UNIVERSITY OF LJUBLJANA
Faculty of Sport

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# WATER ACTIVITIES – E-BOOK 2024

## Physical Activities in Water

# Water-Based Activities for Enhanced Health

Ljubljana, december, 2024

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# Water-Based activities for Enhanced Health

This book is part of a series titled “Water, our friend.”

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**Published by/Založnik:** University of Ljubljana Press/Založba Univerze v Ljubljani
**For the publisher/Za založbo:** Gregor Majdič, The Rector of the University of Ljubljana/rektor Univerze v Ljubljani
**Issued by/Izdajatelj:** University of Ljubljana, Faculty of Sport/Univerza v Ljubljani, Fakulteta za šport
**For the issuer/Za izdajatelja:** Damir Karpljuk, dean of Faculty of Sport UL/dekan Fakultete za šport

Ljubljana, december, 2024

First e-edition/Prva e-izdaja.

Publication is free of charge./Publikacija je brezplačna.

Publication is available free of charge on: /Publikacija je v digitalni obliki prosto dostopna na: https://ebooks.uni-lj.si.



Kataložni zapis o publikaciji (CIP) pripravili v Narodni in univerzitetni knjižnici v Ljubljani
**COBISS.SI**-ID **220159235**
ISBN 978-961-297-510-4 (PDF)

DOI: 10.52165/9789612975104

Projekt je prejel finančna sredstva za izvedbo iz ukrepa razvojnega stebra financiranja (RSF) / To implement the measure, the project secured financial resources from the Development Funding Pillar (RSF).

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**Marko Đurović**, associate professor at the Faculty of Sports and Physical Education, University of Niš. His research focuses on swimming, water polo, sports training (including planning, programming, and training process management), and recreation. Since 2005, he has served as the head coach of the Swimming Club Niš and is also a member of the expert advisory committee for the Serbian Swimming Federation, based in Niš, Serbia.

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## EXPERT REVIEW OF THE BOOK WATER ACTIVITIES 1

The electronic publication titled "*WATER ACTIVITIES*" by the authors is a quality manual covering the most important aspects of physical exercise in water. This textbook is designed in six chapters, the text is clearly written, adequately illustrated and well graphically processed, and I am happy to recommend this manual to all exercisers warmly.

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*Head of Cardiology Clinics at Golnik Hospital*
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## EXPERT REVIEW OF THE BOOK WATER ACTIVITIES 2

The e-book titled *Water Activities* offers a wide variety of aspects, activities, and exercises that water can offer. Indeed, this book is a comprehensive guide that describes the multifaceted benefits of water-based exercises. The book provides an in-depth understanding of water's unique properties and their role in enhancing physical well-being, with chapters dedicated to preventive and therapeutic aspects of aquatic exercises. The most valuable part of this book is the collection of over 120 illustrated exercises, offering practical guidance for a variety of depicts the importance and definition of aquatic literacy. It is important to note that experts from different fields (sports scientists, coaches, sports faculty professors, and medical doctors) combined their knowledge regarding water activities and their benefits on health, which further deepens the value of this book. This resource is invaluable for professionals and enthusiasts alike, combining scientific insights with hands-on applications to promote health and fitness through water activities.

# 1.0. INTRODUCTION

Water activities offer more than mere enjoyment; they serve as a pathway to personal growth, physical health, and a deeper connection with nature. This volume delves into the diverse realm of water-based activities, providing insights into their educational, health, and adaptive benefits.

We begin with an introduction to water activities, focusing on the fundaments of aquatic literacy and underscoring the significance of water safety and skill acquisition. The discussion then moves to the health benefits of participating in water activities, focusing on their therapeutic effects and fitness benefits, such as improved cardiovascular health and mental relaxation. A special chapter on breathing techniques highlights the vital role of respiratory control in enhancing performance and relaxation during aquatic activities. The section on para swimming illustrates the inclusivity and achievements in adaptive water sports, showcasing the transformative effects of aquatic activities for individuals with disabilities. Additionally, this e-book features over 120 practical exercises that can be easily implemented in water.

Throughout these chapters, readers are encouraged to see water as a medium for recreation, rehabilitation, and personal growth, fostering a sense of respect and appreciation for this vital element of life.

## 1.1. WATER AND ITS CHARACTERISTICS

Classification of water bodies based on human health, mobility, usage, and water health hazards associated with water includes following categories regarding their chemical composition:

- saltwater, which is found in oceans and seas
- freshwater, present in lakes and rivers
- mineral water, derived from mineral springs and lakes
- water that is poses health risks

When considering the physical state of water, it can be classified as:

- still or stagnant water
- running water
- rough water

When it comes to the depth of water, it can be classified into several categories:

- shallow water, where one can comfortably stand
- neutral depth water, where the bottom is just barely touched
- deep water, which can be further divided into:
  - deep water with a clear view of the bottom
  - deep water with no visibility of the bottom

In terms of temperature:

- Water that is considered thermally suitable for use is defined as being within a temperature range of 20 to 29 degrees Celsius, making it appropriate for human use.
- On the other hand, thermally unsuitable water includes both excessively cold water, which is below 20 degrees Celsius, and excessively hot water, which exceeds 30 degrees Celsius.

Regarding safety:

- Water that is deemed safe includes all sources that comply with safety standards.
- In contrast, unsafe water sources are those that present potential dangers, such as harmful vegetation, dangerous animals, treacherous currents (like eddies, whirlpools, underwater rocks, waterfalls, strong currents, and high waves), pollution that can harm human health, and risks related to maritime traffic, among others.

Regarding the environmental aspect:

- Water that is safe for human use in artificial settings, such as recreational and sports swimming pools.
- Water that is safe for human use in natural environments, including seas, lakes, ponds, swamps and rivers.
- Water that is not safe for human use, such as ponds, swamps, floodwaters, polluted water, and tidal or floodwaters.

This monograph focuses exclusively on water and its significance for human health, as participating in swimming and exercising in water provides unique benefits and advantages that contribute to overall well-being.

## 1.2. Impact of Water on the Body

Many people underestimate the effectiveness of swimming as a workout because it doesn't leave them drenched in sweat. However, the benefits can be significant. Swimming and similar activities offer unique advantages thanks to the properties of water. These benefits can be particularly helpful for those recovering from illness or individuals who may not be in peak physical condition.

The warm, buoyant nature of water is especially soothing for muscle and joint pain, making swimming a great choice for those who are overweight. It provides a full-body workout that improves flexibility and strength while putting less stress on the joints. Participating in gradual progressive activities in water can also aid in restoring heart health and improving blood circulation.

Swimming is a sport that requires coordinating movements with breathing patterns, which includes moments of holding your breath underwater followed by quick, deep breaths above the surface.

This distinctive breathing technique allows swimmers to develop greater lung capacity and diffusion abilities compared to other athletes and the general population.

The act of swimming focuses on controlled, rhythmic breathing, which can improve lung function and promote mindfulness, ultimately helping to alleviate anxiety. Moreover, moving against the resistance of the water is an effective way to build strength, balance, and coordination.

Several factors impact human health: 50% is linked to lifestyle and conditions, 15% to healthcare, 20% to genetics, and 15% to environmental factors. Maintaining a healthy lifestyle is vital for enhancing overall well-being, promoting longevity, improving the body's adaptability, and striving for a higher quality of life across intellectual, social, spiritual, physical, and material aspects.

Pure water has a specific gravity of 1 $g/cm^3$, which serves as a standard for comparing how objects float. An object with a specific weight of less than 1 $g/cm^3$ will float, while one with a specific weight greater than 1 $g/cm^3$ will sink. A person's specific weight is mainly determined by their muscle mass, fat content, and bone density. Adipose tissue has a specific gravity of less than 1 $g/cm^3$, bones typically range from 1.7 to 1.9 $g/cm^3$, and muscle tissue has a specific gravity slightly above 1 $g/cm^3$, specifically between 1.04 to 1.06 $g/cm^3$. Individuals with higher muscle mass and denser bones, or those with lower fat levels, often find it harder to float. In contrast, those with more fat and less muscle are generally more buoyant. On average, women have 21%-24% body fat, while men have 15%-20%, which usually makes women more buoyant than men.

Swimming is a low-impact exercise that minimizes stress on the joints, making movement easier while providing excellent way to improve muscle strength, cardiorespiratory endurance, and flexibility–all within the swimming context, without changing the natural movement patterns. Different swimming techniques enhance motor control and body awareness, including better coordination of arm and leg movements by maintaining buoyancy and managing breathing. For those who cannot participate in land-based activities like running or cycling, swimming may be their only option for physical exercise. Working out in water significantly lowers the risks of joint strain, allowing for a more efficient and effective increase in intensity during strength and aerobic endurance exercises compared to workouts on solid ground.

Exercising in water offers numerous benefits due to the unique properties of water, such as buoyancy, hydrostatic pressure, and viscosity. Buoyancy acts as an upward force that counteracts gravity. When someone is in water up to their chin or the seventh cervical vertebra, they only feel 10% of their weight compared to being on dry land, and around 25% when walking lightly. As the water level lowers toward the feet, the sensation of body weight increases, demonstrating the effect of gravity. This buoyant force, along with gravity, helps manage the effort needed for movements that support everyday activities like sitting, standing, turning, and walking. It also allows individuals with neuromuscular challenges to move in water when they struggle to initiate motion on land. Thanks to buoyancy, many people with various injuries to bones, joints, and muscles, as well as other health issues, can walk independently in water, while they might require assistance on land.

Hydrostatic pressure is another important factor, especially concerning the cardiovascular system. The deeper a person is submerged, the more significant the impact on increasing the heart's stroke volume. Moreover, hydrostatic pressure affects the respiratory system by stimulating proprioceptors and exerting pressure on the lungs and respiratory muscles during aquatic exercise and swimming. Consequently, hydrostatic pressure helps

strengthen respiratory muscles, improves breathing control, increases vital capacity, and enhances motor control during activities like speaking and eating.

The viscosity of water describes the internal friction between its molecules. This property creates resistance when moving through water, which can help strengthen the muscles involved in those movements. As the force applied to the water increases, the resistance also rises, but it quickly drops to zero as soon as the force ceases. This feature aids in preventing injuries and improves control of strength exercises performed in water. By varying the speed of movement and the surface area of the body parts moving through the water, one can adjust the water resistance created by viscosity, allowing for a gradual increase in exercise intensity.

# 2.0. AQUATIC LITERACY

## 2.1. AQUATIC LITERACY – AN INTRODUCTION

Participating in sports and physical activities is a fundamental right for everyone. It is important to acknowledge that a large portion of leisure, sports, and physical activity occurs in water. Exercising on, in, or through water can be one of the most enjoyable and fulfilling experiences for individuals. Water-based activities are not only crucial for human survival in many cultures, but swimming pools, rivers, lakes, and oceans also provide some of the most enjoyable recreational opportunities.

Words like "diving," "swimming," "floating," and "gliding" evoke the joy associated with water activities. It is no surprise that various water-based recreational pursuits are among our favourites. Water acts as a rich and abundant medium for physical activity (PA), encouraging a lasting commitment to an active and healthy lifestyle, especially considering the sedentary habits and lack of PA seen in many young people over the years. Positive early experiences in aquatic environments can greatly influence lifelong participation in these activities, leading educators to promote children's enjoyment and confidence in water-related settings. Aquatic activities are frequently recommended for their many health benefits.

While benefits of water activities are substantial, they can be greatly reduced if children do not have proper tools to safeguard themselves against drowning. Each year, more than 365,000 individuals around the world lose their lives due to the risks associated with water recreation; with half of these victims being children and young teenagers. The 4–6 age group is especially at risk, making them more prone to accidents in and around water. The World Health Organization (WHO) highlights that various of institutional, educational, and political measures can help prevent tragedies in water sports. Among these, providing comprehensive aquatic education from an early age is vital for building the confidence needed to stay safe from drowning.

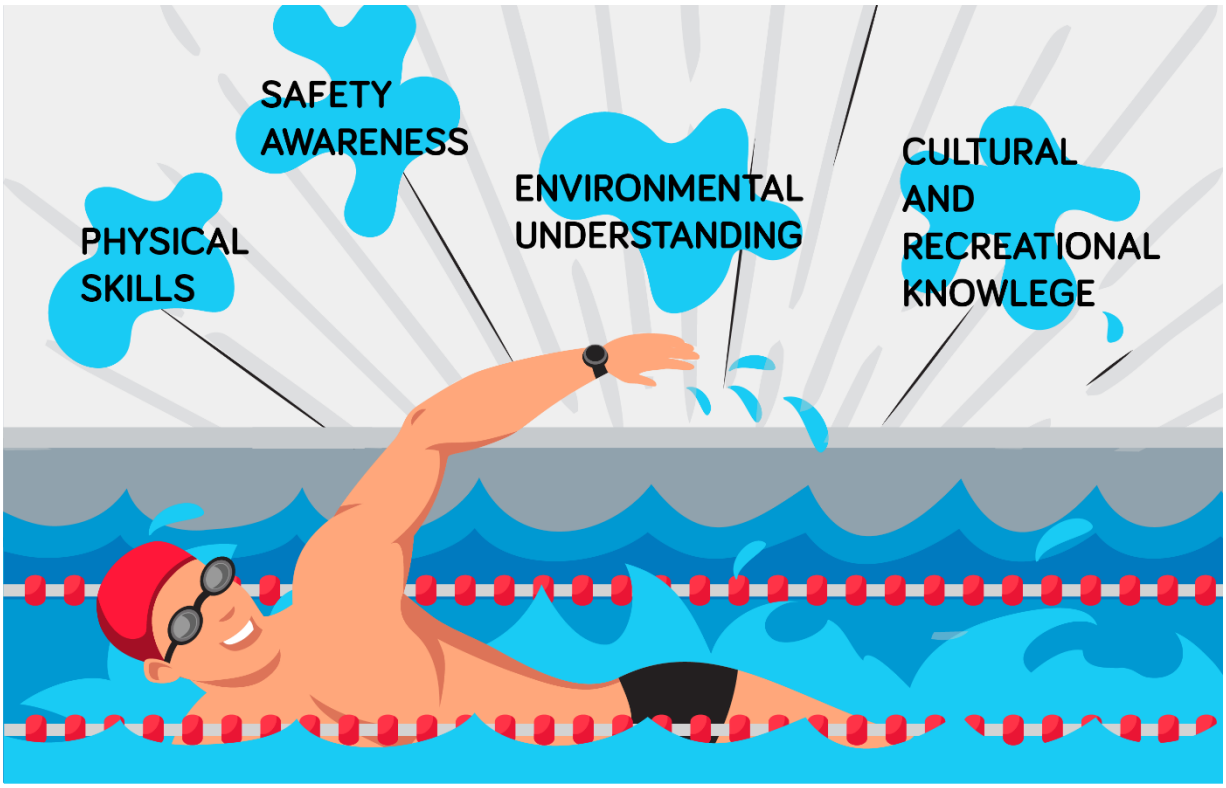
Simply teaching children how to swim is insufficient to lower the high rates of drowning. Furthermore, studies from several developed countries indicate that current "learn to swim" programs have significant limitations, preventing individuals from participating in aquatic activities for health benefits or as a meaningful form of exercise y throughout their lives. To engage in water activities, individuals must develop the necessary skills, knowledge, and understanding of the associated benefits. Since aquatic literacy is crucial for participating in any water-related activity, this chapter will offer valuable insight on the subject.

## 2.2. What is Aquatic Literacy?

Aquatic literacy refers to the essential knowledge, skills, and attitudes needed for safe and confident engagement in water-related activities. This concept encompasses a variety of competencies, including swimming skills awareness of environmental impacts, understanding water safety, and knowledge of aquatic ecosystems. While swimming is a vital part of aquatic literacy, it also requires a thorough understanding of the water environment and its many aspects.

**Key Components of Aquatic Literacy**

Aquatic literacy is a multifaceted concept that combines a wide range of knowledge, skills, and attitudes crucial for interacting with water environments. It extends beyond just being proficient in swimming; it necessitates a comprehensive understanding of the aquatic ecosystem, safety measures, cultural viewpoints, and environmental responsibility. By cultivating these components, individuals can participate in water activities with confidence and accountability, ultimately promoting their well-being and supporting contributing to the sustainability of aquatic ecosystems. The following key components form the basis of aquatic literacy:




Picture 1. Components of aquatic literacy (Mekkaoui et al., 2022).

**Physical Skills:** Mastering physical skills is essential for aquatic literacy. Swimming, in particular, is a crucial survival skill and opens the door to various water-related activities. Achieving proficiency in swimming encompasses:

**Fundamental Swimming Strokes:** Learning and practicing basic strokes such as freestyle, backstroke, breaststroke, and butterfly. These strokes are the building blocks for effective movement in the water and are important for both recreational and competitive swimming.

**Advanced Techniques:** Skills like flip turns, diving, and underwater swimming are key for more experienced swimmers and those involved in water sports such as competitive swimming, diving, or water polo.

**Adaptability to Varying Water Conditions:** The ability to adjust swimming techniques according to varying water conditions, including temperature changes, wave patterns, and water currents, is crucial for both safety and performance.

### 2.2.1. Safety Awareness

A thorough understanding of water safety is essential for achieving aquatic literacy. This includes:

- **Water Safety Rules:** It is important to know basic guidelines, such as never swimming alone, paying attention to signs and flags, and being aware of the dangers posed by rip currents to help avoid accidents.
- **Rescue Techniques:** Understanding rescue methods, like reaching assists, throwing assists, and wading assists, enables individuals to aid those in distress while reducing their own risk.
- **First Aid and CPR:** Being trained in first aid and cardiopulmonary resuscitation (CPR) is crucial in emergencies. The ability to respond quickly and effectively can save lives in situations involving near-drowning or other water-related injuries.

### 2.2.2. Environmental Understanding

Aquatic literacy involves a thorough understanding of the natural water environment and the impact of human activities. Key components include:

- **Aquatic Ecosystems:** Understanding the diverse ecosystems present in oceans, rivers, lakes, and wetlands is crucial. Recognizing the roles of various species, the food chain, and ecological balance helps highlight the importance of conservation.
- **Conservation Efforts:** Being aware of ongoing conservation initiatives, such as marine protected areas, pollution control measures, and wildlife preservation programs, encourages responsible behavior and advocacy for environmental sustainability.
- **Human Impact:** Understanding how human activities—like pollution, overfishing, and coastal development—affect aquatic environments fosters a sense of responsibility and promotes practices that mitigate negative effects.

### 2.2.3. Cultural and Recreational Knowledge

Water activities play a vital role in many cultures and offer a wide range of recreational options. Aquatic literacy includes:

- **Cultural Significance:** Acknowledging the cultural and historical context of water activities, such as traditional fishing methods, water festivals, and the role of water in indigenous practices. This awareness deepens appreciation for diverse water cultures and traditions found around the globe.
- **Recreational Opportunities:** Recognizing the vast selection of water-based recreational activities available, from sports like kayaking, surfing, and snorkeling to more relaxed options such as sailing and paddleboarding. Being familiar with these activities allows individuals to engage with and enjoy water in various ways.
- **Safety and Etiquette in Recreational Activities:** Knowing the specific safety measurements, regulations, and etiquette associated with different water sports and recreational activities helps ensure a respectful and enjoyable experience for everyone involved.

## 2.3. The Importance of Aquatic Literacy in Health

### 2.3.1. Physical Health Benefits

Participating in water-based activities offers numerous physical health benefits. These exercises are low-impact, making them suitable for individuals of all ages and fitness levels. They provide excellent cardiovascular conditioning, boost muscular strength and endurance, and enhance flexibility. Additionally, water activities are especially beneficial for individuals with arthritis, chronic pain, or mobility issues, as the buoyancy of water reduces stress on joints.

### 2.3.2. Impact on Mental Health and Well-being

Engaging in water activities also plays a crucial role in promoting mental health. The calming nature of water can help alleviate stress and anxiety, while the rhythmic movements associated with swimming and other aquatic exercises promote mindfulness and relaxation. Research indicates that regularly engaging in water activities can reduce symptoms of depression and improve overall mood.

### 2.3.3. Social and Community Involvement

Aquatic literacy promotes social connections and community engagement. Various water-based activities such as team sports like water polo and group fitness classes like aqua aerobics, provide opportunities for social interaction and teamwork. Engaging in these activities can enhance feelings of belonging and community, which are essential for mental and emotional well-being.

## 2.4. Safety and Risk Management in Aquatic Environments

### 2.4.1. Understanding Water Safety

A key aspect of aquatic literacy is having a solid grasp of water safety practices. This includes being aware of the dangers present in different water environments, such as oceans, lakes, and swimming pools, as well as knowing how to respond in emergencies. Learning about water safety, which includes CPR and first aid training, is essential for preventing accidents and protecting oneself and others.

### 2.4.2. Recognizing Risk Factors and Prevention Strategies

Certain groups, especially young children and non-swimmers, face a greater risk of water-related accidents. Improving aquatic literacy in these populations through swimming lessons and water safety education can significantly reduce the likelihood of drowning and other water-related injuries. Additionally, understanding weather conditions and the characteristics of water environments is essential for safely engaging in activities like boating or surfing.

## 2.5. Enhancing Aquatic Literacy: Strategies and Programs

### 2.5.1 Educational Programs and Resources

A variety of programs and resources are available to promote aquatic literacy. Schools, community centers, and aquatic facilities often offer swimming lessons, water safety training, and environmental education initiatives. These programs are intended to provide individuals with the vital skills and knowledge necessary for safe and responsible participation in water activities.

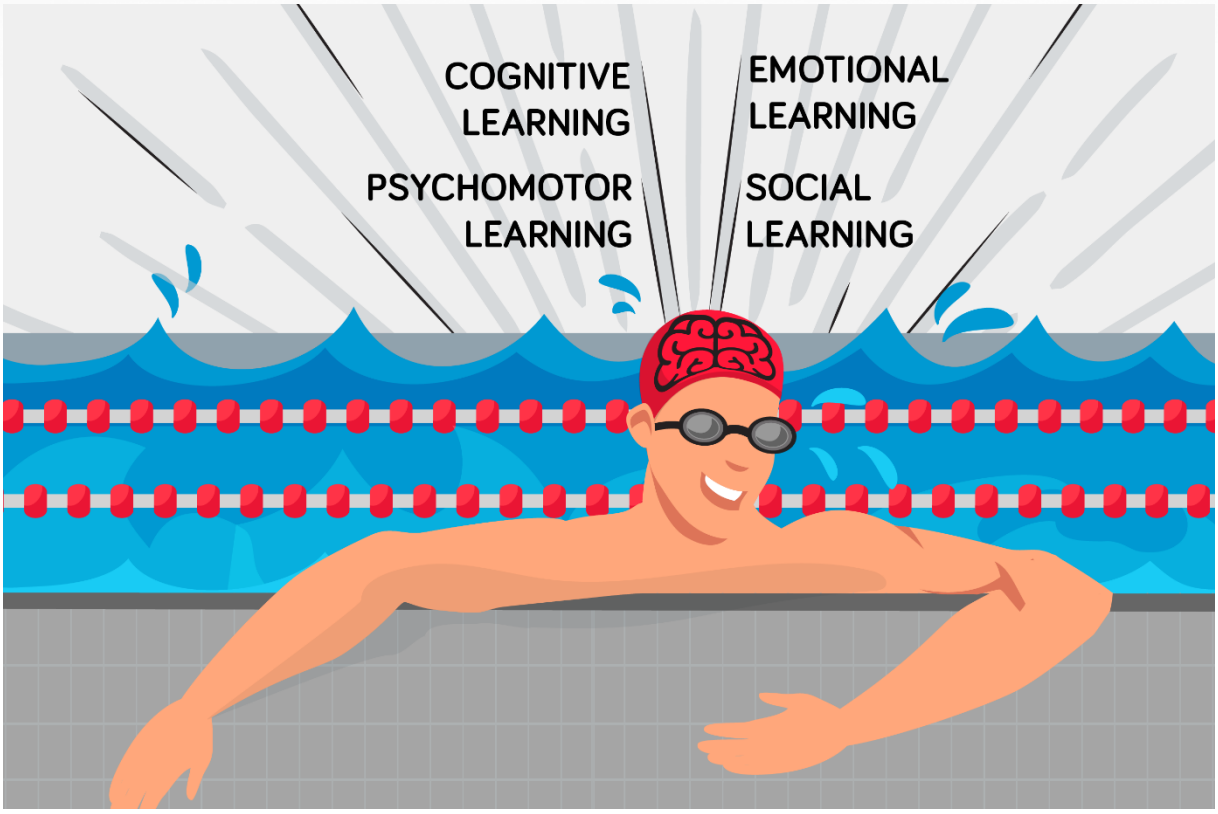
### 2.5.2 The Impact of Media and Technology

In our current digital age, media and technology significantly contribute to spreading awareness about aquatic literacy. Online platforms, mobile applications, and virtual reality experiences present interactive and engaging ways to learn about water safety, aquatic fitness, and environmental stewardship.

As the world faces new challenges like climate change and urbanization, the importance of aquatic literacy will only grow. By embracing this concept and fostering a comprehensive understanding of water-related skills and knowledge, we can empower individuals of all ages and backgrounds to engage in water activities safely and confidently, ultimately improving their health and well-being.

## 2.6. Aquatic Literacy Through the Lens of Physical Literacy

The physical literacy approach to learning in aquatic environments encompasses at least 12 elements of psychomotor learning. These include locomotor skills, stability and balance skills, object manipulation skills, object locomotor skills, cardiovascular endurance, muscular endurance, coordination, flexibility, agility, strength, reaction time, and speed. The focus is on movements, motor skills, health and fitness abilities that individuals develop and utilize through aquatic activities. This approach emphasizes the coordination and application of these skills to execute movements required in various aquatic settings.




Picture 2. Types of Learning for Water Activities (Mekkaoui et al., 2022).

Cognitive learning components mainly focus on gaining the knowledge and understanding needed for movement and physical activity in, through, and on the water. This involves developing an individual's comprehension of how, when, and why to move in certain ways, as well as the ability to adapt and think creatively when faced with new movement challenges in aquatic environments. It also includes understanding key decision-making processes and recognizing the advantages of mobility and exercise in water.

Affective learning components focus on attitudes toward water activities, personal values, and emotional states. This involves recognizing the emotional responses associated with aquatic movement fostering motivation, self-esteem, and confidence.

Social learning components emphasize the importance of developing social skills such as leadership, communication, risk management, cooperation, and fair play. Acquiring these skills can enrich our enjoyment of participation and improve our interactions with teammates, officials, coaches, teachers, and opponents.

Overall, understanding aquatic literacy is crucial for anyone looking to engage in water activities, whether for leisure, fitness, competition, or environmental stewardship. By mastering the essential elements of physical skills, safety awareness, environmental knowledge, and cultural and recreational insights, individuals can confidently and responsibly enjoy water environments.

# 3.0. WATER ACTIVITIES EXAMPLES

## 3.1. Illustration of Pool Water Activities

This section outlines different types of water activities and their unique health benefits. The table below illustrates aquatic activities in a pool, highlighting factors such as water depth, temperature, and the number of participants in each group.

| Water activity | Water depth | Optimal water temperature | Group size |
|---|---|---|---|
| Swimming 1, 2, 3 | 1,35 m-3,5 m | 27°C | 4-6/lane |
| Movement in water | 1,35 m - 3m | 27°C | 14 |
| Water basketball | 3 m | 27°C | 14 |
| Little water polo | 3 m | 27°C | 14 |
| Jumping into the water | 3,5 m | 27°C | 10 |
| Autonomous diving | 1,35 m - 3,5 m | 26°C | 4-6 |
| Trainings | 1,35 m – 3,5m | 27-28°C | 4-6/lane |
| Measurements of top athletes | 1,35 m - 3,5 m | 27°C | |
| Water exercise for seniors | 1,35 m | 28°- 29°C | up to 16 |
| Water aerobics | 1,35 m | 27°- 30°C | up to 16 |
| Artistic swimming | 3 m | 27°C | up to 12 |
| Recreational swimming | 1,35 m – 3 m | 27-28°C | up to 6/lane |
| Autonomous diving | 1,35 m - 3,5 m | 27°C | up to 6 |
| Apnea | 3,5 m | 27-28°C | 2-3/lane |
| Triathlon | 1,35 m | 27°C | up to 6/lane |

| Water activity | Water depth | Optimal water temperature | Group size |
|---|---|---|---|
| Disabled swimming | 1,35 - 3m | 27-28°C | small group |
| Teaching children to swim | 80 cm - 1,2 m | 29 - 30°C | up to 8/group |
| Rescue from the water | 1,35 m - 3,5m | 27-28°C | 10 /group |
| Movement in water - watsu | 1,35 m | 35°C | up to 12 |
| Training of special groups | 1,35 m | 32°C | up to 10 |
| Student internships in the Preschool education course | 1,35 m | 32°C | up to 12 |
| Pedagogical process for the subject Exercise in water for toddlers according to Fred's program | 1,35 m | 32°C | up to 12 |
| Water training for babies according to Fred's program | 1,35 m | 32°C | up to 10 |
| Exercise in the water for toddlers with their parents according to Fred's program | 1,35 m | 32°C | up to 10 |
| Exercise in water for toddlers without parents according to Fred's program | 1,35 m | 32°C | up to 8 |
| Water exercise for pregnant women | 1,35 m | 30 - 32°C | up to 8 |
| Exercise for people after stroke | 1,35 m | 32°C | up to 8 |
| Water exercise for laryngectomized persons | 1,35 m | 32°C | up to 8 |
| Teaching children to swim | 80 cm - 1,2 m | 29-30°C | up to 8 |

Table 1: Overview of pool water activities, including water depth, temperature, and group size (Šajber, Štrumbelj, Štirn, 2020).

## 3.2. Aquatic Activities for Wellness

Aquatic activities blend the healing properties of water with low-impact exercise, offering a wide range of health benefits. Due to the unique characteristics of water, these exercises are particularly advantageous for individuals of all fitness levels, especially those recovering from illness or dealing with chronic conditions. The natural resistance of water acts as an effective form of strength training, while buoyancy helps to lessen the strain on joints during workouts. Moreover, the warmth and sensory experience of water can help relieve pain and encourage relaxation, further enhancing its therapeutic effects.

## 3.3. Preventive Benefits of Water Exercise

### 3.3.1. Physical Activity and its Impact on Health

While some individuals may find their physical capabilities limit their participation in certain sports, it is important to understand that there is a suitable activity for everyone, regardless of age, gender, or health status.

Health Benefits of Swimming:

- Engages healthy individuals
- Aids in achieving and maintaining optimal health
- Enhances overall quality of life
- Prevents age-related diseases and mitigates environmental impacts
- Provides an appropriate level of physical exertion
- Improves or maintains functional ability indicators
- Encourages movement as a lifestyle choice

It is advisable to swim 3-4 times a week for 30-45 minutes.

The table below provides a detailed illustration of a "healthy" swimming schedule, including recommended distances in meters for various swimming sessions, with focus on building endurance, technique, and overall fitness.

| Week | Volume (m) | Week | Volume (m) | Week | Volume (m) |
|---|---|---|---|---|---|
| **1** | 200-250 | **7** | 500-600 | **13** | 1000-1100 |
| **2** | 200-250 | **8** | 600-700 | **14** | 1000-1200 |
| **3** | 250-300 | **9** | 600-700 | **15** | 1100-1300 |
| **4** | 300-350 | **10** | 700-800 | **16** | 1200-1400 |
| **5** | 350-400 | **11** | 800-900 | **17** | 1300-1500 |
| **6** | 400-500 | **12** | 900-1000 | **18** | 1300-1500 |

Table 2: An illustration of a "healthy" swimming regimen (Madić, D., Okičić. T., Aleksandrović, M. (2007). Plivanje. Niš. Sven.)

## 3.2.2. Enhancing Functional Capabilities

Rehabilitation swimming, often referred to as "therapeutic" swimming, is used by individuals dealing with health issues. Specific movements and exercises done in the water help treat or manage of variety of health concerns. These exercises aim to restore physical and occupational abilities that may have been affected by conditions like cardiovascular or respiratory diseases, surgeries, injuries, and postural imbalances. Alongside targeted exercises, the program should also promote overall health, improve physical capabilities, develop voluntary skills, and strengthen motor habits. Generally, the intensity of these exercises is lower, and training sessions are shorter compared to health-focused swimming, with sessions typically held daily.

Fitness swimming, on the other hand, focuses on significantly enhancing both swimming skills and functional abilities. The goal is not just to achieve specific outcomes but to continuously strive for improvement. Competing in events can also provide motivation. The intensity of fitness swimming is moderate and can vary based on factors like age, fitness level, and gender. Training usually occurs 3 to 6 times a week, with sessions lasting 40 to 60 minutes.

**Weight Management and Regulation:**

- While exercise is beneficial for weight loss, it should not be viewed as the sole solution.
- Establishing a healthy energy balance—the relationship between calorie intake and expenditure—is crucial for success.
- A positive energy balance happens when calorie intake exceeds expenditure (e.g., 2700 kcal consumed versus 2400 kcal burned results in a surplus of 300 kcal, which can lead to weight gain).
- On the other hand, a negative energy balance leads to weight loss (for instance, consuming 2400 kcal while burning 2700 kcal results in a deficit of 300 kcal).
- To effectively lose weight, a daily caloric deficit of 500 to 1200 kcal is advisable.
- For instance, a deficit of 500 kcal can result in a weight loss of about 100 grams.
- A weekly energy deficit can be achieved through 2 to 3 training sessions.

| | |
|---|---|
| **Running** | 50-60 km/tempo |
| **Swimming** | 8-12 km/4-5h |

Table 3: Comparison of running and swimming activities in the speed of movement (Okičić, T., Ahmetović, Z., Madić, D., Dopsaj, M., Aleksandrović, M. (2007). Plivanje – praktikum, Sven, Niš.

