position.

MOVEMENT PATH

Your elbows should extend in a vertical line.



Exhaling when pushing dumbbell in the beginning.



Stabilise by:

- keeping arms parallel;
- maintaining a neutral position for the spine and keeping the neck extended.



TRICEPS EXTENSION

BEST FOR

Anconeus.
Triceps brachii.



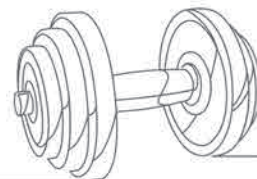
AVOID!

Excessive arching in the back and raising your shoulders towards the ceiling.



ALTERNATIVE

Bend your elbows at 90°.



BENCH DIP



STARTING POSITION

Sitting on a bench, with your torso perpendicular to the bench. Place your hands on the bench each side of your body. Position your feet in front of you so there is room to dip down in front of the bench.



ACTION

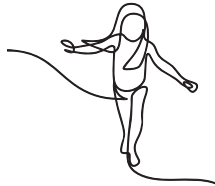
Lower yourself towards the floor by bending your knees and elbows. Once at the bottom position, extend your elbows while keeping your head straight ahead to return to the starting position.

MOVEMENT PATH

Your spine should descend in a straight line, parallel to the bench.



Exhaling while pushing on the bench to return to the starting position.



Stabilise by:

- pulling your abdomen in;
- keeping your feet firmly on the floor;
- placing the palms of your hands firmly on the bench.



BENCH DIP

BEST FOR

Deltoid.
Pectoralis major.
Pectoralis minor.
Triceps brachii.



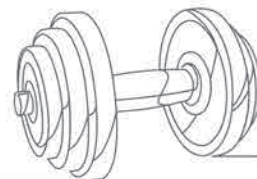
AVOID!

Bending your back and pushing with your legs only.
Raising shoulders at the end of the movement.



ALTERNATIVE

Using step
to reduce movement.



BICEP CURL



STARTING POSITION

Sitting on a bench, keep your chest up and shoulders down, hold the dumbbells with your palms facing up, directly by your sides.



ACTION

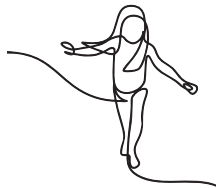
Bring the weight up with the dumbbells firmly in your hands. Finish when the palms are pointing towards the shoulder joints. Return to the starting position.

MOVEMENT PATH

Your torso, hips and legs are motionless as your forearms are drawn upwards.



Exhaling while moving the dumbbells up towards the shoulder joints.



Stabilise by:

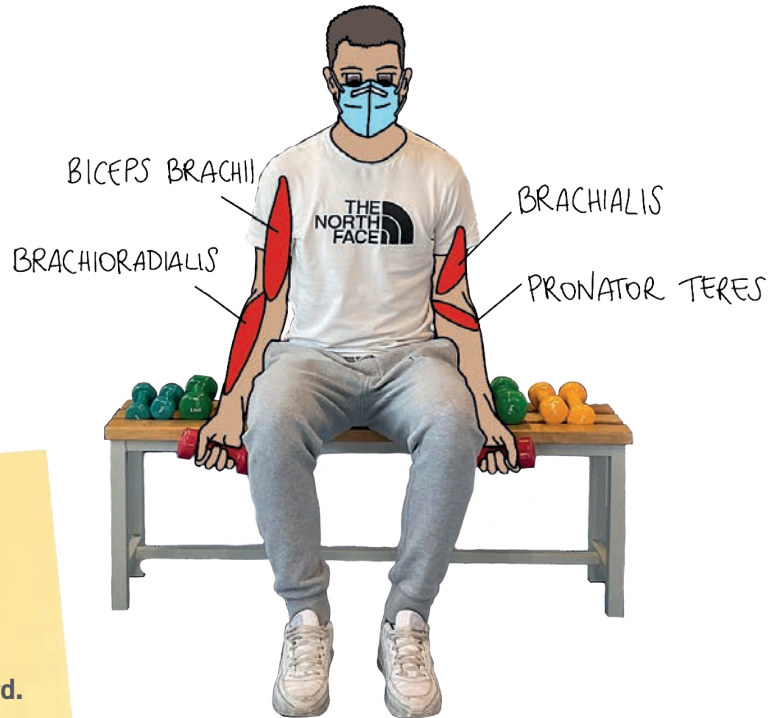
- contracting the abdomen and retracting shoulder blades throughout the entire movement;
- pull your abdomen up and in.



BICEP CURL

BEST FOR

Biceps brachii.
Brachialis.
Brachioradialis.
Pronator teres.



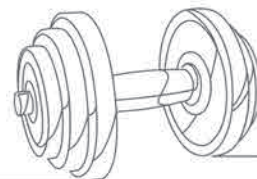
AVOID!

Extending your back during the curl.
Elevating shoulders or moving your head forward.
Rotating your torso or jerking the dumbbells up.



ALTERNATIVE

Try using a bar instead of dumbbells.



HAMMER CURL



STARTING POSITION

Hold the dumbbells and rotate your hands outwards, so that your wrists are facing in at the hips.

ACTION

Bend the elbow lifting the forearms to pull the dumbbells toward the shoulders. Your upper arms should stay straight, and the wrists should be in line with the forearms. Return to the starting position.

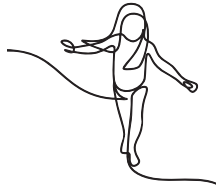


MOVEMENT PATH

Your torso, hips and legs are motionless as your forearms are drawn upwards in an arc from a vertical position.



Exhaling while moving the dumbbells up to the shoulder joint.



Stabilise by:

- contracting abdomen in and retracting shoulder blades throughout the entire movement.



HAMMER CURL

BEST FOR

Biceps brachii.
Brachialis.
Brachioradialis.



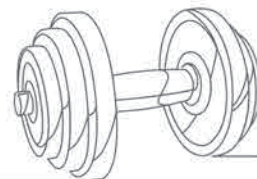
AVOID!

Extending back during the curl, elevating shoulders moving head forward.
Don't rotate torso or jerking the dumbbells up.



ALTERNATIVE

Alternate one arm at a time.



WRIST CURL



STARTING POSITION

Sitting on a bench, lean forward so that your forearms and elbows are on the top of your legs and your palms are facing up as you grip a dumbbells.



MOVEMENT PATH

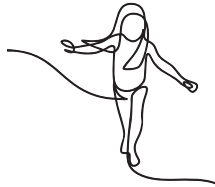
Curve your wrist in towards position.

ACTION

Extend your wrist so the dumbbells move away from you. Slowly return to the starting position.



Exhaling while moving the wrist towards the ceiling.



Stabilise by:

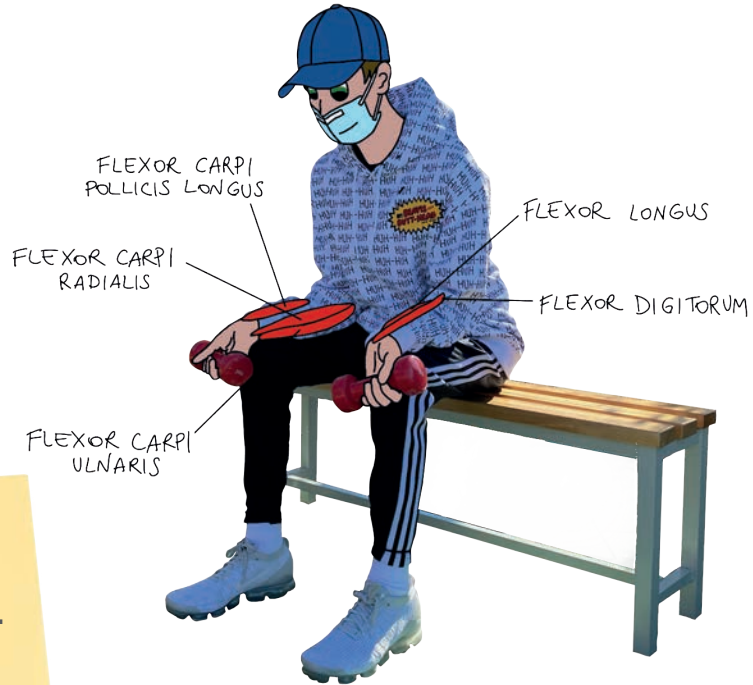
- pushing your elbows on your legs and keeping your forearms parallel.



WRIST CURL

BEST FOR

Flexor carpi pollicis longus.
Flexor carpi radialis.
Flexor carpi ulnaris.
Flexor digitorum.
Palmaris longus.



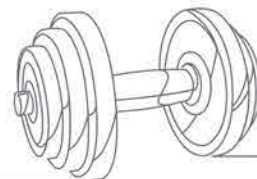
AVOID!

Doing the exercise too fast.
Supporting the movement of your forearms using your legs.



ALTERNATIVE

Carry out the exercise using a bar.



WRIST CURL MODIFICATION



STARTING POSITION

Sitting on a bench, lean your torso forwards, so that your forearms and elbows rest on your upper leg and your palms face the floor while holding the dumbbells.



ACTION

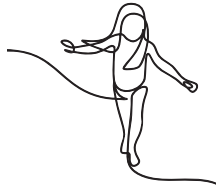
With the dumbbells firmly in your grip, perform an extension of the wrists towards the ceiling. Return to the starting position.

MOVEMENT PATH

Flex your wrist.



Exhaling while moving the wrist towards the ceiling.



Stabilise by:

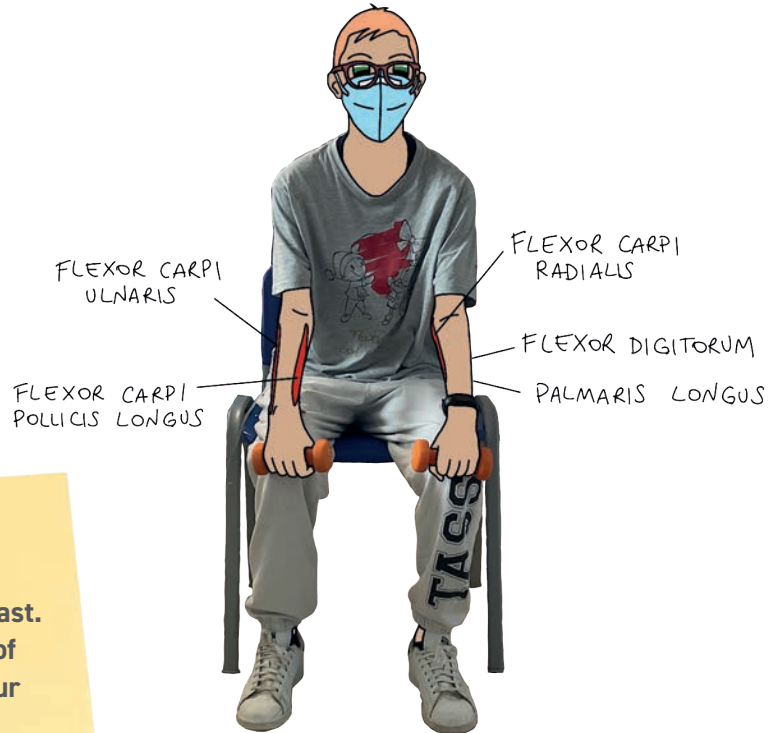
- firmly pushing your elbows into your legs and keeping your forearms parallel.



WRIST CURL MODIFICATION

BEST FOR

Flexor carpi pollicis longus.
Flexor carpi radialis.
Flexor carpi ulnaris.
Flexor digitorum.
Palmaris longus.



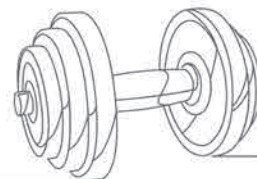
AVOID!

Doing the exercise too fast.
Helping the movement of your forearms using your legs.



ALTERNATIVE

Carry out the exercise holding a bar.



DUMBBELL KICKBACK



STARTING POSITION

Place one knee and one hand on a bench. Place the opposite foot on the floor and bend the arm being used in the exercise.



ACTION

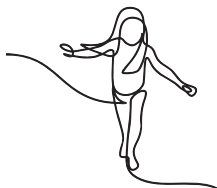
Push your hand back from your shoulder towards your hip and straighten your elbow so that your arm is at least parallel to the floor. Return to the starting position.

MOVEMENT PATH

The dumbbell moves from your shoulder to your hip in an arc.



Exhaling while extending arms parallel with the spine.



Stabilise by:

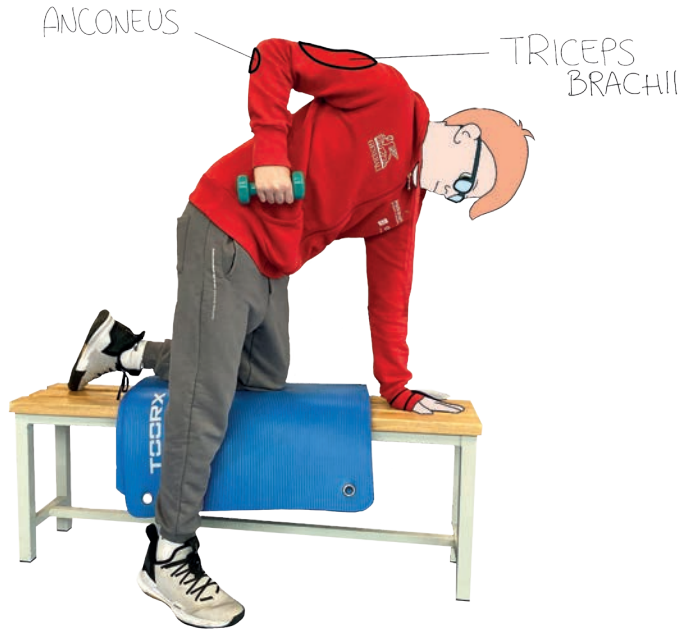
- keeping spine neutral, shoulders parallel and contracted;
- distributing your weight evenly among the three contact points.



DUMBBELL KICKBACK

BEST FOR

Anconeus.
Triceps brachii.



AVOID!

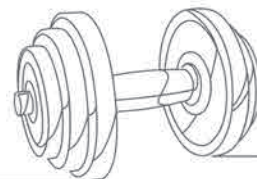
Allowing your elbow to drop towards the floor or moving your arm away from your side.

Allowing your shoulder to go forward or your torso to rotate.



ALTERNATIVE

Carry out the exercise in a sitting position.



CRUNCH FEET ON FITBALL



STARTING POSITION

Place your hands behind your head while lying flat on the gym mat. Place your feet on a fitball while you do a crunch.



ACTION

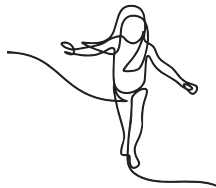
Push your navel towards the ground, contract your abdominal muscles and lift your upper back off the ground slightly forward. Return to the starting position.

MOVEMENT PATH

Lift upper body and go back.



Exhaling when you lift your upper body off the ground.



Stabilise by:

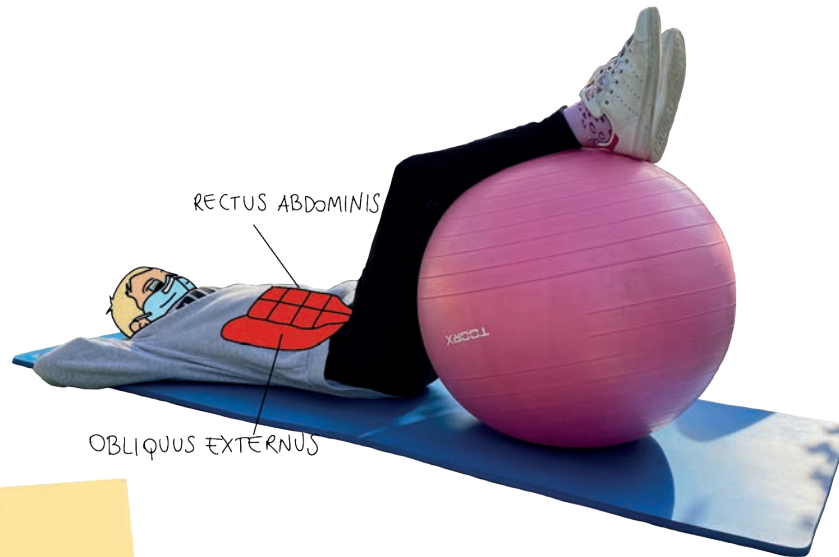
- keeping your shoulder blades open by spreading your elbows wide;
- keeping your lower back down on the ground and your feet flat.



CRUNCH FEET ON FITBALL

BEST FOR

Obliquus externus.
Rectus abdominis.



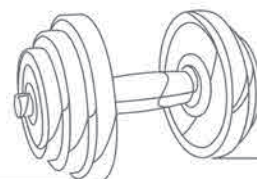
AVOID!

Pulling with your hands.
Bringing your chin
towards your chest.
Arching your back and
elevating your feet.



ALTERNATIVE

Engage your core muscles without
raising your torso.



SEATED CRUNCH



STARTING POSITION

Sitting on a fitball and place your hands behind your head.

ACTION

Lean backwards and slowly do a regular crunch. Return to the starting position.

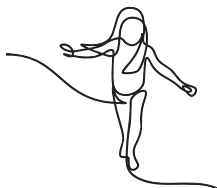


MOVEMENT PATH

Your torso moves back and forwards.



Exhaling when you go forwards with your torso.



Stabilise by:

- keeping your shoulder blades open by having your elbows widely spread, your lower back down on the fitball and your feet flat.



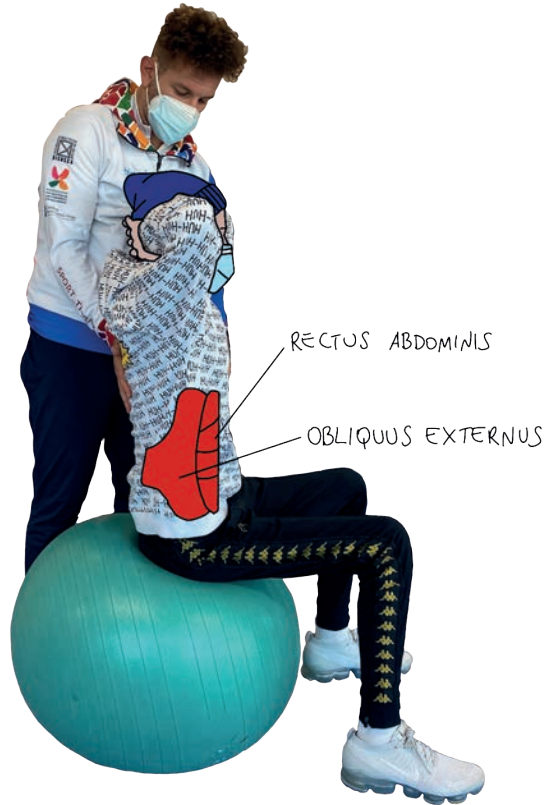
SEATED CRUNCH

BEST FOR

Obliquus externus.
Rectus abdominis.