These loads surpass the recommended limits for healthy swimming. Exercise alone is insufficient; it should act as a complementary tool. The most effective approach to weight loss involves reducing calorie intake while also increasing calorie expenditure through physical activity. For instance, one might reduce their daily food intake by 300 kcal and increase energy expenditure by 200 kcal, along with swimming 4 km each week. This approach is accessible to everyone, and maintaining consistency in training is crucial.

Fat stored in muscles starts to burn after 60-90 minutes of exercise. During physical activity, fat deposits from subcutaneous tissue enter the bloodstream and are used during recovery over the next 5 to 15 hours, helping to replenish fat reserves in muscle fibers. These reserves are restored using fats and carbohydrates from food or glucose and fats from subcutaneous fat stores.
After exercising, individuals might feel a misleading sense of hunger, prompting them to consume low-calorie food such as fruits, vegetables, and mineral water for several hours. During workouts, energy expenditure accounts for 8-12% of total daily energy expenditure. The exercise program should be tailored to each individual. The primary objective is to achieve weight loss by increasing physical activity levels. These figures are approximate, as energy expenditure varies based on factors such as skill level, gender, body weight, and swimming speed.
Table 4 presents the caloric expenditure for swimming 1 kilometre. It outlines the energy used by both males and females, considering their fitness levels.

| Preparedness level | Male (kcal) | Female (kcal) |
|---|---|---|
| **Very high** | 174 | 112 |
| **High** | 224 | 162 |
| **Medium** | 273 | 186 |
| **Low** | 348 | 224 |
| **Very low** | 447 | 273 |

Table 4: Caloric expenditure for swimming 1 km for different fitness levels (Madić, D., Okičić. T., Aleksandrović, M. (2007). Plivanje. Niš. Sven.)

## 3.2.3. Advancements in Aquatic Exercises (Exercise System and Media)

Recent developments in aquatic exercises have been designed to meet the unique needs of seniors, focusing on several key objectives listed below.

### AQUATIC EXERCISE OBJECTIVES FOR SENIORS

- Protect and improve overall health
- Prevent or mitigate chronic non-communicable diseases
- Maintain and enhance mobility and functional abilities
- Increase physical performance

- Improve quality of life
- Slow down biological aging and encourage longevity
- Support and restore mental health
- Provide opportunities for relaxation, enjoyment, and social interaction
- Enhance overall well-being, energy, and vitality

## BENEFITS AND CHARACTERISTICS OF AQUATIC EXERCISE

The benefits of water exercise are primarily experienced in a comfortable, refreshing, and invigorating environment that operates on unique principles. One major advantage is the buoyancy effect, which lessens the impact of body weight depending on the level of submersion.

For instance, when submerged up to the waist, individuals bear only half of their body weight. If submerged from the navel to the chest, they carry only 25 to 35 percent of their weight. This decrease in weight-bearing makes aquatic exercise accessible for those with minor issues related to the knees, hips, spine or excess body weight.

In the water, we can perform movements that might be difficult or even impossible on land, such as running and jumping. The feeling of unrestricted movement, reminiscent of our past abilities, is truly exhilarating. Exercising in water offers benefits; one significant advantage is that the heart rate tends to be lower at the same intensity compared to workouts on land, which eases the strain on the heart. Furthermore, water helps regulate body temperature, reducing the feeling of sweating, decreasing fluid retention, and preventing sudden, jarring movements that could lead to injuries.

The trainer introduces a variety of movements, encouraging each participant to explore and adapt the exercises to fit their abilities. Modifications may include changes to the training position. For those with excess body weight or conditions like back, knee, or hip pain, it is advisable to stay as submerged as possible (up to shoulder height) while performing the same exercises as the rest of the group. Even during jumps, the buoyancy of the water can lessen the impact on bones and muscles, as greater push-offs lead to increased forces. The trainer offers guidance on how to customize the workout to suit personal well-being, limitations, and health conditions. Regardless of individual challenges, everyone is encouraged to experiment and find what works best for them, as the water environment minimizes risks by preventing abrupt movements and keeping us within our physical limits.

One of the main advantages of exercising in an upright position in water is the increased range of motion, which allows for more focused engagement of different muscle groups. Participants can carry out exercises targeting the upper body, lower body, or core, with or without equipment.

This type of exercise is particularly enjoyable and beneficial for older adults. The buoyancy of the water allows individuals to partake in activities like slow running without stressing the skeletal system, especially the spine. The risk of injury is reduced, as the resistance of the water helps prevent rapid, jerky movements. Additionally, the water itself provides an extra resistance, which participants can adjust by changing their speed and directions (Štrumbelj, 2009).

Water aerobics usually occurs in swimming pools, where the water level should ideally reach the chest for most participants, or the waist for those who are non-swimmers or less confident in water. The water temperature should be kept between 28-29 degrees Celsius. Classes are often accompanied by music and include natural movements such as walking,

running, jumping, and turning, along with various combinations of these actions. Exercises can be done without equipment or with specially designed training aids that increase the intensity and loading methods.
To lower the intensity of the workout, participants can take smaller steps, slow down, reduce the height of their leg lifts, and decrease jump heights. It is important to note that speed is not always the main focus; excessive speed and intensity can lead to injuries and fatigue (Zagorc et al., 2006).

## AQUATIC ENVIRONMENTS ENABLE DIVERSE ACTIVITIES

In the water, we can run in different styles, such as lifting our knees forward, bringing our heels toward our glutes, and crossing our knees. We can also leap in various ways while staying on water's surface. Alternatively, we can remain submerged up to our shoulders and instead of pushing off, we simply draw our knees in. If we can, we might push off enough for our upper body to rise above the water, either with our knees together (in a compact position) or apart (like a frog). We can try turning at different angles, such as 90 degrees, a half circle, or a full circle. We kick our feet in various directions, sway from side to side, and move back and forth. Additionally, we can move our hands in different ways; for instance, we can make circular motions, cross our arms in front of us, or spin our arms like a windmill.

## ACCESSORIES

Endurance exercises play a crucial role in improving the function of the heart, blood vessels, and respiratory system, while also helping to counteract the effects of ageing. Water is an excellent medium for strength training, and a pool noodle is an invaluable tool for this purpose. It allows us to push, pull, and perform circular movements, increasing water resistance and thereby intensifying muscle strengthening. Additionally, the pool noodle is beneficial for endurance exercises.
We can engage in water workouts with or without equipment:

- **Pool noodle:** Assists non-swimmers, facilitates exercise in deep water, and enhances water workouts.
- **Swimming goggles:** Recommended for use in chlorinated pools.
- **Swimming belts:** Increase the safety and confidence of less experienced swimmers.
- **Swim paddles:** Can be used to add resistance, making exercise more challenging.
- **Summer:** An ideal time to enjoy exercising in "weightlessness"

## EMERGING CHALLENGES

- Errors in water exercise often stem from movements that are not suitable for the aquatic setting.
- Avoid exercises where you stand in the water while moving your arms outside of it—these could just as easily be performed in a gym—or those where your arms switch between being in and out of the water. The significant difference in resistance between water and air can put unnecessary strain on your elbows and shoulders. One gets the most out of the water environment when the active muscles are completely submerged.

- Moreover, exercises performed at the pool's edge, where you lean on the side with your hands and back, can put excessive pressure on the shoulder joint. This position often causes the lower back to lift off the edge, leading to relaxed abdominal muscles and only the legs being engaged. Instead of these edge exercises, consider using a pool noodle placed behind your back and under your armpits, which allows you to move your legs in various ways (together-apart, up-down, or in a scissor motion).
- Working out in water is regarded as one of the safest forms of physical activity. The most common issue faced while exercising in water is muscle cramps. These cramps can be caused by dehydration, fatigue, lack of sleep, individual susceptibility, or a magnesium deficiency. Fortunately, this can be easily addressed, as trainers usually guide their clients on how to handle cramps. Their suggested method is to move to the edge of the pool, place your toes against it, and pull your body toward the edge. This effectively stretches the quadriceps muscle, where cramps are most likely to occur, helping to relive spasms.
- Additionally, if the pool floor is uneven, there may be some risk of abrasion, which can be reduced by wearing water socks. Extra caution is also necessary outside the pool to avoid slips and falls, especially for older adults, who are generally more susceptible to such accidents.

## NON-SWIMMERS

- Knowing how to swim is not a prerequisite for exercising in the water. The key requirement is the ability to regain your footing if you lose your balance. More challenging than not knowing how to swim is the fear of water. Those who are unsure about their swimming skills can practice near the edge or in a corner, staying close to the instructor, and should avoid pushing off from the bottom.
- If swimming is part of the water training, less confident swimmers can use a pool noodle or wear a buoyancy belt for extra support.
- There are no age limits when it comes to learning how to swim, even if the chance to learn was missed earlier in life.

## 3.3. Water Exercises Examples

Exercising in water alleviates body weight due to the buoyancy provided by the water. This buoyancy, combined with the increased resistance of the water, enhances the activity of the muscular system. Additionally, individuals tend to breathe more deeply, which positively influences the respiratory system. Collectively, these factors also benefit the cardiovascular system. The exercises are designed to promote positive effects across all bodily systems.

**Color legend:**

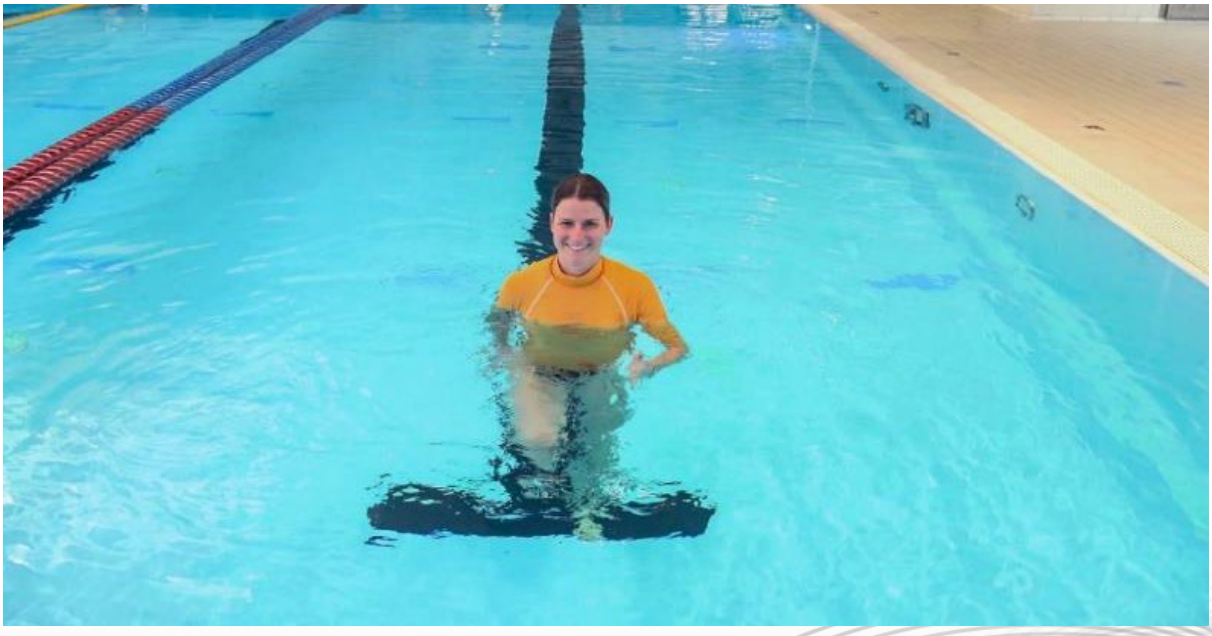
- Red represents **GENERAL WARMING EXERCISES** (increase in body temperature)
- Purple represents **SPECIAL WARMING EXERCISES**
- Green represents **AEROBIC EXERCISE COMPONENTS**
- Blue represents **STRENGTH TRAINING**
- Yellow represents **STRETCHING EXERCISES**

**NOTE** **You can watch videos of listed exercises by klicking on each exercise image.**

### 3.3.1. Warm-Up Exercises

#### 1 STEPPING ON THE SPOT

Stand upright with the feet hip-width apart, raise your right knee toward your chest until your thigh is parallel to the ground. Return to the starting position and repeat the exercise with your left leg. Alternate lifting your legs while coordinating your arm movements along your body, with your palms facing inward. You can also turn your palms to increase the difficulty of the movement.

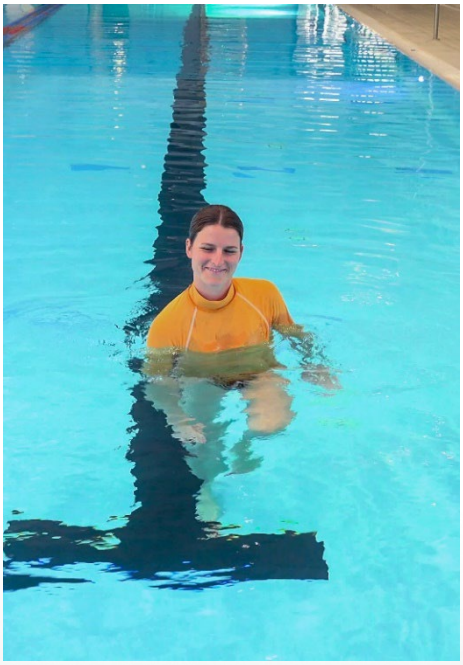


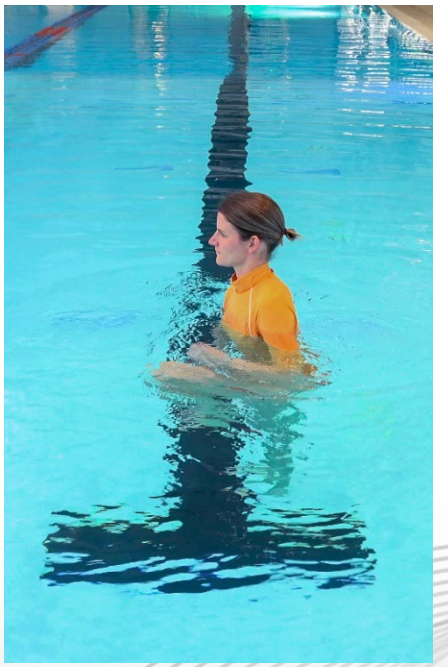
## 2 STEPPING ON THE SPOT, PROPELLING

Stand upright with the feet hip-width apart, raise your right knee toward your chest until your thigh is parallel to the ground. Return to the starting position and repeat the exercise with your left leg. The arms are bent at the elbow and the fists are rotated around each other in front of the body.

## 3 TOE TOUCHES

Extend your left leg while lifting your right leg. Bend your foot and place it in front of your left leg. Use your left palm to touch your right foot. Next, raise your left leg and bend it in front of your right leg, using your right palm to touch your left foot. Continue alternating by lifting your legs and touching your feet with the opposite palms.



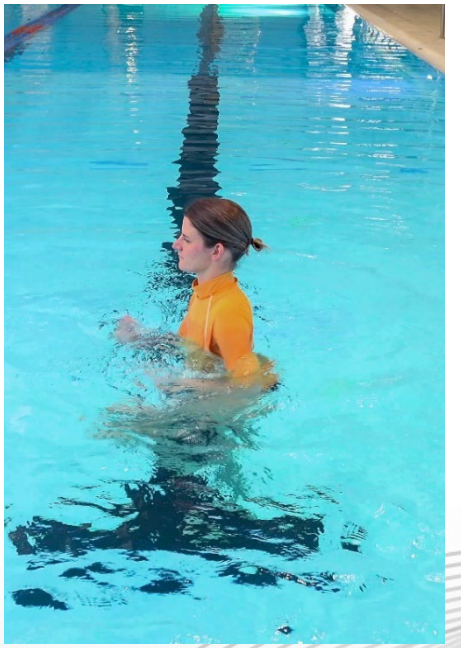


### 4 TOUCHING THE HEELS BEHIND THE BODY

Stand on your left leg while extending it, then raise your right leg behind you in a cross-back position with your foot bent inward. Use your left palm to touch your right heel. Next, raise your left leg in a cross-back position with the foot bent inside, and touch your left heel with your right palm. Continue alternating by raising your legs and touching the heels with the opposite palm.

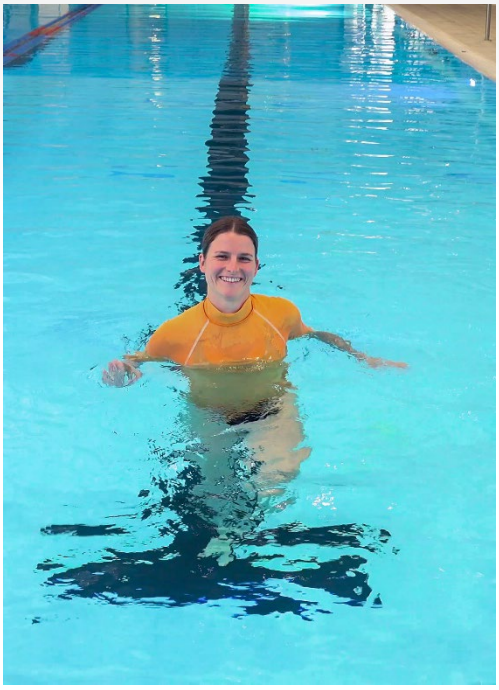
### 5 STEPPING ON THE SPOT, ALTERNATELY PUSHING WATER FORWARD WITH THE HANDS

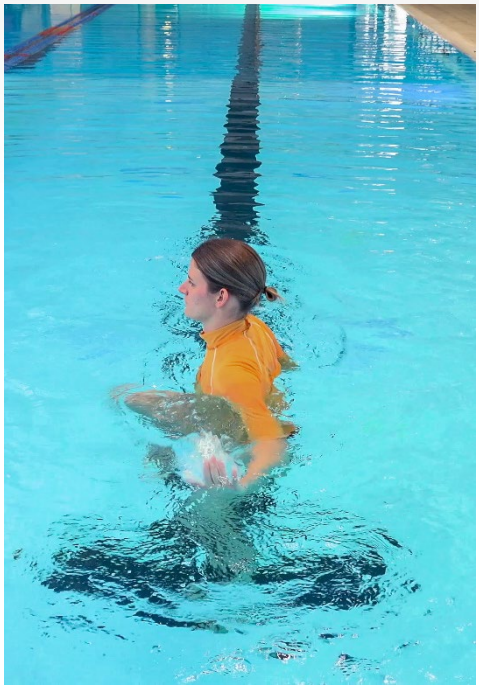
Extend the left leg while bending the right leg, raising the legs alternately. The hands push water from a bent position to an extended position, with palms facing away from the body.



## 6 STEPPING ON THE SPOT, ALTERNATELY PUSHING WATER OUT TO THE SIDE WITH THE HANDS

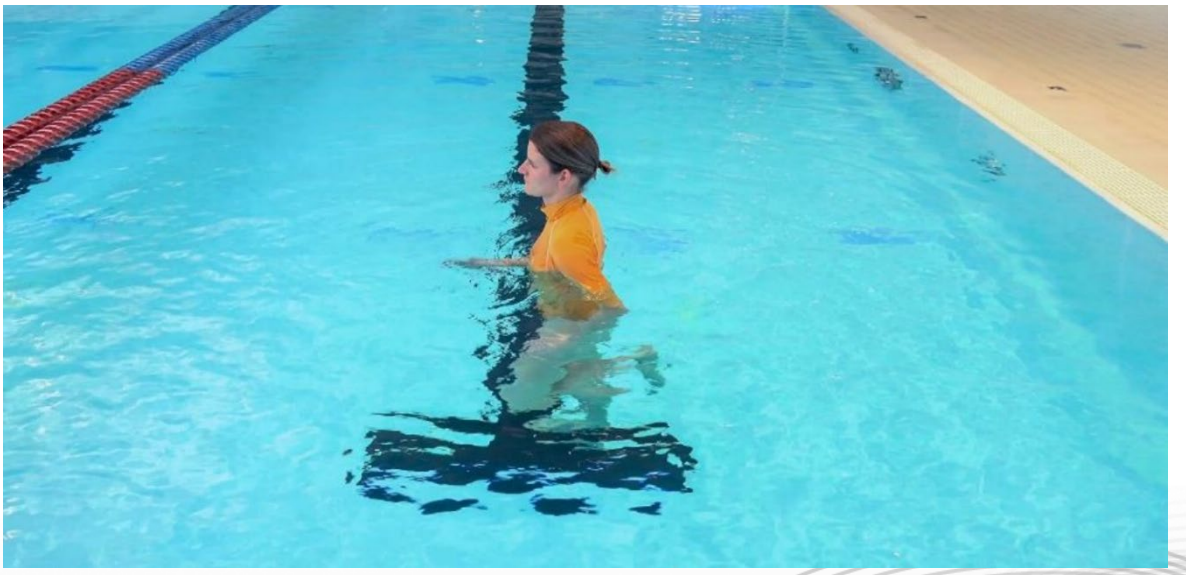
Extend the left leg while bending the right leg, raising the legs alternately. The hands push water from a bent position to an extended position to the side, with palms facing away from the body.





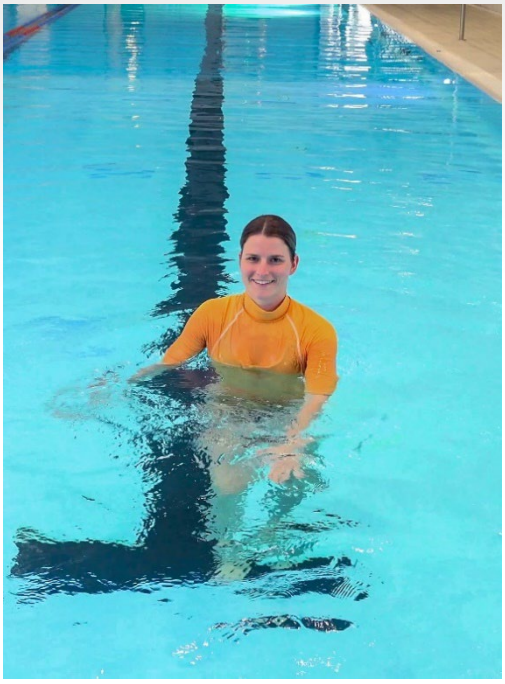
## 7 BACK HEEL KICK, ON THE SPOT

Extend your left leg while bending your right leg back toward your gluteus. Switch legs alternately.



## 8 STANDING LEG LIFTS AND TOUCHING THE FOOT

Slightly bend your left standing leg, lift your right leg, and touch your right foot with your left hand, then switch sides.

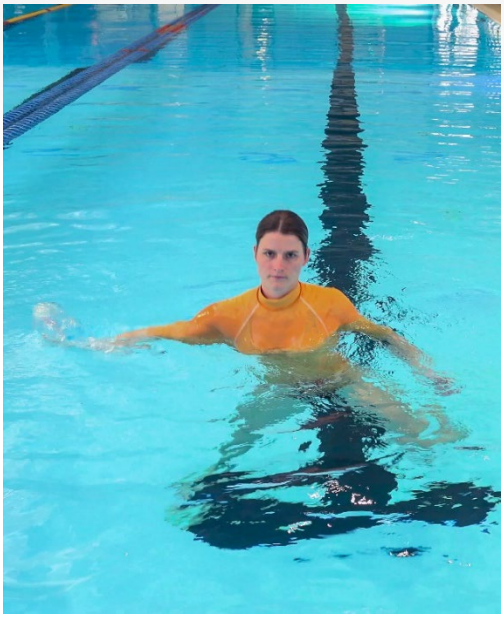


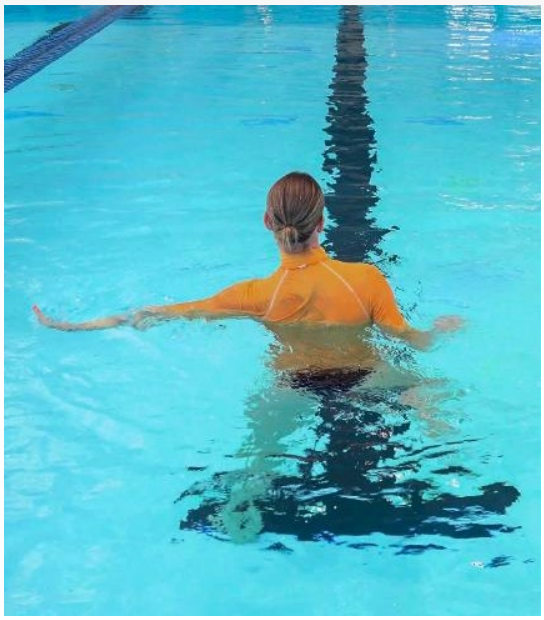
## 9 STEPPING ON THE SPOT WITH HEEL KICKS

Shift your weight from one leg to the other, alternating between left and right. When your left leg is on the ground, lift and bend your right leg back, bringing your heel towards the gluteus.

## 10 STEPPING ON THE SPOT WITH HEEL KICKS, ALTERNATELY PUSHING WATER OUT TO THE SIDE WITH THE HANDS

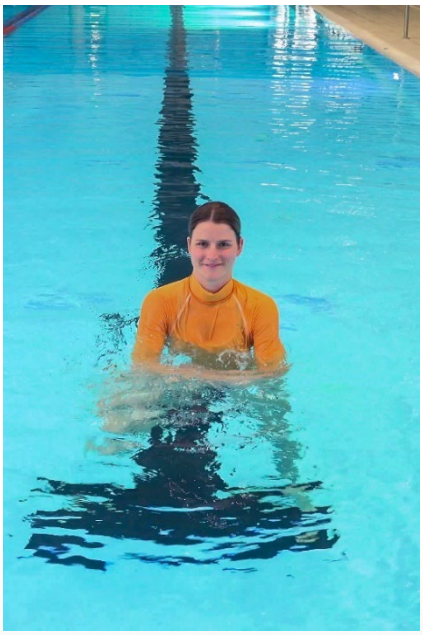
Shift your weight from one leg to the other, moving from the left foot to the right. When your left leg is on the ground, raise and bend your right leg back, bringing your heel towards the gluteus. At the same time, extend your hands out to the side, pushing the water away from a bent position with your palms facing outward.

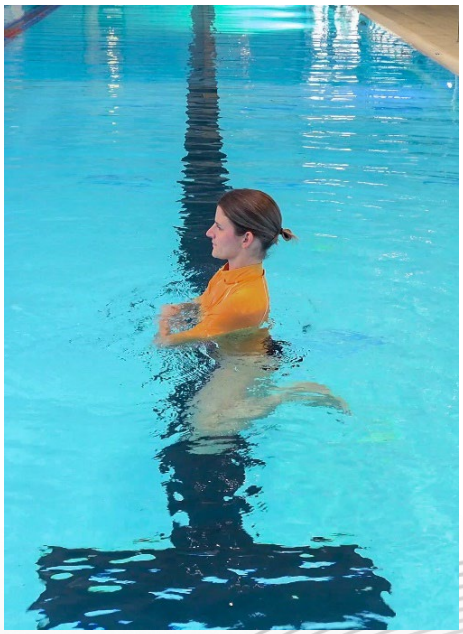




## 11 WALKING WITH HEEL KICKS, PROPELLING

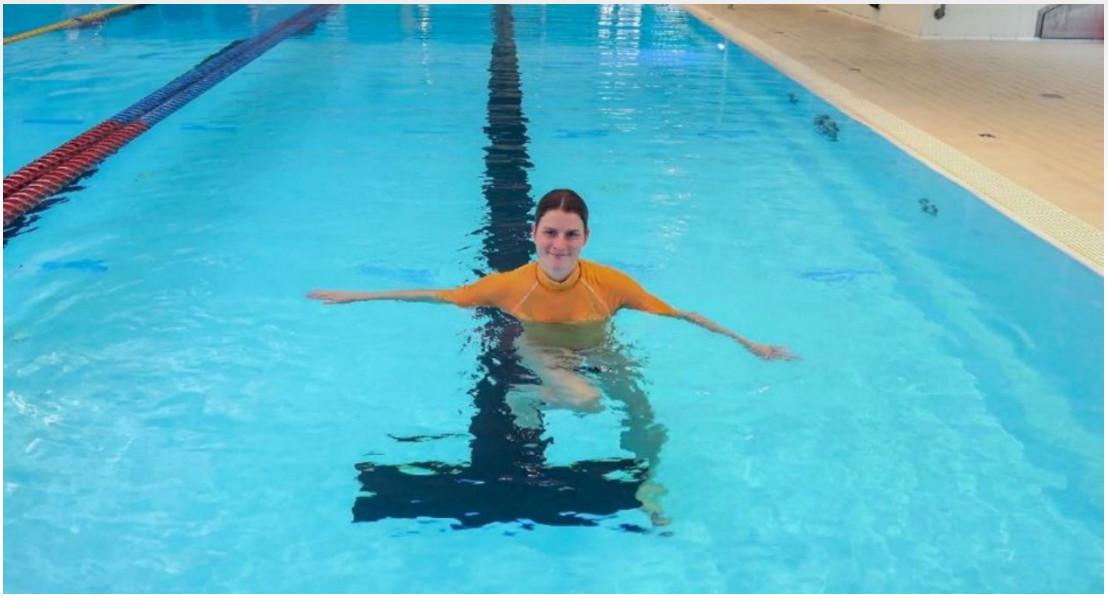
Shift your weight from one leg to the other. When your left leg is on the ground, raise and bend your right leg back, bringing your heel towards the gluteus. Keep your arms bent at the elbows, rotating your fists around each other in front of your body.





## 12 CROSS BODY KNEES

Stand upright on one leg, then lift your knee up and across your body. Alternate by jumping to the other leg and driving the opposite knee up and across as well.

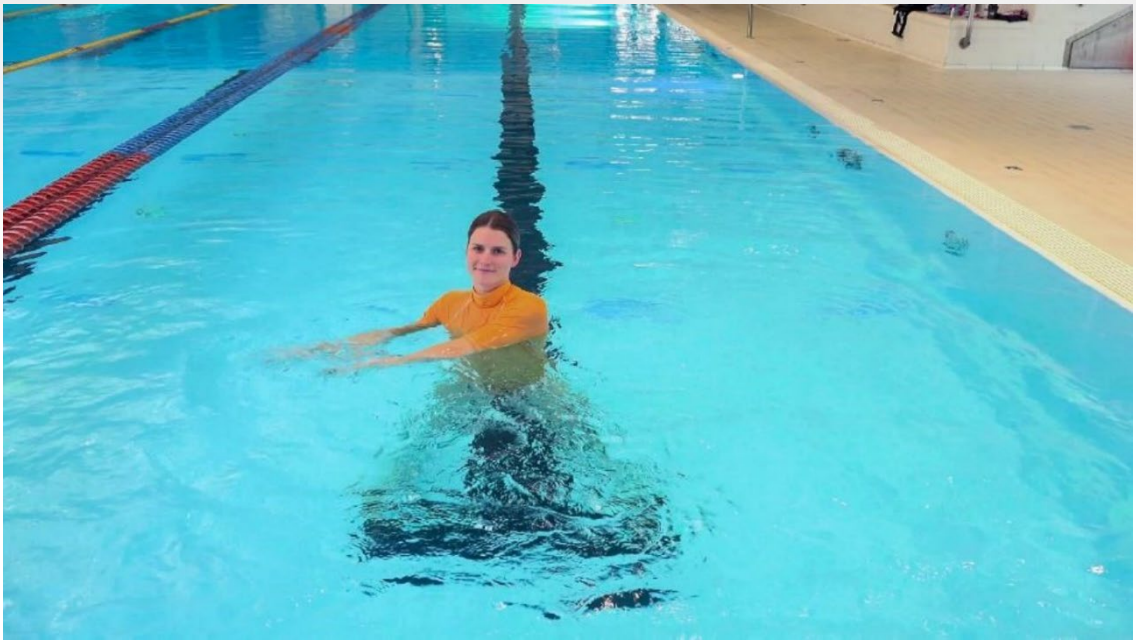


## 13 SLIDING HANDS

Stand upright with your feet slightly wider than shoulder-width apart, hold your hands outstretched on the surface of the water, gliding them gently from one side to the other.

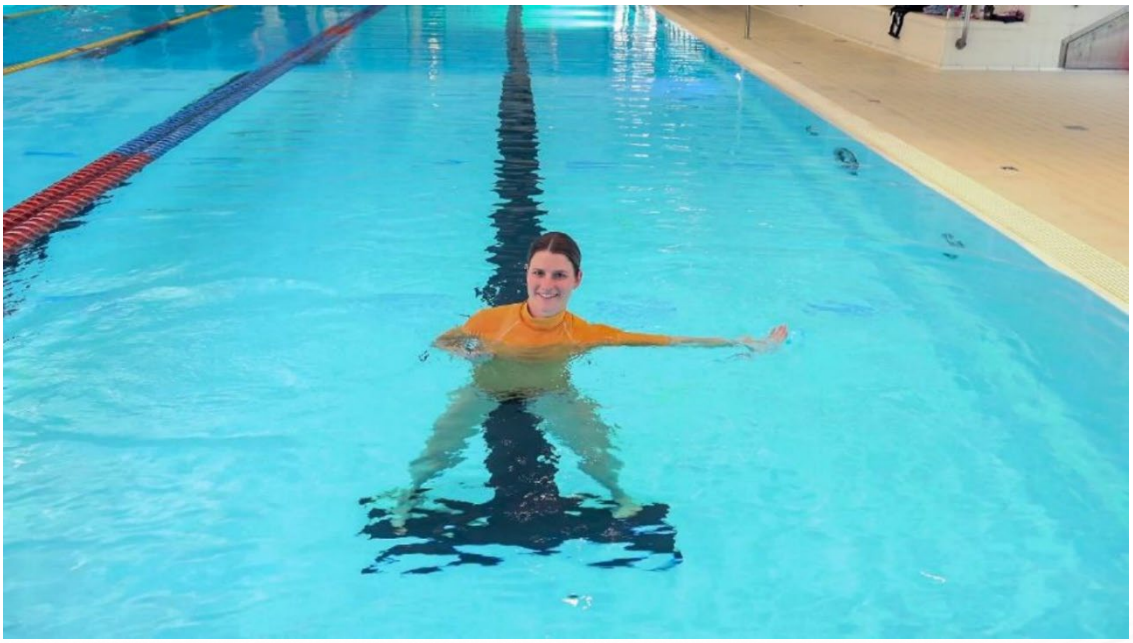
## 14 ARMS SWINGS

Stand upright with your feet slightly wider than shoulder-width apart, with your arms extended in front of you, palms facing down, swing them left and right.



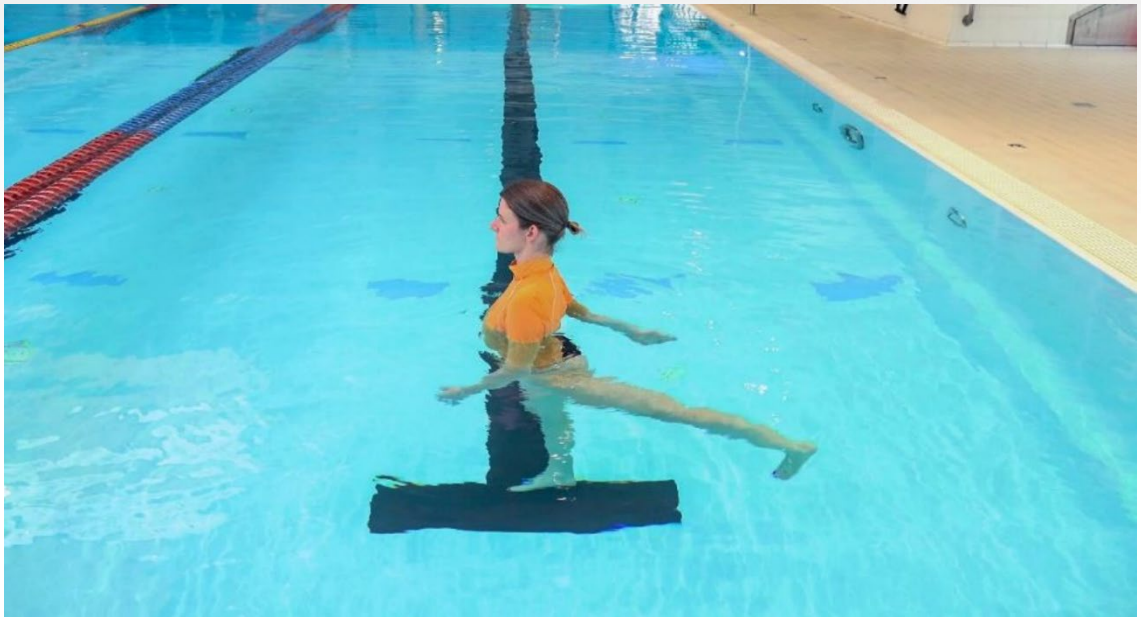
## 15 PUSHING WATER TO THE SIDE

Stand upright with your feet slightly wider than shoulder-width apart. From a bent position, alternate push water with your hands to the side, extending your arms while keeping your palms facing away from your body.



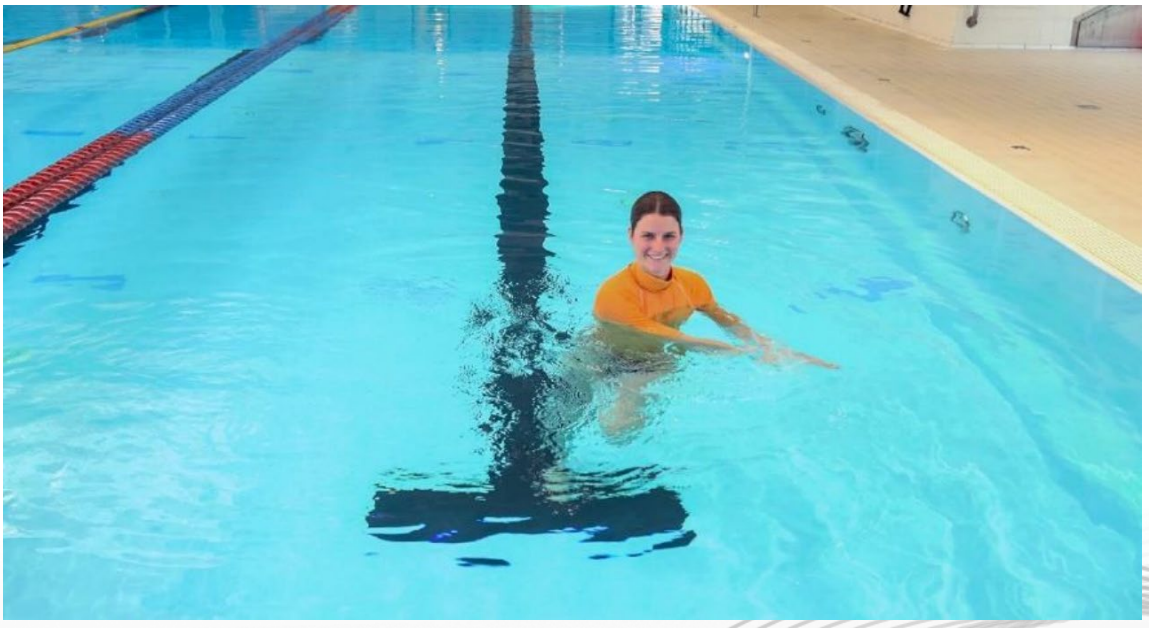
## 16 TOY SOLDIER BACKWARD

Stand upright, lift one arm while at the same time moving the opposite leg back. Keep your knees straight, and let the other arm rest by your side. Continue alternating your legs, moving them out and back while allowing your arms to swing freely.



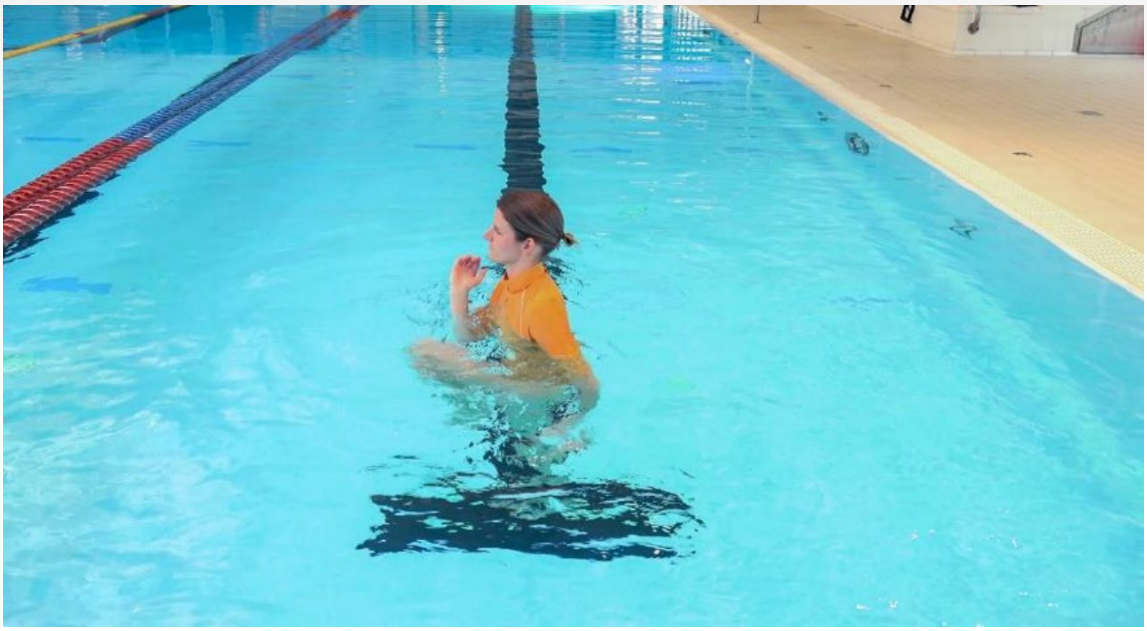
## 17 SIDE STEPS WITH SCOOPING

From a standing position, take a step to the side and then connect the other leg back to a parallel standing position. With your hands in front of your body, perform simultaneous strokes, and scoops. Moving from bent arms at your sides to arms extended forward, then to the side with palms facing downward, back to arms at your sides, and finally returning to bent arms at your sides.



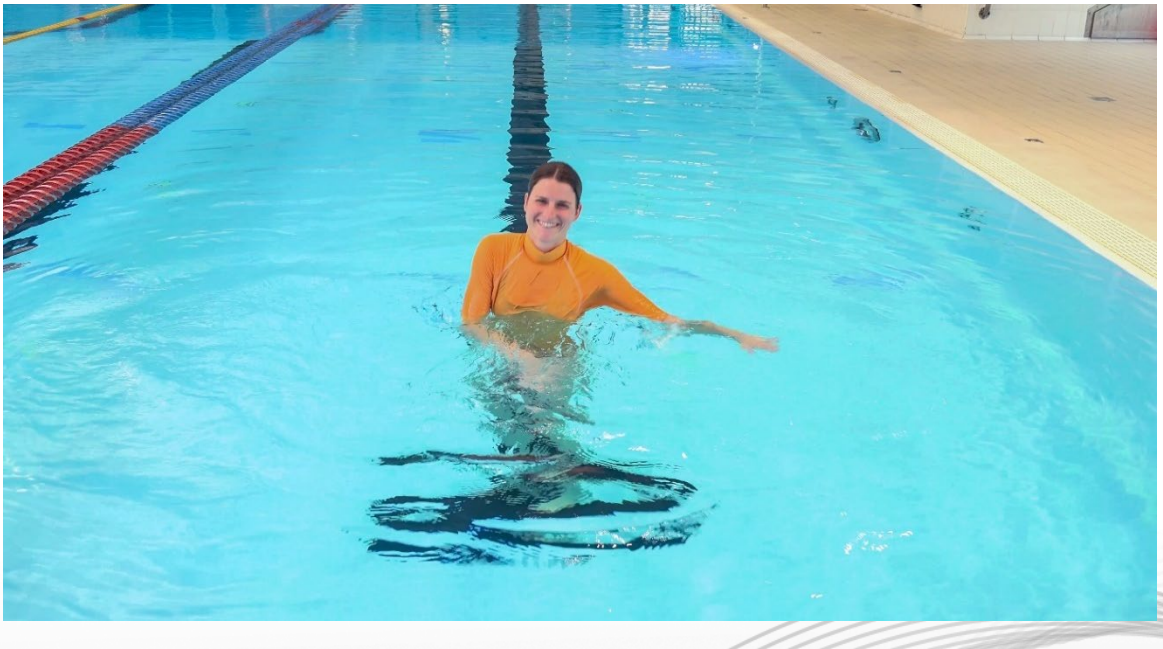
## 18 KNEE – ELBOW

Stand with your feet hip-width apart and your arms relaxed at your sides. Lift one leg as high as you can and touch your knee with the elbow of the opposite arm. Return to a standing position and repeat the movement with the other leg, touching that knee with the elbow of the opposite hand.



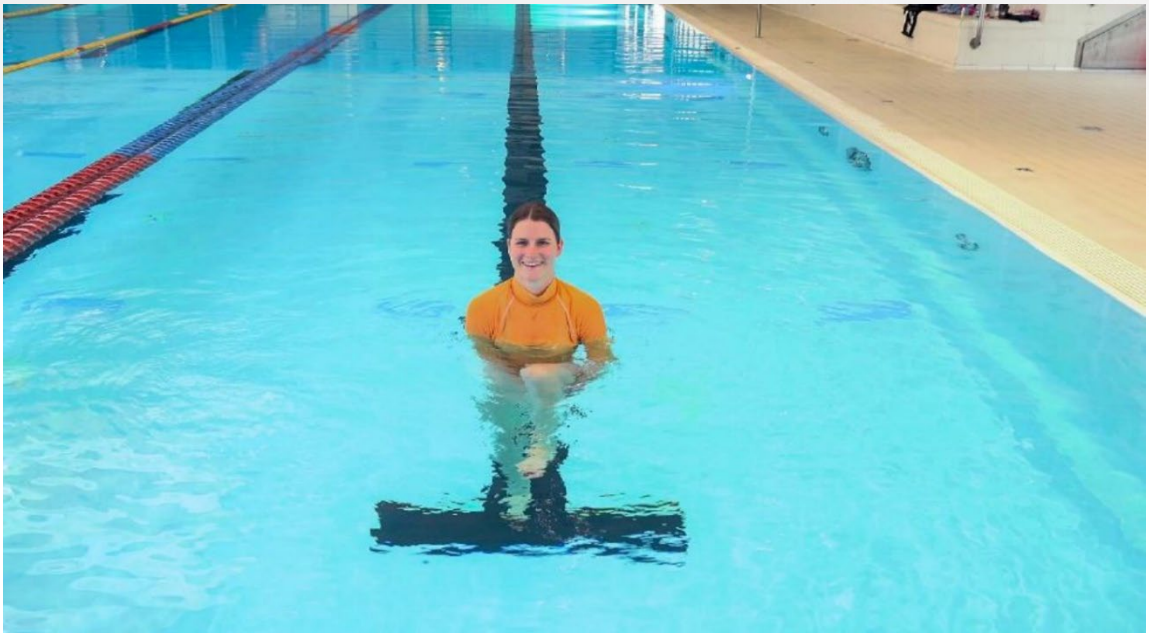
## 19 TWISTS

Jump with both legs from a standing position, bending your knees slightly to the left, then land in a standing position with your knees slightly bent to the right, rotating your trunk and arms in the opposite direction.



## 20 CLAPS BELOW YOUR KNEE

Stand with your feet hip-width apart and arms at your side. Bend one leg as high as possible. When your knee is at its highest position, clap your hands below the it, then step back into a parallel standing position. Repeat this with the other leg.



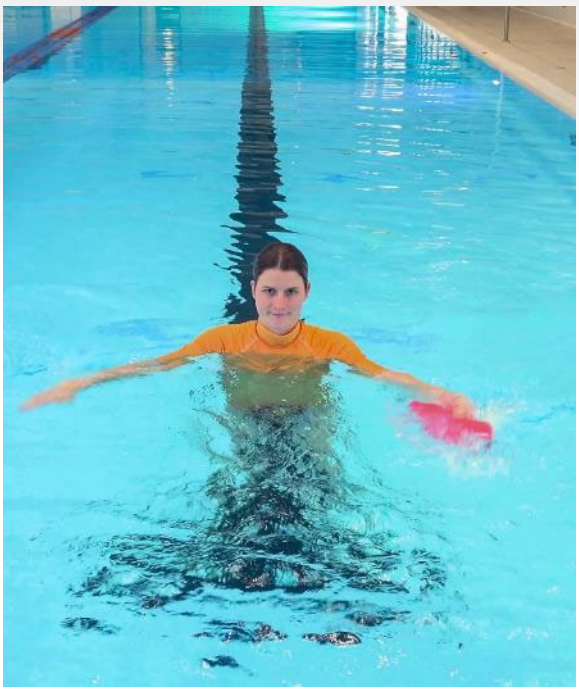
## 21 ONE-LEGGED VERTICAL HOPS

Stand with your feet hip-width apart and your arms at your sides. Jump straight up while simultaneously extending your opposite arm overhead.

**ALSO WATCH:** Example of group exercise, with dumbbells.

## 22 PASSING BUOYS FROM ONE HAND TO ANOTHER

Stand with your feet hip-width apart, arms extended to the sides, with one hand holding the buoy. Bring your hands together and transfer the buoy to the other hand. Return your arms to the starting position.

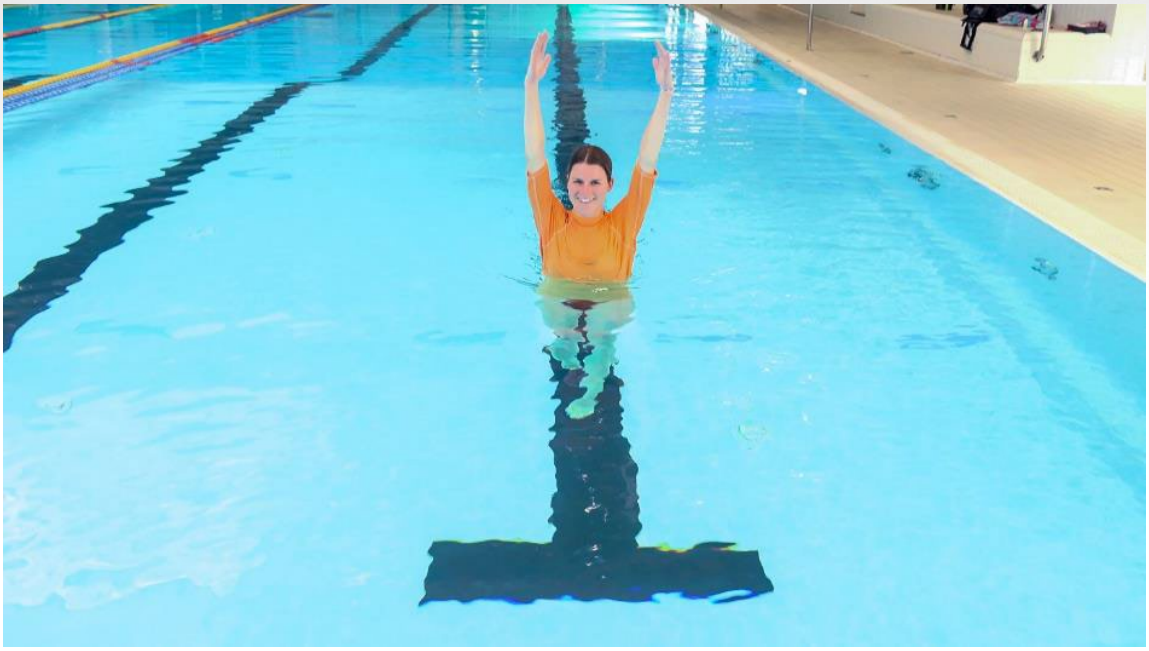


## 23 STRAIGHT LEG BOUNDS

Stand upright with the feet hip-width apart. Keep your legs slightly in front of you and begin pushing off from your feet as you move forward. The bounds should be executed quickly.

## 24 WALKING ON YOUR TOES

Walk on your toes while extending your arms overhead.



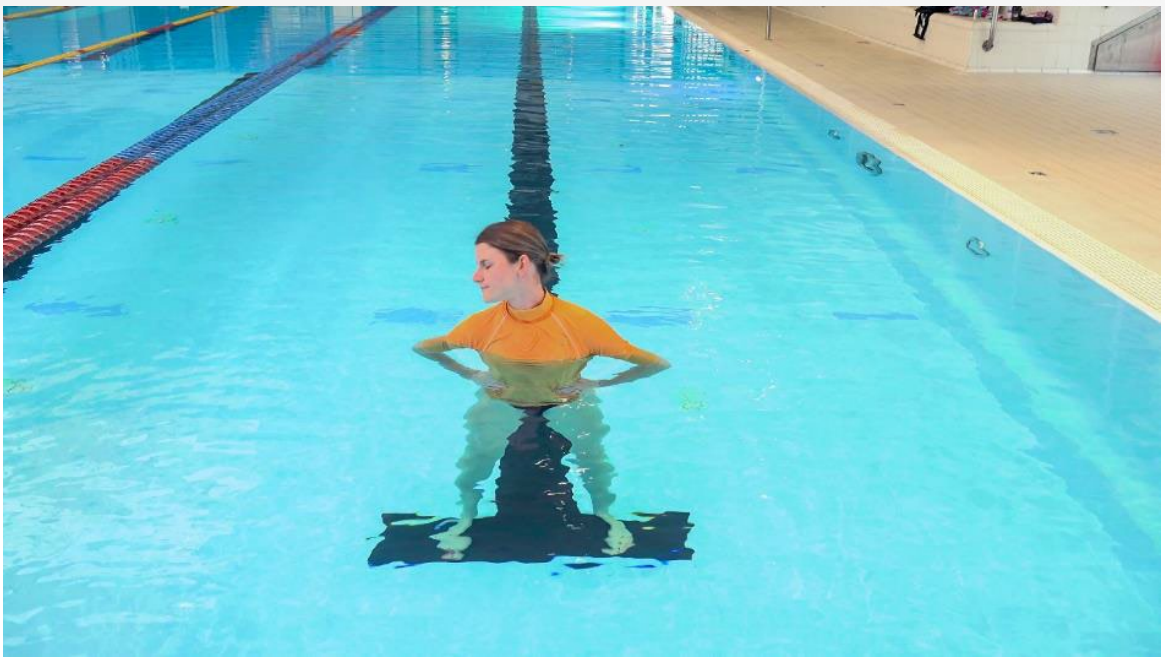
## 25 BOUNDS FROM LEG TO LEG

With your arms extended out to the sides, begin jumping from one leg to other while keeping your knees straight.

## 3.3.2. Special Warm-Up Exercises

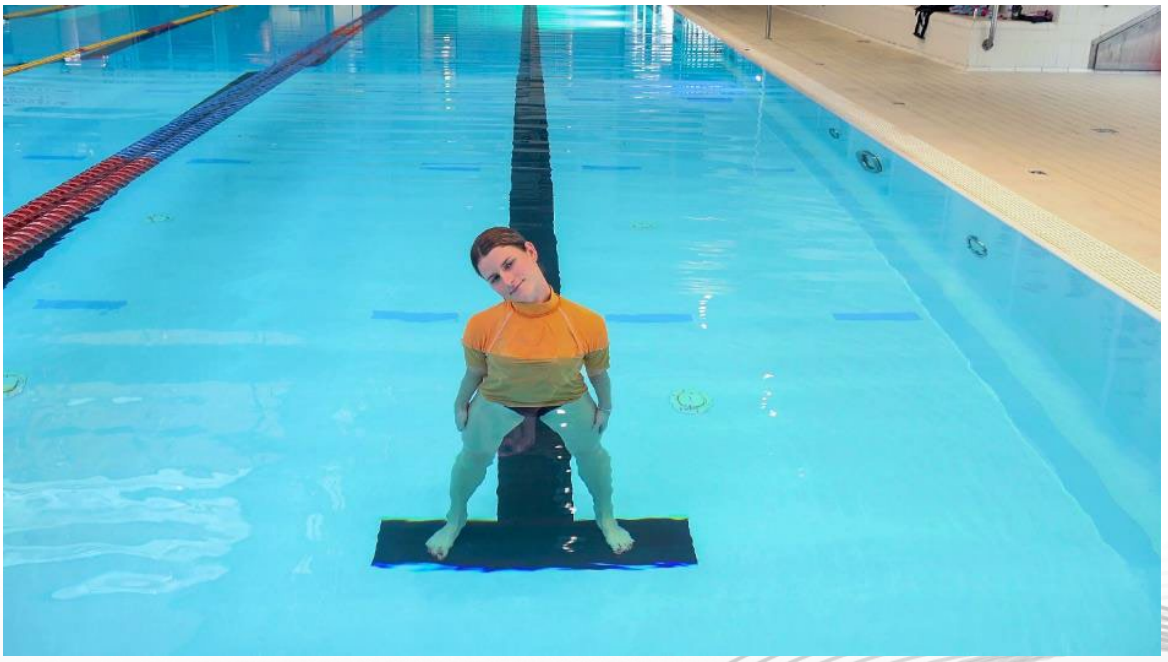
### 26 ROTATIONS OF THE HEAD

Stand upright with your feet shoulder-width apart, turning your head to one side and then the other.



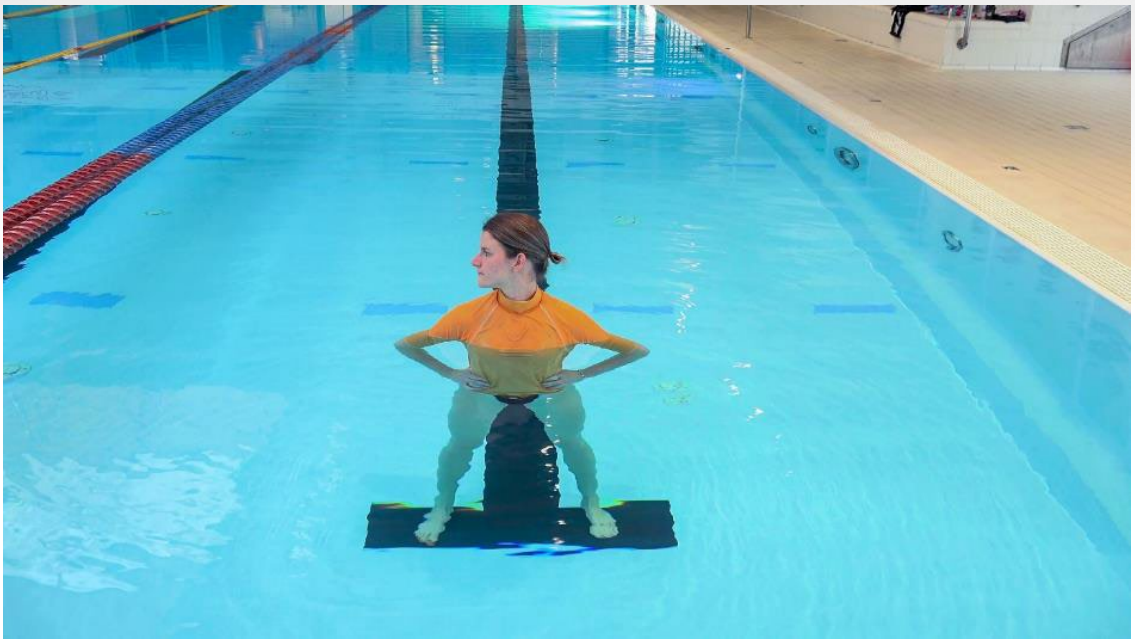
### 27 HEAD TILT TO THE SIDE

Stand upright with your feet shoulder-width apart, leaning your head toward the shoulder, and hold it in this position with slight downward pressure, change sides.



## 28 HEAD TURN TO THE SIDE

Stand upright with your feet shoulder-width apart, gently turn your head to one shoulder, then to the other side.



## 29 SHOULDER CIRCLES

Stand upright with your feet shoulder-width apart, extend your arms out to the sides and begin making shoulder circles moving forward. After a few repetitions, switch direction of the movement.

## 30 ARM CIRCLES

Stand upright with your feet slightly closer than shoulder-width apart, and extend your arms out to the sides. Begin to lift both arms at the same time, making large circles forward, as big as you can. After a few repetitions, switch direction of the circles.

## 31 T-SPINE ROTATIONS

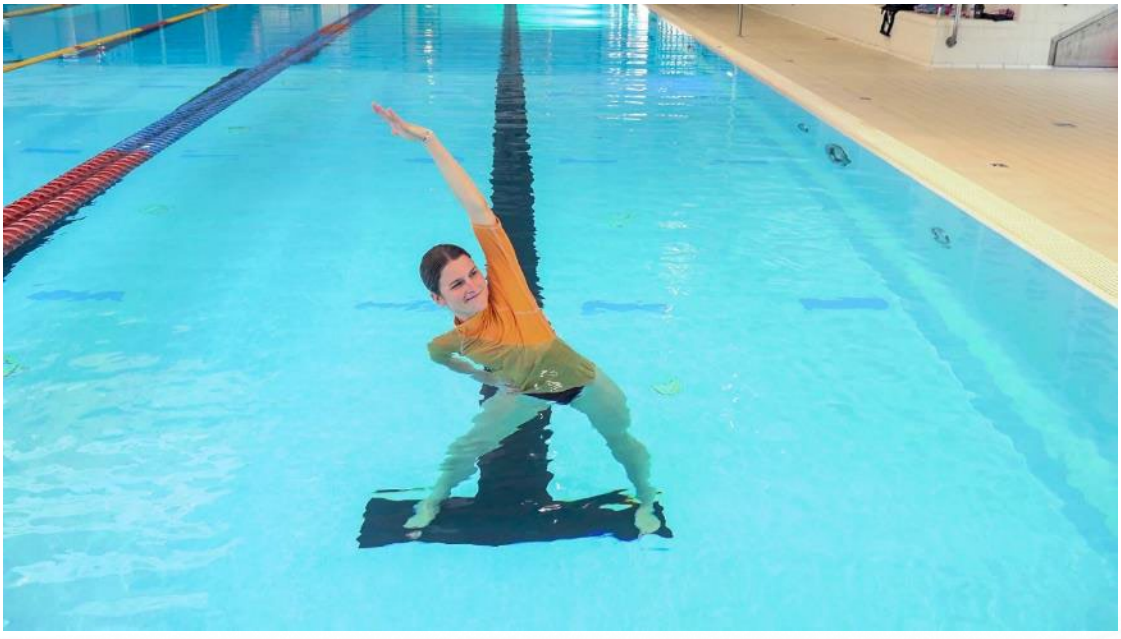
Stand upright with your feet slightly closer than shoulder-width apart, and extend your arms in front of you. Start by rotating one arm backward, while keeping the other arm steady in front. Once you reach the maximum extension, bring the moving arm back to the starting position, all while keeping your gaze on it.

## 32 STREAMLINE POSITION

Stand upright with your feet slightly closer than shoulder-width apart. Extend your arms out to the sides, lift them behind your head while keeping your elbows straight.

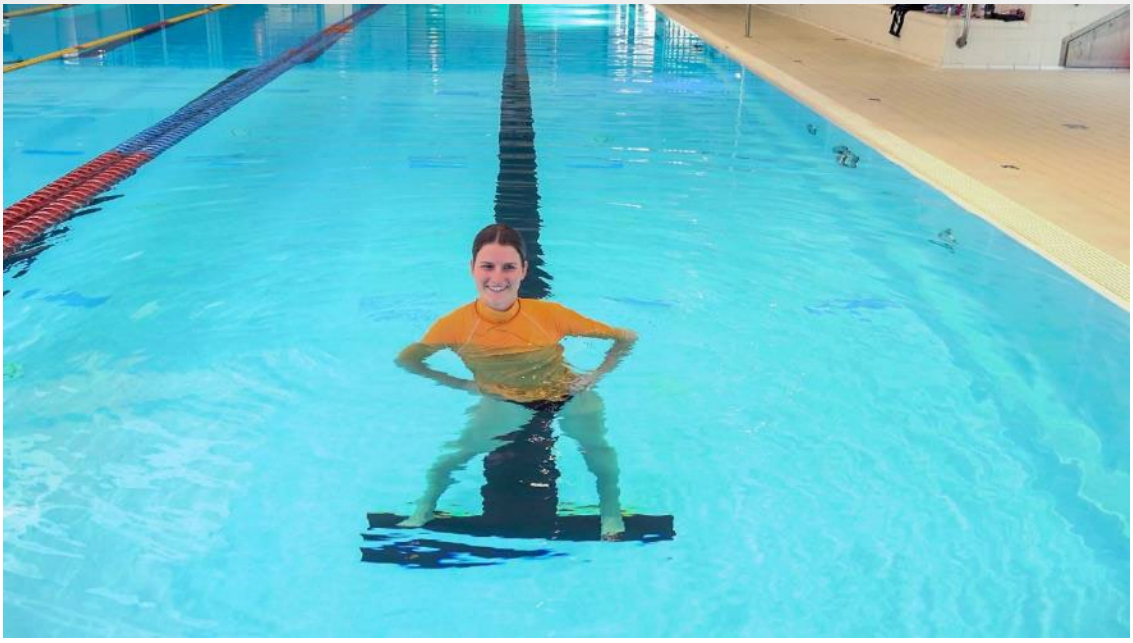
## 33 TRUNK DEFLECTION (DYNAMIC)

Stand upright with your feet slightly closer than shoulder-width apart. Place one hand on your hip and stretch the other arm upward. Bend your torso laterally toward the arm resting on your hip, then repeat the lateral bend on the opposite side.



## 34 HIP CIRCLES

Stand upright with your feet slightly closer than shoulder-width apart, hands on your hips. Begin to move your hips in a circular motion, then reverse the direction.



## 35 KNEE ROTATIONS (INSIDE)

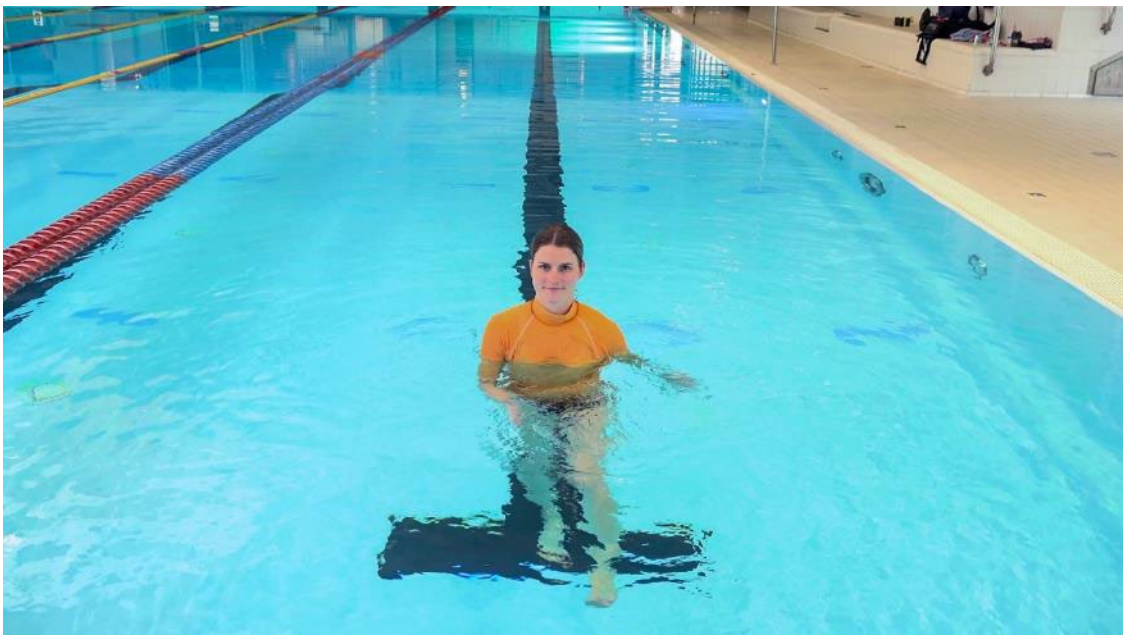
Stand upright with your feet slightly closer than shoulder-width apart, hands on your hips. Raise one leg and move your knee in a circular motion inward, then switch to the other leg.