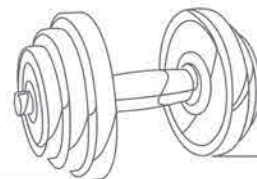
AVOID!

Pulling with your hands.
Bringing your chin
towards your chest.
Arching your back and
elevating your feet.



ALTERNATIVE

Reduce the descending
movement.



CROSS-OVER CRUNCH



ACTION

Extend your right leg while twisting your torso to bring your right elbow toward your left knee. Repeat on the other side. Keep your core engaged.

STARTING POSITION

Place your hands behind your head while lying flat on the gym mat. Place your feet on a fitball.

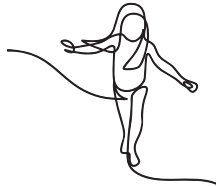


MOVEMENT PATH

Your torso flexes and simultaneously rotates downwards and inwards.



Exhaling when you lift off the floor.



Stabilise by:

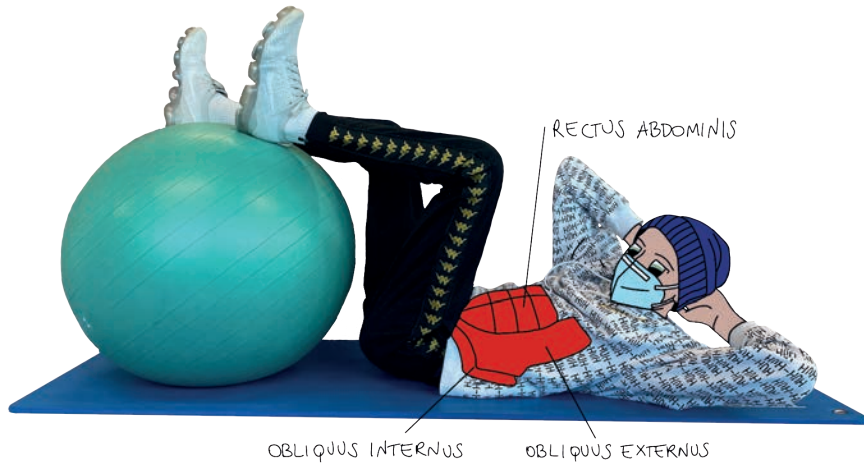
- retracting your shoulder blades;
- keeping your abdomen pulled up and in;
- keeping your knees parallel and over your feet.



CROSS-OVER CRUNCH

BEST FOR

Obliquus externus.
Obliquus internus.
Rectus abdominis.



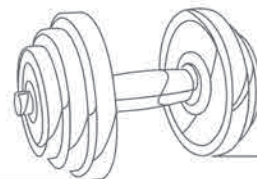
AVOID!

Pulling with your hands.
Bringing your chin towards your chest or collarbone.
Arching your back or elevating your foot.
Raising both arms of the floor at the same time.
Moving the elbow on the active arm faster than your shoulder.

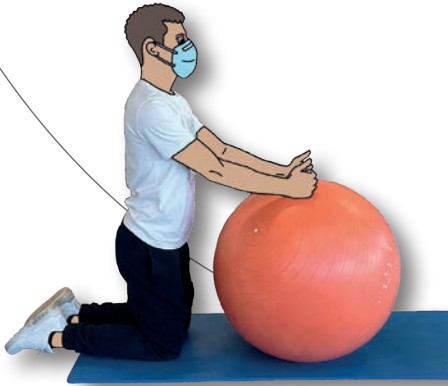


ALTERNATIVE

Don't elevate the shoulder from the floor.

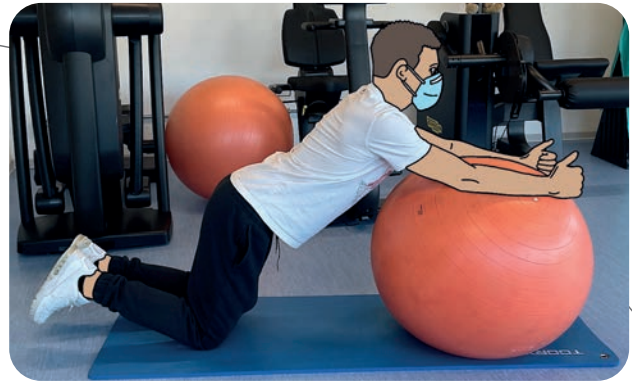


ABS WHEEL



STARTING POSITION

On your knees, bend your torso forward at 45° with your spine in a neutral position. Extend your arms forward at 45°-90° to your torso, with your elbows straight and resting on the fitball.



ACTION

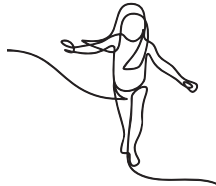
Extend your arms outward, letting your torso lower until your chest is nearly parallel to the floor, rolling the fitball away from you. Your hips move forward, following your torso, but your knees remain stationary. Return to the starting position.

MOVEMENT PATH

Your centre of mass is shifted forwards and downwards as your arms and hips extend into a linear position, with your knees as the fulcrum.



Exhaling when you pull back your arms and hips simultaneously and your torso lifts.



Stabilise by:

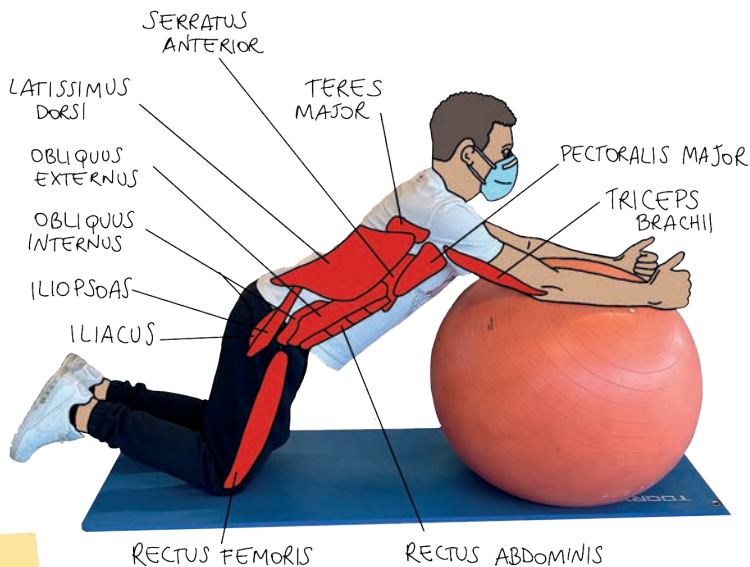
- pulling your abdomen up and in;
- keeping your shoulders down and back throughout the movement;
- keeping your arms extended and your wrists strong;
- maintaining a neutral spinal position throughout the movement.



ABS WHEEL

BEST FOR

Iliacus.
Iliopsoas.
Latissimus dorsi.
Obliquus externus.
Obliquus internus.
Pectoralis major.
Rectus abdominis.
Rectus femoris.
Serratus anterior.
Teres major.
Triceps brachii.



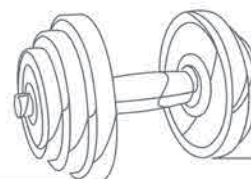
AVOID!

Rounding or arching your spine.
Moving quickly in either direction.



ALTERNATIVE

Reduce forwards movement.



BRIDGE ON FITBALL



STARTING POSITION

Balance your feet on a fitball, keeping your hips elevated and the spine straight.



ACTION

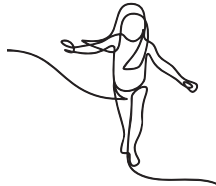
Using your upper arms, shoulders, and feet, push your hips and ribs simultaneously up towards the ceiling. Eventually with the help of an exercise professional return to the starting position.

MOVEMENT PATH

Curvilinear; the spinal movement is straight up from the floor.



Exhaling when push your hips and ribs simultaneously up towards the ceiling.



Stabilise by:

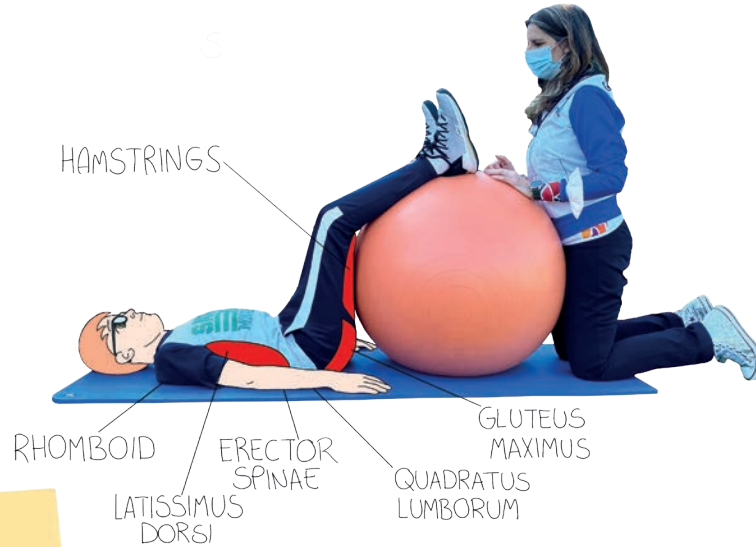
- keeping your upper arms and elbow pulled down and into the floor, distributing your weight evenly;
- keeping your hips, knees and feet in a single line.



BRIDGE ON FITBALL

BEST FOR

Erector spinae.
Gluteus maximus.
Hamstrings.
Latissimus dorsi.
Quadratus lumborum.
Rhomboid.



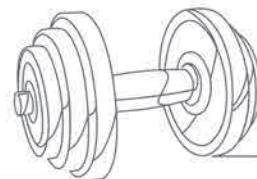
AVOID!

Sequential lifting.
A pelvic tuck or any rotational elevation (one hip rising faster than the other).



ALTERNATIVE

Reduce ascendant movement to 45°.



ARM-LEG EXTENSION

modification 2, extend 1 arm and 1 leg



STARTING POSITION

Lying flat on the gym mat, with one arm bent, your elbow on the floor, your palm down and the hand under your chin. Extend your other arm, holding your thumb up towards the ceiling.



ACTION

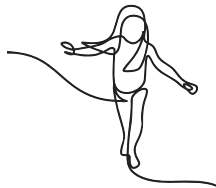
Simultaneously lift your extended arm, torso and the opposite leg. Return to the starting position.

MOVEMENT PATH

Your arm and leg rise straight up to form an arc with your torso.



Exhaling when lifting your extended arm, torso and the opposite leg.



Stabilise by:

- keeping your shoulder blades down and back;
- keeping your hips even and down;
- keeping your legs and arms straight.

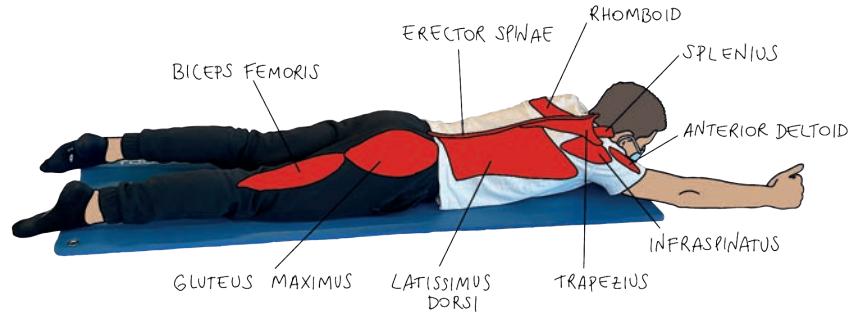


ARM-LEG EXTENSION

modification 2, extend 1 arm and 1 leg

BEST FOR

Anterior deltoid.
Biceps femoris.
Erector spinae.
Gluteus maximus.
Infraspinatus.
Latissimus dorsi.
Rhomboid.
Splenius.
Trapezius.



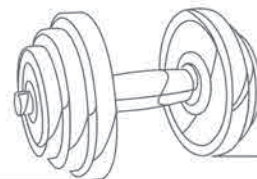
AVOID!

Any rotation of your torso.
Do not lift your hips from the floor.
Elevating your shoulder.
Bending your knee or elbow.



ALTERNATIVE

Don't lift legs.



FRONT PLANK



STARTING POSITION

Lying face down on the gym mat and fold your hands directly beneath your chin with your elbows by your sides and your feet on your toes.



ACTION

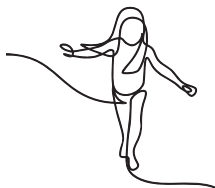
Raise the length of your torso off the floor to a horizontal position with a slight arch in your lower back. Your shoulder blade should be flat and your spine long. Eventually with the help of an exercise professional return to the starting position.

MOVEMENT PATH

None.



Exhaling when drawing your navel in and up.



Stabilise by:

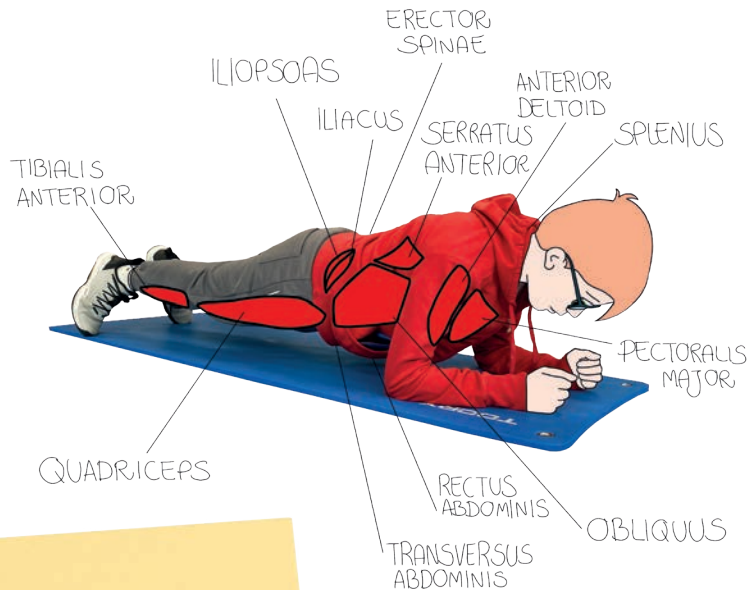
- keeping your spine neutral;
- keeping your shoulders down and your head up;
- maintaining the contraction of your glutes and legs;
- keeping your legs straight and your ankles bent at 90°, with your toes pointing directly into the floor.



FRONT PLANK

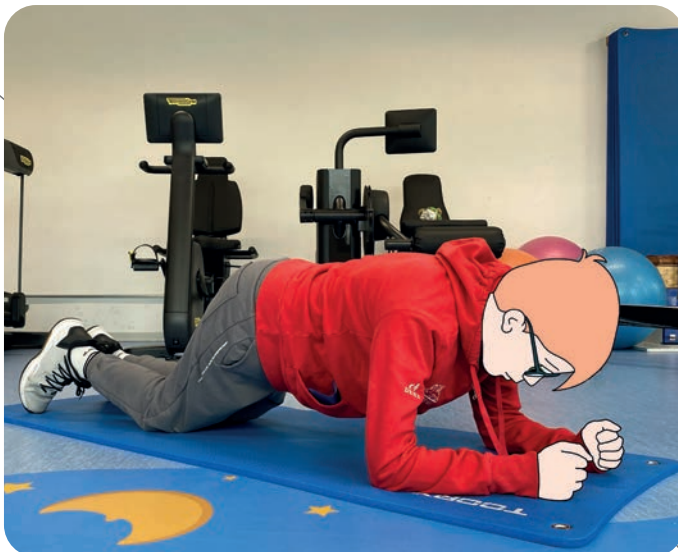
BEST FOR

Anterior deltoid.
Erector spinae.
Iliacus.
Iliopsoas.
Obliquus.
Pectoralis major.
Quadricpes.
Rectus abdominis.
Serratus anterior.
Splenius.
Tibialis anterior.
Transversus abdominis.



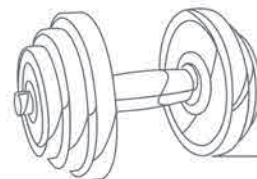
AVOID!

Rounding your spine.
Dropping your hips.
Elevating your shoulders
towards your ears.



ALTERNATIVE

Rest your knees
on the gym mat.



SIDE PLANK

both knees are on the floor

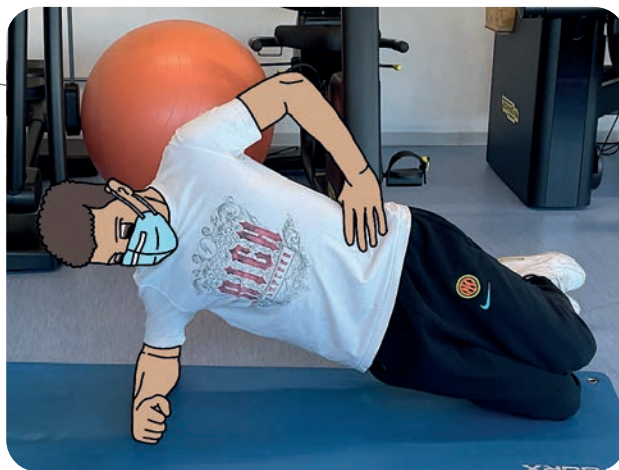


STARTING POSITION

Lying on your side with the lower arm bent at the elbow. The lower elbow should be underneath the shoulder joint and the upper hand should be on your hip. Align your ankles, hips, shoulders, and head.

ACTION

Raise the length of your body towards the ceiling, balancing on the edge of your bottom shoe with one foot directly over the other. Return to the starting position.

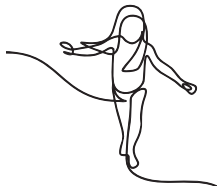


MOVEMENT PATH

Your centre of mass rises directly upwards.



Exhaling when you push up.



Stabilise by:

- pulling your abdomen up and in;
- keeping your spine neutral;
- balancing on the edge of your bottom foot or shoe.

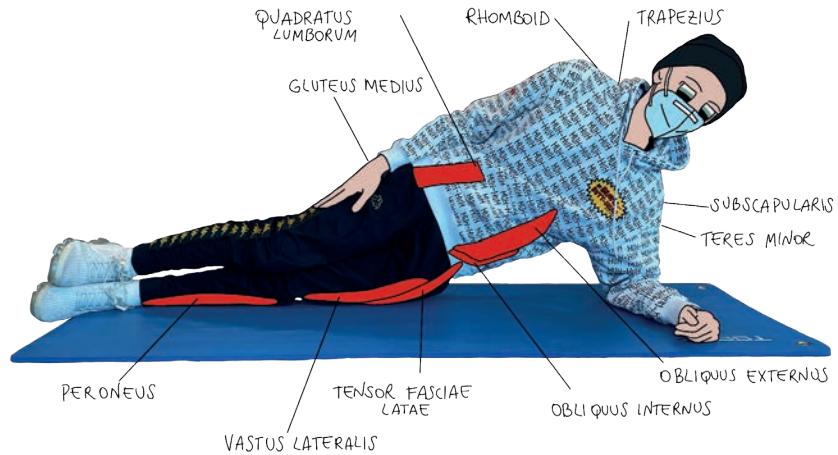


SIDE PLANK

both knees are on the floor

BEST FOR

Gluteus medius.
Obliquus externus.
Obliquus internus.
Peroneus.
Quadratus lumborum.
Rhomboid.
Subscapularis.
Tensor fasciae latae.
Teres minor.
Trapezius.
Vastus lateralis.



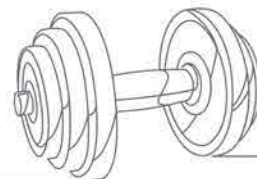
AVOID!

Rotating your hips.
Rounding your shoulders.
Moving your head.



ALTERNATIVE

Bend both legs, crossing your top leg in front so that both knees are on the gym mat.



PNF RAISE



STARTING POSITION

Standing on one foot, bending the raised knee, and grasp a ball just below and to the outside of the knee on the standing leg.

ACTION

Stand, extending your leg, while bringing the ball across your body to above and outside the opposite shoulder. Return to the starting position.

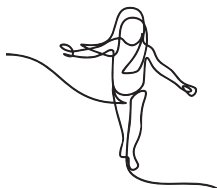


MOVEMENT PATH

Your upper body rotates as your centre of mass shifts upwards. The ball moves in an arc across your body.



Exhaling when you extend your leg and bring the ball up.



Stabilise by:

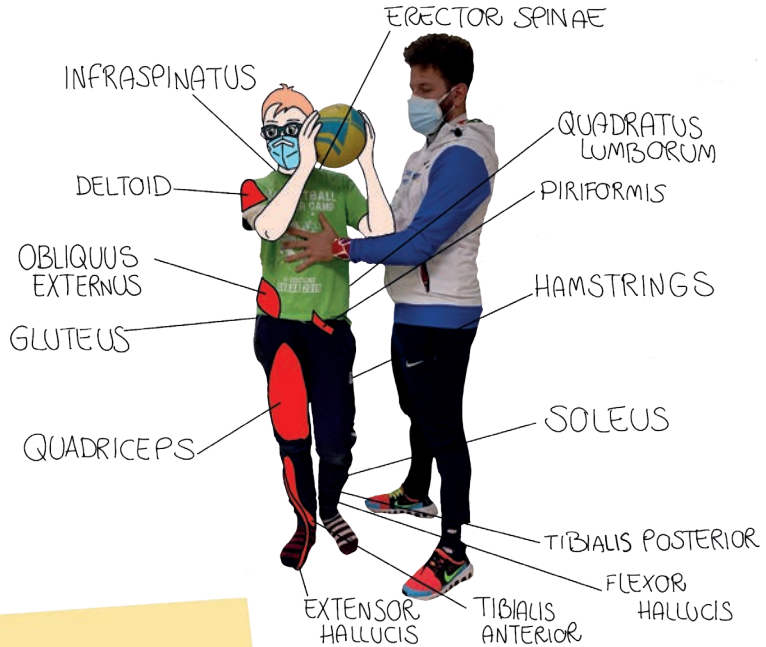
- pulling your abdomen up and in;
- distributing your weight evenly across your foot;
- using all muscles and joints in a coordinated, relaxed manner.



PNF RAISE

BEST FOR

- Deltoid.
- Erector spinae.
- Extensor hallucis.
- Flexor hallucis.
- Gluteus.
- Hamstrings.
- Infraspinatus.
- Obliquus externus.
- Piriformis.
- Quadratus lumborum.
- Quadriceps.
- Soleus.
- Tibialis anterior.
- Tibialis posterior.



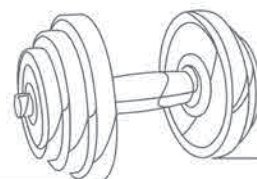
AVOID!

- Excessive flexion of your torso and spine.
- Bringing the ball close to your body.
- Letting any part of your foot touch the floor.



ALTERNATIVE

Start with both feet on the floor.



WOODCHOPPER



STARTING POSITION

Stand with the ball to one side and slightly in front of your body, with your feet wider than your shoulders. Grasp the ball with both hands at shoulder height by crossing your torso with the opposite arm. Align your shoulder, hips, and ankles in the same plane.

ACTION

Bring the ball downwards and inwards with straight arms in a 90° arc, stopping in front of the opposite leg; return along the same path. Return to the starting position.

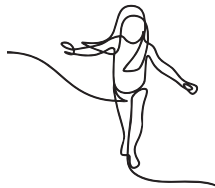


MOVEMENT PATH

Your torso and centre of mass remain stationary as your arms move in a 90° arc from the side of your body downwards and inwards until your hands cross your midline.



Exhaling when you pull the weight down and inhale as you return to the starting position.



Stabilise by:

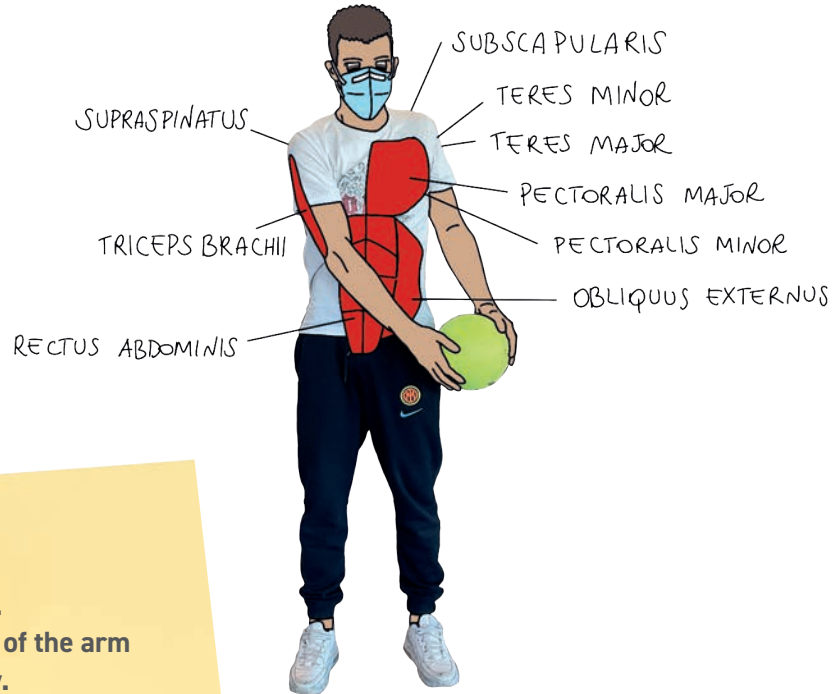
- keeping your shoulders down and back;
- pulling your abdomen up and in and keeping your chest high;
- distributing your weight evenly across your feet;
- keeping your hips and knees slightly bent and solid.



WOODCHOPPER

BEST FOR

Obliquus externus.
Pectoralis major.
Pectoralis minor.
Rectus abdominis.
Subscapularis.
Supraspinatus.
Teres major.
Teres minor.
Triceps brachii.



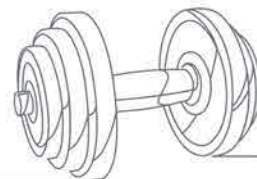
AVOID!

Rotating your hips.
Bending the elbow of the arm
crossing your body.
Shifting your weight between your
feet.

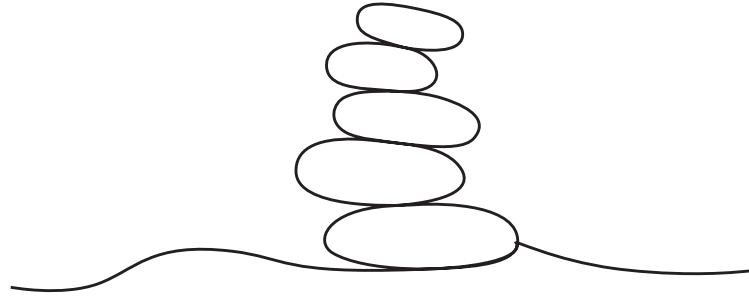


ALTERNATIVE

Carry out the exercise
using a very light weight ball.



BALANCE EXERCISE



All the exercises described below can be combined with the motivational games suggested in the section 'Didactic physical activity games in the frame of exercise therapy', on pp. 269-302.

CROSS LEG GLUTEAL BALANCE



STARTING POSITION

Put your weight through one foot, and lift the other foot slightly.

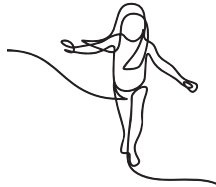


ACTION

Standing on one leg, lift your other leg and place your ankle just above the knee of your other leg. Extend your arms forward. Return to the starting position.



Exhaling
throughout the
exercise.



Stabilise by:

- engage your core and look at a fixed point in front of you.



CROSS LEG GLUTEAL BALANCE / ALTERNATIVE

58

BALANCE EXERCISE



**SLIGHTLY GO DOWN WITH THE HELP
OF AN EXERCISE PROFESSIONAL.**

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.

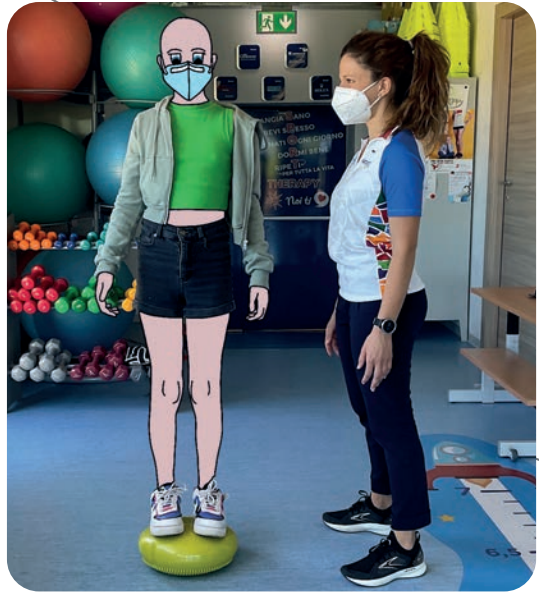


BIPEDAL POSTURE ON BALANCE DISC



STARTING POSITION

Standing on the balance disc, with the help of an exercise professional; position your body in the centre.

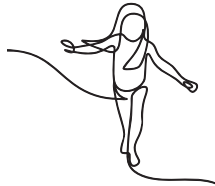


ACTION

Place one foot on the balance disc and then place the other. Slowly let go of the exercise professional and try to maintain the position without losing balance.



Exhaling
throughout the
exercise.



Stabilise by:

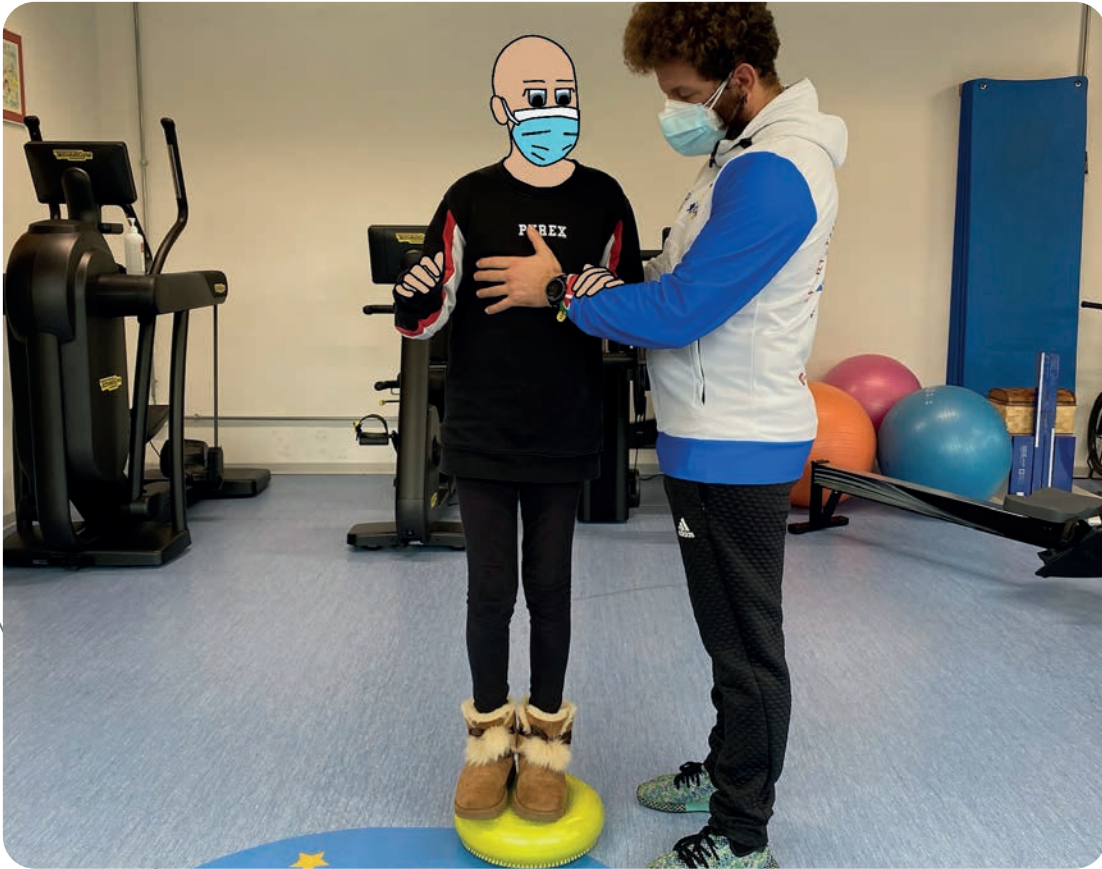
- engage your core and look at a fixed point in front of you;
- using arms to find balance.



BIPEDAL POSTURE ON BALANCE DISC / ALTERNATIVE

59

BALANCE EXERCISE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.

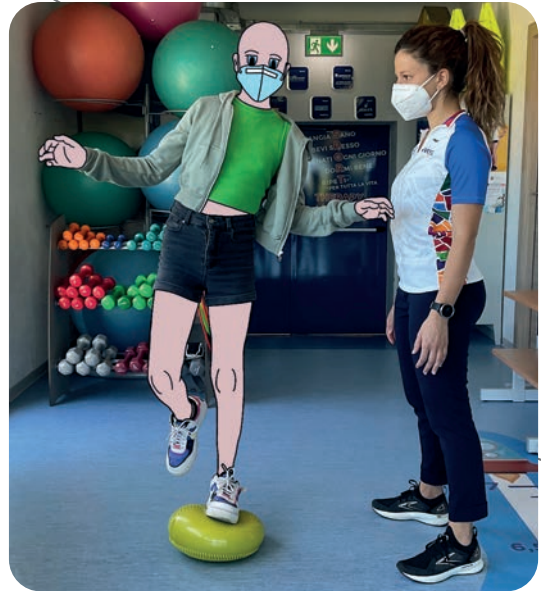


ONE LEG POSTURE ON BALANCE DISC



STARTING POSITION

Standing on the balance disc, with the help of an exercise professional; position your body in the centre.

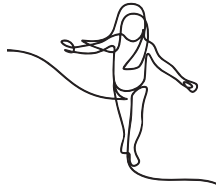


ACTION

Balance your body on the balance disc without placing the opposite foot on the floor. Return to the starting position, switch the foot and repeat the exercise.



Exhaling
throughout the
exercise.



Stabilise by:

- engage your core and look at a fixed point in front of you;
- using arms to find balance.



ONE LEG POSTURE ON BALANCE DISC / ALTERNATIVE

60

BALANCE EXERCISE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.

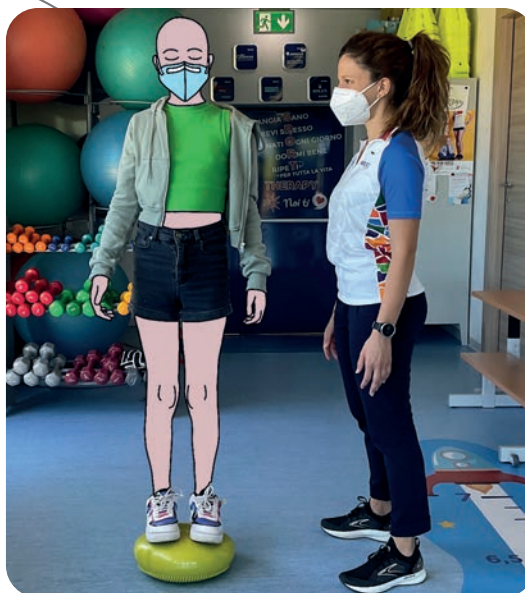


BIPEDAL POSTURE ON BALANCE DISC WITH EYES CLOSED



STARTING POSITION

Standing on the balance disc, with the help of an exercise professional; position your body in the centre.

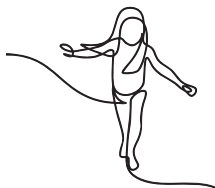


ACTION

Close your eyes and slowly let go of the exercise professional and try to maintain the position without losing balance. Return to the starting position.



Exhaling
throughout the
exercise.



Stabilise by:

- engage your core and look at a fixed point in front of you;
- using arms to find balance.



BIPEDAL POSTURE ON BALANCE DISC WITH EYES CLOSED / ALTERNATIVE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.



ONE LEG POSTURE ON BALANCE DISC WITH EYES CLOSED



STARTING POSITION

Standing on the balance disc, with the help of an exercise professional; position your body in the centre.

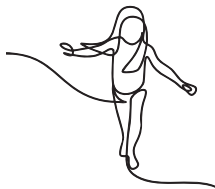


ACTION

Close your eyes and slowly let go of the exercise professional and try to maintain the position without losing balance. Return to the starting position, switch the foot and repeat the exercise.



Exhaling
throughout the
exercise.



Stabilise by:

- engage your core and look at a fixed point in front of you;
- using arms to find balance.



ONE LEG POSTURE ON BALANCE DISC WITH EYES CLOSED / ALTERNATIVE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.



BIPEDAL POSTURE WITH EYES OPEN ON TRAMPOLINE



STARTING POSITION

Standing on the trampoline, with the help of an exercise professional; position your body in the centre.

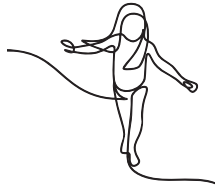


ACTION

Keep balance for as long as possible while remaining in the centre of the trampoline with your eyes open.



Exhaling
throughout the
exercise.



Stabilise by:

- engage your core and look at a fixed point in front of you;
- using arms to find balance.



BIPEDAL POSTURE WITH EYES OPEN ON TRAMPOLINE / ALTERNATIVE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.