## 36 KNEE ROTATIONS (OUTSIDE)

Stand upright with your feet slightly closer than shoulder-width apart, placing your hands on your hips. Raise one leg and move your knee in a circular motion outward, then switch to the other leg.

## 37 SINGLE-LEG SWINGS FROM BACK TO FRONT

Standing on one leg, perform with extension and flexion movements with the other leg, then repeat the extension and flexion movements with the opposite leg.

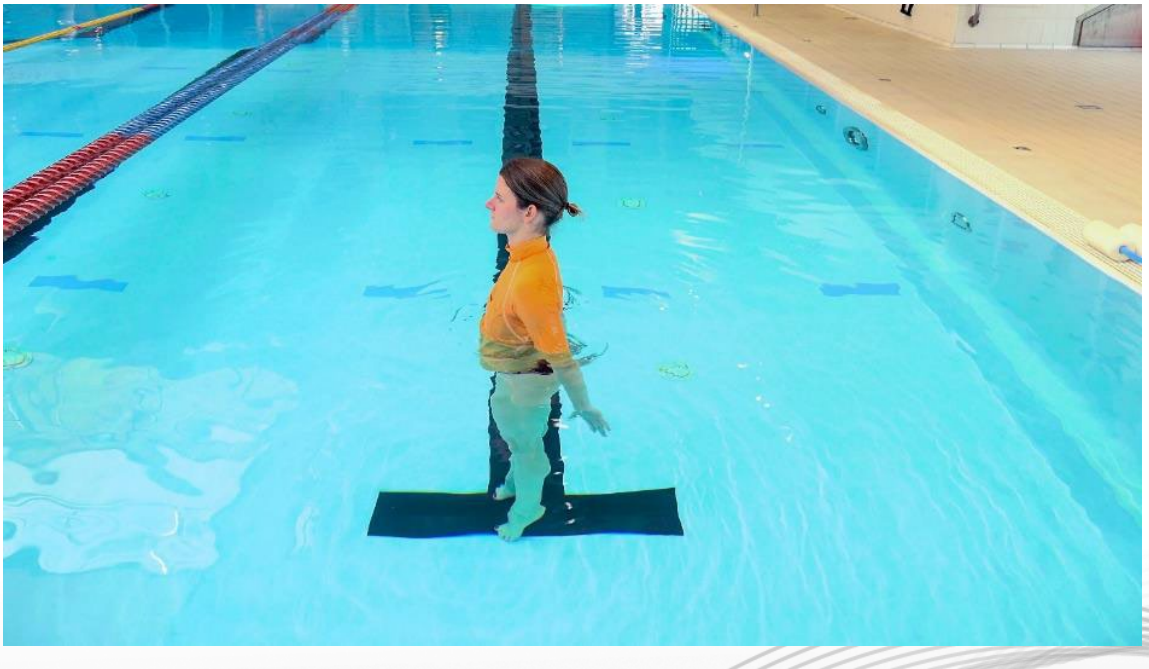


## 38 SINGLE-LEG SWINGS TO THE SIDE

Standing on one leg and holding a foam dumbbell in your arms, perform abduction and adduction movements with the opposite leg, then switch to doing the same with the leg you are standing on.

## 39 HEEL-TO-TOE

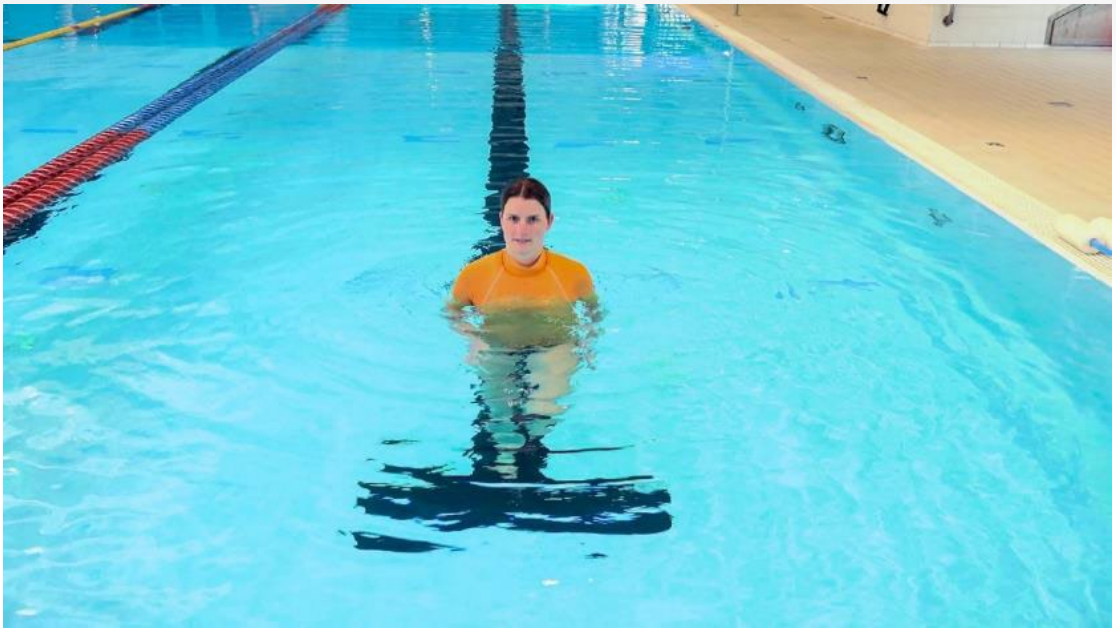
Stand upright with your feet slightly closer than shoulder-width apart, and alternate between standing on your heels and your toes. Keep your arms extended to the side, to help maintain your balance.



## 3.3.3. Aerobic exercises

### 40 JOGGING ON THE SPOT

To start a running phase, lift your legs and bend your knees. Hold your elbows at a 90-degree angle and move your arms in a coordinated manner (opposite arm to opposite leg).



### 41 JOGGING ON THE SPOT WITH ALTERNATE FIST PUNCHING ACTION

Begin by lifting and bending your knees to get into a jogging rhythm. Your arms should alternate between being bent forward and stretched out, with your palms forming fists.

## 42 JOGGING ON THE SPOT WITH ALTERNATE FORWARD PUNCHES (WITH SWIM PADDLES)

Lift and contract your legs alternately to create a running motion; at the same time, punch forward with your arms, moving from a bent position at your sides to an extended position in front, using swim paddles.

## 43 JOGGING ON THE SPOT WITH ALTERNATE ARM EXTENSION TO THE SIDE (WITH AND WITHOUT SWIM PADDLES)

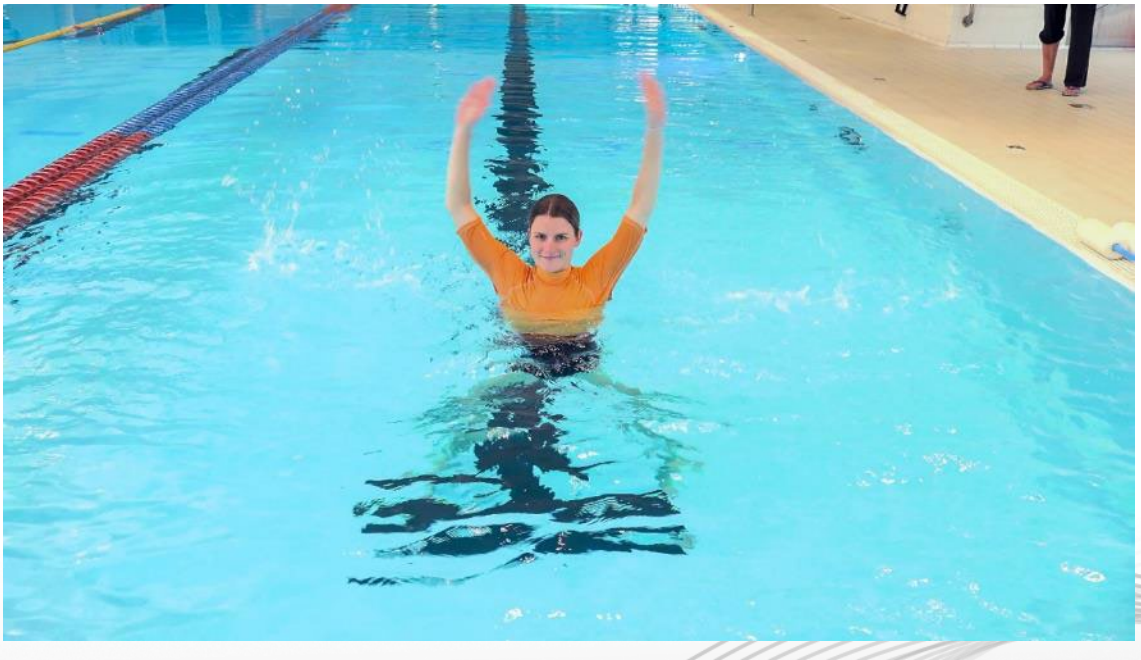
Lift and bend your knees alternately to start a jogging motion while extending and flexing your arms. This exercise can be done with or without swim paddles.

## 44 JOGGING ON THE SPOT WHILE ALTERNATELY PUSHING DUMBBELLS TO THE SIDE

The left standing leg is extended, while bending your right knee in front of you. Alternate lifting your legs while extending one arm from a bent position at your side to a fully extended position, then switch sides. Ensure to hold the dumbbells throughout the exercise.

## 45 JUMPING JACKS

Begin in a straight, upright standing position with your arms at your sides and feet together. Jump up, spreading your legs slightly while extending your arms to the sides, then return to the starting position with your feet together and arms at your sides.



## 46 JUMPING JACKS WITH ROTATION

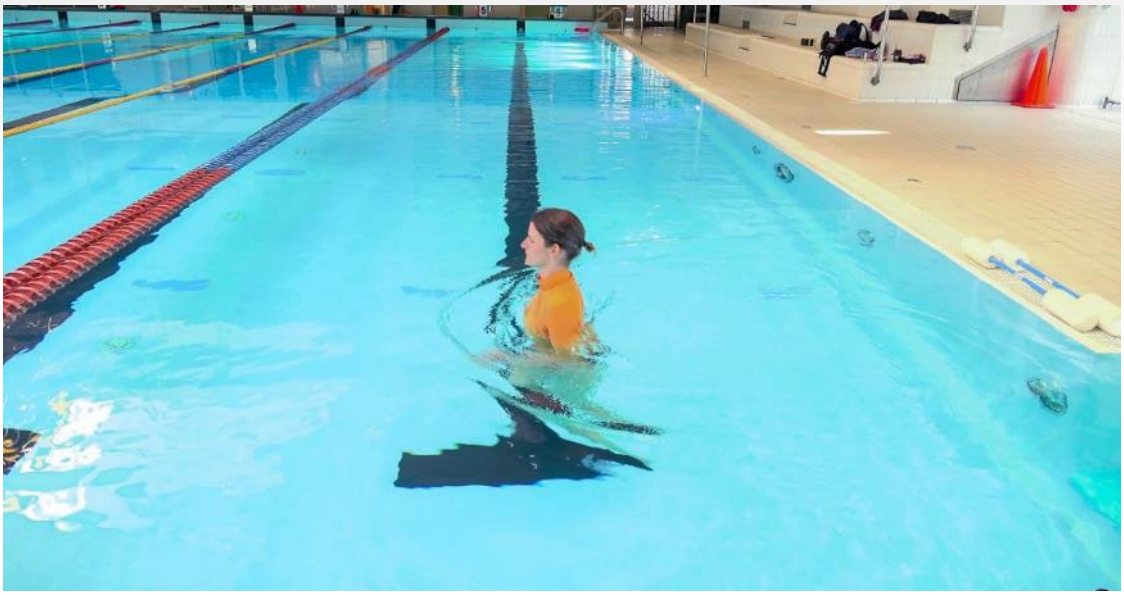
Starting from a parallel standing position with both knees and feet facing forward and arms at your sides, jump into a slightly bent position with your arms extended out to the sides. Then, jump back to a parallel standing position while simultaneously turning left on the first jump and to the right on the second.

## 47 JUMPING JACKS WITH DUMBBELLS

Begin in a parallel standing position with your arms at your sides. Jump into a shoulder-width stance with a slight bend in your knees, extending your arms out to the sides. Then, jump back to the parallel standing position while holding the dumbbells in your hands.

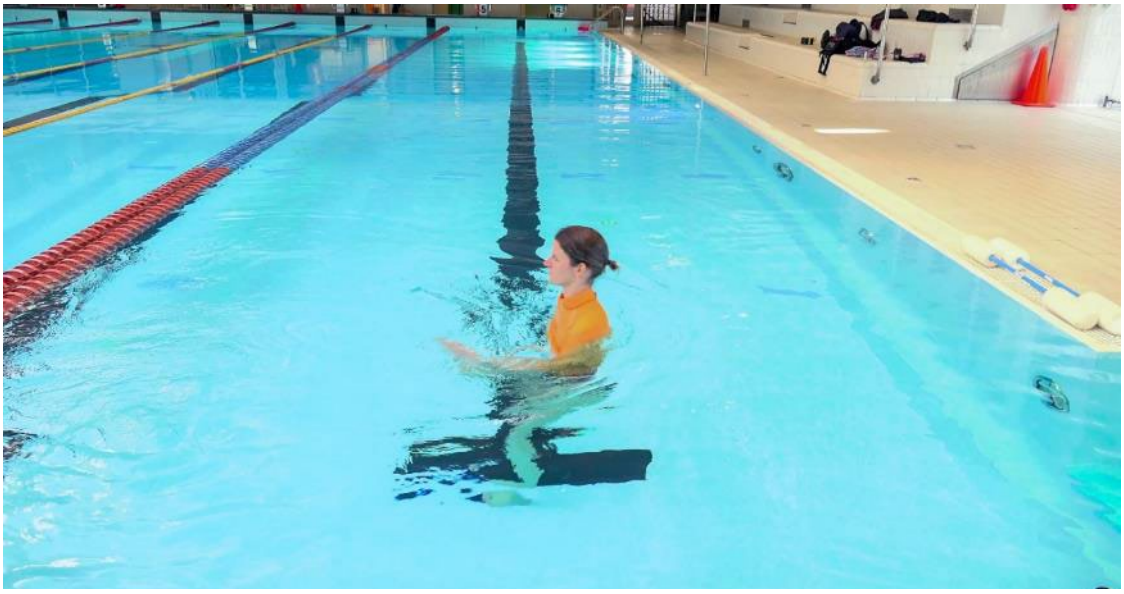
## 48 JOGGING FORWARD

Stand with your legs shoulder-width apart and alternately lift and lower them to create a running motion. As you do this, swing your elbows back and forth in a coordinated way to help you to move forward.



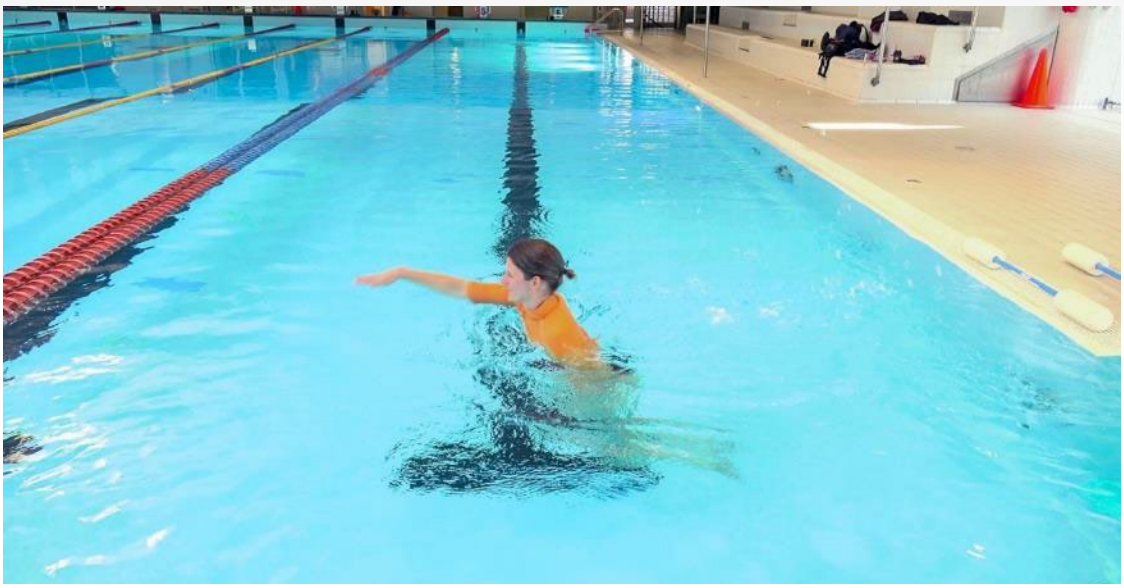
## 49 JOGGING BACKWARD

Keep your legs shoulder-width apart, and alternate raising and lowering them to simulate a running phase. Swing your elbows back and forth in a coordinated manner as you move backward.



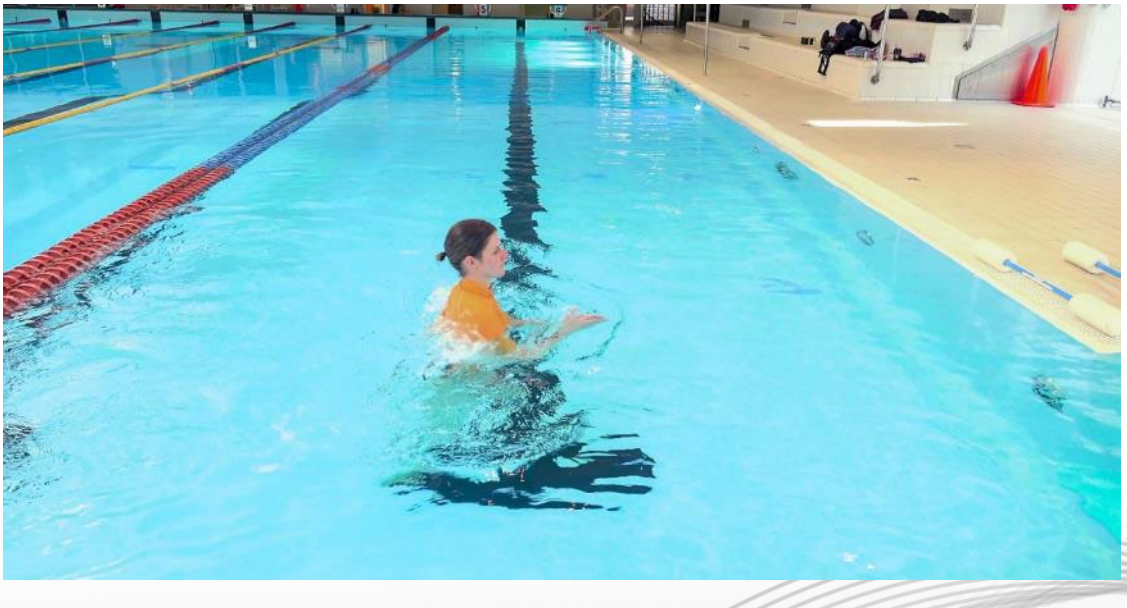
## 50 JOGGING FORWARD WITH FREESTYLE STROKE

Alternate bending and straightening your legs in front of your body to create a running motion as you move forward. Keep your hands close to your body and perform freestyle strokes: start with your arms at your sides, then stretch them upward with bent elbows until they reach shoulder height, palms facing down. Lower your arms back down to your sides and then raise them again.



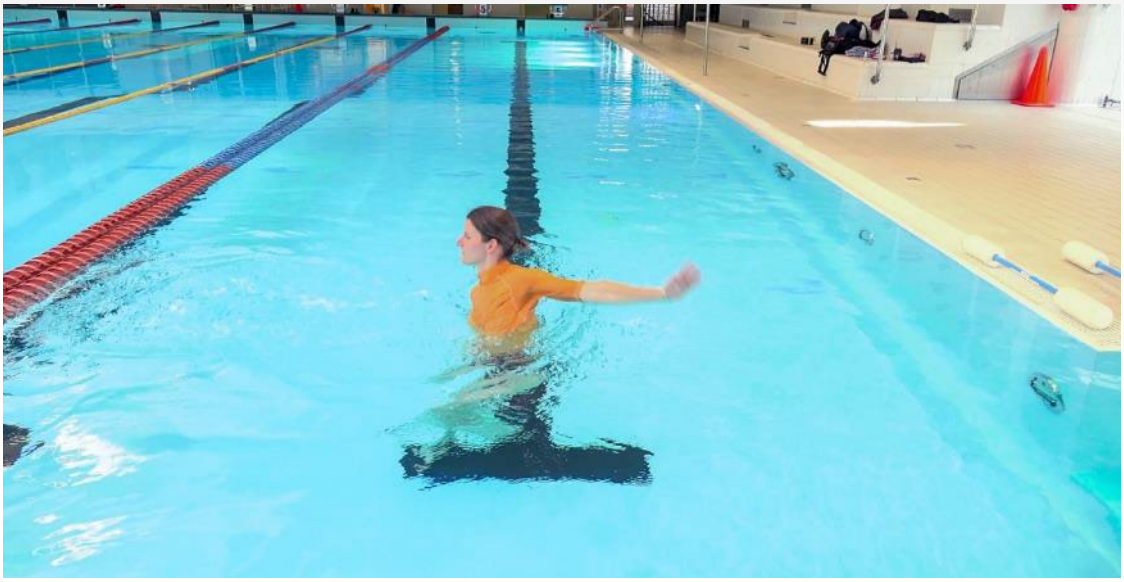
## 51 JOGGING FORWARD WITH BREASTSTROKES

Alternate pulling your legs in front of your body to create a running phase while moving forward, using your hands to perform breaststrokes. Your arms should extend forward simultaneously with palms facing inward, then move to a stretched position before bending inward again, and return to the stretched forward position with palms inward.



## 52 JOGGING BACKWARD WITH BACKSTROKES

Bend and straighten your legs alternately in front of your body to create a running motion as you move backwards. Keep your hands close to your body and perform backstrokes: start with your arms moving in a backward motion, lifting them toward your head, then back into the water, while pushing down before returning to the starting position.

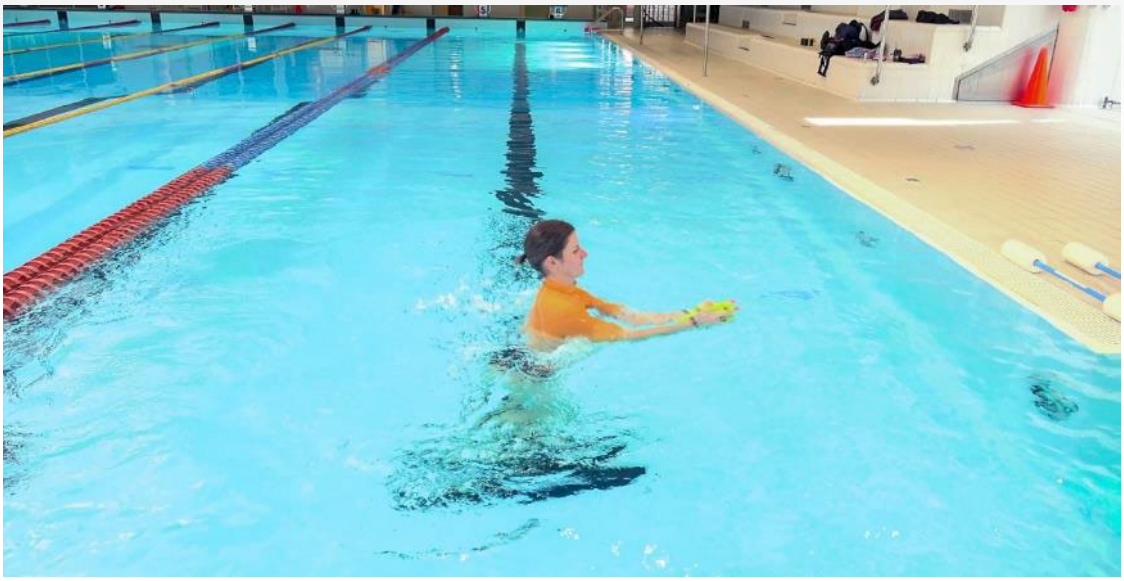


## 53 JOGGING FORWARD WITH FREESTYLE STROKES (WITH SWIM PADDLES)

Alternate bending and straightening your legs in front of your body to create a running motion as you move forward. Keep your hands close to your body and perform scooping strokes with paddles: start with your arms at your sides, bend your elbows to raise your arms to shoulder height with palms facing down, then lower your arms back to your sides and raise them again.

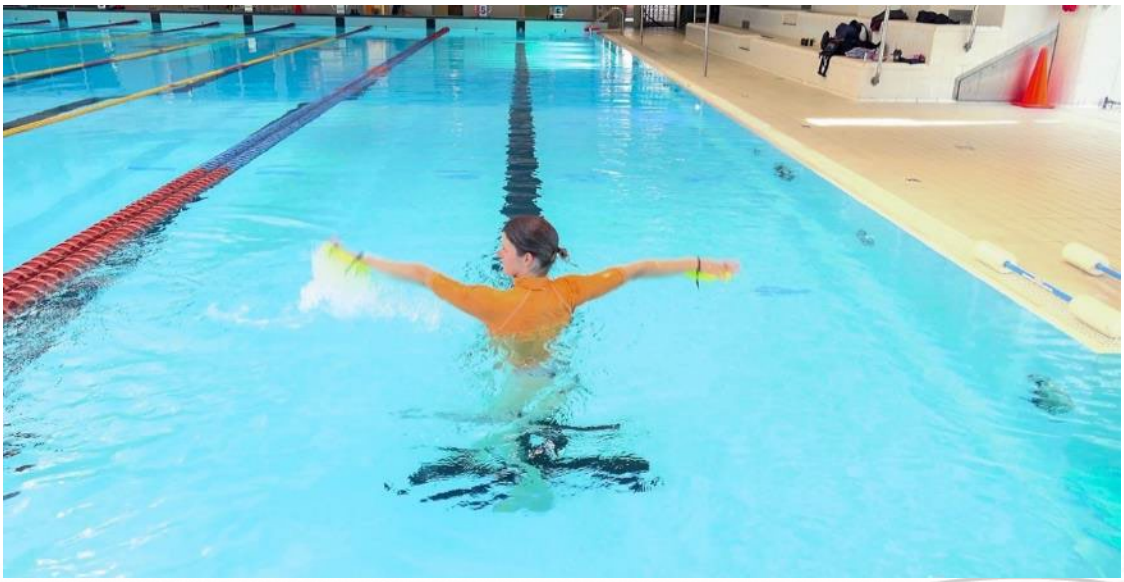
## 54 JOGGING FORWARD WITH BREAST STROKES (WITH SWIM PADDLES)

Bend and straighten your legs alternately in front of your body to create a running motion as you move forward. Use your hands to make breaststroke movements with paddles: your arms go simultaneously into a forward extension with palms facing inward, then bring them back to the stretched position, bending inward before extending them again with palms inward.



## 55 JOGGING BACKWARD WITH BACKSTROKES (WITH SWIM PADDLES)

Alternate bending and straightening your legs in front of your body to create a running motion while moving backwards. Use your hands to perform backstroke movements with paddles: your arms move backwards, rising toward your head, then back into the water while pushing, and returning to the starting position near your head.



## 56 JOGGING BACKWARD WITH SIMULTANEOUS ARM ACTION

Alternate bending and straightening your legs in front of your body to create a running motion while moving backward. Use your arms to assist by making stroking movements, where your arms transition from an extended side position to an extended forehand and then return to the body and back to the side.

## 57 JOGGING BACKWARD WITH SIMULTANEOUS ARM ACTION (WITH PADDLES)

Alternate bending and straightening your legs in front of your body to create a running motion while moving backwards. Use your arms to assist by making stroking movements, where your arms transition from an extended side position to an extended forehand and then return to the body and back to the side.

## 58 CROSS COUNTRY SKI

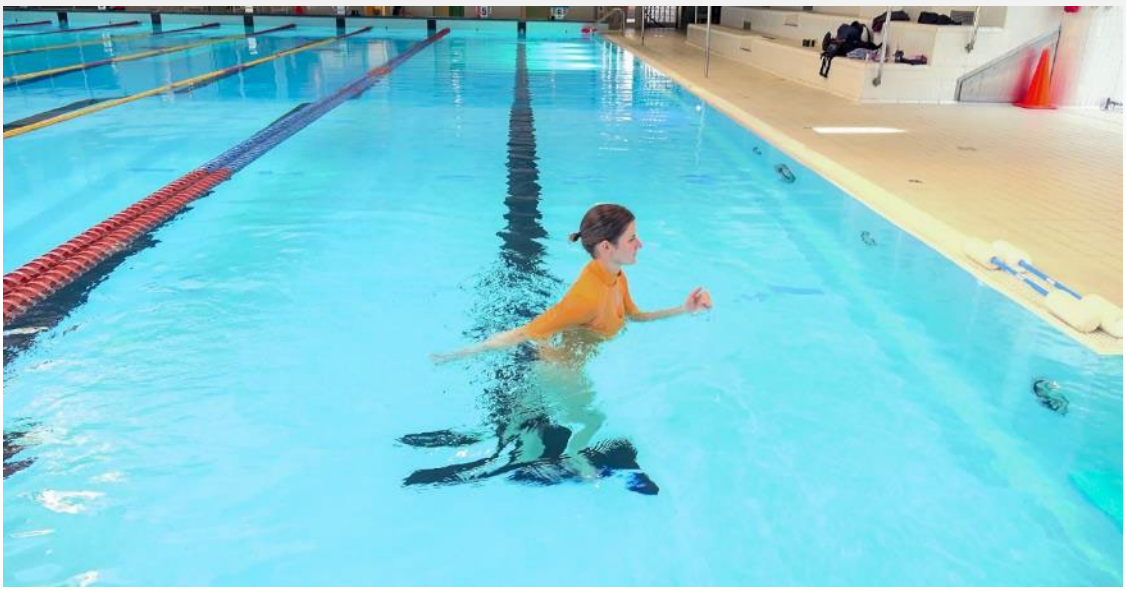
To perform jumps while keeping your center of gravity balances, step forward and switch legs in the air. Extend your arms out to the sides with palms facing inward, swinging them alternately.

## 59 CROSS COUNTRY SKI WITH ARMS MOVING UP AND DOWN

Stand with one foot forward, maintaining your center of gravity. Jump by alternating your legs in the air. Keep your arms fully extended in front of you, palms facing downward, and move them up and down arms alternately.

## 60 CROSS COUNTRY SKI FORWARD

Begin with one foot in front, keeping your center of gravity balanced, perform jumps by switching legs in the air while swinging your arms alternately beside your body; this allows you to move forward with each leap.



## 61 CROSS COUNTRY SKI BACKWARD

Begin with one foot in front, keeping your center of gravity balanced, perform jumps by switching legs in the air, with your arms extended alongside your body; this allows you to move backward with each leap.

## 62 CROSS COUNTRY SKI WITH DUMBBELLS

Begin with one foot in front, keeping your center of gravity balanced, perform jumps by switching legs in the air while swinging your arms alternately at your sides, holding dumbbells in your hands.

## 63 SKIPPING TO THE SIDE

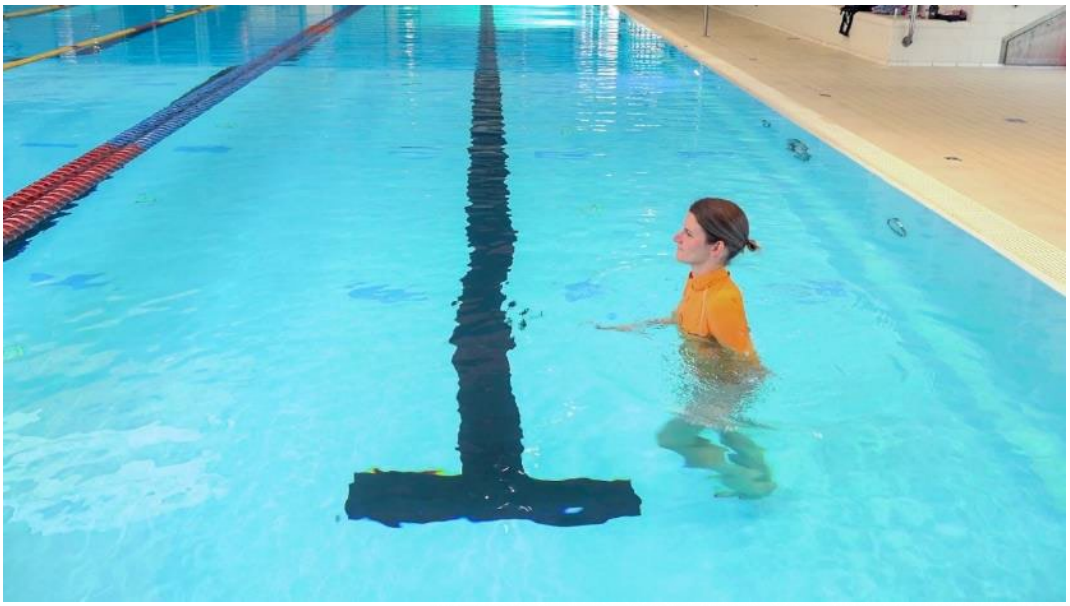
Lift and bend your legs at a 90-degree angle alternately, creating a running motion. Your arms should move along the body in a coordinated manner with your body as you shift sideways.