ONE LEG POSTURE WITH EYES OPEN ON TRAMPOLINE



STARTING POSITION

Standing on the trampoline, with the help of an exercise professional; position your body in the centre.

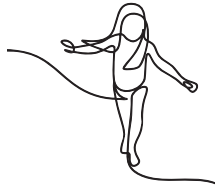


ACTION

Keep your balance on one leg for as long as possible while remaining in the centre of the trampoline, keeping your eyes open. Return to the starting position, switch foot and repeat the exercise.



Exhaling
throughout the
exercise.



Stabilise by:

- engage your core and look at a fixed point in front of you;
- using arms to find balance.



ONE LEG POSTURE WITH EYES OPEN ON TRAMPOLINE / ALTERNATIVE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.



BIPEDAL POSTURE WITH EYES CLOSED ON TRAMPOLINE



STARTING POSITION

Standing on the trampoline, with the help of an exercise professional; position your body in the centre.

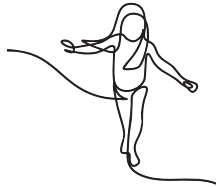


ACTION

Keep your balance for as long as possible while remaining in the centre of the trampoline, keeping your eyes closed. Return to the starting position, switch foot and repeat the exercise.



Exhaling
throughout the
exercise.



Stabilise by:

- engage your core and look at a fixed point in front of you;
- using arms to find balance.



BIPEDAL POSTURE WITH EYES CLOSED ON TRAMPOLINE / ALTERNATIVE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.



ONE LEG POSTURE WITH EYES CLOSED ON TRAMPOLINE



STARTING POSITION

Standing on the trampoline, with the help of an exercise professional; position your body in the centre.

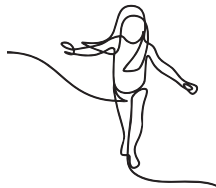


ACTION

Keep your balance on one leg for as long as possible while remaining in the centre of the trampoline, keeping your eyes closed. Return to the starting position, switch foot and repeat the exercise.



Exhaling
throughout the
exercise.



Stabilise by:

- engage your core and look at a fixed point in front of you;
- using arms to find balance.



ONE LEG POSTURE WITH EYES CLOSED ON TRAMPOLINE / ALTERNATIVE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.



BIPEDAL POSTURE WITH EYES OPEN AND THROWING AND CATCHING THE BALL



STARTING POSITION

Standing on the trampoline, with the help of an exercise professional; position your body in the centre.

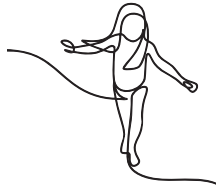


ACTION

An exercise professional will throw a ball from two metres. Catch the ball without losing balance and throw the ball back to the exercise professional. Return to the starting position.



Exhaling
throughout the
exercise.



Stabilise by:

- engage your core and look at a fixed point in front of you;
- using arms to find balance.



BIPEDAL POSTURE WITH EYES OPEN AND THROWING AND CATCHING THE BALL / ALTERNATIVE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.



ONE LEG POSTURE WITH EYES OPEN AND THROWING AND CATCHING THE BALL



STARTING POSITION

Standing on the trampoline, with the help of an exercise professional; position your body in the centre.

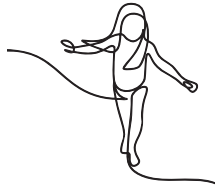


ACTION

While balancing on one leg, an exercise professional will throw a ball from two metres. Catch the ball without losing balance and throw the ball back. Return to the starting position, switch the foot and repeat the exercise.



Exhaling
throughout the
exercise.



Stabilise by:

- engage your core and look at a fixed point in front of you;
- using arms to find balance.



ONE LEG POSTURE WITH EYES OPEN AND THROWING AND CATCHING THE BALL / ALTERNATIVE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.



BIPEDAL POSTURE TOUCHING YOUR NOSE, HEAD, HIPS, KNEES AND SHOULDERS



STARTING POSITION

Standing on the trampoline, with the help of an exercise professional; position your body in the centre.

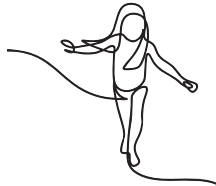


ACTION

Touch the part of the body that an exercise professional tells you (i.e. "touch your shoulders"). Return to the starting position.



Exhaling throughout the exercise.



Stabilise by:

- engaging your core and looking at a fixed point in front of you.



BIPEDAL POSTURE TOUCHING YOUR NOSE, HEAD, HIPS, KNEES AND SHOULDERS / ALTERNATIVE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.



SKIP AND STOP ON TRAMPOLINE



STARTING POSITION

Standing on the trampoline, with the help of an exercise professional; position your body in the centre.

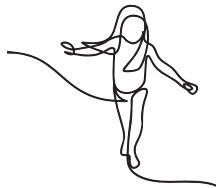


ACTION

Lift one leg at a time so your knee comes to 90°. Hold your leg here for a second before returning to the starting position. Repeat with the other leg.



Exhaling
throughout the
exercise.



Stabilise by:

- engaging your core and looking at a fixed point in front of you.



SKIP AND STOP ON TRAMPOLINE / ALTERNATIVE

70

BALANCE EXERCISE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving object.
Moving too fast.



ONE LEG POSTURE TURN AROUND CONE



STARTING POSITION

Standing in the middle of a hoop, lift one foot towards the cone on the floor.



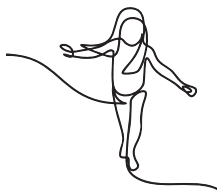
ACTION

While balancing on one leg, stand in the centre of the circle. Lift the foot next to the cone outside the circle.

Turn the foot clockwise around the cone and return to the starting position. Then lift the other foot and turn it clockwise around the next.



Exhaling throughout the exercise.



Stabilise by:

- engaging your core and looking at a fixed point in front of you.



ONE LEG POSTURE TURN AROUND CONE / ALTERNATIVE

71

BALANCE EXERCISE



TOUCHING THE FLOOR WITH YOUR TOE

AVOID!

Holding your breath.
Looking at a moving
object.
Moving too fast.

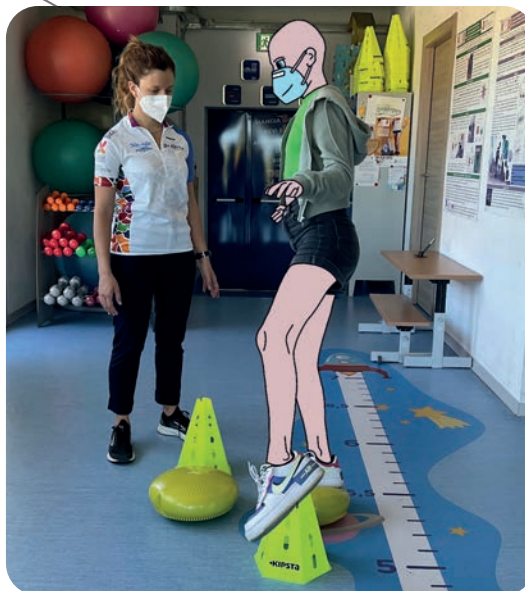


ONE LEG POSTURE BALANCE WITH DISC AND FOOT TURN ON THE CONE



STARTING POSITION

Standing on the balance disc, with the help of an exercise professional; position your body in the centre.

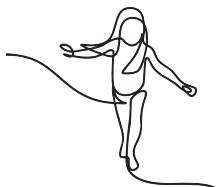


ACTION

Lift the foot next to the cone outside the circle. Turn the foot clockwise around the cone and return to the starting position. Then lift the other foot, which in turn will be behind and turn clockwise around the next cone.



Exhaling throughout the exercise.



Stabilise by:

- engaging your core and looking at a fixed point in front of you;
- finding balance after the turns around the cones.



ONE LEG POSTURE BALANCE WITH DISC AND FOOT TURN ON THE CONE / ALTERNATIVE



WITH THE HELP OF AN EXERCISE PROFESSIONAL

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving object.
Moving too fast.

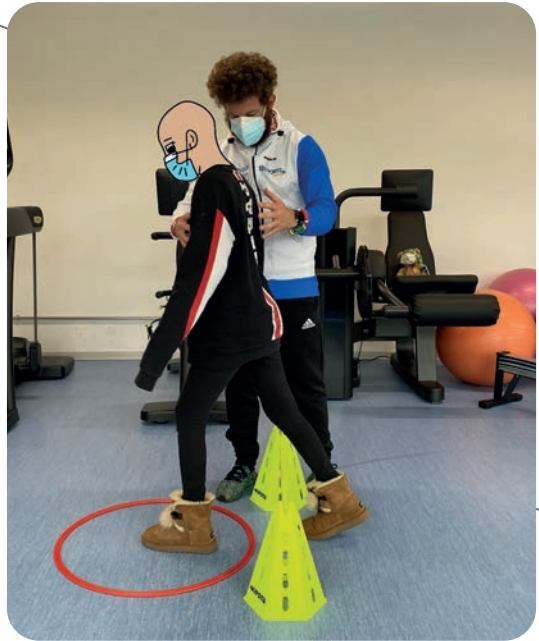


STEPPING OVER OBSTACLES



STARTING POSITION

Standing in front of an obstacle.

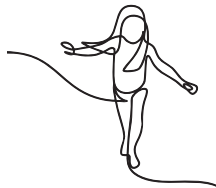


ACTION

Stand in the centre of the circle.
Pass the obstacle in front.
Try not to touch the obstacles.
Return to the starting position.



Exhaling
throughout the
exercise.



Stabilise by:

- engaging your core and looking at a fixed point in front of you.



STEPPING OVER OBSTACLES / ALTERNATIVE

73



WITHOUT THE OBSTACLES

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving
object.



LATERAL STEPPING OVER OBSTACLES



STARTING POSITION

Standing in front of an obstacle.

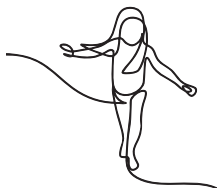


ACTION

Stand in the centre of the circle. Then lift your leg over the obstacle laterally. Try not to touch it. Return to the starting position.



Exhaling
throughout the
exercise.



Stabilise by:

- engaging your core and looking at a fixed point in front of you.



LATERAL STEPPING OVER OBSTACLES / ALTERNATIVE

74

BALANCE EXERCISE



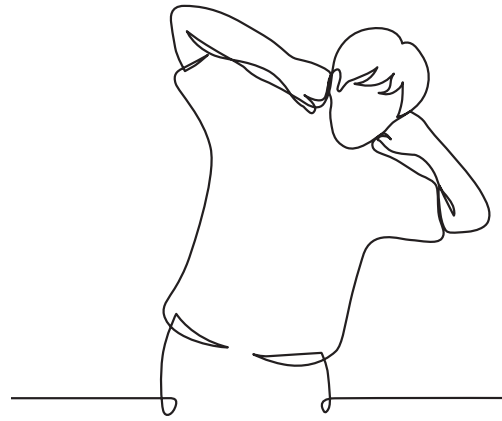
WITHOUT THE OBSTACLES

AVOID!

Looking up or down,
or to the side.
Holding your breath.
Looking at a moving object.



FLEXIBILITY EXERCISE



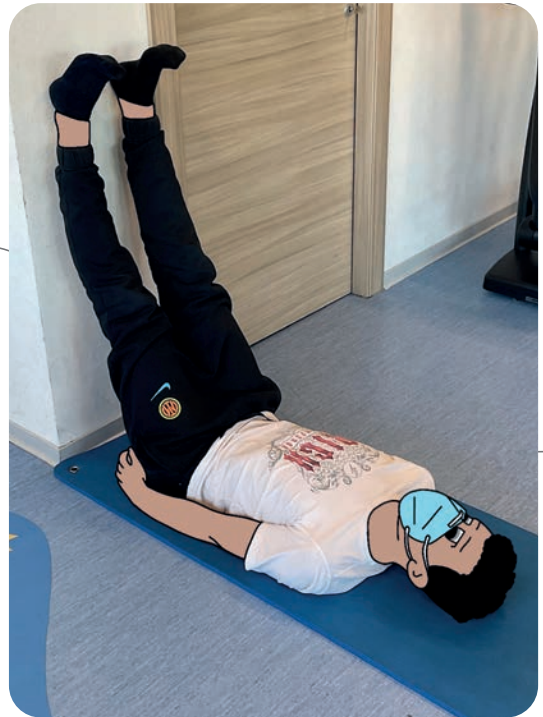
All the exercises described below can be combined with the motivational games suggested in the section 'Didactic physical activity games in the frame of exercise therapy', on pp. 269-302.

STAR GAZERS



STARTING POSITION

With your back on the gym mat, legs bent and feet resting at the wall.



ACTION

Extend your legs and rest your heels against the wall. Try to stay as near as possible to the wall with your pelvis. Return to the starting position.



Stretch for from
30 to 45 seconds.



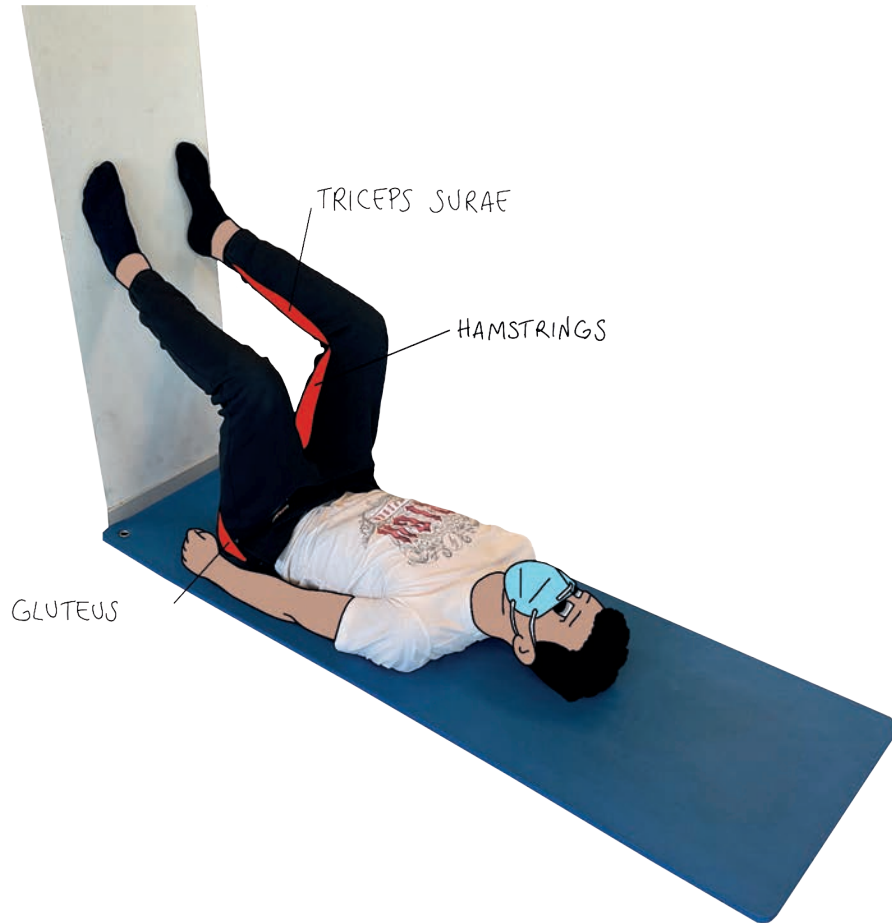
Inhale through your nose and exhale through your
mouth in a relaxing rhythm.



STAR GAZERS

BEST FOR

Gluteus.
Hamstrings.
Triceps surae.



AVOID!

Flexing your knees during the exercise.



CHANDELIER



STARTING POSITION

Lying on your back with your knees bent and your feet flat on the floor.



ACTION

With the soles of your feet together, open your legs and try to spread your knees as far apart as possible. Arms should be flat on the ground above your head at 90°. Return to the starting position.



Stretch for from
30 to 45 seconds.



Inhale through your nose and exhale through your
mouth in a relaxing rhythm.

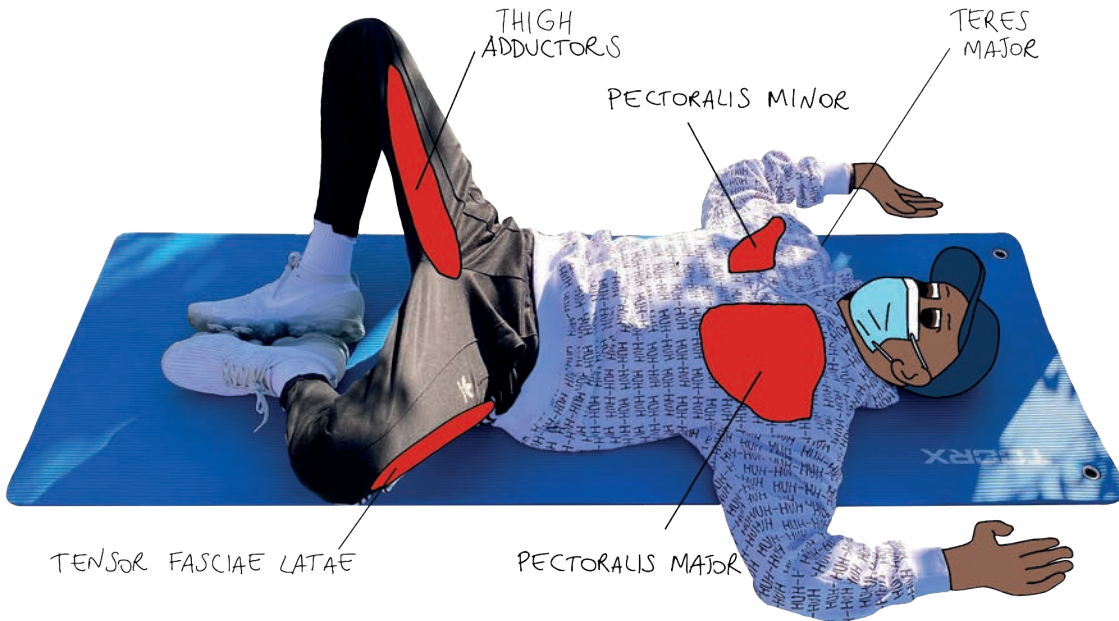


CHANDELIER

76

BEST FOR

Pectoralis major.
Pectoralis minor.
Tensor fasciae latae.
Teres major.
Thigh adductors.

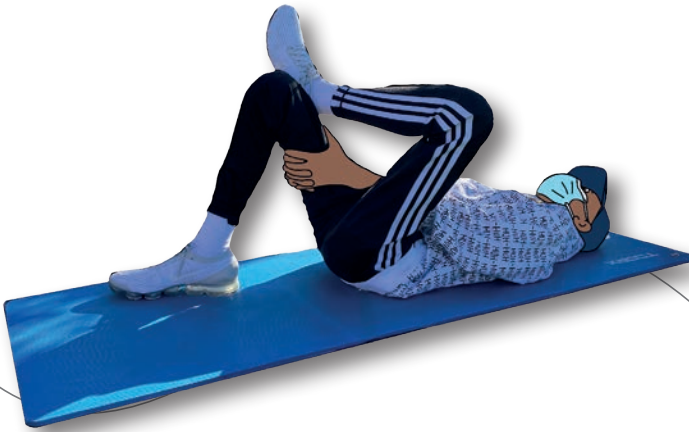


AVOID!

Letting your wrists touch the floor.
Straightening your fingers completely.



PADLOCK



STARTING POSITION

Lying on your back, rest your ankle on the opposite thigh, with your hands holding the thigh.



ACTION

Pull your leg toward your chest and hold it with your hands just below your knee. Return to the starting position. Change your leg.



Stretch for from
30 to 45 seconds.



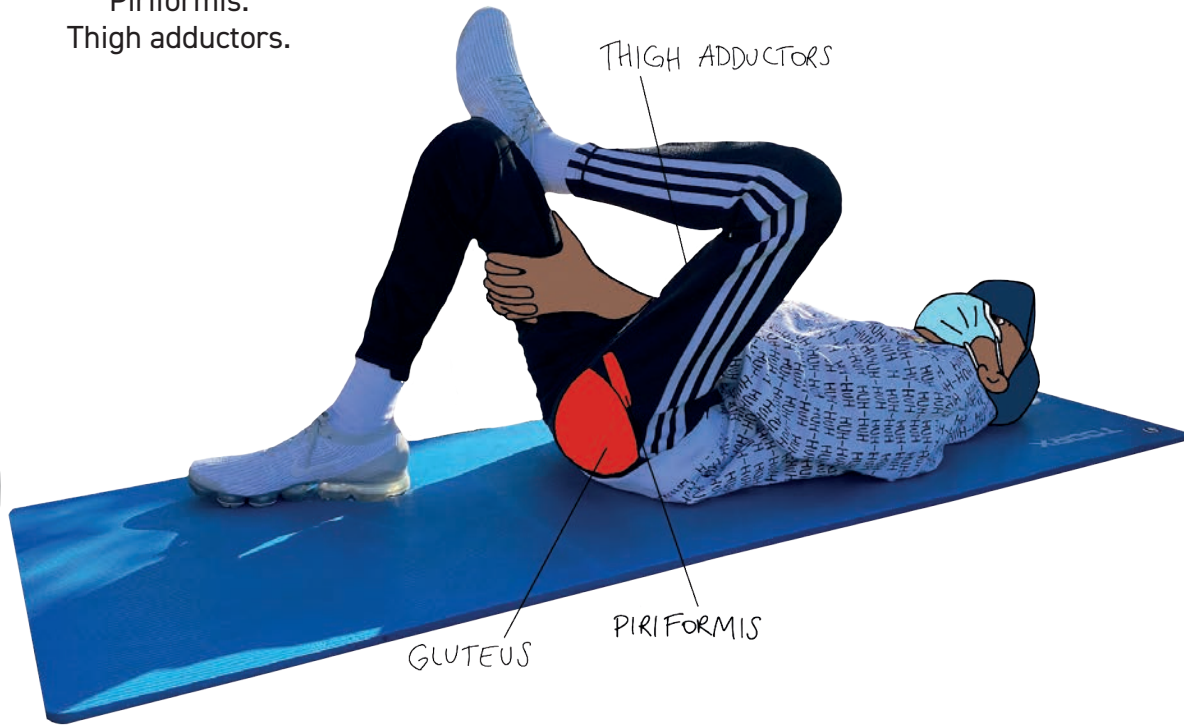
Inhale through your nose and exhale through your
mouth in a relaxing rhythm.



PADLOCK

BEST FOR

Gluteus.
Piriformis.
Thigh adductors.



AVOID!

Raising shoulders from
the ground.

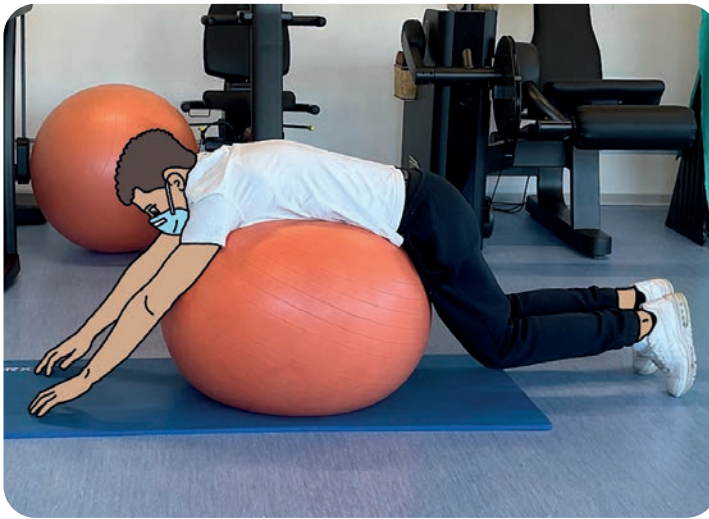


EARTHWORM



STARTING POSITION

With your stomach on a fitball and your back towards the ceiling. Hug ball or let your hands hang towards the floor. Your toes should remain flat on the floor.



ACTION

Raise your knees and extend your arms. Your toes should stay on the floor. Return to the starting position.



Stretch for from
30 to 45 seconds.

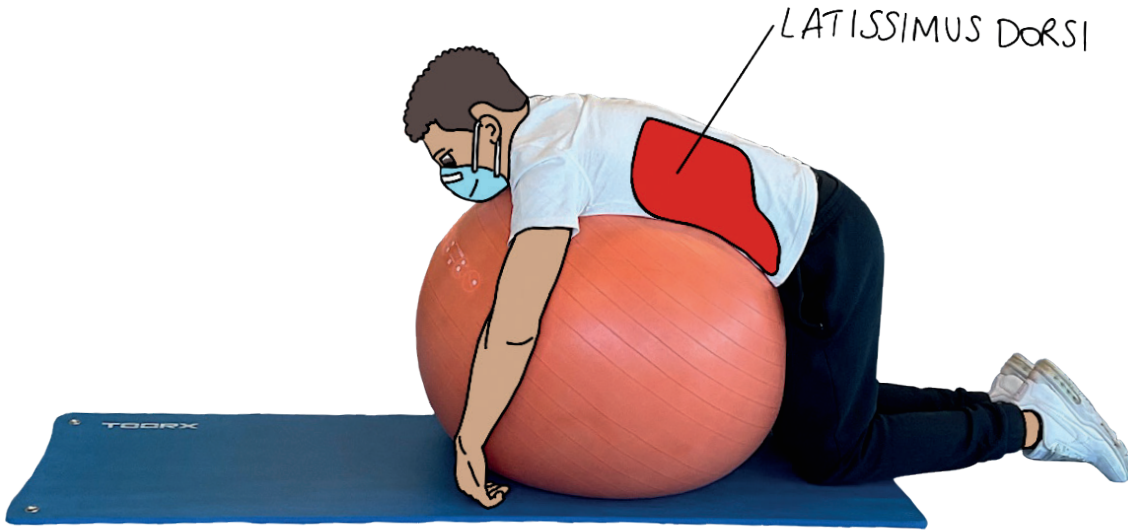


Inhale when you bring your knees to the floor and
exhale when you raise your knees.



EARTHWORM

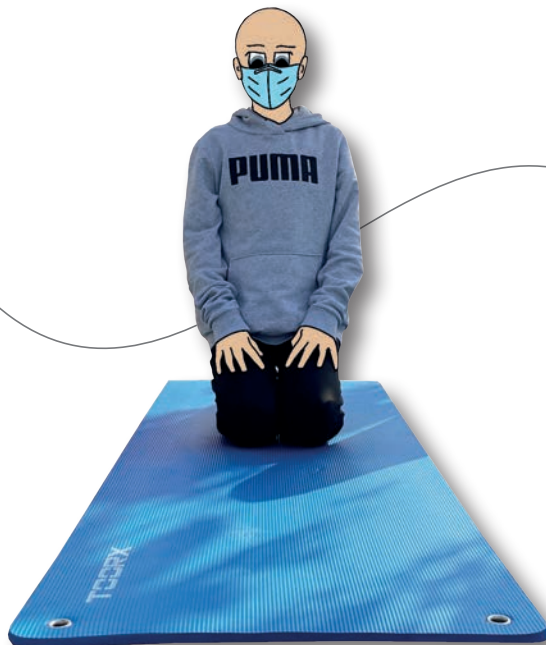
BEST FOR
Latissimus dorsi.



AVOID!
Extending your knees.



PRAYER



STARTING POSITION

Kneel down, with your upper body uprights and your hands on your thighs.



ACTION

Bring your arms forward on the gym mat, trying to stretch as far as possible. Return to the starting position.



Stretch for from
30 to 45 seconds.



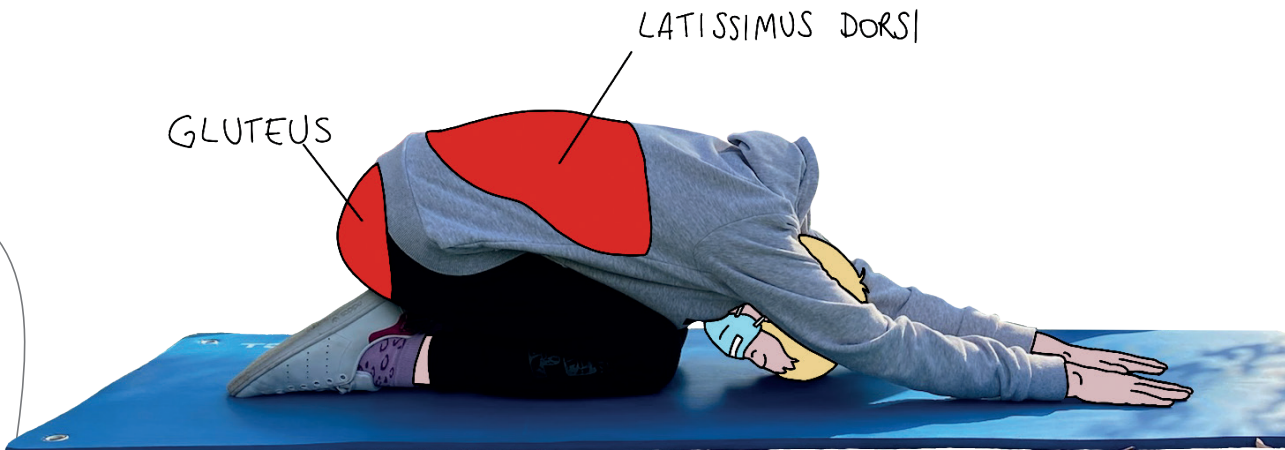
Inhale through your nose and exhale through your mouth in a relaxing rhythm.



PRAYER

BEST FOR

Gluteus.
Latissimus dorsi.



AVOID!

Shrugging your shoulders.
Raising the gluteal muscle from the heels of your feet.



CAT AND DOG



STARTING POSITION

Position yourself on your hands and knees.



ACTION (CAT)

Round your back, pull the stomach up, drop your chin on the chest and round your shoulders.

ACTION (DOG)

Drop your stomach, arch the back by raising your tailbone (coccyx) and raise your head up towards the ceiling, pressing your chest down towards the floor and look up.



Stretch for from
30 to 45 seconds.



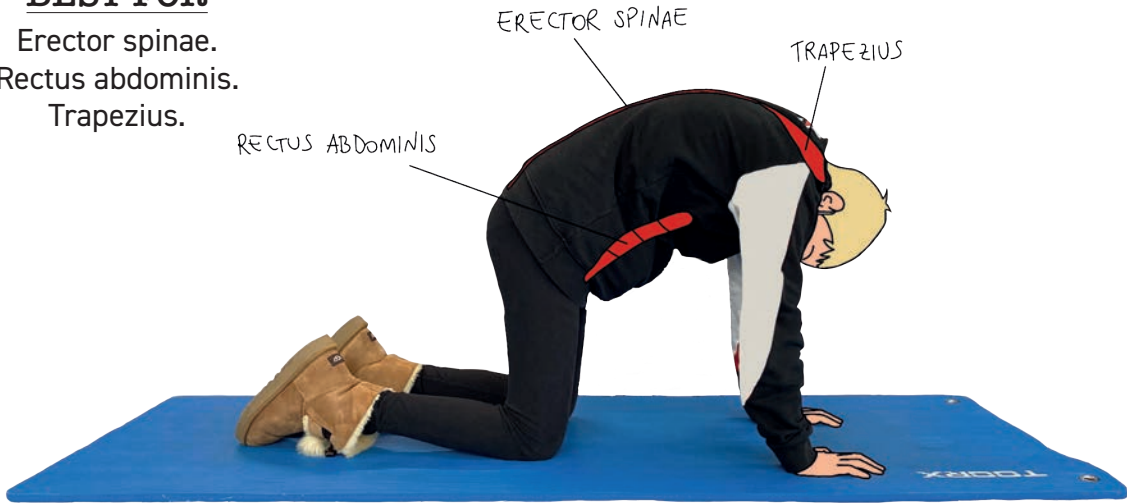
Exhale when lowering your head and inhale when
relaxing your spine.



CAT AND DOG

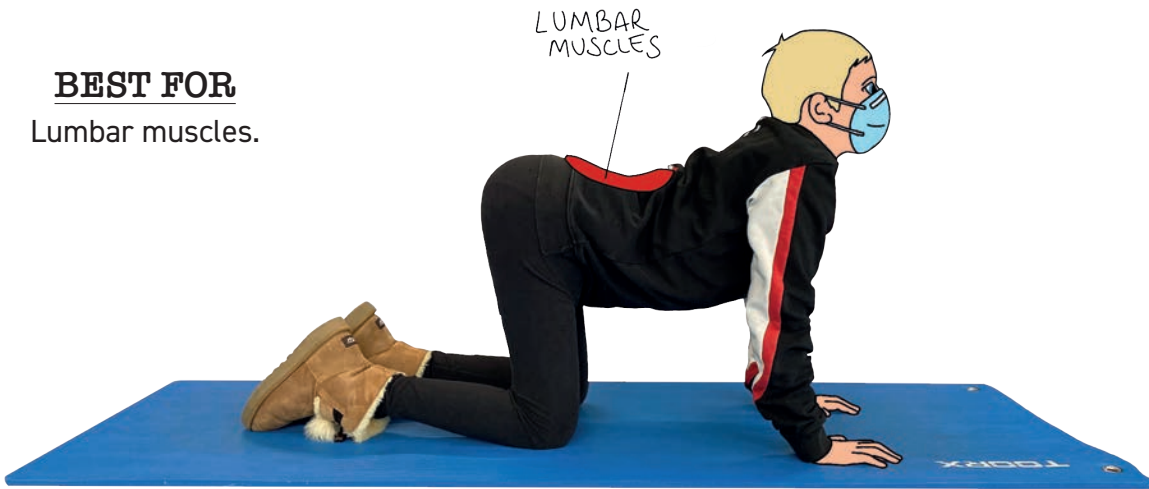
BEST FOR

Erector spinae.
Rectus abdominis.
Trapezius.



BEST FOR

Lumbar muscles.



AVOID!

Not evenly distributing
the weight of your body.



SCORPION



STARTING POSITION

Sitting with your legs stretched out. Cross your right leg over your left, planting your foot off the opposite knee.



ACTION

Wrap the opposite arm around your bent leg. Rotate your torso towards the bent knee by pulling your leg. Return to the starting position. Change your leg.



Stretch for from
30 to 45 seconds.



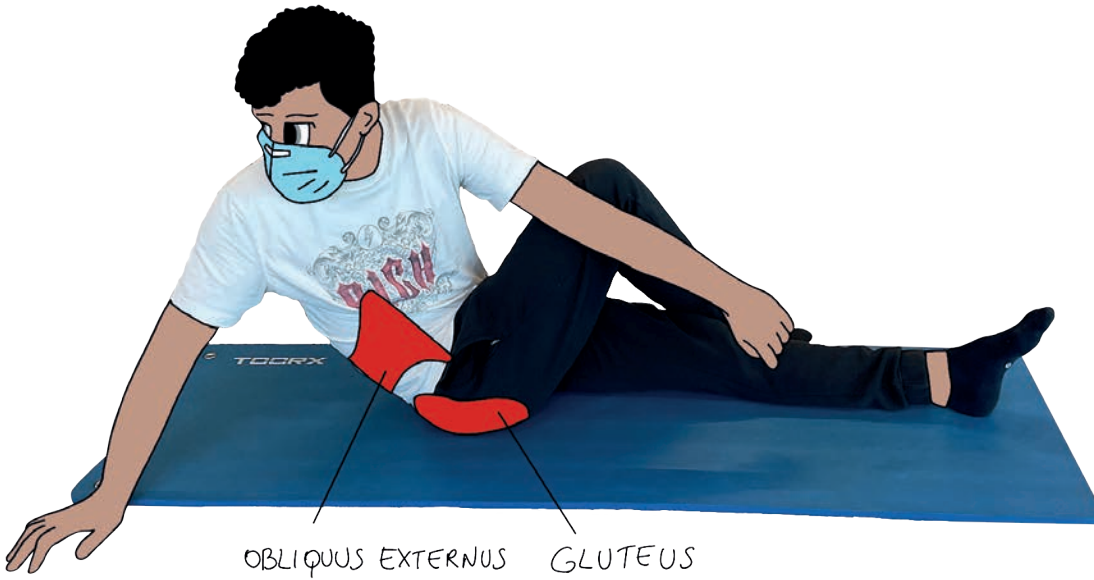
Inhale through your nose and exhale through your
mouth in a relaxing rhythm.



SCORPION

BEST FOR

Gluteus.
Obliquus externus.



AVOID!

Not evenly distributing
the weight of your body.



CUBE



STARTING POSITION

Lying on your side on the gym mat with your knees bent.



ACTION

Extend your hip and heels backwards. Gently assist the movement by pulling your upper leg back and up with your hand. Return to the starting position. Change your leg.



Stretch for from
30 to 45 seconds.



Inhale through your nose and exhale through your mouth in a relaxing rhythm.



CUBE

BEST FOR

Quadriceps.



AVOID!

Over rotating the hip.
Not keeping the spine in
a neutral position and
rotating the pelvis.



POLICE MAN



STARTING POSITION

Standing with your arm out stretched to the side.



ACTION

Bring your left arm across the front of your body at about chest height. Support your left arm with the elbow crease of your right arm. Repeat on the opposite side. Return to the starting position. Change your arm.



Stretch for from
30 to 45 seconds.



Inhale through your nose and exhale through your mouth in a relaxing rhythm.



POLICE MAN

BEST FOR

Rotator cuff.
Deltoid.