## 64 THE KARAOKE

Start by moving in a lateral motion, crossing your left foot over your right. Then, step out with your left foot and cross your right foot behind it. Repeat this movement pattern to one side, and when you return, switch the leg movements. Keep your arms extended to the sides to help with balance as you move.

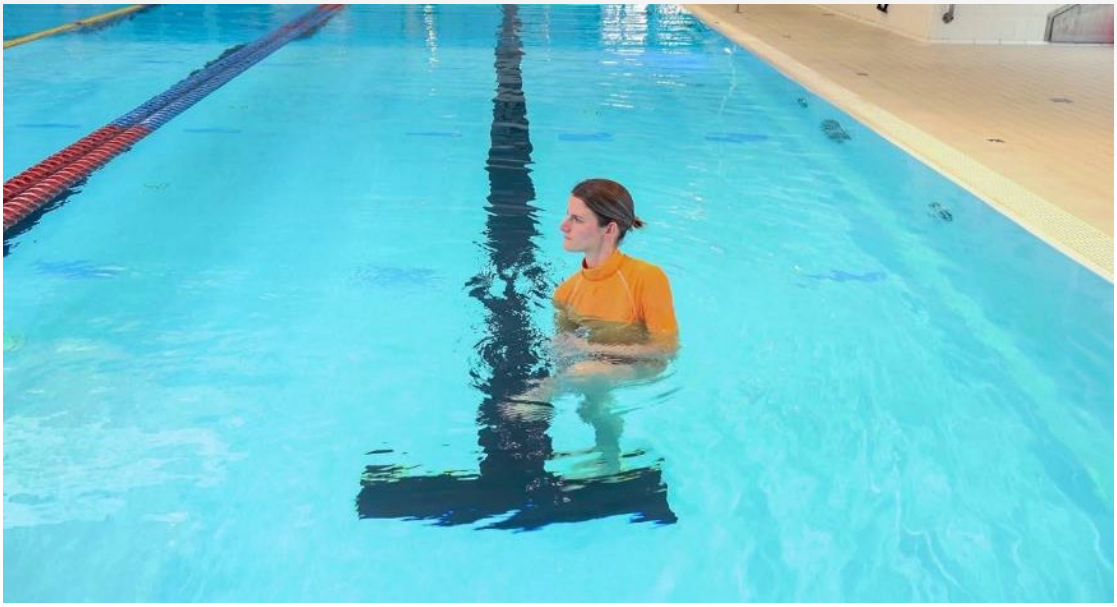
## 65 TOUCHING THE FEET WITH FORWARD MOVEMENT

Raise one leg in front and touch the foot with the opposite hand while keeping the standing leg straight. Then take a step forward with the bent leg and draw the extended leg inward to touch the foot with the other hand. Keep alternating as you move forward.



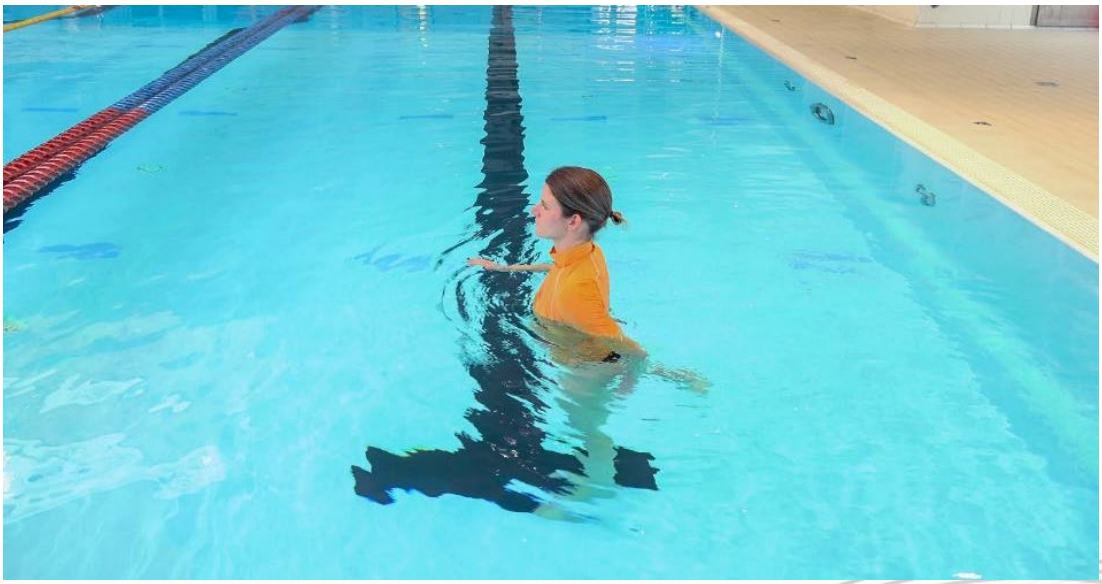
## 66 TOUCHING THE FEET WITH MOVEMENT IN REVERSE

Raise one leg into a bent position and touch the foot with the opposite hand while keeping the standing leg straight. Then, step back with the bent leg and bend the other leg, again reaching to touch the foot with the opposite hand. Alternate this movement as you move backward.



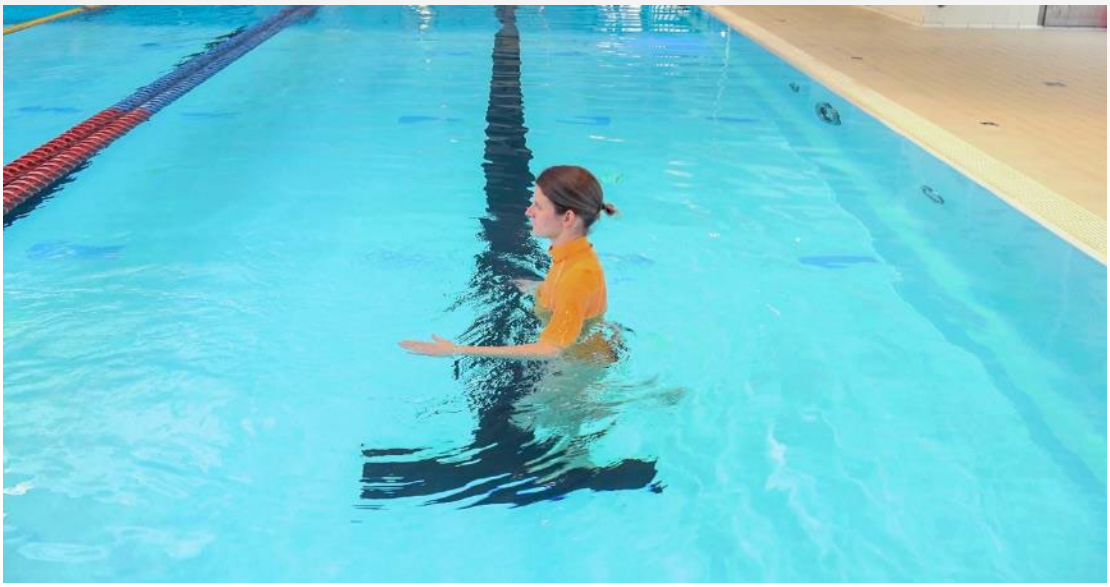
## 67 TOUCHING THE HEELS WITH FORWARD MOVEMENT

Lift one leg and bend it backward across your body, touch the heel with the opposite hand while keeping the standing leg extended. Step forward with the bent leg and bend the other leg backward in a similar crosswise manner, touching its heel with the opposite hand. Continue to alternate this movement as you move forward.



## 68 TOUCHING THE HEELS WITH MOVEMENT BACKWARDS

Lift one leg and bend it backwards and to the side, touching the heel with the opposite hand. Keep the standing leg straight, then step back with the bent leg, crossing over the other leg, touching its heel with the opposite hand. Continue alternating this movement as you move backward.



## 69 JOGGING ON THE SPOT WHILE TOUCHING THE OPPOSING HAND AND KNEE

Begin by lifting one leg and bending your knee as if jogging in place. When your right knee is raised, touch it with your left hand. Switch to the left leg and repeat the motion.

## 70 JOGGING ON THE SPOT WHILE TOUCHING THE OPPOSITE HAND AND KNEE (WITH SWIM PADDLES)

Alternately, lift your leg and bend your knees to initiate a running phase. When your right knee is raised, touch it with your left hand. Repeat the same action with your left leg. In this version, swim paddles are being used.

## 71 JOGGING ON THE SPOT WHILE EXTENDING YOUR ARMS NEXT TO YOUR BODY

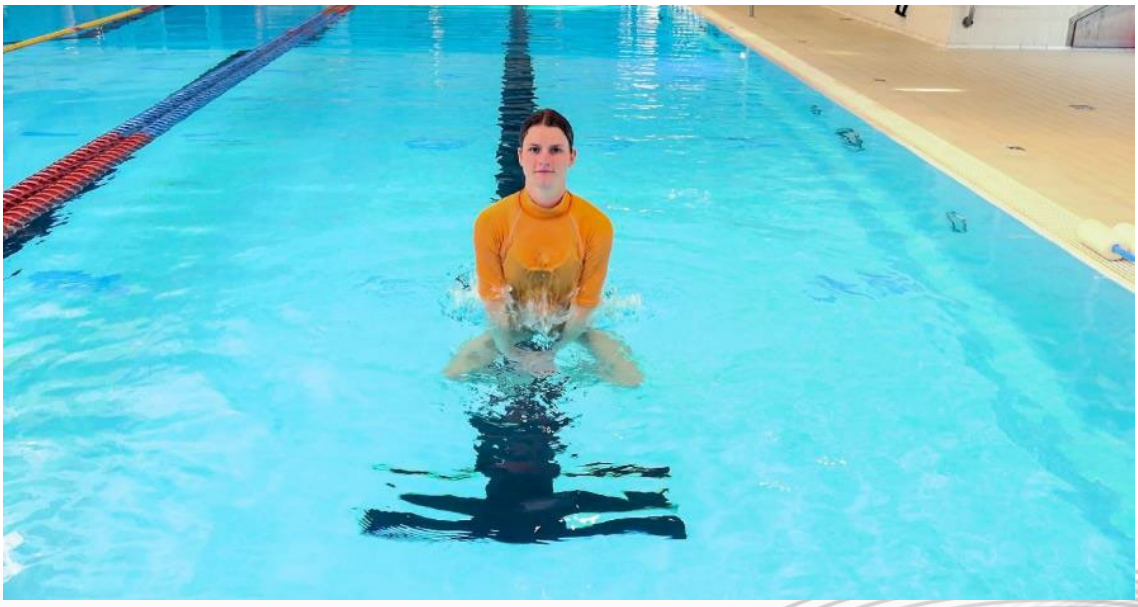
Lift your legs alternately and bend your knees to initiate a running phase. At the same time, extend your elbows next to your body, pushing down with your hands and keeping your palms facing down.

## 72 JOGGING ON THE SPOT WHILE EXTENDING YOUR ARMS NEXT TO YOUR BODY (WITH POOL NOODLE)

Begin by lifting your legs and bending your knees to initiate a running phase. At the same time, extend your elbows out to the sides, pushing down with your hands and keeping your palms facing down while holding the pool noodle.

## 73 FROG JUMPS

Begin with your feet slightly narrower than hip-width apart and your forehand bent. Jump into a bent spread, raising your knees as high as possible, while extending your hands downwards in a forehand position.



## 74 FROG JUMPS WITH DUMBBELLS

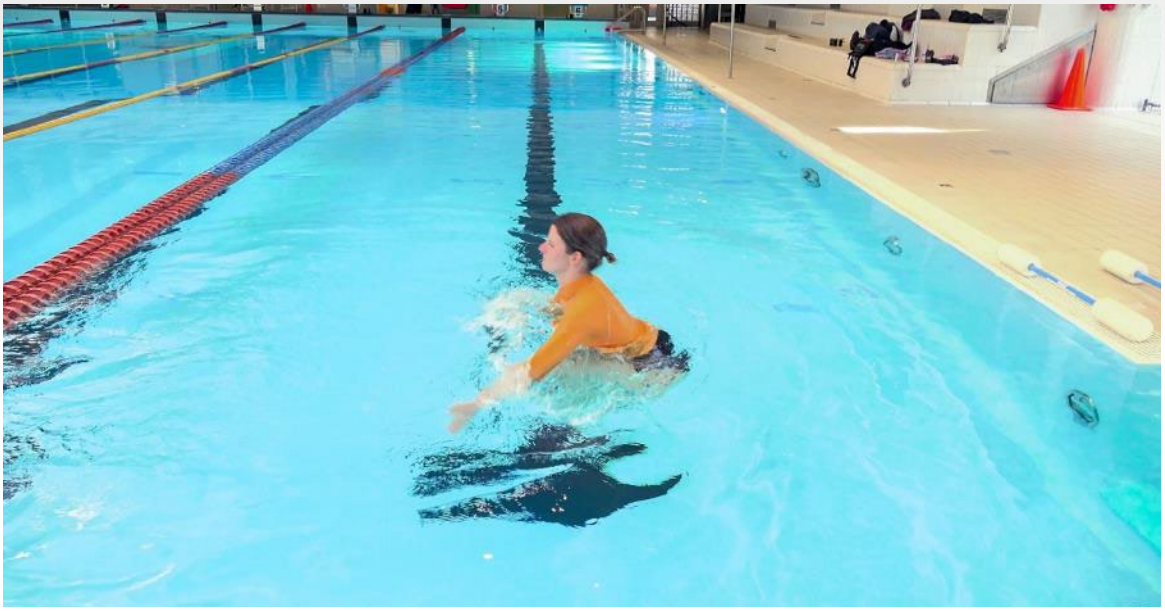
Begin with your feet slightly narrower than hip-width apart and your forehand bent. Jump into a bent spread, raising your knees as high as possible, while extending the dumbbells downwards in front of you.

## 75 DOUBLE-LEG JUMPS FORWARD

Begin from a standing position with your feet close together. Jump forward, lifting your knees as high as possible, while rowing your arms from front to back alongside your body.

## 76 DOUBLE-LEG JUMPS BACKWARD

Begin from a standing position with your feet close together. Jump backward, lifting your knees as high as possible, while rowing your arms from back to front alongside your body.



## 77 POOL NOODLE JUMP ROPE

Hold the pool noodle like a jump rope submerged in the water and perform double-legged jumps over it, moving back and forth.

## 78 ALTERNATE FOOT TOUCHES IN FRONT OF THE BODY WITH THE POOL NOODLE

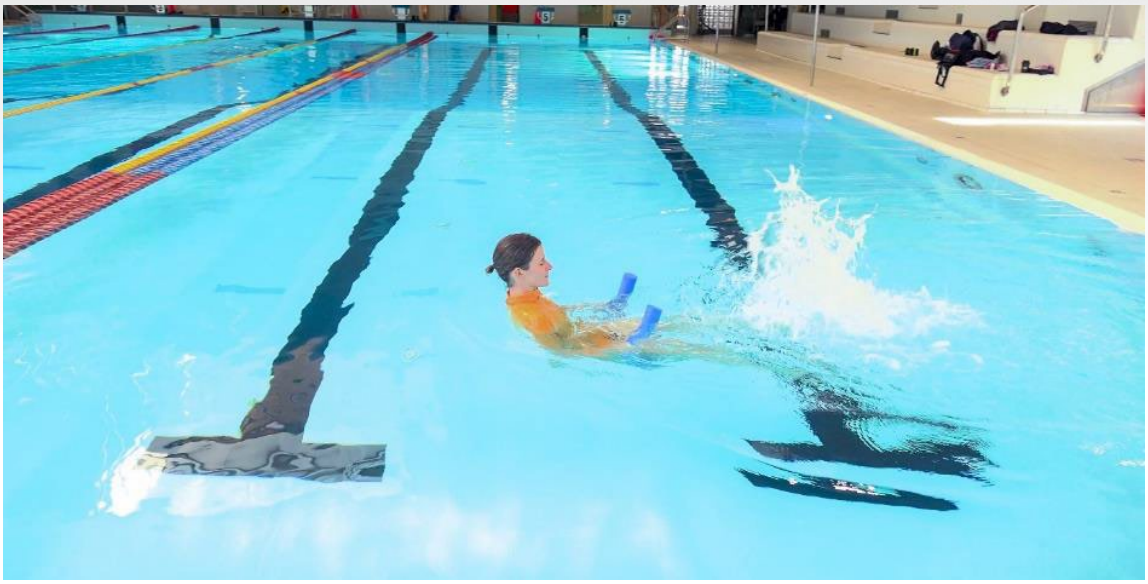
Begin by positioning the pool noodle behind your back, securing it with both arms. Lift one leg, bending the knee inward, and touch the foot with the opposite hand while keeping your grip on the pool noodle; ensure the standing leg remains straight. Then, place the bent leg back on the ground and repeat the process with the other leg, bending that knee inward and touching the foot with the opposite hand (while still holding the pool noodle); continue alternating between legs.


## 79 ALTERNATE TOUCHES OF THE HEEL BEHIND THE BODY WITH POOL NOODLE

Position the pool noodle in front of your abdomen, securing it with both arms. Raise one leg, bending it inward, and reach down to touch your heel with the hand that is holding the pool noodle, while keeping the standing leg straight. Subsequently, place the bent leg back on the ground and repeat the movement with the other leg, bending it inward and again touching the heel with the opposite hand that is holding the pool noodle; continue alternating between legs.


## 80 SITTING ON A POOL NOODLE WITH KICKS

Sit on the pool noodle and execute alternating kicks by pushing yourself backward.

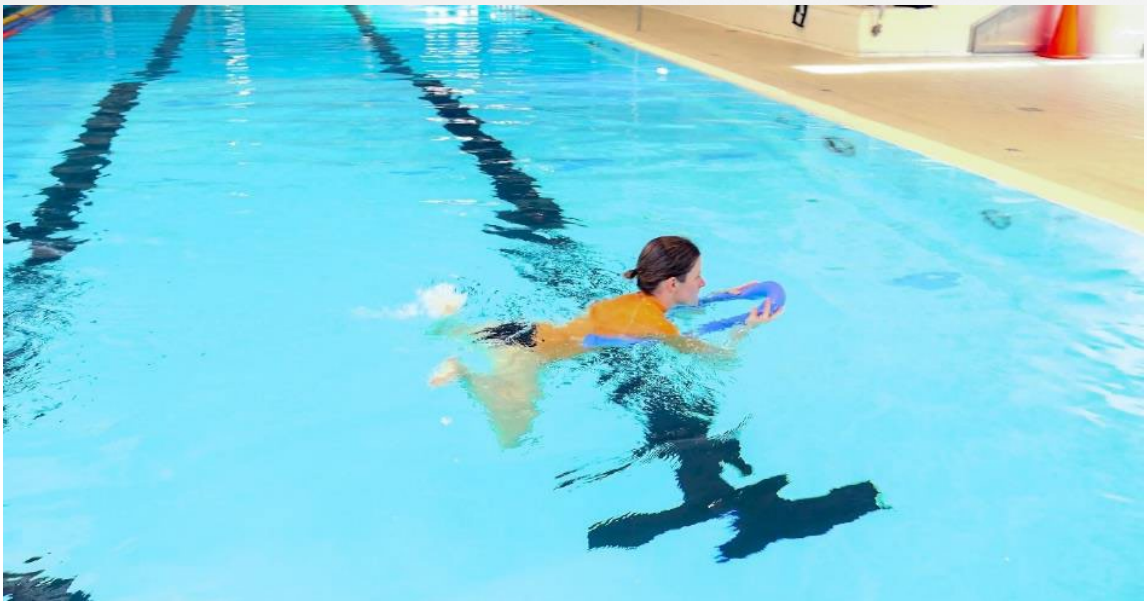


## 81 FREESTYLE KICKS HOLDING THE POOL NOODLE WITH EXTENDED ARMS

Lie on your stomach and hold the pool noodle horizontally positioned with your arms extended in front of you. Alternate your leg movements as if doing crawl strokes.

## 82 BREASTSTROKE KICKS HOLDING THE POOL NOODLE IN THE EXTENDED FOREHAND

Lie on your stomach and hold the pool noodle horizontally positioned with your arms extended in front of you. Execute leg kicks similar to those used in breaststroke swimming.

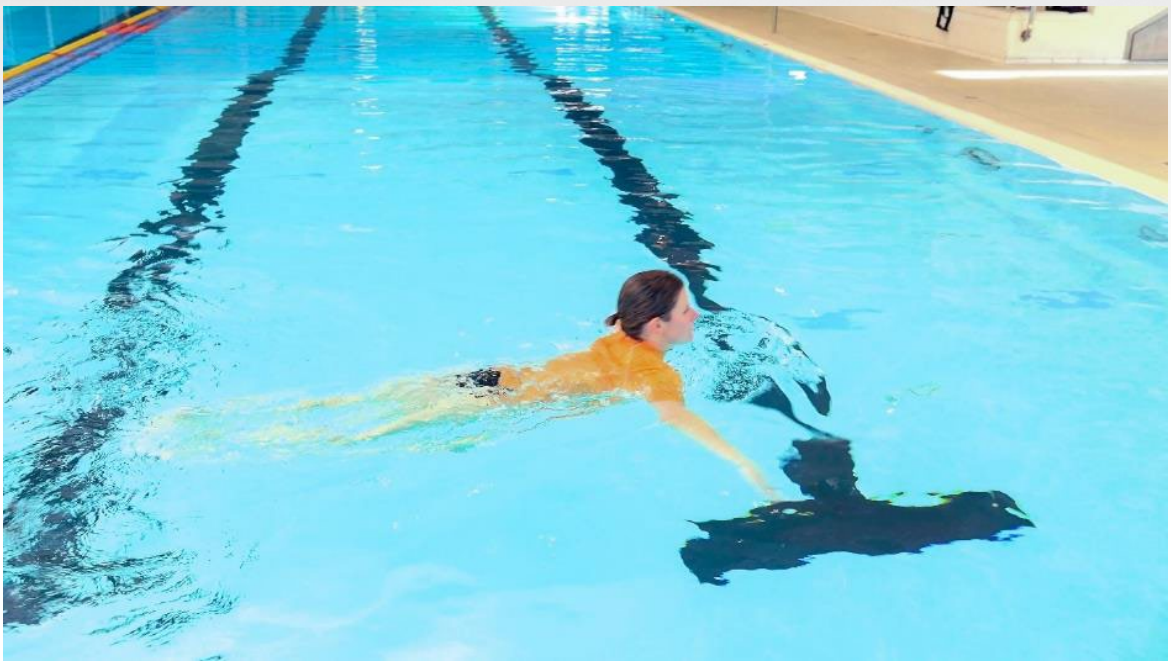


## 83 FROG STYLE WITH THE HELP OF A POOL NOODLE

Lie on your stomach and lean on the pool noodle while swimming in the frog style.

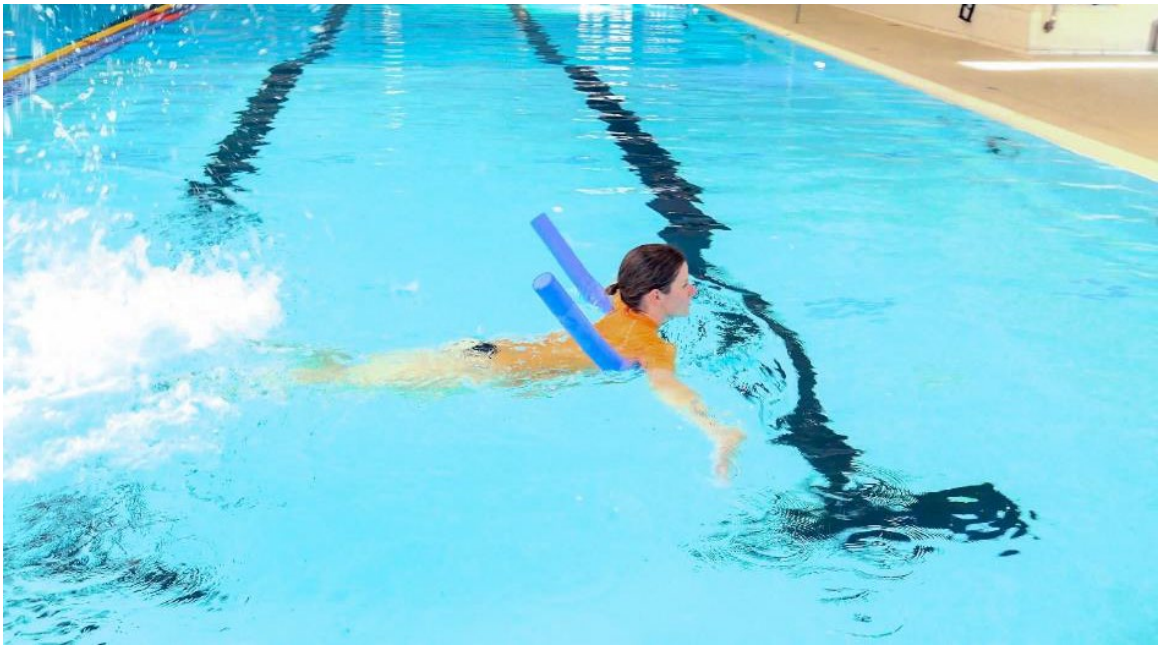
## 84 FROG STYLE

Lie on your stomach and swim in the frog style.



## 85 FREESTYLE KICKS AND BREASTSTROKES WITH THE HELP OF A POOL NOODLE

Lie on your stomach and lean on the pool noodle while executing freestyle kicks along with breaststrokes.



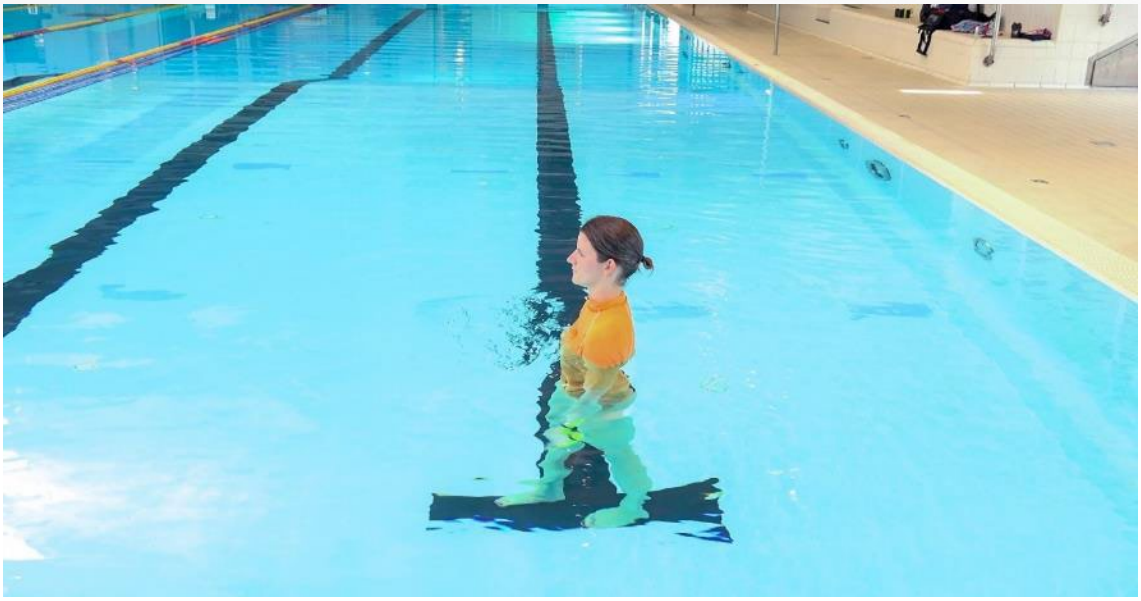
## 86 FREESTYLE KICKS AND BREASTSTROKES

Lie on your stomach and perform freestyle kicks in combination with breaststroke movements.

## 3.3.4. Strength training exercises

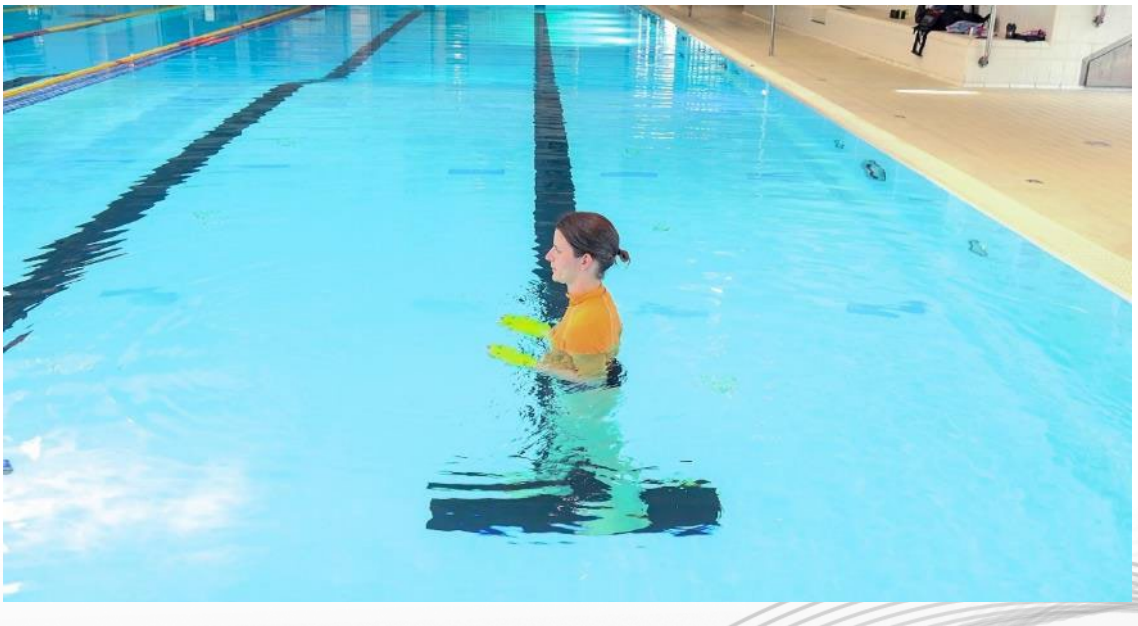
### 87 ELBOW EXTENSION WITH SWIM PADDLES

Stand in a balanced position by placing one foot in front of the other. Keep your arms bent and raised in front of you with palms facing down. Extend your elbows while keeping your upper arms still, then return to the starting position by bending your arms again.



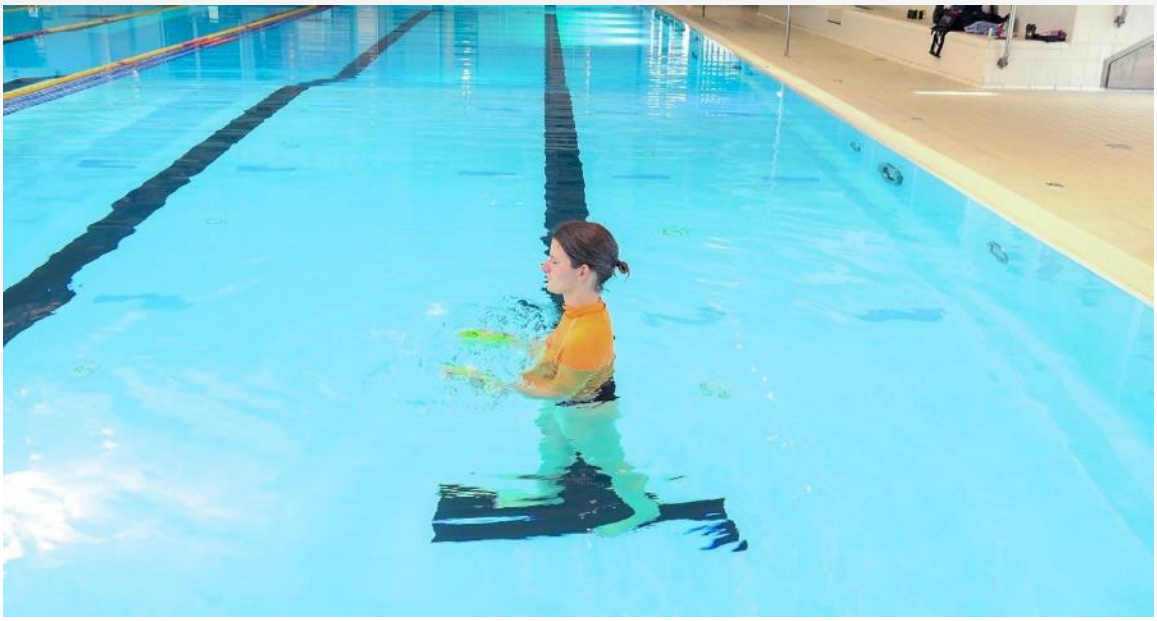
### 88 ELBOW FLEXION WITH SWIM PADDLES

Stand in a balanced position by placing one foot in front of the other. Keep your arms straight alongside your body with your palms facing up. Flex your elbows without moving your upper arms, then return to the starting position by extending your arms.