ROTATOR CUFF

DELTOID

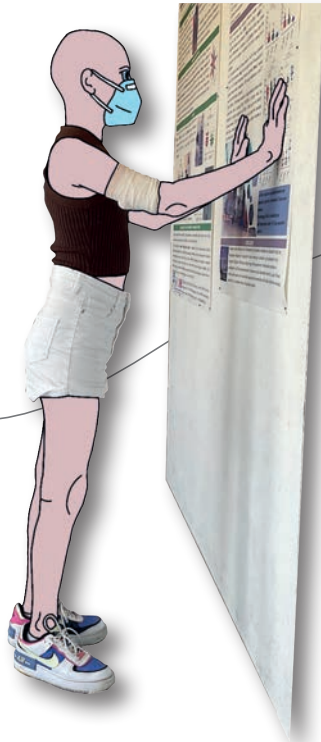


AVOID!

Do not raise your
shoulder.
Do not rotate your torso.



PUSH THE WALL



STARTING POSITION

Standing and lean your hands against the wall.



ACTION

Bring one leg forward and flex the knee without going over your toes. Return to the starting position. Change your leg.



Stretch for from
30 to 45 seconds.



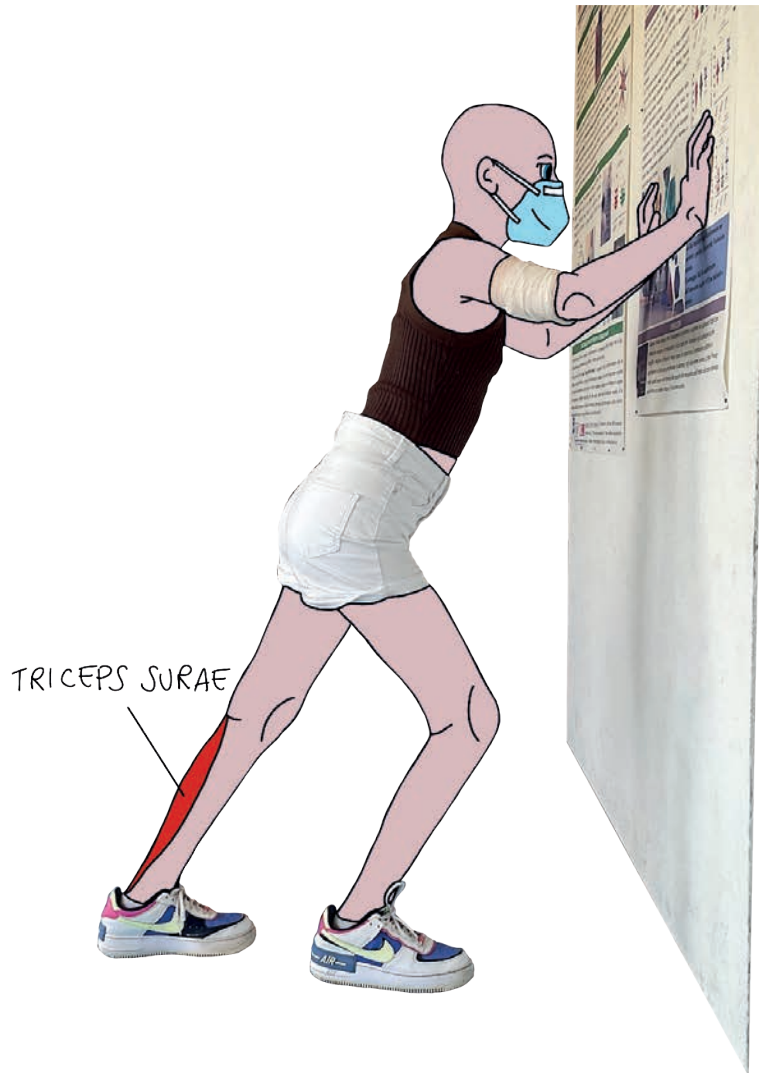
Inhale through your nose and exhale through your mouth in a relaxing rhythm.



PUSH THE WALL

BEST FOR

Triceps surae.



AVOID!

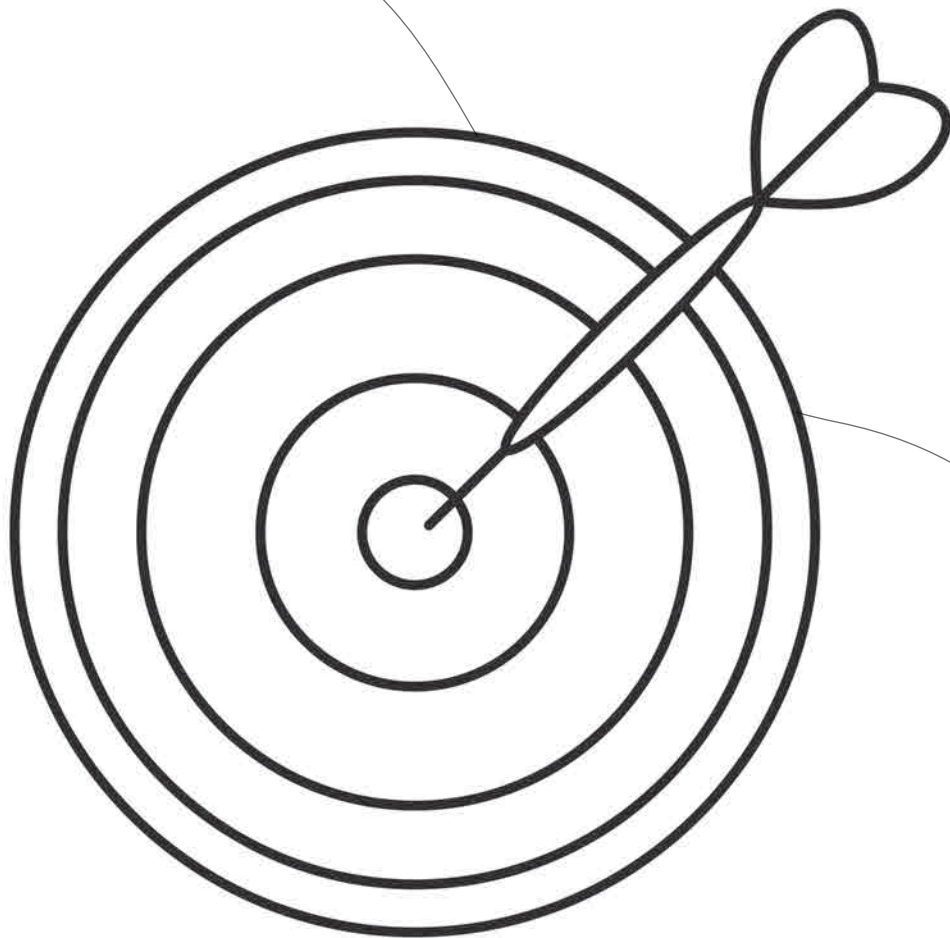
Your knee extending past your toes.



.....
**DIDACTIC PHYSICAL ACTIVITY
GAMES IN THE FRAME
OF EXERCISE THERAPY**
.....



HIT THE TARGET



HIT THE TARGET

| | | |
|---------------------------------|-------------------------------|---|
| Age | 3 – 20 | |
| Functional ability | General physical endurance | X |
| | Strength | X |
| Motor skills | Speed | X |
| | Coordination | X |
| | Balance | X |
| | Flexibility | X |
| | Precision | X |
| Gait | | X |
| Form of exercise therapy | Group exercise therapy (ET) | X |
| | Individual ET – exercise room | X |
| | Individual ET – child's room | X |
| | Bed exercise | X |
| | Remote video training | X |



GROUP EXERCISE THERAPY, EXERCISE ROOM

EQUIPMENT

A set of targets with exercises for each CAYA-c.

Tennis ball or bean-bag or other ball (which depends on the exercises).

Tape.

Scissors.

Dynamic music.

The exercise professional encourages the CAYA-c to join him/her in the middle of the exercise room/gym. The exercise professional explains that they will try some different exercises that will help improve their physical fitness.

With the help of the CAYA-c, the exercise professional sticks the targets with an exercise on different parts of the gym.

Before sticking the target, the exercise professional shows them the picture/name of the exercise and challenges them to describe it. If the CAYA-c do not recognise what the picture represents or they are not familiar with the exercise, the exercise professional helps them with questions, but does not give them the answer.

When all the targets have been stuck on the selected surfaces, the exercise professional stands in the middle of the gym and invites the CAYA-c to join him/her, using a time frame, namely **I am counting 1, 2, 3, you are all with me** or just **1, 2, 3, 4 and 5**.

Then the exercise professional gives each CAYA-c one tennis ball or encourages them to take it from a box or bag.

Next, he/she calls out the name of the exercise.

CAYA-c run to the appropriate target and try to hit it with the ball. After a successful hit they read the picture/word and wait for the further instructions.

⇒ Primarily exercise professional performs the exercise that is on the picture/written on the target. He/she repeats it with the CAYA-c and monitors that the CAYA-c perform it correctly.

⇒ When the CAYA-c are performing an exercise, the exercise professional closely monitors their performance and ensures that the exercise is performed correctly.



HIT THE TARGET

- ⇒ Once CAYA-c have successfully completed an exercise, the exercise professional challenges them to rejoin him/her in the middle of the exercise room/gym.
- ⇒ The exercise professional repeats the process with the remaining targets.

THE CYCLE IS REPEATED SEVERAL TIMES

The exercise professional calls out the name of the exercise – the CAYA-c run to the appropriate target, they stop half meter (it may be more or less) away from the target and try to hit it from that spot – they name the exercise and execute it in a proper manner – after completion they return to the centre of the gym.

IMPORTANT

- ⇒ If the CAYA-c fail to hit the target, the exercise professional encourages them to try again, or simply hit it near the target.
- ⇒ The exercise professional should select the appropriate number of exercises on a target that the CAYA-c can manage in the first exercise session.
- ⇒ When asking questions, the exercise professional should use associative and comparative learning, without directly giving them the answer.



INDIVIDUAL EXERCISE THERAPY, EXERCISE ROOM OR CHILD'S ROOM

EQUIPMENT

A set of targets with exercises.

Tennis ball or bean-bag or other ball (which depends on the exercises).

Tape.

Scissors.

Dynamic music.

The exercise professional prepares a tennis ball, bean-bag or other type of ball, which depends on exercises that he/she chooses for the CAYA-c, and targets with specific exercises.

With the help of the CAYA-c, the exercise professional sticks the targets with exercises on different parts of the gym or child's room.

Before sticking the target, the exercise professional shows the picture/name of the exercise to the CAYA-c and challenges him/her to describe/read it. If the CAYA-c does not recognise what picture represents or he/she doesn't know the exercise, he/she is

helped by the professional with questions without giving him/her the answer.

When all the targets have been stuck on the selected surfaces, the exercise professional stands in the middle of the gym/room and invites the CAYA-c to join him/her. Then the exercise professional gives the CAYA-c a ball.

Next, the exercise professional calls out the name of the exercise.

The CAYA-c runs to the appropriate target and tries to hit it with the ball. After a successful hit he/she reads the picture/word and waits for the further instructions.

⇒ Primarily the exercise professional performs the exercise that is on the picture/written on the target. The exercise professional repeats it with the CAYA-c and monitors that he/she performs it correctly.

⇒ When the CAYA-c is performing an exercise, the exercise professional closely monitors his/her performance and ensures that the exercise is performed correctly.

⇒ Once the CAYA-c has successfully completed an exercise, the exercise professional challenges him/her to rejoin in the middle of the gym or in the other side of the room.



HIT THE TARGET

- ⇒ The exercise professional repeats the process with the remaining targets.

THE CYCLE IS REPEATED SEVERAL TIMES

The exercise professional calls out the name of the exercise – the CAYA-c runs to the appropriate target, stops half meter (it may be more or less) away from the target and try to hit it from that spot – the CAYA-c names the exercise and executes it in a proper manner – after completion he/she returns to the centre of the gym or to the other side of the room.

IMPORTANT

- ⇒ If the CAYA-c fails to hit the target, the exercise professional encourages him/her to solve the problem by itself. He/she should try several times or just touch the targets with the ball.
- ⇒ The exercise professional should select the appropriate number of exercises on targets that the CAYA-c can manage in the first exercise session. The exercise professional can always add more targets with or without exercises written on, if necessary. Some targets only act as targets, and do not require the CAYA-c to perform the exercise.
- ⇒ When asking questions, the exercise professional should use associative and comparative learning, without directly giving him/her the answer.



INDIVIDUAL EXERCISE THERAPY, BED EXERCISE

EQUIPMENT

A set of targets with exercises.

Tennis ball or bean-bag.

Tape.

Scissors.

Music.

The exercise professional prepares a tennis ball, soft ball or bean-bag, and targets with specific bed exercises.

Before sticking the target, the exercise professional shows the picture/name of the exercise to the CAYA-c and challenges him/her to describe/read it. If the CAYA-c does not recognise what picture represents or he/she doesn't know the exercise, he/she is helped by the exercise professional with questions without giving him/her the answer.

The exercise professional then sticks the target with an exercise on a wall, window, floor, wardrobe, door, shelf, bed, etc.

The process is then repeated with all the targets.

When all the targets have been stuck on the selected surfaces, the exercise professional gives one tennis or other ball or bean-bag to the CAYA-c.

Next, he/she calls out the name of the exercise.

The CAYA-c tries to hit the target with the ball from the bed. After a successful hit he/she reads the picture/word, and waits for the further instructions.

⇒ If necessary, the exercise professional performs the exercise that is on the picture/written on the target and repeats it with the CAYA-c and monitors he/she performs it correctly.

⇒ When the CAYA-c is performing an exercise, the exercise professional closely monitors his/her performance and ensures that the exercise is performed correctly.

⇒ Once the CAYA-c has successfully completed an exercise, the exercise professional gives him/her the ball.

⇒ The exercise professional repeats the process with the remaining targets.



HIT THE TARGET

IMPORTANT

- ⇒ If the CAYA-c fails to hit the target, the exercise professional encourages him/her to try several times.
- ⇒ The exercise professional should select the appropriate number of exercises on targets that the CAYA-c can manage in the first exercise session. He/she can always add more targets with or without exercises written on, if necessary. Some targets only act as targets, and do not require the CAYA-c to perform the exercise.
- ⇒ When asking questions, the exercise professional should use associative and comparative learning, without directly giving him/her the answer.



INDIVIDUAL EXERCISE THERAPY, REMOTE VIDEO TRAINING

EQUIPMENT

A set of targets with exercises which are given to the CAYA-c at the outpatient clinic or sent by email.

Tennis ball or bean-bag.

Tape.

Scissors.

Before starting the remote video training, the exercise professional informs the child's parents/carers to prepare a ball and targets that are printed and cut out beforehand.

The CAYA-c can also receive exercise targets in the outpatient clinic.

IMPORTANT

The exercise professional can only select those exercises that he/she has already performed live with the CAYA-c several times.

Before sticking the target, exercise professional challenges the CAYA-c to read and describe the exercise written on the target. If the CAYA-c does not recognise what picture represents or he/she doesn't know the exercise, he/she is helped by the exercise professional with questions without giving him/her the answer.

The CAYA-c then sticks the target with an exercise on a wall, window, floor, wardrobe, door, shelf, bed, etc. The target needs to be seen on the camera.

When all the targets have been stuck on the surfaces that can be seen on the camera, the exercise professional calls out the name of one exercise.

The CAYA-c runs to the appropriate target and tries to hit it with the ball. After a successful hit he/she reads the picture/word and waits for the further instructions.

⇒ First the exercise professional explains the exercise that is written on the target.

⇒ Then the exercise professional encourages the CAYA-c to perform the exercise correctly.

⇒ When the CAYA-c is performing an exercise, the exercise professional closely monitors the child's performance and ensures that the exercise is performed correctly.



HIT THE TARGET

⇒ The exercise professional verbally guides the CAYA-c all the time to perform the exercise correctly and reminds him/her on what to pay attention to. At the same time, the exercise professional also encourages him/her.

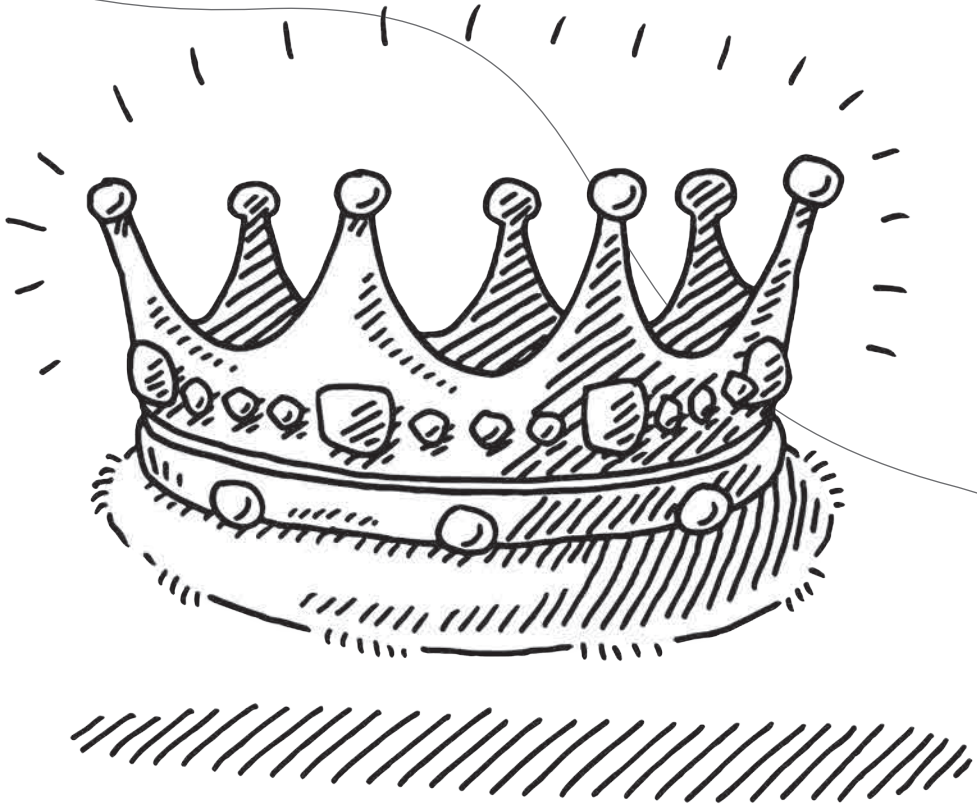
The exercise professional repeats the process with the remaining targets.

IMPORTANT

- ⇒ If the CAYA-c fails to hit the target, the exercise professional encourages him/her to try several times.
- ⇒ The exercise professional should select the appropriate number of exercises on targets that the CAYA-c can manage in the first exercise session. The exercise professional can always add more targets with or without exercises written on, if necessary. Some targets only act as targets, and do not require the CAYA-c to perform the exercise.
- ⇒ When asking questions, the exercise professional should use associative and comparative learning, without directly giving him/her the answer.



THE ROYAL JEWELS



THE ROYAL JEWELS

| | | |
|---------------------------------|-------------------------------|---|
| Age | 2 – 20 | |
| Functional ability | General physical endurance | X |
| | Strength | X |
| Motor skills | Speed | X |
| | Coordination | X |
| | Balance | X |
| | Flexibility | X |
| | Precision | |
| Gait | | X |
| Form of exercise therapy | Group exercise therapy (ET) | X |
| | Individual ET – exercise room | X |
| | Individual ET – child's room | X |
| | Bed exercise | X |
| | Remote video training | X |



GROUP EXERCISE THERAPY, EXERCISE ROOM

EQUIPMENT

Hoops.

Jump ropes.

Dice.

Balls different sizes and shapes.

Paper balls.

Dumbbells etc.

The exercise professional encourages the CAYA-c to join him/her in the middle of the exercise room/gym. The exercise professional explains them that they will play the game 'The Royal Jewels' with which they will learn and try specific exercises to help improve their physical fitness.

After a short introduction, the exercise professional prepares one or more treasure chests.

TREASURE CHESTS OPTIONS

1. The exercise professional places three hoops on the floor, so that all three are touching each other and forming the shape of flower. The CAYA-c fill them with various sports equipment that represents jewels.

2. The exercise professional places one or more hoops on the floor in such a way that they are distributed around the room, far from one another. The CAYA-c fill each hoop with various sports equipment.

Two CAYA-c in the group are chosen to be the **guards**, the remaining CAYA-c are the **thieves**.

The **guards** protect the royal jewels that are stored in the treasury. They do this by moving only around the hoops. They are not allowed to leave them or stand in them.

The **thieves** try to steal the royal jewels without being caught by the **guards**.

The exercise professional determines the number of jewels that each **thief** can take at a time (e.g. only one jewel).

If the **guard** touches the **thief**, he/she freezes until the end of the game. Instead, the exercise professional can designate a place that serves as a prison and where the caught **thieves** go.



THE ROYAL JEWELS

The **guards** must catch as many **thieves** as possible by touching them, and **thieves** must steal as many royal jewels as possible. They store the jewels in their hiding places (mark the thieves' hiding places in the gym).

When the CAYA-c have mastered the first stage of the game, the exercise professional can add a new rule, that when the **guard** touches the **thief**, he/she freezes and counts to five (or less, more). When the frozen **thief** has counted to five, he/she can return to the game and start stealing the royal jewels again.

The CAYA-c should take turns in different roles as many times as possible.

CAUTION

The exercise professional must pay attention to the intensity of the CAYA-c' movements. If it is too high, he/she should instruct the use of walking instead of running.

VARIATIONS

- ⇒ After the game is over, the exercise professional, together with the **thieves**, checks which and how many jewels they managed to steal and bring to their hiding places.
- ⇒ Each **thief** takes one of the jewels and, according to the exercise professional instructions, performs an exercise with it. For example, if he/she has a skipping rope, he/she can walk on it, stepwalks on it or performs another exercise shown to him/her by the exercise professional.



INDIVIDUAL EXERCISE THERAPY, EXERCISE ROOM OR CHILD'S ROOM

EQUIPMENT

Hoops.

Jump ropes.

Dice.

Balls different sizes and shapes.

Newspaper balls.

Dumbbells etc.

The exercise professional encourages the CAYA-c to join him/her in one part of the room. He/she explains that they are going to play a game called 'The Royal Jewels', which will help the CAYA-c to develop the individual components of motor performance.

After short introduction of the game, the exercise professional prepares one or more treasure chests.

TREASURE CHESTS

Place one or two hoops on the floor, so that in the case of two hoops, they are touching

one another on one side. The CAYA-c fills it/them with various sports equipment that represents jewels.

The exercise professional and the CAYA-c play a role play:

⇒ Before the game starts, they play the game 'Rock, Paper, Scissors'. The winner takes the role of the **guard** while the loser takes the role of the **thief**, or vice versa.

⇒ The game 'Rock, Paper, Scissors', with which the CAYA-c struggles to gain the position, further stimulates the child's intrinsic motivation to engage in physical activity.

THE ROLES

⇒ The **guard** protects the royal jewels that are stored in the treasury. He/she does this by moving only around the hoops. He/she is not allowed to leave them or stand in them.

⇒ A **thief** tries to steal the royal jewels without being caught by a **guard**. He/she takes the stolen jewel to his hiding place, which can be on or under their bed, by the window or in a hoop he/she has prepared before the start of the game.



THE ROYAL JEWELS

If the **guard** touches the **thief** who is holding a jewel, he/she must first put the jewel back in the treasure trove and freeze in place for 5 seconds (counting to 5).

⇒ Instead of freezing, the exercise professional can designate a place in the room to serve as a **prison**. In this case, the caught **thief** must first return the jewel to the treasure trove and then go to the **prison**, where he/she counts to five and returns to the game or performs the exercise set by the **guard** and then returns to the game.

The game ends when the **thief** manages to steal all the jewels from the treasure trove and take them to his hiding place.

The exercise professional and the CAYA-c switch roles.

VARIATIONS

- ⇒ After the game is over, the exercise professional, together with the **thief**, checks which and how many jewels he/she managed to steal and bring to its hiding place.
- ⇒ The **thief** then chooses one of the jewels with which then performs some exercises, according to the exercise professional instructions.



INDIVIDUAL EXERCISE THERAPY, BED EXERCISE

EQUIPMENT

Hoops.

Dice.

Balls different sizes and shapes.

Bean bags.

Paper balls.

Dumbbells etc.

The exercise professional encourages the CAYA-c to get into a sitting position on the bed. The sitting position depends on the child's condition.

Then he/she puts a hoop on the bed and fills it with sport equipment (tennis balls, table tennis balls, balls made of paper, dumbbells, bean bags, etc.). As the exercise professional places the equipment in the hoop, he/she explains that they represent the jewels stored in the treasure chest.

When the exercise professional has finished preparing the treasure chest, he/she places one hoop at each end of the room, which will be used as a hiding place for the duration of the game. Caution: if the CAYA-c movement is limited the hoops should be placed under his bed, or by the bed.

The exercise professional and the CAYA-c play a role play:

⇒ Before the game starts, they play the game 'Rock, Paper, Scissors'. The winner takes the role of the **guard** while the loser takes the role of the **thief**, or vice versa.

⇒ The game 'Rock, Paper, Scissors', with which the CAYA-c struggles to gain the position, further stimulates the child's intrinsic motivation to engage in physical activity.

1. OPTION

The **guard**, the exercise professional, protects the royal jewels that are stored in the treasury. He/she does this by holding hands above the hoop. The **guard** is trying to catch the **thief** by the arm, while he/she is holding the jewel.

A **thief**, the CAYA-c, tries to steal the royal jewels without being caught by a **guard**. He/she can take only one jewel at a time and throws it to his hiding place (the hoops that are placed in a different places in the room).



THE ROYAL JEWELS

If the **guard** touches the **thief** who is holding a jewel, he/she must first put the jewel back in the treasure trove and freeze in place for 5 seconds (counting to 5).

⇒ Alternatives. The **thief** can freeze in different positions, such as extended arms above the head, extended arms behind the back, leaning with the torso to the right side and in the next catch to the left side, etc. In which position the **thief** must freeze can be also determined by the **guard**.

The game is over when the **thief** has managed to steal all the jewels and store them in his hiding place.

2. OPTION

The **guard**, the CAYA-c, protects the royal jewels that are stored in the treasury. He/she does this by holding hands above the hoop. The **guard** is trying to catch the **thief** by the arm, while he/she is holding the jewel.

A **thief**, the exercise professional, tries to steal the royal jewels without being caught by a **guard**. He/she can take only one jewel at once and store it to his hiding place (the hoops that are placed in a different spots in the room).

If the **guard** touches the **thief** who is holding a jewel, he/she must first put the jewel back in the treasure trove and freeze in place for 5 seconds (counting to 5).

⇒ Alternatives. The thief can freeze in different positions, such as extended arms above the head, extended arms behind the back, leaning with the torso to the right side and in the next catch to the left side, flamingo position, flying angel position, childs' pose position, etc. In which position the **thief** must freeze can be also determined by the **guard**.

The game is over when the **thief** has managed to steal all the jewels and store them in his hiding place.



INDIVIDUAL EXERCISE THERAPY, BED EXERCISE

MORE OPTIONS

- ⇒ Game between two CAYA-c. If one of the CAYA-c is in bed and the other is mobile, these two can play the game 'The Royal Jewels' with each other according to the instructions described above. The exercise professional monitors the movement intensity of both CAYA-c at all times, as well as the correct execution of the exercises.
- ⇒ Game between the CAYA-c and the parent/carer. The parent takes on the role of the exercise professional and plays the game with his/her child, who has a prescribed bed rest. In both cases (as the **guard** and the **thief**), the game is played in the same way as described above. The exercise professional monitors the child's movement intensity at all times, as well as the correct execution of the exercises.

VARIATIONS

- ⇒ After the game is over, the exercise professional encourages the **thief** to choose one of the jewels, with which then performs some exercises, according to the exercise professional instructions.



INDIVIDUAL EXERCISE THERAPY, REMOTE VIDEO TRAINING

EQUIPMENT

Balls different sizes and shapes.

Paper balls.

Dumbbells (if they have them at home).

2 large paper boxes or other items which can serve as a chests.

Before starting remote video training, the exercise professional informs the child's parents to prepare balls different sizes and shapes, paper balls, dumbbells (if they have them), other small equipment and two large cardboard boxes or other similar items.

IMPORTANT

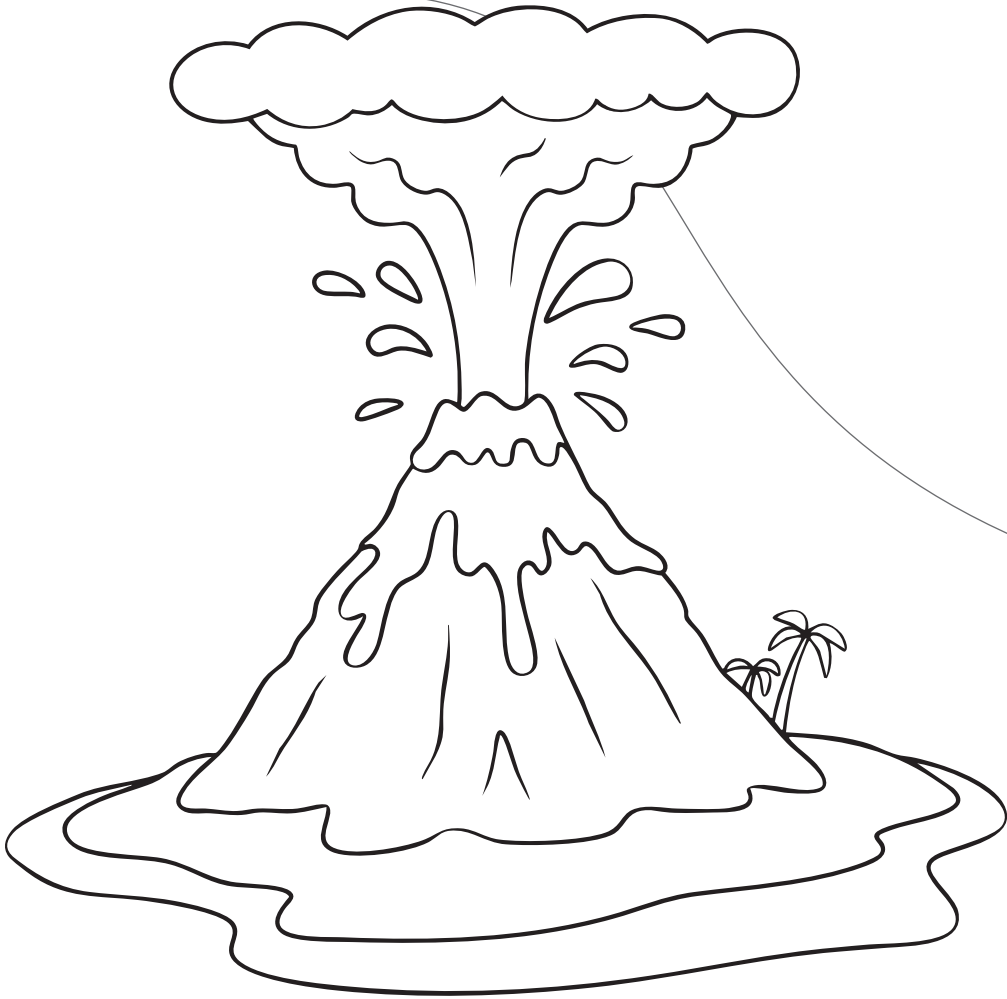
⇒ The exercise professional writes in the instructions that at least one sibling or parent will need to be actively involved in the training.

⇒ The game is performed in its entirety as if it were performed 'Individual exercise therapy' (read the guidelines for 'Individual exercise therapy - exercise room or child's room').

⇒ The exercise professional guides each step and constantly monitors the child's movement intensity and the correct execution of all exercises.



VOLCANO



VOLCANO

| | | |
|---------------------------------|-------------------------------|---|
| Age | 3 – 20 | |
| Functional ability | General physical endurance | X |
| | Strength | X |
| | Speed | X |
| Motor skills | Coordination | X |
| | Balance | X |
| | Flexibility | X |
| | Precision | X |
| Gait | | X |
| | Group exercise therapy (ET) | X |
| | Individual ET – exercise room | X |
| Form of exercise therapy | Individual ET – child’s room | X |
| | Bed exercise | X |
| | Remote video training | X |



GROUP EXERCISE THERAPY, EXERCISE ROOM

EQUIPMENT

Worksheet with exercises per group.

0.5 l paper cup per group.

Scissors per group.

The exercise professional encourages the CAYA-c to join him/her in the middle of the exercise room/gym. The exercise professional tells them that they will learn and try specific exercises to help improve their physical fitness.

Then the exercise professional instructs them to divide themselves into numerically equal groups. The exercise professional can use one of the fit methods for sorting.

Each group prepares its own work area. At the same time, the group is provided a paper cup and a worksheet with exercises, from which members cut out pieces of paper, so that each exercise is on its own piece of paper. In the meantime they crumple each piece of paper and make a ball out of it. When they have the balls ready, they put them into a paper cup. They agree among themselves on the order of throwing.

The group members form a circle. The first thrower stands in the middle of the circle, holding a paper cup.

At the exercise professional's signal **3-2-1-now**, the thrower throws the balls, making them fly out of the cup as high as possible, and then trying to catch them in the cup.

The remaining balls are intercepted by the group members, so that they do not fly outside the circle. The paper balls that the thrower failed to catch, are left on the floor within their work area and collected in a pile.

The thrower places the cup with the paper balls in the middle of the work area. He/she takes one paper ball from the cup, opens it and reads the words out loud to the rest of the team.

The team members first describe the exercise to the exercise professional. They remain standing in the meantime.

⇒ The exercise professional first performs the exercise that is written on the paper and that the CAYA-c just described.



VOLCANO

⇒ Then the exercise professional repeats it with the CAYA-c and monitors that the CAYA-c perform it correctly.

⇒ When the CAYA-c are performing the exercise, the exercise professional closely monitors their performance and ensures that the exercise is performed correctly.

Once CAYA-c have successfully completed the exercise, the exercise professional challenges them to take another ball out of the cup, if there are any left.

If there are none, the second thrower picks up the balls that remained on the floor and places them in the paper cup.

The group members form a circle again, and the second thrower stands in the middle of it with the cup in his hands.

In the second cycle, the team performs the start independently, namely one of the members calls out **3-2-1-now**, the thrower throws the balls into the air and tries to catch them in the cup.

The game is repeated until the groups have managed to catch all the balls in the cup and execute all the exercises written on the pieces of paper or when the time set by the exercise professional has elapsed.

IMPORTANT

⇒ The exercise professional should select the appropriate number of exercises that the CAYA-c can manage in the first exercise session.

⇒ When asking questions, the exercise professional should use associative and comparative learning, without giving him/her directly the answer.

⇒ To perform Volcano game as a group, a minimum of three members are required. Two hold hands and form a circle, while one stands in the middle.



INDIVIDUAL EXERCISE THERAPY, EXERCISE ROOM OR CHILD'S ROOM

EQUIPMENT

Worksheet with exercises.

0.5 l paper cup.

Scissors.

The exercise professional prepares a worksheet with exercises, one paper cup and scissors. Then the exercise professional encourages the CAYA-c to cut out pieces of paper from the worksheet, so that each exercise is on its own piece. In the meantime the CAYA-c crumples each piece of paper and makes a ball out of it. When the CAYA-c has the balls ready, he/she puts them into a paper cup.

The CAYA-c stands in the middle of the gym/room, holding a paper cup.

At the exercise professional's signal **3-2-1-now**, the CAYA-c throws the balls, making them fly out of the cup as high as possible, and then trying to catch them in the cup. The paper balls that the CAYA-c failed to catch, are left on the floor within their work area and stacked in a pile.

The CAYA-c places the cup with the paper balls in the selected surface. He/she takes one from the cup, opens it and reads the words out loud and describes the exercise to the exercise professional, while standing.

⇒ The exercise written on the paper, which was described by the CAYA-c, is first performed by the exercise professional. While the exercise professional demonstrates it, he/she also describes the correct procedure for its performance.

⇒ Afterwards the exercise professional repeats it with the CAYA-c and monitors that the CAYA-c performs it correctly.

⇒ When the CAYA-c is performing the exercise, the exercise professional closely monitors the child's performance and ensures that the exercise is performed correctly.

Once the CAYA-c has successfully completed the exercise, the exercise professional challenges him/her to take another ball out of the cup, if there are any left.



VOLCANO

If there are none, the CAYA-c picks up the balls that remained on the floor and places them in the paper cup.

He/she again steps in the middle of the gym/room, holding a paper cup.

In the second cycle, the CAYA-c performs the start independently, namely he/she calls out **3-2-1-now**, and throws the balls into the air and tries to catch them in the cup.

The game is repeated until the CAYA-c has managed to catch all the balls in the cup and execute all the exercises written on the slips of paper or when the time set by the exercise professional has elapsed.

IMPORTANT

⇒ The exercise professional should select the appropriate number of exercises that the CAYA-c can manage in the first exercise session.



INDIVIDUAL EXERCISE THERAPY, BED EXERCISE

EQUIPMENT

Worksheet with exercises.

0.5 l paper cup.

Scissors.

The exercise professional prepares a worksheet with exercises, one paper cup and scissors. Then he/she encourages the CAYA-c to cut out pieces of paper from the worksheet, so that each exercise is on its own piece. In the meantime the CAYA-c crumples each piece of paper and makes a ball out of it. When the CAYA-c has the balls ready, he/she puts them into a paper cup.

If necessary, the exercise professional assists the CAYA-c in preparing the paper balls.