## 89 ELBOW FLEXION AND EXTENSION WITH SWIM PADDLES

Stand in a balanced position by placing one foot in front of the other. Keep your arms straight alongside your body with your palms facing up. Flex your elbows without moving the upper arms, then turn your palms down and extend your elbows, returning to the starting position of your arms.

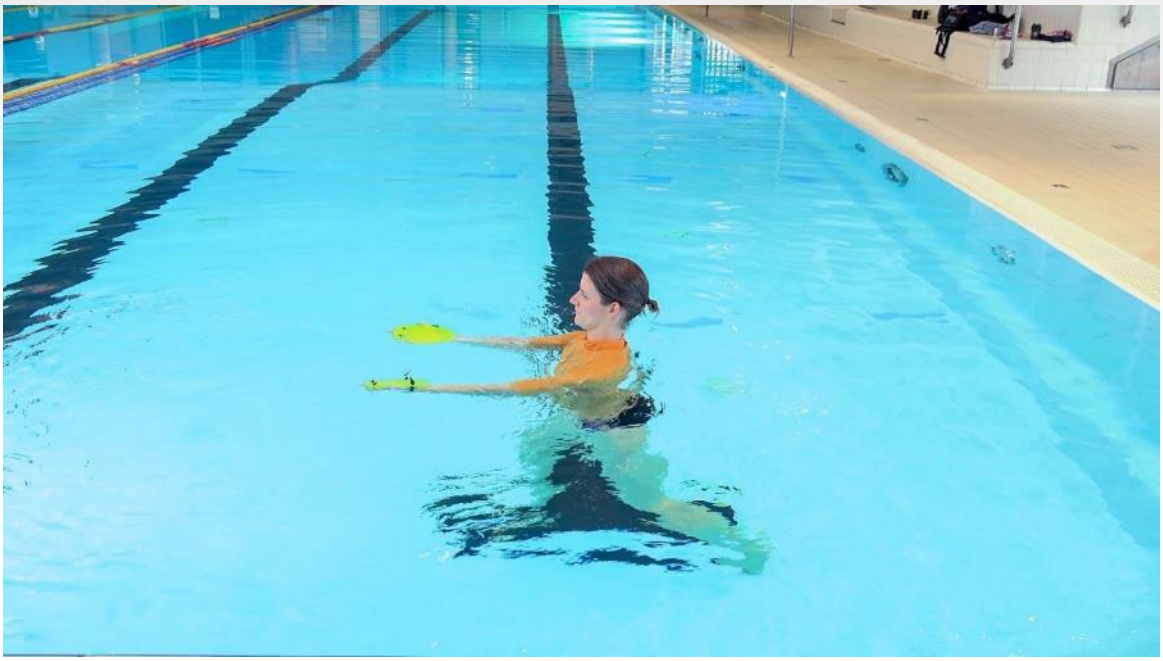


## 90 SHOULDER EXTENSIONS, WITH SWIM PADDLES

Stand with your feet hip-width apart and extend your arms forward, palms facing down. Perform shoulder extensions, then return to the starting position.

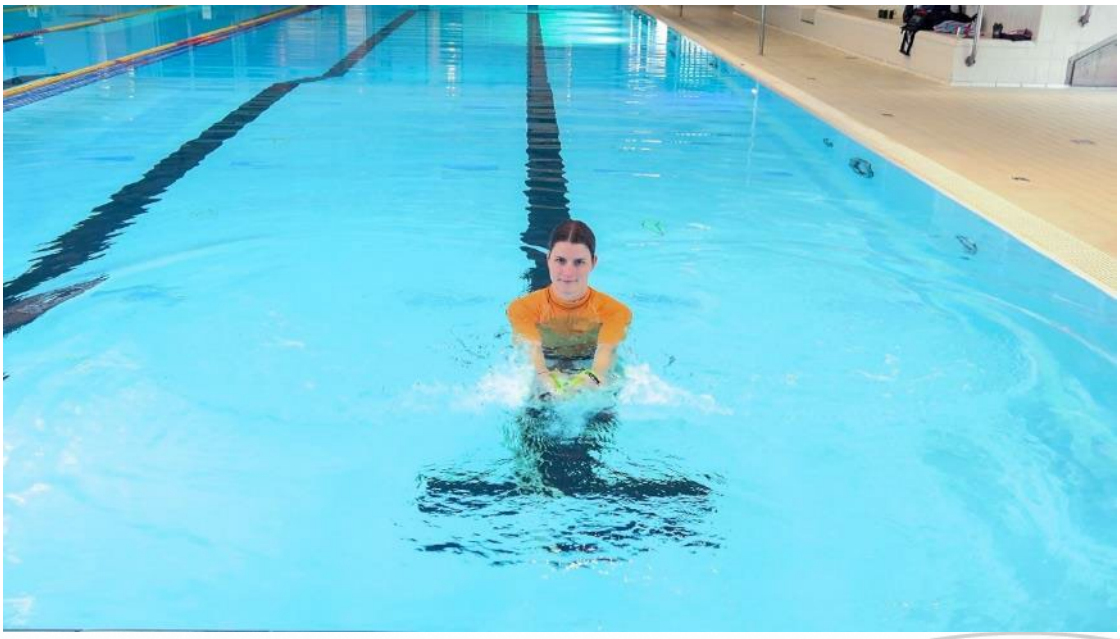
## 91 SHOULDER FLEXIONS, WITH SWIM PADDLES

Stand with your feet hip-width apart and extend your arms forward, palms facing down. Raise your arms up to the shoulder, then return to the starting position.



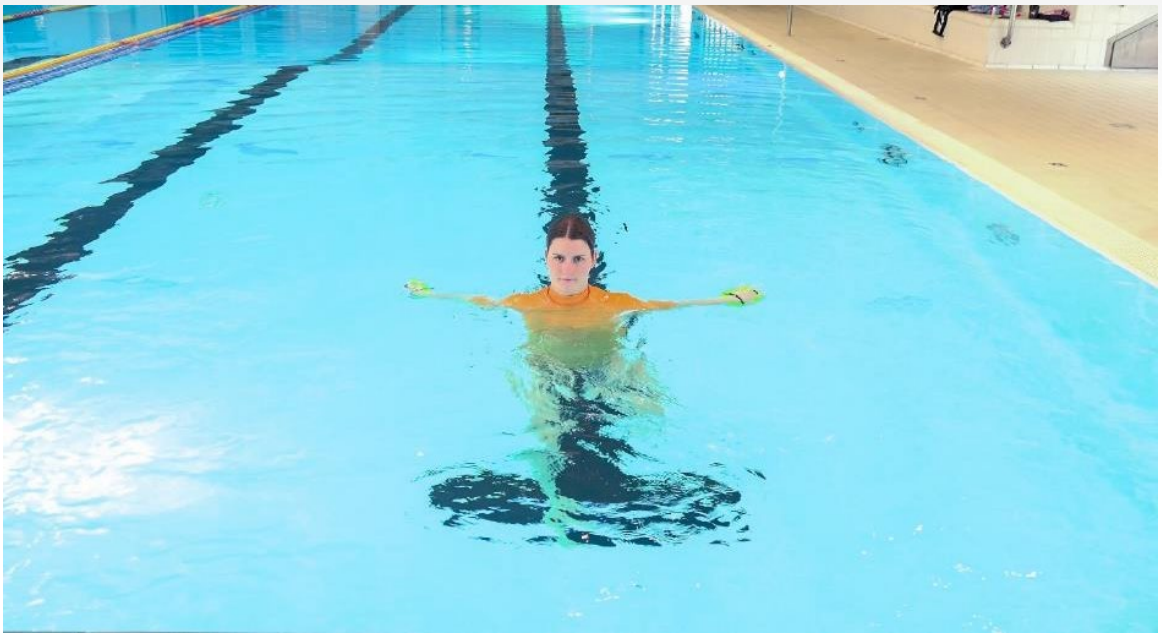
## 92 SHOULDER HORIZONTAL ADDUCTION

Place one foot in front of the other, leaning your body slightly forward. Stretch your arms out to the sides with your palms facing each other, then bring your arms together in front of you, making sure to keep the movement beneath the water's surface.



## 93 SHOULDER HORIZONTAL ABDUCTION

Place one foot in front of the other, leaning your body slightly forward. Reach your hands out in front of you with your palms facing outward, and then bring your arms out to the sides in a horizontal motion, making sure to keep the movement beneath the water's surface.



## 94 ALTERNATELY PUSHING THE WATER FORWARD WITH SWIM PADDLES

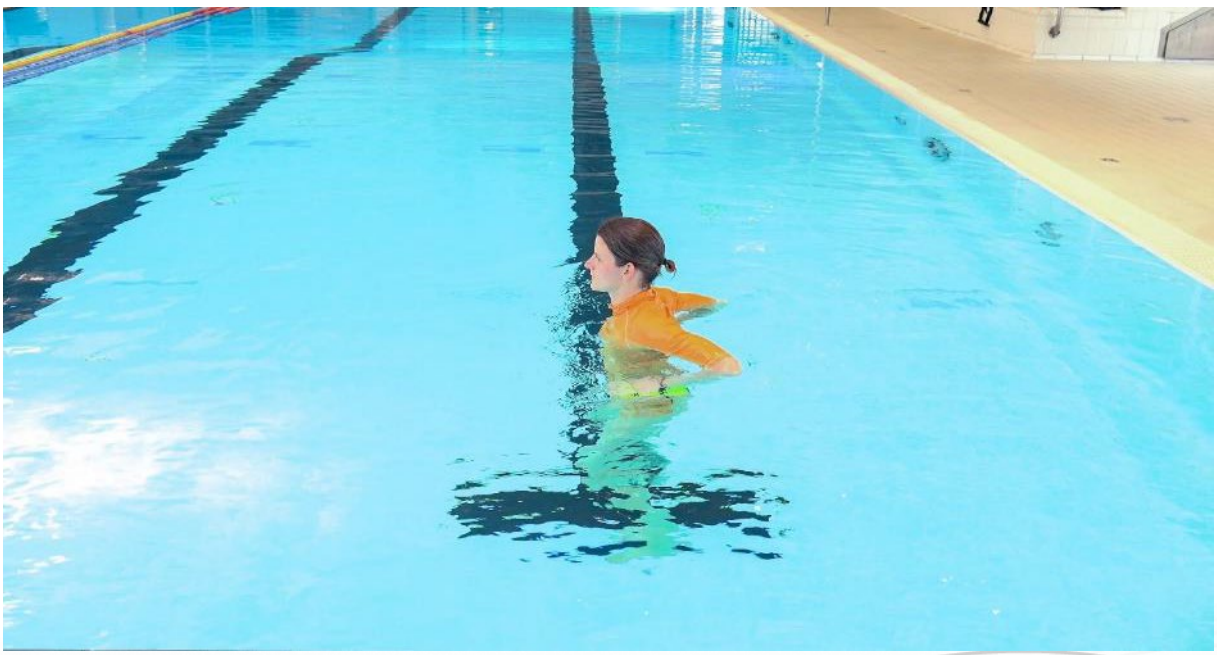
The hands alternate between pushing the water from a bent position to an extended position, with the palms facing away from the body.

## 95 SIMULTANEOUSLY PUSHING THE WATER FORWARD WITH SWIM PADDLES

Simultaneously, the hands move water from a bent position to an extended arm, with the palm facing away from the body.

## 96 EXTENSIONS IN THE ELBOWS DOWNWARDS WITH THE ARMS NEXT TO THE BODY

Stand in a balanced position with your arms bent at your sides and palms facing down. Extend your elbows and then contract them back to the starting position.



## 97 ARM SWINGS WITH SWIM PADDLES

Stand upright with your feet slightly wider than shoulder-width apart. Extend your arms in front of you with your palms facing down, and gently swing your arms from side to side.

## 98 ARM SWINGS WITH KICKING BOARD (LESS RESISTANCE)

Stand upright with your feet slightly wider than shoulder-width apart. Extend your arms in front of you, holding the kicking board (with the board facing up or down for less resistance). Keep your palms facing up or down, and swing your arms from side to side.

## 99 ARM SWINGS WITH KICKING BOARD (MORE RESISTANCE)

Stand in an upright position slightly wider than shoulder-width apart. Hold the kicking board in front of you, positioned sideways to create more resistance. With your palms facing each other, swing your arms from side to side.

## 100 SINGLE-LEGGED STEPS ON THE POOL NOODLE

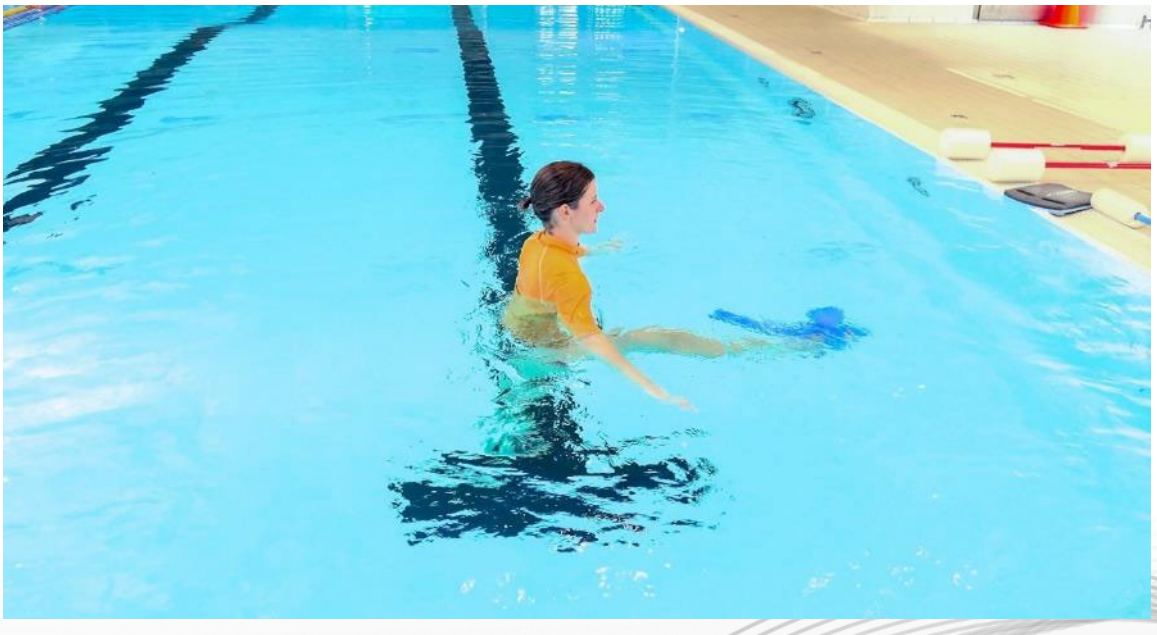
Stand with your feet slightly narrow hip-width apart, arms extended to the sides. Step one leg onto the pool noodle and perform a hip and knee flexion, then press your foot down until your leg is fully extended.

## 101 HIP ADDUCTION TO THE SIDE WITH A POOL NOODLE

Stand with your feet hip-width apart and your arms extended to the side. Place the pool noodle under one foot and perform single-legged hip adduction. Pull the leg toward the standing leg, ensuring the hip remains in the starting position, then return to the starting position. Repeat the exercise with the opposite leg.

## 102 HIP EXTENSIONS WITH A POOL NOODLE

Stand with your feet slightly narrower than hip-width apart and extend your arms to the sides. Take the pool noodle and form a loop, then place the foot of one leg into it. Begin performing hip stretches by moving from flexion to extension, ensuring your body remains straight and avoiding any arching in the lower back.



## 103 HIP FLEXIONS USING A POOL NOODLE

Stand with your feet slightly narrower than hip-width apart, placing your hands on the wall for support. Take the pool noodle and form a loop, then place the foot of one leg into it. Begin performing hip stretches by moving from extension to flexion with a bent knee, ensuring your body remains straight and avoiding any arching in the lower back.

## 104 CIRCULAR MOTION OF THE HIPS WITH THE POOL NOODLE (OUTWARD)

Stand with your feet slightly narrower than hip-width apart and extend your arms to the side. Take the pool noodle and form a loop, then place the foot of one leg into it, allowing your leg to move in a circular motion—extending forward, to the side, and then backward.

## 105 CIRCULAR MOTION OF THE HIPS WITH THE POOL NOODLE (INWARD)

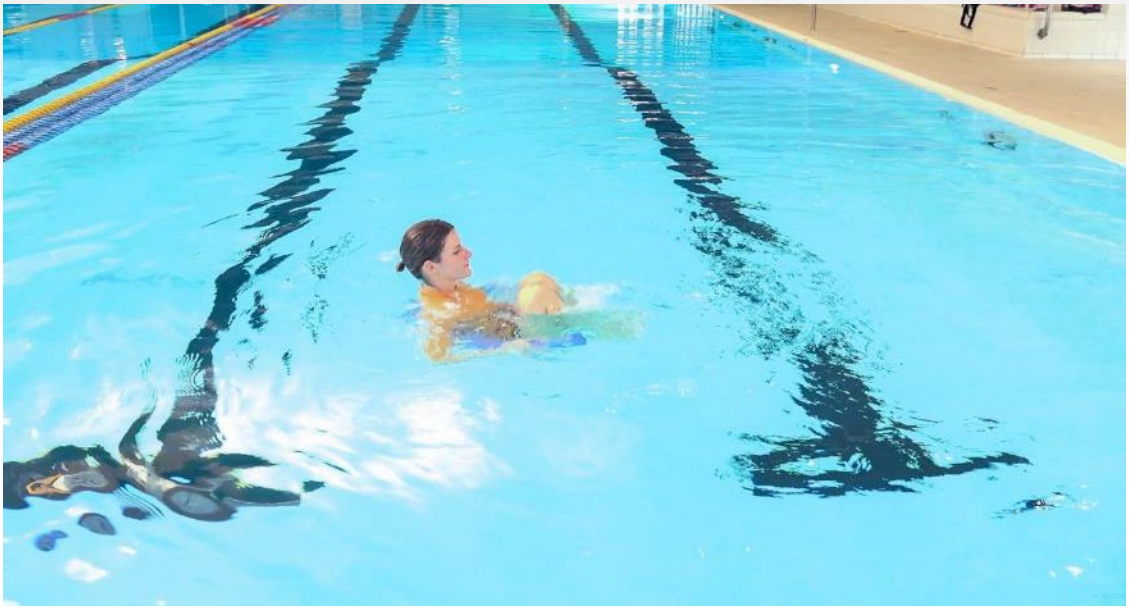
Stand with your feet slightly narrower than hip-width apart and extend your arms to the side. Take the pool noodle and form a loop, then place the foot of one leg into it, allowing your leg to move in a circular motion—extending forward, to the side, and then forward.

## 106 PULLING THE KNEES TO THE CHEST

Stand with your feet hip-width apart and your hands extended to the sides, holding dumbbells. Pull both knees up to your chest, engaging your abdominal muscles, and then extend your legs back to the starting position.

## 107 SITTING ON A POOL NOODLE AND PULLING THE KNEES TO THE CHEST

Sit on the pool noodle with your legs extended. Perform a simultaneous movement by flexing your knees and hips, pulling your knees toward your chest, and then extending them back to the starting position.



## 108 LEANING ON A POOL NOODLE WITH HIP ABDUCTION AND HIP ADDUCTION

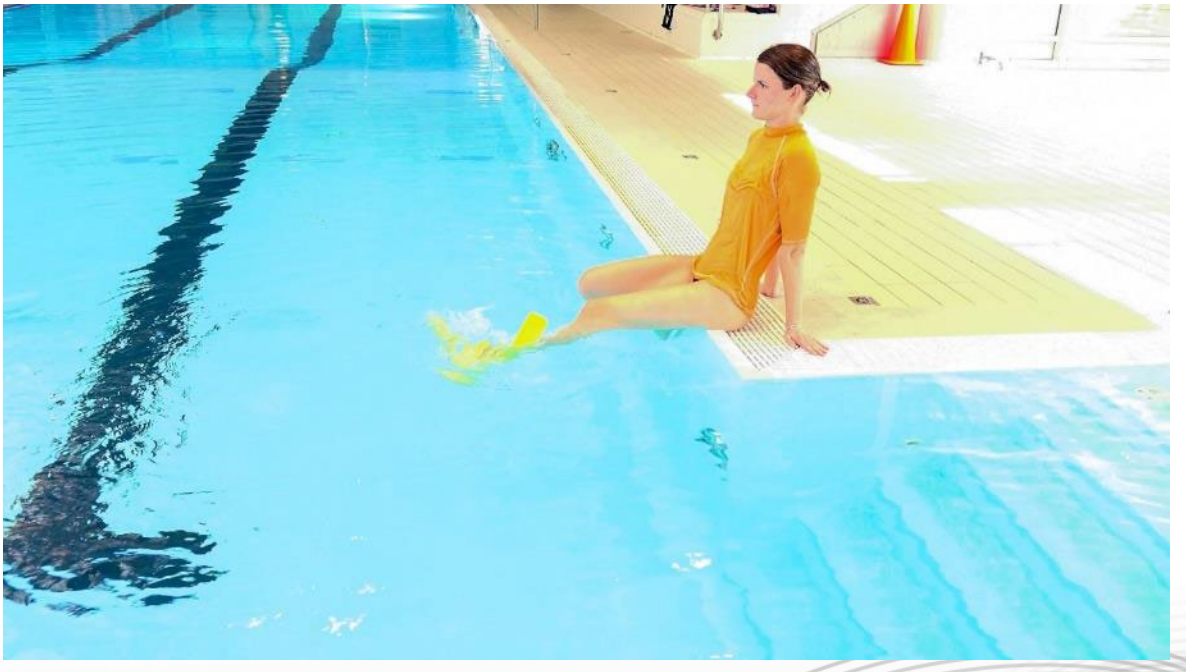
Lie on your back and use a pool noodle for support while doing hip abduction and hip adduction at the same time.

## 109 KNEE EXTENSIONS

Stand at the edge of the pool. Form a loop with the pool noodle and place the foot into it to perform knee extensions.

## 110 KNEE FLEXIONS

Assume a seated position at the edge of the pool, allowing your legs to dangle in the water. Form a loop with the pool noodle and insert the foot of one leg into it to execute knee flexions.



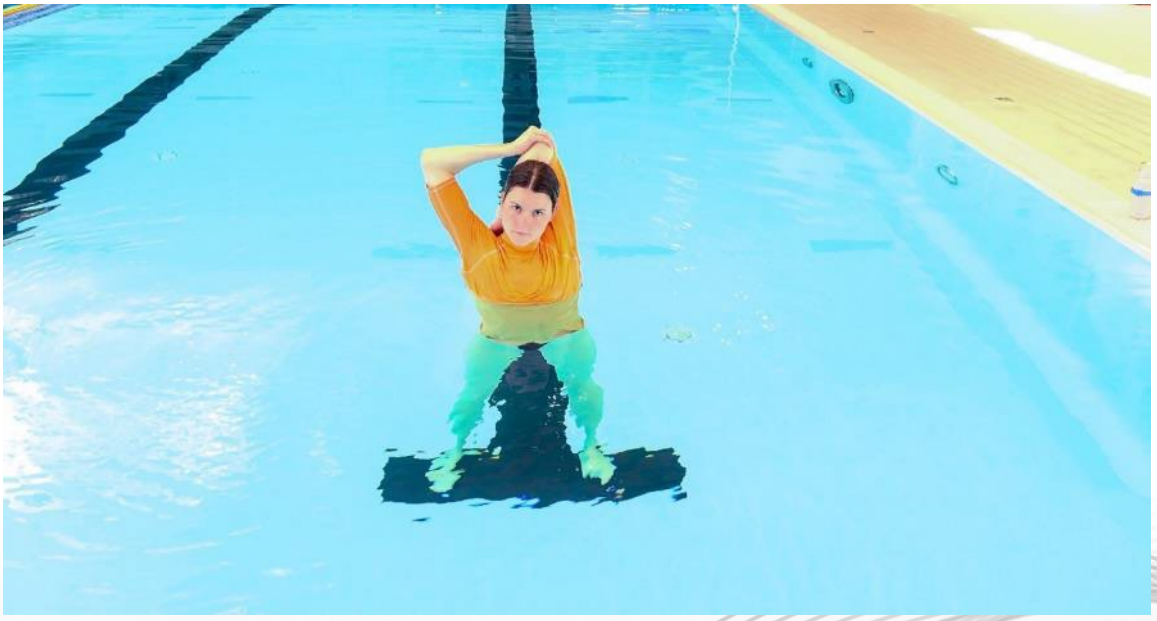
## 3.3.5. Stretching exercises

### 111 NECK MUSCLES STRETCH

Stand upright with your feet shoulder-width apart. Tilt your head to one side and use one arm to gently pull your head closer to your shoulder. Hold the stretch for a few seconds, then switch to the other side.

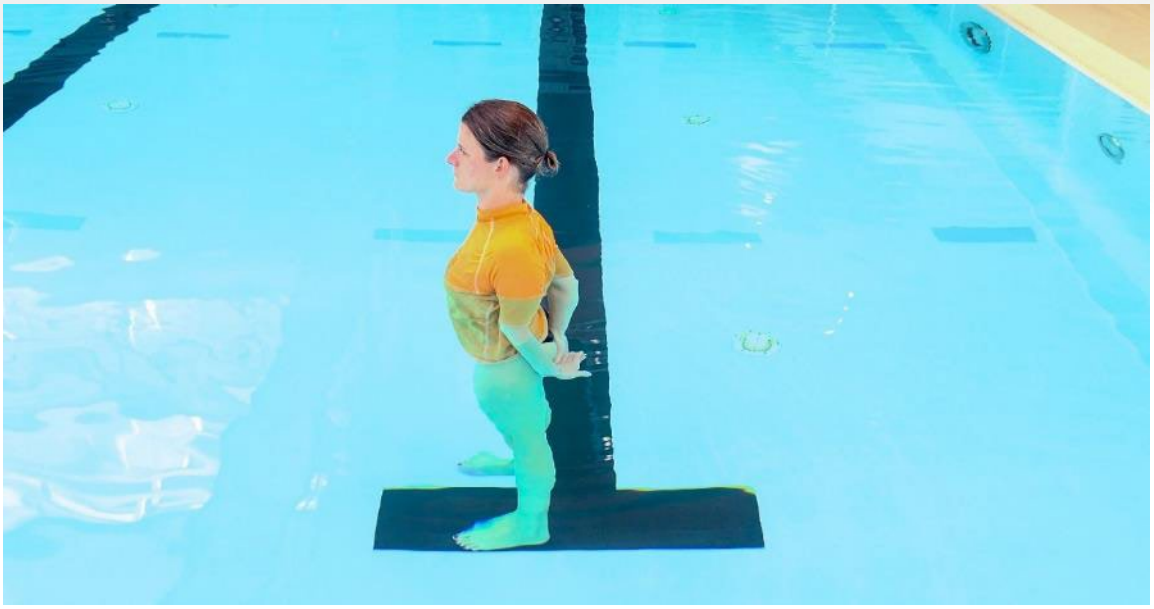
### 112 TRICEPS STRETCH

Stand upright with your feet slightly closer than shoulder-width apart. Raise one arm overhead and bend it behind your head. Use your other hand to gently grasp the bent arm slightly below the elbow, and hold for a few seconds, then switch hands.



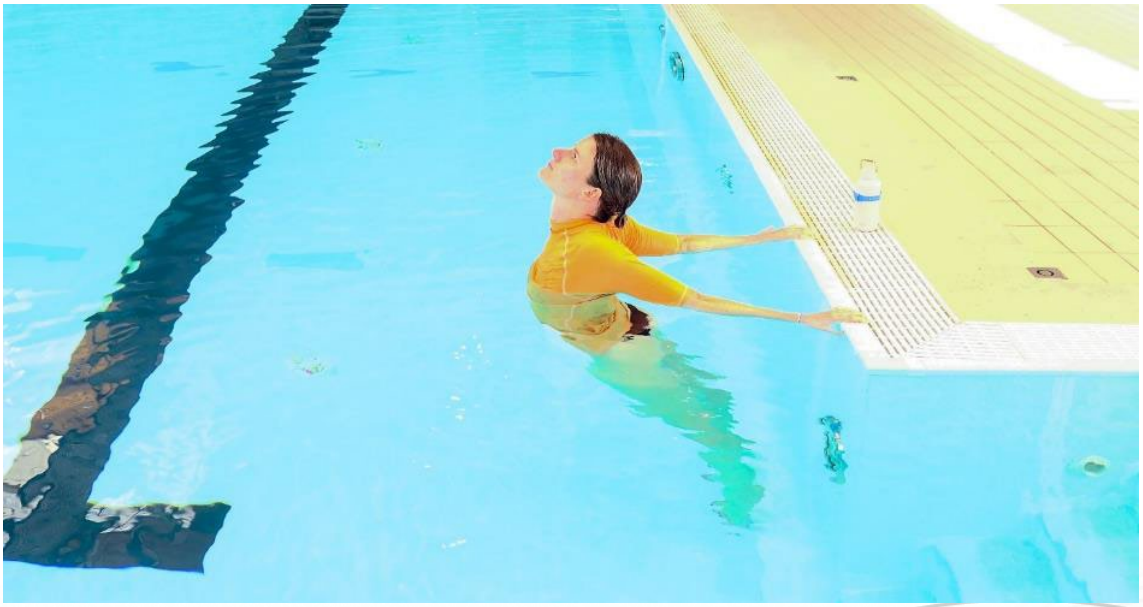
## 113 BICEPS STRETCH

Stand upright with your feet slightly closer than shoulder-width apart. Keep one arm relaxed by your side, with your fingers pointing back and your palm facing down. With your other arm, grasp the fingers and gently pull upwards, then switch hands.



## 114 CHEST STRETCH

Stand upright with your feet slightly closer than shoulder-width apart with your back against the wall. Hold onto the edge of the pool, making sure your arms are fully extended and your heels stay close to the wall. Allow your body to relax, letting your chest to stretch as you look up at the ceiling.

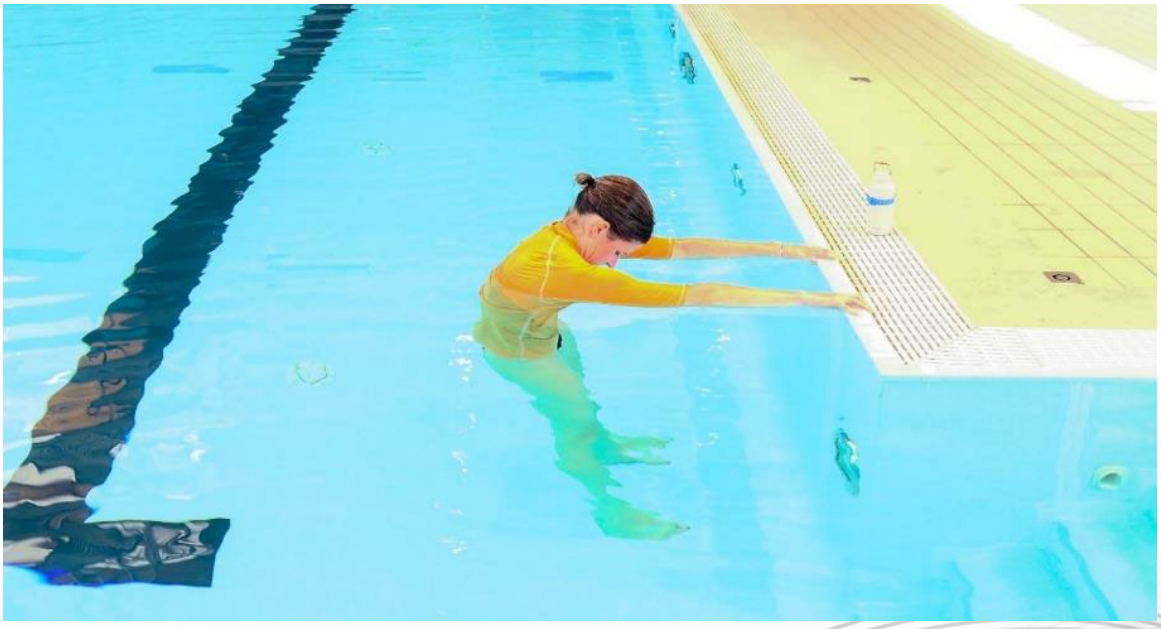


## 115 INTERLOCKING OF THE FINGERS ON THE BACK

Stand upright with your feet shoulder-width apart. Interlace your fingers behind your back and lift your arms as high as possible while expanding your chest. Look up and hold this position for a few seconds.

## 116 BACK STRETCH

Stand upright with your feet slightly closer than shoulder-width apart and press your face against the wall. Hold onto the edge of the pool with your arms fully extended and keep your toes close to the wall. Allow your back to stretch while you look downward towards the ground.



## 117 DELTOID STRETCH

Stand upright with your feet slightly closer than shoulder-width apart. Extend one hand forward, then pull it back towards your body with the other hand. Hold this position for a few seconds before switching to the other hand.