The CAYA-c sits on the bed with bent and crossed legs, holding a paper cup.

At the exercise professional's signal **3-2-1-now**, the CAYA-c throws the balls, making them fly out of the cup as high as possible, and then trying to catch them in the cup. The exercise professional collects the paper balls that the CAYA-c failed to catch in the paper cup and places them in a pile.

The CAYA-c places the cup with the paper balls in the selected surface. He/she takes one from the cup, opens it and reads the words out loud, and describes the exercise.

⇒ The exercise written on the paper, which was described by the CAYA-c, is first performed by the exercise professional himself. While the exercise professional demonstrates it, he/she also describes the movement.

⇒ Afterwards the exercise professional repeats it with the CAYA-c and monitors that the CAYA-c performs it correctly.

⇒ When the CAYA-c is performing the exercise, the exercise professional closely monitors the child's performance and ensures that the exercise is performed correctly.

Once the CAYA-c has successfully completed the exercise, the exercise professional challenges him/her to take another ball out of the cup, if there are any left.

If there are none, the CAYA-c picks up the balls from the pile and places them in the paper cup.



VOLCANO

He/she again sits on the bed with bent and crossed legs, holding a paper cup.

In the second cycle, the CAYA-c performs the start independently, namely he/she calls out **3-2-1-now**, and throws the balls into the air and tries to catch them in the cup.

The game is repeated until the CAYA-c has managed to catch all the balls in the cup and execute all the exercises written on the slips of paper or when the time set by the exercise professional has elapsed.

IMPORTANT

- ⇒ The exercise professional should select the appropriate number of exercises that the CAYA-c can manage in the first exercise session.
- ⇒ When asking questions, the exercise professional should use associative and comparative learning, without giving him/her directly the answer.



INDIVIDUAL EXERCISE THERAPY, REMOTE VIDEO TRAINING

EQUIPMENT

Worksheet with exercises.

16 sheets of paper or less (which depends on number of exercises).

Dark coloured marker.

Small box, bucket or trash can.

Before starting the video distance training, the exercise professional informs the child's parents to prepare 16 sheets of paper, dark coloured marker and small box, bucket or bin.

IMPORTANT

⇒ The exercise professional can only select those exercises that he/she has already performed live with the CAYA-c several times.

The CAYA-c prepares 16 sheets of paper. On each sheet, he/she writes one word from the worksheet that the exercise professional hands out on the screen. The CAYA-c writes one word in large print on each sheet and then crumples it up to make a paper ball. He/she should end up with 16 paper balls.

When the CAYA-c has the balls ready, he/she puts them into a box and then places the box in the middle of the room, so it can be seen from the camera on the computer screen.

At the exercise professional's signal **play the game**, the CAYA-c throws the balls so that they fly out of the box as high as possible in different directions and then tries to catch them with the box.

One by one, the CAYA-c opens the balls that he/she managed to catch back into the box, reads the word that is written on the paper and describes each exercise.

⇒ The exercises written on the paper, which were described by the CAYA-c, are first performed by the exercise professional. While the exercise professional demonstrates them one by one, he/she also describes the movement.

⇒ Afterwards the exercise professional repeats each exercise with the CAYA-c, and monitors that the CAYA-c performs it correctly.



VOLCANO

⇒ When the CAYA-c is performing the exercise, the exercise professional closely monitors the child's performance and ensures that the exercise is performed correctly.

Once the CAYA-c has successfully completed all exercises written on the paper balls that he/she managed to catch in the first round, he/she picks up the remaining balls and places them in the box.

The second cycle, the CAYA-c starts himself, namely on **3-2-1-now**, throws the balls into the air and tries to catch them with the box.

The game is repeated until the CAYA-c has managed to catch all the balls in the box and execute all the exercises written on paper balls or when the time set by the exercise professional has elapsed.

IMPORTANT

- ⇒ The exercise professional should select the appropriate number of exercises that the CAYA-c can manage in the first exercise session.
- ⇒ When asking questions, the exercise professional should use associative and comparative learning, without giving him/her directly the answer.



VOLCANO

BALANCE AND POSTURE

| | | | |
|--------------------------------|--|----------------------------------|---------------------------------------|
| CRUNCH FEET ON FITBALL | ONE LEG POSTURE ON BALANCE DISC | CROSS-OVER CRUNCH | ABS WHEEL |
| BRIDGE ON FITBALL | ARM-LEG EXTENSION | FRONT PLANK | SIDE PLANK |
| BIPEDAL POSTURE ON BALANCE | CROSS LEG GLUTEAL BALANCE | ONE LEG POSTURE ON TRAMPOLINE | BIPEDAL POSTURE ON TRAMPOLINE |
| SKIP AND STOP ON TRAMPOLINE | ONE LEG POSTURE TURN AROUND CONE | STEPPING OVER OBSTACLES | LATERAL STEPPING OVER OBSTACLES |

STRENGTH

| | | | |
|------------------------------|------------------------|----------------------------|--------------|
| BARBELL SQUAT | LUNGE | CALF RAISE | ADDUCTION |
| BACK EXTENSION ON FITBALL | PUSH UPS ON FITBALL | BENCH PRESS | UPRIGHT ROWS |
| OVERHEAD PRESS | LATERAL RAISE | TRICEPS EXTENSION | BICEP CURL |
| DUMBBELL KICKBACK | THE SKATER | LAT PULLDOWN ON FITBALL | WALL SIT |



VOLCANO

CARDIORESPIRATORY

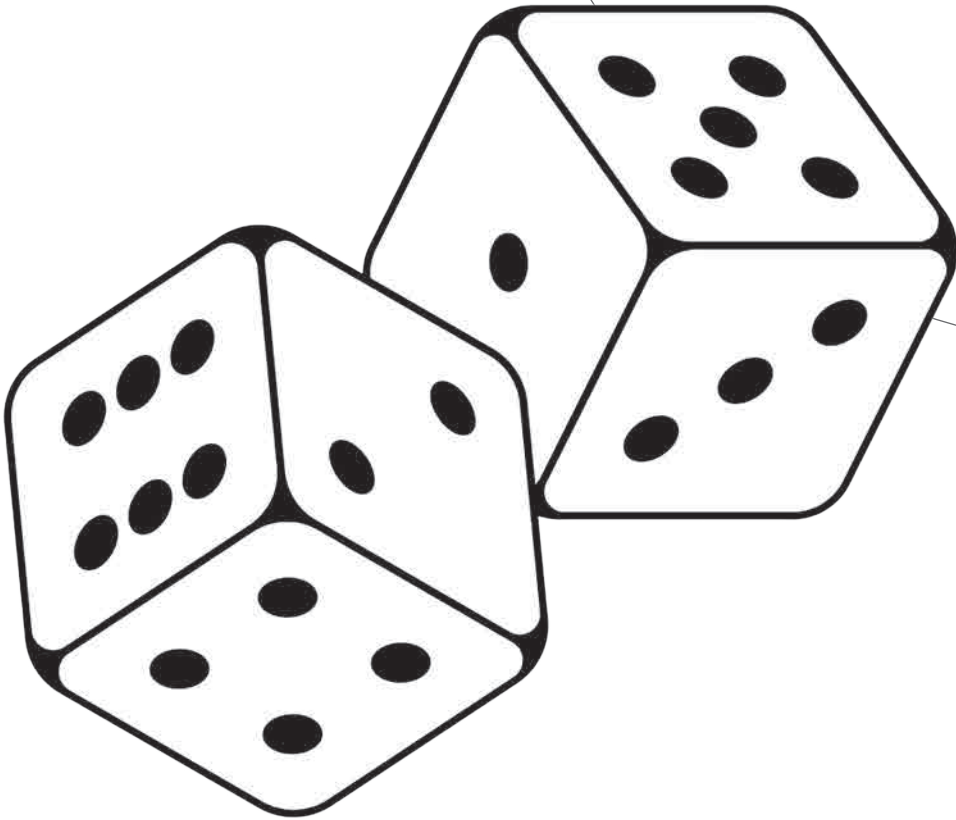
| | | | |
|----------------------------------|---------------------------------|-------------------------------------|---------------------------------|
| MINI TRAMPOLINE WALK | MINI TRAMPOLINE JUMP | UP & DOWN STAIRS | WALKING THROUGH OBSTACLE COURSE |
| STEP UP, RIGHT LEG UP FIRST | STEP UP, LEFT LEG UP FIRST | STEP DOWN, RIGHT LEG DOWN FIRST | STEP DOWN, LEFT LEG DOWN FIRST |
| LATERAL STEP, RIGHT LEG UP FIRST | LATERAL STEP, LEFT LEG UP FIRST | STEP UP, ONE LEG UP, CLAPPING HANDS | ROWING ERGOMETER |
| STRADDLE STEP UP AND DOWN | ELLIPTICAL MACHINE | RECUMBENT BIKE | |

FLEXIBILITY

| | | | |
|-------------|---------------|----------|-----------|
| STAR GAZERS | CHANDELIER | PADLOCK | EARTHWORM |
| PRAYER | CAT AND DOG | SCORPION | CUBE |
| POLICE MAN | PUSH THE WALL | | |



ROLL THE MOVEMENT



ROLL THE MOVEMENT

| | | |
|---------------------------------|-------------------------------|---|
| Age | 3 – 20 | |
| Functional ability | General physical endurance | X |
| | Strength | X |
| | Speed | X |
| | Coordination | X |
| | Balance | X |
| | Flexibility | X |
| | Precision | X |
| | Motor skills | |
| Gait | | X |
| Form of exercise therapy | Group exercise therapy (ET) | X |
| | Individual ET – exercise room | X |
| | Individual ET – child’s room | X |
| | Bed exercise | X |
| | Remote video training | X |



GROUP EXERCISE THERAPY, EXERCISE ROOM

EQUIPMENT

Foam dice or cardboard dice.

Worksheet with exercises and repetitions for each group.

Gymnastics mats if needed.

Dynamic music.

The exercise professional encourages the CAYA-c to join him/her in the middle of the exercise room/gym. The exercise professional tells them that they will learn and try different exercises to help improve their physical fitness.

Then the exercise professional instructs them to divide themselves into numerically equal groups or into pairs.

Each group chooses its own workspace on which it prepares a mat (or two), a foam dice and a worksheet. Each CAYA-c must prepare their own sheet of paper and pen, which they also bring to the group's workspace.

Once the groups have prepared their workspace and all the necessary equipment, the group members must agree on the order of throwing, namely who will be the first, second... and last to throw the dice.

Before the game begins, the exercise professional gradually demonstrate each exercise written on the worksheet.

⇒ First, the exercise professional performs the exercise that is on the picture/written under the number one (one dot). He/she repeats it with the CAYA-c and monitors that the CAYA-c performs it correctly.

⇒ The exercise professional repeats the process with the second, third... and sixth exercise.

On the mark **play the game**, the first thrower in each group rolls the dice. The number on which the dice lands, indicates the exercise and the number of repetitions. Each member of the group must perform the exercise correctly and repeat it as many times as the shows number requires. After all members of the group have successfully completed the exercise, the next thrower rolls the dice.



ROLL THE MOVEMENT

If the next thrower gets the same number as the thrower before him/her:

- a. all group members execute the exercise again, or
- b. he/she throws the dice again and again, until the dice lands on a different number.

With each throw, the group members must write down on their sheet of paper the exercise the group member rolled. They do this after each throw.

It is important that the group members roll the dice so many times that it stops on all six numbers, and that everyone performs all six exercises.

Once the group has managed to perform all six exercises, they must perform them again in the order they were drawn and create a choreography.

VARIATIONS

- ⇒ The groups perform the choreography in reverse order of the exercises.
- ⇒ The selected group teaches their choreography to the other groups.
- ⇒ Each CAYA-c in the group creates its own worksheet with the selected exercises.
- ⇒ The groups connect all the choreographies into one.
- ⇒ The groups exchange cards with tasks/exercises.
- ⇒ The group creates their own worksheet with exercises.
- ⇒ For preschool CAYA-c, instead of words, we draw animals, plants, characters. When a number is rolled, CAYA-c performs an adequate exercise, that is written next to the number on the worksheet.
- ⇒ For very young participants, draw or stick pictures of animals, plants or characters on a dice. In this case, each CAYA-c has their own dice that they roll. Each dice should show different pictures. Patient must participate in making the dice, as this involves him/her in the preparation process, which ensures a holistic approach and intrinsic motivation.



INDIVIDUAL EXERCISE THERAPY, EXERCISE ROOM OR CHILD'S ROOM

EQUIPMENT

Foam dice or
cardboard dice.

Worksheet with exercises
and repetitions.

Dynamic music.

The exercise professional prepares a foam dice and a worksheet for the CAYA-c.

Before starting the game, the exercise professional encourages the CAYA-c to read the exercises written on the worksheet. With asking questions he/she must check whether the CAYA-c already knows the exercises and can describe them. With the preschool CAYA-c encourages him/her to read pictures.

On the signal **play the game**, the CAYA-c rolls the dice. The number on which the dice lands, indicates the exercise and the number of repetitions.

⇒ First the exercise professional performs the exercise that is on the picture/written under the drawn number.

⇒ Then the exercise professional repeats it with the CAYA-c and monitors that the CAYA-c performs it correctly.

⇒ When the CAYA-c is performing the exercise, the exercise professional closely monitors the child's performance and ensures that the exercise is performed correctly.

Once the CAYA-c has successfully completed the exercise, he/she rolls the dice again.

If the next throw lands on the same number as before:

- CAYA-c executes the exercise again, or
- he/she throws the dice again and again, until the dice lands on a different number.

The CAYA-c must remember and write down the sequence of rolled exercises and create a choreography from them. Transitions from one exercise to another must be fluid.

VARIATIONS

⇒ The CAYA-c performs the choreography in reverse order.

⇒ The CAYA-c should create his/her own exercise worksheet.



INDIVIDUAL EXERCISE THERAPY, BED EXERCISE

EQUIPMENT

Foam dice or
cardboard dice.

Worksheet with exercises
and repetitions.

Dynamic music (optional).

The exercise professional prepares a foam dice and a worksheet for the CAYA-c.

IMPORTANT

The worksheet includes only selected exercises that can be performed on the bed or that can be modified so that they can be performed on the bed.

Before starting the game, the exercise professional encourages the CAYA-c to read the exercises written on the worksheet. With asking questions he/she must check whether the CAYA-c already knows the exercises and can describe them. With the preschool CAYA-c encourages him/her to read pictures.

On the signal **play the game**, the CAYA-c rolls the dice, either on the bed or it throws it on the floor. The number on which the dice lands, indicates the exercise and the number of repetitions.

⇒ First the exercise professional performs the exercise that is on the picture/written under the drawn number.

⇒ Then the exercise professional repeats it with the CAYA-c and monitors that the CAYA-c performs it correctly.

⇒ When the CAYA-c is performing the exercise, the exercise professional closely monitors the child's performance and ensures that the exercise is performed correctly.

After successfully completing the exercise, the CAYA-c rolls the dice again.

If the next throw lands on the same number as before:

- a. CAYA-c executes the exercise again, or
- b. he/she throws the dice again and again, until the dice lands on a different number.

The CAYA-c must remember and write down the sequence of rolled exercises and create a choreography from them. Transitions from one exercise to another must be fluid.

VARIATIONS (see p. 274)



INDIVIDUAL EXERCISE THERAPY, REMOTE VIDEO TRAINING

EQUIPMENT

Foam, cardboard or plastic dice.

Worksheet with exercises and repetitions which the exercise professional shares/projects via the screen.

Before starting the remote video training, the exercise professional informs the child's parents/carers to prepare a cardboard dice for the exercise session (which the CAYA-c received during hospitalisation) or other dice.

IMPORTANT

The exercise professional can only select those exercises that he/she has already performed live with the CAYA-c several times.

Before starting the game, the exercise professional encourages the CAYA-c to read the exercises written on the worksheet. With asking questions he/she must check whether the CAYA-c already knows the exercises and can describe them. With the preschool CAYA-c the exercise professional encourages them to describe pictures.

On the signal **play the game**, the CAYA-c rolls the dice. The number on which the dice lands, indicates the exercise and the number of repetitions.

- ⇒ First the exercise professional explains the exercise that is on the picture/written under the drawn number.
- ⇒ Then he/she encourages the CAYA-c to perform the exercise correctly.
- ⇒ When the CAYA-c is performing the exercise, the exercise professional closely monitors the child's performance and ensures that the exercise is performed correctly.

The exercise professional verbally guides the CAYA-c all the time to perform the exercise correctly and reminds him/her on what he/she needs to pay attention to. At the same time, the exercise professional also encourages the CAYA-c.

After successfully completing the exercise, the CAYA-c rolls the dice again.

If the next throw lands on the same number as before:

- a. CAYA-c executes the exercise again, or
- b. he/she throws the dice again and again, until the dice lands on a different number.



ROLL THE MOVEMENT

The CAYA-c must remember and also write down the sequence of rolled exercises and create a choreography from them. Transitions from one exercise to another must be fluid.

VARIATIONS

- ⇒ The CAYA-c performs the choreography in reverse order.
- ⇒ The CAYA-c should create his own exercise worksheet.



ROLL THE MOVEMENT



Mini trampoline walk



Wall sit



Lunge



Back extension on fitball



Push ups on fitball



Barbell squat



Up & down stairs



Barbell squat



Clamshell



One arm dumbbell row



Rowing ergometer



Crunch feet on fitball



ROLL THE MOVEMENT



One leg posture on trampoline



Lateral lunge



Front plank



Mini walking jump



PNF raise



ABS wheel



Bike recline



Bench dip



Overhead press



Bridge on fitball



Hammer curl



Cross-over crunch



ROLL THE MOVEMENT



Elliptical machine



Crunch feet on ball



Up and down stairs



The skater



Bench press



Woodchooper



Walking through obstacle



Mini trampoline jump



Overhead press



Bridge on fitball



Straight arm pulldown



Front raise



ROLL THE MOVEMENT



Step up, right leg up first



Cross leg gluteal balance



Seated crunch



One leg posture on trampoline



Bipedal posture on trampoline catching and throwing



Skip and stop on trampoline



Cat and dog



Padlock



Prayer



Policeman



Chandelier



Star gazers



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FORTEe is a precision-based exercise research project taking place across Europe. It studies the effects of a standardised and customised exercise programme in children, adolescents and young adults who are undergoing cancer treatment, while in hospital. There is not enough scientific research showing how precision-based training and sport can improve the healing process. Therefore, together with other European researchers, FORTEe wants to conduct the world's largest study on the effects of exercise in children with cancer.

Researchers from 10 clinical centres in 7 European countries are working on the FORTEe project. Participating in the research are more than 450 athletes who are currently and for the next 4 years fighting and will fight against cancer.



The protocols presented in this book are scientifically endorsed by European Federation of Sports Medicine Associations (EFSMA) and by Federazione Medico Sportiva Italiana (FMSI)



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