## 118 TRUNK DEFLECTION (STATIC)

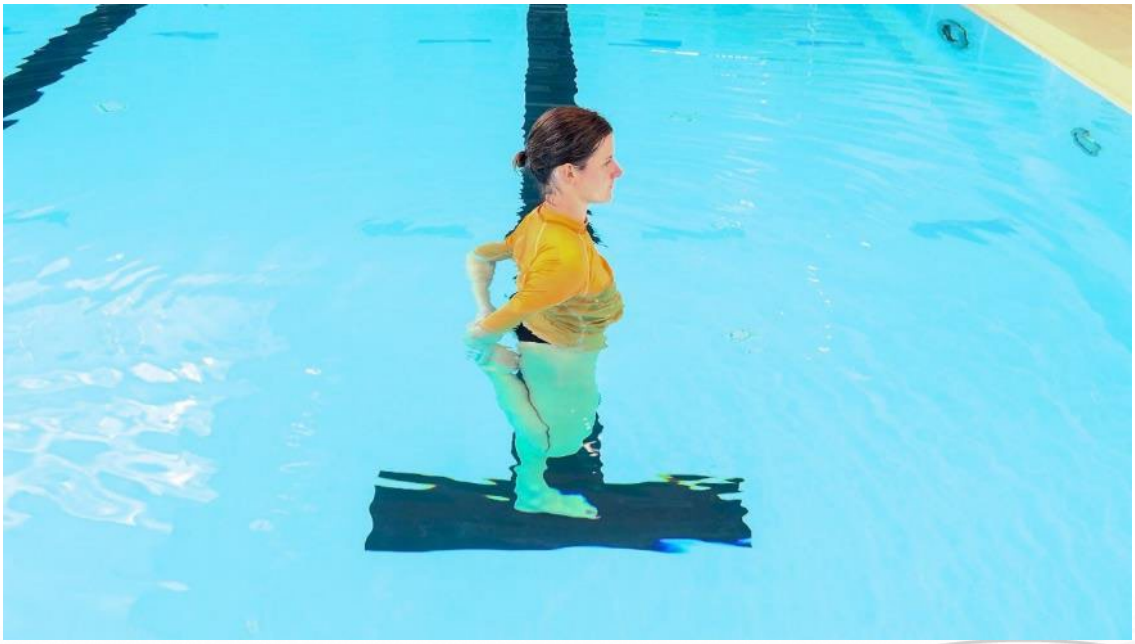
Stand upright with your feet slightly closer than shoulder-width apart. Place one hand on your hip while extending the other arm overhead. Lean your torso to the side of the arm resting on your hip and hold the position for few a seconds. Repeat the lateral bend on the opposite side as well.

## 119 GLUTEUS STRETCH

Bend the standing leg slightly and bring the other leg in front of your body, resting it just above the knee. Hold this position for a few seconds, then switch legs. Use your hands to help maintain your balance.

## 120 QUADRICEPS STRETCH

While standing on one leg, bend the other leg backward and grasp your ankle with your hand for a few seconds. Then, switch to the other leg and arm.

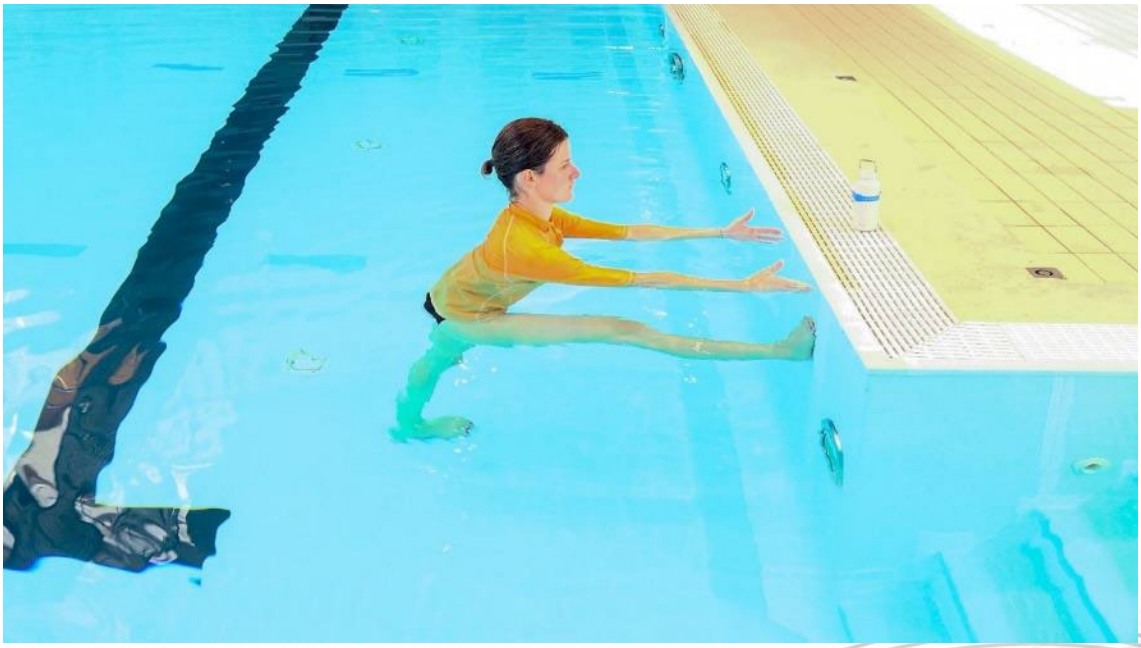


## 121 QUADRICEPS STRETCH BY THE WALL

While balancing on one leg, extend the opposite leg backward and press the top of your foot against the wall. Apply gentle pressure with your foot against the wall and hold the stretch for a few seconds before switching to the other leg.

## 122 HAMSTRING STRETCH

Extend one leg forward and place your foot against the wall. Lean your torso toward the extended leg while keeping your back straight, and hold this position for a few seconds before switching to the other leg.

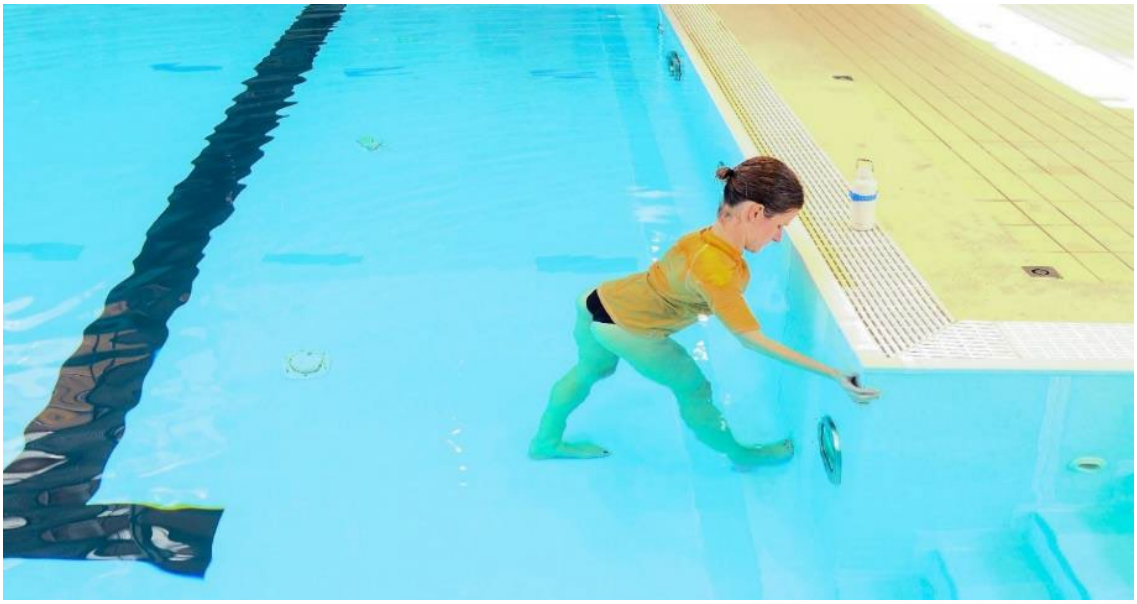


## 123 LUNGE STRETCH

Lunge forward onto your front leg and begin lowering your hips straight down until you feel a stretch in the hip flexor and quadriceps of your back leg, as well as in the calf muscle. Hold this position for a few seconds, then switch to the other leg.

## 124 CALF STRETCH

Lunge forward onto your front leg until you feel a stretch in the calf muscle on your back leg, keeping the heel pressed firmly against the ground. Push your hips forward and hold this position for a few seconds.



## 3.4. A SAMPLE TRAINING PROGRAM FOR SWIMMING

Swimming is a low-impact exercise that exerts minimal stress on the joints, making it easier to move, and provides an excellent opportunity to build muscle strength, improve cardiorespiratory endurance, and enhance flexibility; all while swimming, i.e., without changing the functional pattern of movement. Different swimming styles help develop motor control and body awareness, particularly by improving coordination of arm and leg movements through buoyancy and breathing techniques. For individuals who find it difficult to engage in physical activities on land like running or cycling, swimming may be their only viable form of exercise. Exercising in water reduces the risks associated with joints strain, allowing for a more efficient and effective increase in intensity when performing strength and aerobic endurance compared to workouts on solid ground.

Table 5. Exercise plan and program schedule (Caloric expenditure for swimming 1 km for different fitness levels (Madić, D., Okičić. T., Aleksandrović, M. (2007). Plivanje. Niš. Sven.))

| 1. Overall health status of the individual – medical assessment (physician's report) | 2. Choice of exercises (based on swimming proficiency) | 3. Amount of exercise (quantitative measures) | 4. Exercise intensity (scoring - quantitative measures) | 5. Remarks (constraints in selecting exercises and determining load size (amount and intensity)) |
|---|---|---|---|---|
| Poor aerobic capacity (VO2peak) | Breathing exercises in a standing position<br>Breathing exercises in a lying position | 15-30 min during the initial weeks; 2-3 training sessions/week | 30%-60% of maximal inspiratory pressure | Non-swimmers/ recreational swimmers/swimmers; volume and intensity are adjusted to aerobic capacity |
| Poor aerobic capacity (VO2peak)/good aerobic capacity (VO2peak) | Breathing exercises with head immersion | 15-30 min during the initial weeks; 2-3 training sessions/week | 30%-60% of maximal inspiratory pressure | Non-swimmers/ recreational swimmers/ swimmers; volume and intensity are adjusted to aerobic capacity |
| Poor aerobic capacity (VO2peak) | Walking in a small pool | 15-30 minutes during the initial weeks, with a gradual increase to 30-60 min/d; 1-3 sets of 3-5 min at a moderate intensity; 2-3 training sessions/week | Maintaining a heart rate reserve of 40%-59% during exercise or <40% of VO2peak during the initial weeks, with a gradual increase to 50-70% VO2peak; ≥70% according to patients' progress during exercise training and individual preference | Non-swimmers/ recreational swimmers/swimmers; volume and intensity are adjusted to aerobic capacity |

| 1. Overall health status of the individual – medical assessment (physician's report) | 2. Choice of exercises (based on swimming proficiency) | 3. Amount of exercise (quantitative measures) | 4. Exercise intensity (scoring - quantitative measures) | 5. Remarks (constraints in selecting exercises and determining load size (amount and intensity)) |
|---|---|---|---|---|
| Poor aerobic capacity (VO2peak)/good aerobic capacity (VO2peak) | 1. STEPPING IN PLACE | 15-30 minutes during the initial weeks, with a gradual increase to 30-60 min/d; 1-3 sets of 15-20 repetitions at moderate intensity; 2-3 training sessions/week | Maintaining a heart rate reserve of 40%-59% during exercise or <40% of VO2peak during the initial weeks, with a gradual increase to 50-70% VO2peak | Non-swimmers/ recreational swimmers/swimmers; volume and intensity are adjusted to aerobic capacity |
| Poor aerobic capacity (VO2peak)/good aerobic capacity (VO2peak) | FROM EXERCISE 2 TO EXERCISE 114 in the 3.3. section | 15-30 minutes during the initial weeks, with a gradual increase to 30-60 min/d; 1-3 sets of 15-20 repetitions at moderate intensity; 2-3 training sessions/week | Maintaining a heart rate reserve of 40%-59% during exercise or <40% of VO2peak during the initial weeks, with a gradual increase to 50-70% VO2peak; ≥70% according to patients' progress during exercise training and individual preference | Non-swimmers/ recreational swimmers/swimmers; volume and intensity are adjusted to aerobic capacity |
| Poor aerobic capacity (VO2peak)/good aerobic capacity (VO2peak) | running in the middle pool | 15-30 minutes during the initial weeks, with a gradual increase to 30-60 min/d; 1-3 sets of 15-20 repetitions at moderate intensity; 2-3 training sessions/week | Maintaining a heart rate reserve of 40%-59% during exercise or <40% of VO2peak during the initial weeks, with a gradual increase to 50-70% VO2peak; ≥70% according to patients' progress during exercise training and individual preference | Non-swimmers/ recreational swimmers/swimmers; volume and intensity are adjusted to aerobic capacity |

| 1. Overall health status of the individual – medical assessment (physician's report) | 2. Choice of exercises (based on swimming proficiency) | 3. Amount of exercise (quantitative measures) | 4. Exercise intensity (scoring - quantitative measures) | 5. Remarks (constraints in selecting exercises and determining load size (amount and intensity)) |
|---|---|---|---|---|
| Poor aerobic capacity (VO2peak)/good aerobic capacity (VO2peak) | Swimming at a moderate pace | 15-30 minutes during the initial weeks, with a gradual increase to 30-60 min/d; ≥300 m; 2-3 training sessions/week | Maintaining a heart rate reserve of 40%-59% during exercise or <40% of VO2peak during the initial weeks, with a gradual increase to 50-70% VO2peak; ≥70% according to patients' progress during exercise training and individual preference | Recreational swimmers/swimmers; volume and intensity are adjusted to aerobic capacity; the volume of the initial weeks should be ≤50% compared to the volume of swimming before infection |
| Good aerobic capacity (VO2peak) | Swimming at a medium pace | 15-30 minutes during the initial weeks, with a gradual increase to 30-60 min/d; ≥300 m; 2-3 training sessions/week | Maintaining a heart rate reserve of 40%-59% during exercise or <40% of VO2peak during the initial weeks, with a gradual increase to 50-70% VO2peak; ≥70% according to patients' progress during exercise training and individual preference | Recreational swimmers/swimmers; volume and intensity are adjusted to aerobic capacity; the volume of the initial weeks should be ≤50% compared to the volume of swimming before infection |

## 3.5. Well-Being – Breathing Exercises

### BREATHING EXERCISES

All breathing exercises should be practiced daily in the morning, right after waking up and finishing your personal hygiene routine. For the first three weeks, you should exercise for three consecutive days, followed by a one-day break. After that, aim to practice 5 to 6 times a week, depending on how you can organize your daily responsibilities. All exercises should be done while standing.

Table 6. Sets I to VI of breathing exercises (Dopsaj M., 2023)

| **Set I of exercises: Lung air retention exercises, both with and without movement** | |
|---|---|
| **Exercises description** | **Method of performance** |
| **1.** Inhale until you reach about 50% of your maximum lung capacity (based on your own perception) and hold your breath for 20 seconds. Then, exhale slowly. Following this, take a 30-second break to breathe normally. Repeat this sequence a total of 5 times.<br><br>**2.** Inhale until you reach about 50% of your maximum capacity (based on your own perception) and hold for 10 seconds. Then, inhale an additional 10-15% of air and hold for another 10 seconds. Afterward, exhale slowly and take a 30-second break to breathe normally. Repeat this sequence a total of 5 times.<br><br>**3.** Inhale until you reach about 50% of your maximum capacity (based on your own perception) and hold for 10 seconds. Next, inhale an extra 10-15% of air and hold for another 5 seconds. Then, inhale an additional 10-15% of air and hold for another 5 seconds. Exhale slowly, take a 30-second break to breathe normally. Repeat this sequence a total of 5 times. | **a)** Stand with your legs in a stride position, keeping your posture upright and your arms extended at your sides. Execute the exercises while standing.<br><br>**b)** Stand with your legs in a stride position, keeping your posture upright and your arms extended at your sides. Perform the specified exercises (I) while moving, such as during a casual walk, throughout the active phase of the workout. |

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## SET II OF EXERCISES:
## Lung air retention exercises with and without movement

### Exercises description

**1.** Inhale until you reach about 50% of your maximum capacity (based on your own perception) and hold the breath for 20 seconds. Gradually exhale the air from your lungs, then take a 30-second break to breathe normally. Repeat this sequence a total of 5 times.

**2.** Inhale until you reach about 50% of your maximum capacity and hold for 10 seconds. Then, take five additional breaths using the "air swallowing" technique, holding each for another 10 seconds. Slowly exhale the air from your lungs, followed by a take a 30-second break to breathe normally. Repeat this sequence a total of 5 times.

**3.** Inhale until you reach about 50% of your maximum capacity and hold for 10 seconds. Next, take five more breaths using the "air swallowing" technique, holding each for an additional 5 seconds. Follow this with another five breaths using the same technique, holding for another 5 seconds. Gradually exhale the air from your lungs, then take a take a 30-second break to breathe normally. Repeat this sequence a total of 5 times.

### Method of performance

**a)** Stand with your legs in a stride position, keeping your posture upright and your arms extended at your sides. Execute the exercises while standing.

**b)** Stand with your legs in a stride position, keeping your posture upright and your arms extended at your sides. Perform the specified exercises (II) while moving, such as during a casual walk, throughout the active phase of the workout.

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## SET III OF EXERCISES:
## Lung air retention exercises, both with and without movement

### Exercises description

**1.** Inhale until you reach approximately 70% of your maximum capacity (based on your own perception) and hold the breath for 30 seconds. Then, exhale forcefully to empty your lungs, followed by a 45-second break of normal breathing and repeat this sequence a total of 5 times.

**2.** Inhale until you feel you've reached about 70% of your maximum capacity and hold for 20 seconds. Then, take in an additional 10-15% of air and hold for another 10 seconds. Exhale forcefully to empty your lungs, followed by a 45-second break of normal breathing. Repeat this sequence a total of 5 times.

**3.** Inhale to about 70% of your maximum capacity and hold for 20 seconds. Next, take in another 10-15% of air and hold for 5 seconds. After that, inhale an additional 10-15% and hold for another 5 seconds. Exhale forcefully to empty your lungs, followed by a 45-second break of normal breathing. Repeat this sequence a total of 5 times.

### Method of performance

**a)** Stand with your legs in a stride position, keeping your posture upright and your arms extended at your sides. Execute the exercises while standing.

**b)** Stand with your legs in a stride position, keeping your posture upright and your arms extended at your sides. Perform the specified exercises (III) while moving, such as during a casual walk, throughout the active phase of the workout.

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## SET IV OF EXERCISES:
## Lung air retention exercises, both with and without movement

### Exercises description

**1.** Inhale up to 70% of your maximum lung capacity (based on your own perception) and hold the breath for 30 seconds. Exhale forcefully to empty your lungs, then take a 45-second break with normal breathing. Repeat this sequence five times.

**2.** Inhale up to 70% of your maximum lung capacity (based on your own perception) and hold for 20 seconds; inhale five more times using the "air swallowing" technique and hold the breath for another 10 seconds. Exhale forcefully to empty your lungs, then take a 45-second break with normal breathing. Repeat this sequence five times.

**3.** Inhale up to 70% of your maximum lung capacity (based on your own perception) and hold for 20 seconds. inhale five more times using the "air swallowing" technique and hold the breath for another five seconds. Exhale forcefully to empty your lungs, then take a break of 30 seconds with normal breathing. Repeat this sequence five times.

### Method of performance

**a)** Stand with your legs in a stride position, keeping your posture upright and your arms extended at your sides. Execute the exercises while standing.

**b)** Stand with your legs in a stride position, keeping your posture upright and your arms extended at your sides. Perform the specified exercises (IV) while moving, such as during a casual walk, throughout the active phase of the workout.

**c)** Stand with your legs in a stride position, keeping your posture upright and your arms extended at your sides. Perform the specified exercises (IV) while moving, such as during a casual walk, throughout the active phase of the workout.

**d)** Stand with your legs in a stride position, keeping your posture upright and your arms slightly bent with your palms resting at your sides. As you perform the breathing exercises (IV) gently do half-squats in a smooth rhythm during the active phase of the workout.

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## SET V OF EXERCISES:
## Exercises to strengthen inhalation muscles

### Exercises description

**1.** Take three slow breaths in succession with PBP, filling your lungs to approximately 80–85% of their maximum capacity (based on your perception), and hold the breath for 30 seconds. After each inhalation, remove the PBP from your mouth and exhale forcefully. Take a 60 second break with normal breathing, then repeat this sequence three times.

**2.** Inhale slowly three times in a row with PBP, reaching about 90–95% of your maximum capacity (based on your own perception); hold the breath for 30 seconds. After each inhalation, remove the PBP from your mouth and exhale forcefully. Take a 60 second break with normal breathing, then repeat this sequence three times.

**3.** Inhale slowly three times consecutively with PBP, filling your lungs to about 95–100% of their maximum capacity (based on your own perception), and hold the breath for 30 seconds. After each inhalation, remove the PBP from your mouth and exhale forcefully. Take a 60 second break with normal breathing, then repeat this sequence three times.

### Method of performance

**a)** Stand in a stride position with your legs apart, keeping your posture upright and your arms are extended in front of you. Insert the POWER-breathe Plus (PBP) into your mouth, ready for use, and adjust it to the first load level (https://www.powerbreathe.com/product-category/breathing-instructors/plus/).

**b)** Stand in a stride position with your legs apart, keeping your posture upright with and your arms slightly bent and palms resting at your sides. Repeat the previous breathing exercises (V).

**c)** Stand in a stride position with your legs apart, keeping your posture upright and your arms slightly bent with palms resting at your sides. Perform the specified breathing exercises (V) while in motion, such as during a casual walk, throughout the active phase of the workout.

**d)** Stand in a stride position with your legs apart, keeping your posture upright and your arms extended in front of you. Perform the specified breathing exercises (V) while in motion, such as during a casual walk, throughout the active phase of the workout.

**e)** Stand in a stride position with your legs apart, keeping your posture upright and your arms slightly bent with palms resting at your sides. Perform the specified breathing exercises (V) while doing half-squats in a gentle rhythm during the active phase of the workout.

Note: The load on the PBP increases proportionally each week.

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## SET VI OF EXERCISES:
## Exercises to strengthen inhalation muscles

### Exercises description

**1.** Inhale deeply, filling your lungs to about 98-99% of their maximum capacity (based on your own sensation), and hold your breath for 10 seconds. Then, use the "air swallowing" technique to take three more quick inhales, holding your breath for 5 seconds each time. Repeat this process of inhaling three times with the "air swallowing" technique and holding for 5 seconds, continuing until you reach maximum tension in your lungs or can no longer hold your breath comfortably. Finally, exhale forcefully until your lungs are completely empty. Afterward, breathe normally for 90-120 seconds. Try to repeat this exercise 3 to 5 times, and pay attention to any dizziness that may occur as a side effect. If you do feel dizzy, take a seat and rest for as long as you need.

### Method of performance

**a)** Stand in a stride position with your legs apart, keeping your posture upright and your arms slightly bent with palms resting at your sides.


## 3.6. WATSU: THERAPEUTIC METHOD IN WARM WATER

### WHAT IS WATSU?

Watsu, derived from the terms "water" and "shiatsu," is a therapeutic technique that integrates massage, swimming, and stretching in warm water. This method focuses on relaxation, body-mind connection, and improving overall well-being. The therapist gently guides and supports the individual, facilitating relaxation while employing a range of massage techniques. Watsu is commonly utilized to alleviate stress, enhance mobility, and diminish tension and pain in the body.

### HISTORY OF WATSU

Watsu was created in the 1980s by Harold Dull, an American seeking to merge swimming with massage. He drew inspiration from Japanese techniques, particularly shiatsu, and modified them for use in water. For the first time, Watsu was presented at workshops in the USA, where it quickly gained popularity. Since then, it has spread around the world and evolved into various styles that incorporate diverse techniques and approaches.

## IMPACT ON THE BODY AND MIND

Watsu provides a variety of benefits for both the body and mind. Throughout the therapy, the body enters a state of relaxation aiding in the reduction of stress and anxiety. By loosening the muscles and joints, Watsu improves mobility and boosts blood circulation, potentially speeding up recovery from injuries. Beyond its physical benefits, Watsu also positively affects emotional well-being, with many individuals experiencing a profound sense of tranquillity and inner balance following their sessions.

## THE GLOBAL SPREAD OF WATSU

Watsu quickly gained popularity outside the United States, spreading to numerous countries worldwide. Today, many therapists trained in this method, including co-author Dorica Šajber, offer it in health resorts, wellness centers, and therapeutic facilities. Organizations dedicated to educating and certifying Watsu therapists provide workshops and courses, further encouraging the expansion of this therapeutic practice.

## DESCRIPTION OF THE WATSU METHOD

Environment: Watsu is typically conducted in a warm water pool, with temperatures between 34 to 36 degrees Celsius. This warmth helps relax the muscles and enhances comfort during the therapy session.

Support and movement: The therapist supports the patient in the water, facilitating effortless movement. This support allows the patient to relax and fully immerse themselves in the experience.

Massage techniques: Throughout the session, the therapist uses various massage techniques, including gentle strokes, pressure, and stretching. These techniques stimulate circulation, alleviate tension, and improve mobility.

Relaxation: Watsu focuses on deep relaxation. The therapist guides the patient through different postures and movements, further promoting relaxation for both body and mind.

Breathing techniques: The therapist may also incorporate breathing exercises to deepen the patient's relaxation and help them connect with their body.


Watsu has demonstrated its **effectiveness in enhancing both physical and mental health**, making it a favored approach for **achieving relaxation and inner tranquility**.

1. Alleviation of stress and anxiety

Studies indicate that Watsu can significantly lower stress and anxiety levels. The warm water therapy has been found to stimulate the release of endorphins and other hormones, leading to improved mood and an overall sense of happiness.

2. Physical Rehabilitation

Watsu is frequently incorporated into rehabilitation programs for individuals with injuries or chronic conditions. Research suggest that this technique can improve mobility and alleviate pain, particularly for patients with osteoarthritis or those recovering from surgery.

3. Pain Management

Evidence indicates that Watsu can effectively lessen chronic pain. In one study, participants experiencing various types of pain reported a decrease in symptoms following a series of Watsu therapies.

4. Psychosocial Effects

Several studies have investigated the impact of Watsu on psychological well-being. Findings indicated enhancements in self-esteem, a decrease in feelings of loneliness, and an overall boost in life satisfaction.

5. Effects on Dementia

Research examining Watsu therapy in dementia patients has revealed that it can improve emotional and social interactions while alleviating anxiety. The connection with a therapist and the physical relaxation experienced in the water played a significant role in enhancing their well-being.

### 6. Connection to Physical Activity

Some studies have examined the effects of Watsu on overall physical fitness. The results indicated that regular Watsu sessions can help improve mobility, strengthen muscles, and enhance coordination.

### 7. Methodological Approaches

Most studies employ a combination of qualitative and quantitative methods, utilizing tools like surveys, interviews, and the assessment of physical indicators such as stress and mobility levels. While research on Watsu remains limited compared to other therapeutic techniques, the findings thus far are encouraging and suggest potential benefits for various populations. Ongoing research is expected to deepen our understanding of Watsu's effects.

Watsu may offer several **positive outcomes for individuals dealing with diabetes, depression, asthma, and lung conditions**. Here are some specific ways Watsu can impact these health issues:

### 1. Diabetes

Watsu can help enhance blood circulation, which is vital for individuals with diabetes. The relaxation of muscles can alleviate tension and stress, positively impacting blood sugar levels. Moreover, the warm water may help ease symptoms of neuropathy that some patients experience.

### 2. Depression

Watsu promotes relaxation and boosts overall well-being. Water therapy can stimulate the release of endorphins, which can uplift mood and lessen symptoms of depression. Many participants report feelings of inner peace and connection following sessions, which can be particularly helpful for those facing emotional challenges.

### 3. Asthma and Lung Conditions

Immersion in warm water can improve breathing and reduce anxiety, which is frequently inked to asthma. The warmth helps relax the airways and increase lung capacity, making it easier to breathe. During therapy sessions, patients frequently feel a sense of safety and support, which can help alleviate stress and anxiety related to respiratory issues.

### 4. Overall Benefits

Watsu is renowned for its calming effects on both body and mind. It improves mobility, eases pain and tension, and can contribute to improved sleep quality. This holistic approach is particularly advantageous for individuals with chronic illnesses, as it fosters overall health and well-being.

Given these positive effects, Watsu is frequently recommended as a complementary therapy for various health concerns. However, it is advisable for patients to consult their healthcare provider before starting any new therapeutic practices.

Watsu is a distinctive method that provides a range of benefits, including improved mobility, decreased stress, and profound relaxation. Its holistic nature makes it a favored choice for those looking for therapeutic solutions to enhance their health and well-being.

## 3.7. HEALTHY AGEING

### DEFINITION OF AGEING

Aging, often referred to as senescence (derived from the Latin word *senex*, meaning "old man" or "old age"), is a biological process marked by a gradual decline in the physiological functions of an organism. This decline reduces the body's ability to maintain homeostasis, leading to increased sensitivity to environmental changes. Ageing is a complex phenomenon that is not yet fully understood, affecting individuals throughout adulthood and ultimately culminating in death.

### FIELDS OF STUDY RELATED TO HUMAN AGEING

Geriatrics is a specialized branch of internal medicine focused on the study, prevention, alleviation, and treatment of health issues in the elderly. Gerontology, which combines the Greek words *geron* (meaning old or aged) and *logos* (meaning study or discourse), also encompasses the sociological aspects of ageing.

### LIFE CYCLE THEORY - LIFE CIRCLE

Throughout various stages of development, individuals encounter crisis or dilemmas that must be addressed to progress successfully to the next stage. Failure to resolve these issues can result in incomplete personality development.

This theory aligns with Erikson's stages of development, which view maturation as a process.

**A society's population can be categorized into four generations:**

1. Younger generation – encompasses individuals from birth to middle age;
2. Middle generation – consists of the active population in their middle years;
3. Older generation – refers to those in the later stages of life; typically, from retirement or age 65 to 85;
4. Elderly - includes individuals aged 85 and older.

Intergenerational socialization aims to bridge the gap between generations, fostering closer connections, enhancing mutual support, promoting coexistence, and encouraging active ageing. It also seeks to prevent the exclusion and discrimination of older adults.

**The senior age groups are categorized as follows:**

- Early stage: 66 to 75 years old
- Middle stage: 76 to 85 years old
- Late stage: 86 years and older
- A fourth stage has emerged in recent times

### CHARACTERISTICS OF INDIVIDUAL SENIOR STAGES

1. Early senior years, ages 65 to 74: This stage marks a transition into a life of freedom following retirement. Health tends to be relatively stable, with manageable chronic conditions possibly present.

   Retirees often stay active, maintaining numerous social connections with peers, former colleagues, and new acquaintances made through hobbies and community activities.

They also strengthen their bonds with family, including children and grandchildren; dedicating more time and support to them. Preparing individuals for this new phase is crucial for a fulfilling retirement.

2. Middle age, specifically between 75 and 84 years: During these years, many individuals begin to notice a decline in their vitality and energy levels. Chronic illnesses may become more pronounced, and they may experience significant losses, such as the passing of partners, friends, and peers, as well as the loss of their homes.
3. Late age, starting from 85 years and beyond: At this stage, individuals often require more formal and informal assistance due to various health challenges. They tend to reflect on their life experiences, embodying the saying “such a life, such an age (a Slovene proverb).
4. Fourth life stage: This stage is marked by increased exhaustion and a greater need for help with basic daily activities. As life expectancy, continues to rise, the proportion of older people in society is growing, leading to a new generation of centenarians.
   There is a theory suggesting that in the latest phase of human evolution, there is a strong selection for individuals with longer lifespans. Older adults share their knowledge and experiences to younger generations, enhancing their survival prospects and contributing to a higher prevalence of genetic traits associated with longevity. Additionally, advancements in civilization have improved our ability to manage external mortality factors, resulting in an overall increase in average life expectancy.

Throughout history, average lifespans have varied significantly. For instance, Neanderthals had an average lifespan of about 20 years, while people in the Bronze Age lived around 19 years, those in ancient Greece to approximately 28 years, and people in medieval England to about 33 years. Today, global demographic trends show an increasing number of elderly individuals, with the average life expectancy now estimated at around 68 years, highlighting the ongoing trend of global ageing.
In Europe, the population is gradually getting older due to several factors, including increased life expectancy, lower fertility rates, and the ageing of the baby boomer generation. Although older adults are becoming more aware of the significance of active ageing, data from Eurobarometer 472 on sports and physical activity from 2018 reveal a slight increase in the percentage of individuals who report "I never exercise or participate in sports", rising from 42% to 46% across Europe between 2014 and 2018.
In 2018, people aged 65 and older accounted for 22% of the total population, and this figure is projected to reach 34% by 2047.

**ALSO READ**: https://www.eumonitor.eu/9353000/1/j9vvik7m1c3gyxp/viw3hgajaly2

## DILEMMA FACED BY SENIORS

Researchers assert that for older adults to successfully navigate this new phase of life, they need to confront several challenges and adapt accordingly:

- Deteriorating health and physical condition
- Retirement and resulting decrease in income
- Loss of spouse or family members
- A major change in their usual lifestyle
- Embracing the ageing process, which may involve more leisure time and opportunities to engage with grandchildren

## MENTAL AND PSYCHOLOGICAL CHANGES WITH AGE

As individuals age, they often experience a decline in higher cognitive functions such as memory, attention, and learning. Self-initiative and motivation are vital in mental engagement, yet these qualities are frequently diminished in the elderly. By implementing customized programs and fostering a stimulating environment, we can significantly boost motivation for ongoing mental activity among older adults.

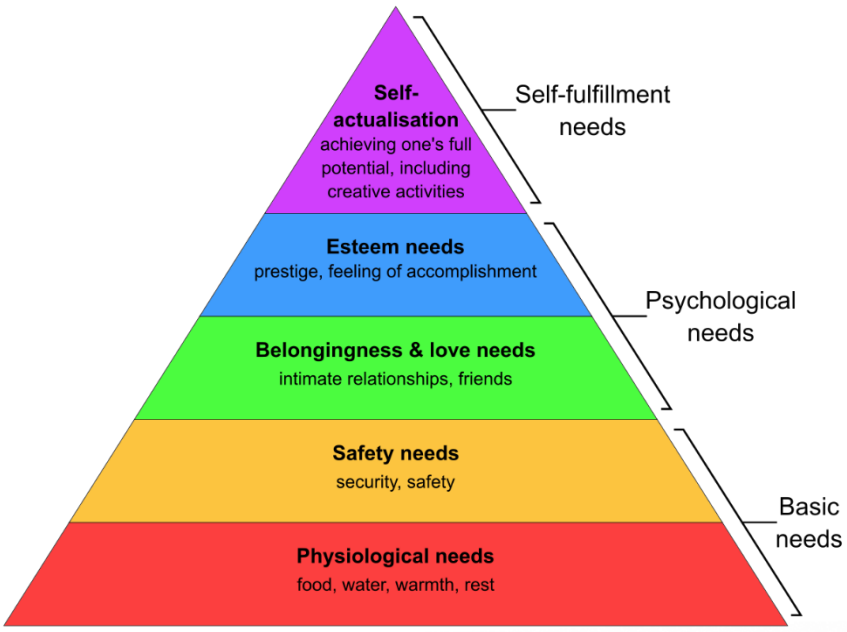
Many elderly individuals feel a sense of spiritual emptiness, struggling to find meaning in their past experiences or current circumstances. They may wrestle with questions about their purpose, how to make most of their life experiences and energy, and feelings of guilt or fear surrounding death. This can result in a loss of meaning in life, along with changes in life goals and motivations.

Additionally, ageing can lead to changes in personality and emotional ups and downs. The elderly often perceive the world and their interpersonal relationships differently; they might find themselves spending more time at home with their partners and family, becoming more set in their routines and less open to new ideas and changes. This tendency can show up as stubbornness and a reluctance to embrace modern innovations.

## MOTIVATION CHANGES IN SENIORS

Numerous studies continue to support Maslow's theory of needs, first introduced in 1974. For older adults, the drive for self-actualization may lessen, as they might feel they have already achieved that stage. However, the need for self-esteem, along with the needs for security, love, and belonging, remains strong. Basic needs, such as those for food, water, and sanitation, also continue to be important.

Maslow's theory is particularly relevant when it comes to learning to swim, as the need for safety is crucial. Individuals who are learning to swim must feel secure in order to effectively develop the necessary skills.




Maslow's hierarchy of needs (https://en.wikipedia.org/wiki/Maslow%27s_hierarchy_of_needs)

## SOCIAL AND ECONOMIC CHANGES IN LATER LIFE

Change in Social Networks: When individuals retire, their social networks often undergo significant transformations. Factors such as shifts in the family dynamics, the arrival of grandchildren, the passing of friends and partners, caregiving, responsibilities, and transitions to daycare centers or assisted living facilities can lead to feelings of isolation. Many older adults face loneliness due to the decline of their social connections and challenges in interpersonal relationships. Therefore, (re)socialization becomes crucial, especially during moves or other major changes in their social environment.

Changes in Life Roles: Retirement and loss of a life partner can lead to the loss of vital life roles for older adults. They need to identify new roles and find ways to compensate for these losses. Preparing for these transitions can help them navigate this period successfully and foster a sense of fulfilment in their later years.

Economic circumstances can shift, influencing successful social inclusion and enhancing self-esteem and independence. In light of the altered retirement conditions, numerous insurance companies are promoting strategies for preparing for old age, which include planning financial resources for retirement and saving for the future.

**ALSO READ:**

http://www.impletum.zavod-irc.si/docs/Skriti_dokumenti/Starost_in_staranje-Milavec.pdf

## DISCRIMINATION AGAINST SENIORS

- *Ageism*, often referred to as *oldism*, is the prejudice directed at individuals or groups based on age.
- This form of discrimination often leads to the exclusion of older individuals from social activities, with their abilities and roles being defined solely by age. It can also manifest in institutions that care for the sick and disabled.

The marginalization of the elderly stems from various psychological, physical and social factors associated with ageing. Current social attitudes often devalue old age, viewing it as inferior, undesirable, and stigmatized. In our culture, reaching retirement age—determined by society—often marks a significant shift in how individuals are perceived. Consequently, retirees frequently find themselves marginalized, facing stereotypes that label them as dependent, unproductive, and helpless.

## ESSENTIAL LIFE ACTIVITIES FOR SENIORS

As defined by Virginia Henderson, the essential life activities for seniors include:

- Breathing and circulation
- Eating and drinking
- Excretion
- Movement and maintaining a suitable position
- Sleeping and resting
- Dressing and undressing
- Regulating body temperature
- Personal hygiene and cleanliness
- Ensuring safety and avoiding hazards in the environment
- Communication and building relationships

- Expressing emotions and feelings
- Addressing spiritual needs
- Engaging in meaningful work
- Participating in leisure and recreational activities
- Learning to maintain a healthy lifestyle.

## 3.7.1. Three Types of Ageing

The concept of ageing can be understood through three distinct but interconnected categories: chronological age, biological age, and psychological age. Each of these categories provide a different perspective on the ageing process and its implications for individuals.

### CHRONOLOGICAL AGEING

Chronological ageing is beyond our control, as is determined by the moment of our birth. However, biological and psychological ageing can be somewhat influenced by maintaining a healthy, active lifestyle and ensuring psychological stability throughout life.

### BIOLOGICAL CHANGES

Many biological changes associated with ageing stem from a decline in tissue elasticity, reduced functionality of various organ systems (including the immune, digestive, cardiovascular, and nervous systems), and a decrease in the water content in the body.

1. Skin and Skin Organs

As we age, our skin tends to become loose, wrinkled, dry, hyperpigmented, thinner, and less elastic due to the degeneration and rearrangement of collagen fibers. These changes can be exacerbated by poor nutrition, inadequate blood circulation, alterations in the immune system, unhealthy eating habits, and various lifestyle vices.

In addition, the skin often exhibits increased capillary sensitivity, leading to spontaneous bursts and the formation of bruises. There is also a loss of subcutaneous fat, and the number and activity of skin glands—such as sweat and sebaceous glands—decrease, resulting in drier and more sensitive skin. This can impact the body's ability to regulate temperature effectively.

As people age, they may experience various skin conditions, including skin cancer (which necessitates regular check-ups), keratosis, dermatitis and pruritus (itching).

2. Bones and Muscles

Ageing brings about changes in the body's structure, leading to muscle atrophy and weakened bones. The increased decline in skeletal muscle mass results in reduced muscle strength and slower peak muscle performance, primarily due to the deterioration of glycolytic fibers. The proportion of muscles in the body is influenced by physical activity. However, the durability of the muscle fibers remains stable with age. Additionally, bone mass decreases over time, increasing the risk of fractures and cartilage degeneration in older adults. Movement can also be affected by disruptions in the nervous system.

3. Anthropometry

Body height tends to decrease primarily due to the loss of elasticity in the intervertebral discs, which become rigid over time. This rigidity leads to the growth of cartilage in the small intervertebral joints, resulting in a reduction in height, less decreased mobility, and altered alignment of the entire spine.

Body weight generally increases until middle age, after which it begins to decline in later years for both men and women. The composition of body weight also shifts, with fat and muscle tissue proportions changing. By the age of 70, approximately 40% of body weight is comprised of fat, and the distribution of adipose tissue varies, with bony structures becoming more prominent in the limbs and face.

Additionally, the total water content in the body decreases, and this, combined with the increase in fat tissue, leads to a diminished capacity for thermoregulation.

4. Heart and vessels

As individuals age, the elasticity of the vascular system decreases. This decline predominantly impacts the aorta and arteries, resulting in increased rigidity and reduced flexibility. A sudden drop in blood pressure can occur due to decreased autonomic nervous system function or poor blood circulation. Lifestyle choices significantly influence the cardiovascular system's health; therefore, engaging in regular physical activity and recreational pursuits is crucial for preserving its health in later years. The heart's ability to adapt to physical stress diminishes, necessitating a gradual increase in exertion. The risks associated with vascular changes include potential blockages in blood vessels, which can result in serious conditions such as heart attacks and strokes.

5. Lungs and respiratory system

Breathing patterns tend to become shallower, and lung capacity tends to decrease. The health of the respiratory system is significantly influenced by smoking habits and various lung diseases. Changes in spinal alignment can reduce the flexibility of the chest, which in turn lowers the lung’s vital capacity. Furthermore, the elasticity of lung tissue diminishes, leading to greater energy expenditure during breathing. The effectiveness of coughing and the ability to clear the airways also decline.

6. Brain and nerves

As people age, there is a notable decline in the number of neurons within the central nervous system, which contributes to a decrease in brain tissue weight. The loss of nervous system cells leads to slower reaction times, reduced reflexes, and changes in balance, as well as alterations in the senses of smell, taste, and touch, along with coordination and spatial orientation. Sexual behaviours may also undergo modifications. Cognitive functions generally remain stable, although there may be minor issues with short-term memory, variations in brain wave patterns (as observed in EEG), and increased distractibility. While communication difficulties can arise, significant personality changes are typically not observed in older adults.

As individuals progress in age, there is a significant decrease in the number of neurons present within the central nervous system, which contributes to a reduction in brain tissue weight. The loss of these neural cells contributes to slower reaction times, diminished reflexes, and alterations in balance, as well as changes in the senses of smell, taste, and

touch, along with coordination and spatial orientation. Sexual behaviors may also undergo modifications. Cognitive functions generally remain stable, although there may be minor issues with short-term memory, variations in brain wave patterns (as observed in EEG), and increased distractibility. While communication difficulties can arise, significant personality changes are typically not observed in older adults.

### 7. Digestive system

MOUTH: The ageing process often leads to tooth loss, particularly due to periodontitis, which can begin after the age of 50. Additionally, there is a decrease in saliva production, thinning of the oral mucosa, and a diminished sense of taste. Many elderly individuals tend to neglect oral hygiene, which exacerbates their overall health issues. These factors contribute to significant digestive complications and may lead to malnutrition. A common complaint among this demographic is dry mouth.

Gastrointestinal tract: As for the gastrointestinal tract, ageing is associated with a reduction in the secretion of digestive juices, leading to constipation and impaired bowel movements. These issues are often attributed to decreased bowel motility, reduced physical activity, low dietary fiber, and insufficient fluid intake. Furthermore, there may be a decline in liver function.

### 8. Urine and genitalia

Aging also brings about changes in the smooth muscles of the bladder. The supportive elastic tissue gradually replaces connective tissue, which can result in incomplete bladder emptying. As individuals age, bladder capacity diminishes, and the frequency of urination tends to increase. Kidney function may weaken, often resulting in urinary incontinence.

In women, the decline in estrogen production following menopause leads to reduced vaginal discharge, causing the vaginal walls to become thinner, drier, and less elastic, which may increase the risk of vaginal infections. In men, benign prostatic hyperplasia is common, primarily causing urinary difficulties, believed to stem from hormonal imbalances. Despite changes in the nervous and vascular systems that may prolong the time required for an erection, sexual activity remains feasible for both men and women well into their later years.

### 9. The senses

Vision: Visual acuity typically deteriorates with age. The most common vision disorder is the inability to focus on nearby objects. Additionally, color vision tends to diminish in old age, which is thought to be related to the absorption of short-wave lengths of light through the opaque lens.

Hearing: Hearing loss usually occurs gradually as a result of age, often leading to challenges in understanding spoken language. The use of hearing aids can greatly improve communication with others.

Smell and Taste: After teaching the age of 50, the sensitivity of the olfactory sense diminishes due to the overall decline of taste buds and sensory neurons. Furthermore, certain medications and health conditions can influence taste perception.

Touch: The degeneration of neurons results in a reduced sensitivity to touch and, consequently, to pain. It is important for older adults to be cautious about potential injuries, such as burns and blisters.

Changes in the perception of various senses, including thirst, vision, taste, balance, and hearing, have also been documented (Pendl Žalek, 2004).

## 10. Immune system

With age, the effectiveness of our immune system also weakens, leading to a higher risk of various diseases.

The decline of the thymus, an endocrine gland that produces T-lymphocytes essential for our immune response, begins to decline around the age of 50. While the total number of T-cells remains stable, there are noticeable changes in the function of helper T-cells, which play a crucial role in the immune response.

Additionally, many antibodies also increase with age, which increases the risk of various autoimmune diseases. Consequently, older adults are more vulnerable to infections such as those affecting the urinary tract, respiratory system and wound.

## 11. Anabolic resistance

Anabolic resistance is a common issue associated with ageing, often resulting in weight gain. This condition is a key aspect of protein metabolism and is influenced by various age-related changes, particularly inflammation, which significantly depletes amino acids. As a result, older adults need to increase their protein intake to support the repair and formation of new tissues in the organs that facilitate physical activity. However, the simultaneous ageing of the digestive system, along with the potential negative impact of physical activity on gastrointestinal health, can complicate nutritional strategies for enthusiastic recreational athletes. This situation often leads to a deficiency in amino acids necessary for muscle and immune system support.

Older individuals must maintain an active lifestyle to preserve functional muscle mass, while also being mindful that exercise requires energy and sufficient amino acid sources for effective recovery and bodily function.

Elderly individuals experience anabolic resistance, necessitating a higher consumption of high-quality protein and adequate energy intake. Older athletes should aim to have a meal every four hours, ensuring that each meal includes a protein source of approximately 0.3-0.4 g per kg body weight. It is advisable to time these meals around exercise, ideally consuming one to two hours post-exercise to meet the protein requirement of 0.3-0.4 g/kg of body weight.

High-quality protein sources are those that provide all essential amino acids, including leucine. This is more readily accomplished with animal-based foods such as eggs, lean meats, and fish compared to with plant-based options. To meet the necessary amino acid profile from plant proteins, a thoughtful combination of different sources is vital.

It is essential to ensure adequate intake of carbohydrates for several reasons, particularly because older adults are more susceptible to insulin resistance as a result of ageing. The onset of insulin resistance can hasten the effects of starvation, making it crucial for ageing athletes to prevent prolonged periods of uncontrolled fasting. To achieve this, it is advisable to distribute food intake across the day, ideally in three to four meals. failing to do so may negatively impact recovery following exercise.

## PHYSIOLOGICAL CHANGES

Physiological changes associated with ageing are often more closely linked to a sedentary lifestyle than to the ageing process itself. By the age of 65, cardiac output can decline by 20% to 30%, and for those who are physically inactive, maximal oxygen uptake may decrease by about 9%, continuing to drop by about 5% subsequent decade. Maximum heart rate typically decreases by around 10 beats per minute for every decade, while resting heart rate remains relatively stable. The maximum heart rate can be estimated using the formula 220 minus the individual's age. Additionally, hemoglobin levels and red blood cell density tend to decline, while total cholesterol levels rise and HDL cholesterol decreases. The respiratory system's functionality can diminish by 40% to 50% by age 70, impacting vital lung capacity, lung wall flexibility, and maximum ventilation. By the age of 70, individuals may experience a loss of up to 40% in muscle mass and a 30% reduction in muscle strength. After age 35, bone mineral density decreases about one percent annually, with postmenopausal women experiencing an accelerated loss of approximately three percent per year. Joint degeneration, particularly in the spine, is prevalent, and connective tissue gradually loses elasticity, muscle fibers shorten, and joints produce less synovial fluid. Furthermore, by age 60, the speed and conduction of nerve fibers can decline by up to 15%, leading to slower reaction times and reduced movement speed.

## CHANGES IN THE MOTOR SKILLS

1. Muscular strenght

The decline in muscular strength typically begins after the age of 50 and becomes more pronounced after 70. A key contributor to this reduction in strength is the loss of muscle mass, known as sarcopenia—a term derived from Greek, combining *sarx* (flesh) and *penia* (loss). This condition signifies a progressive decrease in muscle tissue and its functionality with age, resulting in diminished muscle strength, reduced power, and lower endurance. Consequently, this leads to increased fragility and a heightened risk of fractures and falls. Fast-twitch muscle fibers are particularly vulnerable, leading to a decrease not only in maximum muscle strength but also in the capacity for explosive movements.

Preserving strength in later years is a primary objective of physical activity. Contemporary lifelong exercise strategies advocate for a focus on cardiovascular endurance during youth, while emphasizing strength training to maintaining muscle mass in older age.

Strength training offers numerous benefits that are particularly significant for older adults. It stands out as the most effective exercise modality for preventing osteoporosis. Additionally, it enhances mobility and balance, while alleviating symptoms associated with various chronic conditions, including arthritis, depression, type 2 diabetes, heart disease, Parkinson's disease, and other neurodegenerative disorders, as well as aiding recovery post-stroke. Furthermore, it can help mitigate issues related to sleep and nutrition.

A key element of strength training for seniors is the anabolic hormonal response, which, although less pronounced than in younger individuals, is unique to this form of exercise. The response of growth hormone is especially crucial, as it plays a vital role in the growth and repair of different tissues.

Beyond promoting movement, muscles serve several essential functions, including regulating body temperature, maintaining hydration, and controlling blood sugar levels.

In adult males, muscle mass constitutes approximately 40% of total body weight, while in females, the figure is about two-thirds of that amount.
Muscle tissue serves as the primary organ for heat production. As individuals age and experience a decline in muscle mass, their ability to regulate body temperature becomes compromised, although other factors also play a role.
Additionally, muscles act as a significant reservoir for water, which is crucial during sweating, as the body loses fluids primarily from blood volume. Consequently, individuals with lower muscle mass are at higher risk of rapid dehydration.
Active muscles are the largest consumers of blood glucose. a sedentary lifestyle can increase the risk of developing type 2 diabetes, but regular physical activity can mitigate these effects.

## 2. Mobility

Maintaining physical fitness is a critical aspect of well-being for older adults, facilitating participation in various activities and enhancing overall quality of life. Adequate mobility is essential for correcting postural issues, promoting general health, and minimizing the risk of injuries. The positive impacts of exercise include preserving muscle flexibility and joint mobility.
Inactivity leads to a decline in mobility, potentially reducing the range of motion necessary for daily tasks. However, consistent exercise can help maintain this range even in later years (Petavs et al., 2008). The ability to move through the full range of motion permitted by the anatomy of joints are a vital skill across all age groups.
Alongside numerous age-related changes in the body—such as degeneration of muscles, bones, connective tissues, and the nervous system—the individual's lifestyle significantly influences their range of motion. Older adults are particularly vulnerable to insufficient physical activity, which heightens the risk of mobility issues.

## 3. Balance

Balance training offers numerous effects, with the most significant being its direct effect on enhancing balance, a crucial factor in fall prevention. Furthermore, it contributes to improved muscle activation during explosive movements and enhances joint stability (Strojnik, 2009).
Falls are a major concern for individuals in their late years. Statistics indicate that around 30% of people aged 65 and older experience at least one fall annually. Up until the age of 75, women tend to fall more frequently than men; however, after this age, the incidence of falls becomes similar genders. Falls among the elderly pose a serious risk, as they can lead to lasting injuries. The majority of these incidents stem from inadequate balance or poor body control, which is often linked to a decline in strength (Ulaga and Rugelj, 2006).
Engaging in exercise can mitigate the decline of the nervous system, while stronger muscles provide a reliable foundation for executing corrective movements necessary to restore balance (Petavs et al., 2008).

## 4. Coordination

Coordination is a multifaceted motor skill often referred to as motor intelligence. it encompasses the capacity to swiftly acquire new movement patterns to effectively execute intricate motor tasks (Berčič et al., 2001). The groundwork for proficient coordination is

established during early childhood through a diverse array of movement experiences. The enhancement of these skills relies on numerous repetitions and the continuous challenge of new movement tasks. Engaging in appropriate physical activity in later years helps individuals avoid rigid movement habits and equips them to tackle new physical challenges, thereby significantly contributing to the development of this intricate ability (Petavs et al., 2008).

5. Endurance

Endurance refers to the functional capacity of the cardiovascular and respiratory systems to operate effectively, which can be preserved in older age through aerobic exercise. Exercise triggers various adaptive processes within the body that yield positive health and functional benefits (Petavs et al., 2008). While aerobic capacity tends to diminish with age, it is possible to maintain or even enhance it through exercise regimens (Berčič et al., 2001). Older adults are encouraged to participate in aerobic activities such as walking, Nordic walking, cycling, cross-country skiing, swimming, and other sports for as long as possible into their later years (Berčič, 2005).

## PHYSIOLOGICAL EFFECTS OF REGULAR ACTIVITY

Regular physical activity can help postpone the various effects of ageing. According to Strojnik (2010), a lack of physical activity significantly contributes to the deterioration of bodily functions throughout all life stages, with particularly severe consequences in older ages. For instance, a week of bed rest can lead to a reduction in muscle strength by as much as 20% and ta decrease in spinal bone density by 1%.

Younger individuals typically possess a sufficient functional reserve to maintain mobility after such a period of inactivity. However, older or frailer individuals may experience a drop in muscle strength that falls below the minimum functional threshold, making it challenging for them to recover and often resulting in prolonged immobility. Functional reserve refers to the capacity to perform what is strictly necessary to complete a task; a greater reserve facilitates easier task execution.

## SOCIALAZING – STRUCTURED EXERCISE PROGRAMS FOR SENIORS

Structured exercise programs serve not only the fundamental purpose of promoting physical activity and providing a healthy way of spending leisure time, but also foster social interaction and relationship building.

For seniors, maintaining and expanding their social networks requires intentional effort and energy, particularly as feelings of loneliness and social isolation can be prevalent during this stage of life.

Recognizing the significance of preserving mobility skills in older age, there is a growing demand for and availability of diverse recreational and exercise options. Engaging in physical activities is associated with a lifestyle that mitigates risk factors for heart disease, thereby enhancing overall health.

## 3.7.2. Water Activities for seniors

Given the unique characteristics and varying abilities of seniors, it is essential to categorize this demographic based on their physical and psychophysical conditions into specific target groups:

1. Partially mobile
2. Fully mobile
3. Physically active
4. Engaged in recreational sports
5. Competitive masters athletes

This section provides a detailed overview of swimming and water activities tailored for seniors:

- Supervised recreational swimming sessions
- Water jogging
- Aquatic fitness classes
- Water gymnastics for seniors
- Water aerobics
- Mindfulness-based swimming activities
- Swimming accompanied by music
- Yoga in the water
- Halliwick method for seniors

### SUPERVISED RECREATIONAL SWIMMING SESSIONS

This is an activity that effectively and harmoniously promotes the growth and development of the body. Unlike many land-based exercises, it minimizes the risk of injury. The horizontal position in water, along with the physical principles at play, alleviates stress on the entire skeletal system. Exercise for seniors caters to both those in good physical condition and individuals with musculoskeletal issues, aiming to enhance quality of life and foster social interaction.

When addressing the elderly demographic, it is essential to assess their swimming proficiency. Experts categorize them into three groups: beginners and non-swimmers, moderate swimmers, and advanced swimmers. While swimming serves as an excellent recreational activity, certain techniques, such as the breaststroke, can lead to discomfort in the neck and thoracic spine if the head remains above water for extended periods. The discomfort arises from the unnatural position of the head. In contrast, proper execution of breaststroke, as well as crawl and backstroke, does not typically result in such pain. It is also important to monitor water temperature, ensuring it remains between 25 and 32 degrees Celsius.

Prior to the initial exercise session, the following assessments should be conducted:

- Health evaluation
- Assessment of swimming abilities
- Preparation of a list of individual contraindications
- Distribution of written guidelines for gentle swimmers, including pre-exercise instructions

- Discussion of incontinence, both urinary and fecal, whether formed or unformed
- Assessment of balance (determining the need for assistance at the start block)
- Conducting the Cooper test and evaluating the results

**ALSO READ:** https://www.delo.si/polet/zima-je-idealna-za-ucenje-plavanja

Given the varied swimming experiences of seniors, their techniques—backstroke, breaststroke, freestyle, butterfly–are also diverse and warrant attention.
Participation in exercise is significantly influenced by an individual's well-being, quality of sleep, and health status. Over the years, the list of medical diagnoses tends to expand. Seniors often experience more frequent changes in their health conditions due to various factors, such as shoulder injuries or the buildup of calcifications in the shoulder, which may limit their ability to perform basic swimming techniques, leading them to adopt sidestroke or modified backstroke instead.

## WATER JOGGING

This activity offers a unique advantage, as muscle contractions occur at a slower pace compared to exercising on land, reducing the risk of injury. This activity is accessible even to non-swimmers.

## AQUATIC FITNESS CLASSES

These classes incorporate enjoyable water games, stretching routines, strength training, and relaxation exercises. These sessions are designed to be enjoyable and safe, minimizing the risk of overexertion since the skeletal system, and muscle contractions are never explosive. This makes aquatic fitness also suitable for individuals with varying body types. Additionally, exercising in water alters thermo-regulation, resulting in energy expenditure, making it feasible for non-swimmers to participate.

## WATER GYMNASTICS FOR SENIORS

This activity can be introduced at the outset and is particularly beneficial for individuals with minor injuries, rheumatism, arthritis, spinal issues, multiple sclerosis, or those who are overweight. The unique properties of water, such as buoyancy and warmth, create a different experience for the body compared to exercising on land. Water gymnastics allows for more enjoyable movement in a nearly weightless environment, promoting relaxation and well-being. Additionally, it positively impacts the cardiovascular system. Various accessories are utilized, including water weights, pool noodles, and underwater resistance bands.
Water aerobic exercises: These exercises are performed in water to music, providing a different level of resistance compared to exercising on land. They have a more pronounced effect on the respiratory and cardiovascular systems while minimizing stress on the skeletal structure. The risk of injury is significantly reduced, as muscle contraction s in water are never explosive. This form of exercise is accessible to individuals who may not be proficient swimmers.

## WATER AEROBICS

Water aerobics is a dynamic and engaging form of exercise, appealing primarily due to the unique characteristics of the aquatic environment. This setting encourages a different mode of movement and provides a remarkable sense of freedom for the body. It is accessible to individuals of all fitness levels, regardless of their prior experience. Interest in water aerobics tends to peak during the summer months, as the coolness of the water during workouts alleviates the discomfort of sweating. This exercise method serves as an excellent preventive measure against the adverse effects of sedentary lifestyle, which are increasingly common today. The water offers a pleasant and adaptable environment that facilitates safe and effective workouts.

This activity is a type of water exercise designed for recreational athletes. It aims to enhance physical fitness, build muscle strength, and promote overall health and well-being. During the winter months, structured exercise programs are held in indoor swimming pools. The optimal water temperature for effective workouts is between 27 and 30 degrees Celsius. Ideally, participants should choose a water depth that reaches from the navel to the chest, ensuring a sense of safety, balance, and control over their movements. From June to September, the enjoyment of exercising in water transitions to the sea and outdoor pools. When practicing in shallow water, it is essential to be mindful of weather conditions, water movement (such as waves and tides), and the characteristics of the bottom (including unevenness, hazardous objects, and sudden depth changes). In the sea, deep water practice is also an option. To assist with buoyancy while floating, participants can utilize a pool noodle, which enhances buoyancy and facilitates easier surface support.

## MINDFULNESS-BASED SWIMMING ACTIVITIES

Mindfulness enhances awareness and enriches the sensory experience associated with proper swimming techniques. The objective is to engage in swimming with a focus on sensations. This is accomplished by examining our own bodies, concentrating on one aspect at a time, and deliberately practicing swimming while setting aside all other thoughts. The learning approach is unconventional: rather than instructing the body on what to do, swimmers attune themselves to their bodies to discover what feels effective. If the experience is enjoyable, they are on the right track. Consider the following recommendations:

1. Decelerate your pace. Disregard the clock and take your time. Glide into position and maintain an aerodynamic posture. Gradually stretch and draw your arms back, savoring the calming effects.
2. Begin with “yoga breathing” prior to your swim and during breaks. This technique enhances focus, boosts concentration, and stabilizes breathing, which can lower heart rate. The method is straightforward: inhale deeply, exhale, and take a brief moment to relax before inhaling again. You can adjust the frequency of yoga breathing before each exercise or even while swimming.
3. Establish a comfortable breathing rhythm by exhaling through your nose, which can help slow your breathing and create a soothing trail of bubbles.

4. Concentrate on a single aspect. Once we establish a swimming rhythm, we can direct our attention to either visual or auditory components: the sound of bubbles trailing from the nose, the sensation of the body rolling side to side, the shape of the hand as it emerges from the water, the "hole" created by the fingertips as they enter the water, and the movement of the feet, which function like flippers. Reflecting on emotions before and after swimming can prompt us to consider questions such as: How does our body feel? What changes are occurring in our energy levels? Do you recall the sensations of flashing or streaming? What is your emotional state? Prior to entering the water, take note of your mental state. After completing your workout, assess how your mindset has shifted.

## SWIMMING ACCOMPANIED BY MUSIC

Music can provide numerous advantages for swimmers, serving as a tool for relaxation, motivation, and focus. Typically, the cardiovascular system aligns with the tempo of the music. As the song's rhythm accelerates, so does the swimmer's stroke rate, balance, and overall rhythm. Listening to slower music can help eliminate distractions and promote calmness, while faster music can enhance motivation.

The tempo of a song is measured by its beats per minute (BPM). Different swimming activities necessitate varying musical tempos: slower beats are suitable for warm-ups and relaxation, while faster beats are ideal for continuous swimming and motivation. For relaxing swimming sessions, music should be below 80 BPM, while certain distances may require tracks ranging from 120 to 140 BPM. The BPM of a song is calculated by counting the beats in 15 seconds and multiplying that number by four.

Song selection

It is important to recognize that swimmers possess diverse levels of fitness, technique, and musical preferences. A song that inspires or calms one swimmer may not have the same impact on another. Consequently, song selection should be tailored during swimming sessions, and finding the right fit may take some experimentation.

| Relaxation and soothing tracks | Upbeat songs for swimming and motivation |
|---|---|
| • ***We are the Champions*** - Queen (64 bpm)<br>• ***Sunshine on Leith*** - The Proclaimers (76 bpm)<br>• ***No Woman, No Cry*** - Bob Marley and the Wailers (78 bpm)<br>• ***Last Request*** - Paolo Nutini (80 bpm)<br>• ***Time After Time*** - Cyndi Lauper (80 bpm) | • ***Speed of Sound*** – Coldplay (123 bpm)<br>• ***Here Comes the Sun*** - The Beatles (129 bpm)<br>• ***Love Shack -*** B52's (134 bpm)<br>• ***Atomic*** - Blonde (135 bpm)<br>• ***Let It Go*** - Idina Menzel (from the movie Frozen) (137 bpm) |

## YOGA IN THE WATER

The effects of swimming, both before and after the activity, are remarkable, much like those experienced in yoga. Swimming can serve as an exceptional form of pranayama, which involves breath control and breathing exercises. One of the first lessons in swimming is learning to manage our breath, often starting with simple bubble-blowing in the pool. Beyond yoga and swimming, there are few instances in daily life where we consciously regulate our breathing. By cultivating awareness, we can transform our swimming experience into a form of yoga.

Pranayama is characterized by the intentional control of breath, as opposed to the automatic nature of most breathing. Through yogic breathing exercises, we harness our breath to generate more energy, or prana, within the body. Pranayama is one of the eight limbs of yoga, as outlined in the Yoga Sutras of Patanjali, and serves as a pathway to ultimate freedom and bliss.

How can we integrate pranayama into our swimming practice? While swimming, we naturally hold our breath when submerging and gradually exhale as we move through the water. Each time we take a breath, we establish a rhythm that enhances our swimming experience. This synchronization of breath and movement is a fundamental principle in vinyasa yoga, where the term "vinyasa" refers to the coordination of movement and breath. By focusing on breath control in both yoga and swimming, we can achieve a state of moving meditation.

The relationship between swimming and pranayama is symbiotic. Mastering breath control and maintaining a rhythmic breathing pattern in swimming can enhance our yoga practice on land. Conversely, practicing pranayama on land can improve our swimming skills and increase lung capacity. It’s a mutually beneficial scenario.

Just as riding a bicycle becomes second nature, breath control in swimming can also become instinctive. While swimming elevates our energy levels and opens energy pathways in the body, cultivating awareness and focus can gradually transform our experiences in the water.

## HALLIWICK METHOD FOR SENIORS

One of the notable programs is the Halliwick Concept, particularly its focus on one-on-one training and games, which has been shown to be highly effective for senior training. This program incorporates a variety of games that enhance social interaction among the elderly, fostering enjoyment and laughter. Additionally, these games contribute to improved mobility and strength, as well as better special awareness, situational reasoning, and creativity.

This approach is particularly beneficial for senior swimmers who are beginners and may have a fear of water. Many seniors experience tension in the water; they may be apprehensive about swimming in deeper areas, feel uneasy when lying on their backs, or have previously encountered negative experiences in aquatic environments. It is essential for them to build confidence and a sense of safety in the water first.

More about the Halliwick method in the next subtitle, 4.0 Para Swimming

### GUIDELINES FOR SWIMMING AND WATER EXERCISE FOR SENIORS

- Begin with a proper warm-up, as it is essential even in swimming. Engaging in various gentle exercises that promote blood circulation is advisable.
- For seniors, entering the water should be a gradual process. In warm weather, it is crucial to enter slowly, preferably using steps. A sudden plunge into the water can lead to significant shock and stress on the heart.
- Prioritize safety at all times. It is recommended to exercise in swimming pools where lifeguards are present. When swimming in the ocean, be mindful of your own capabilities.
- Despite being surrounded by water, hydration is vital. Sweating can occur even during water activities, and dehydration can affect even elite swimmers. It is particularly important to stay hydrated in hot conditions, and it is advisable to avoid carbonated beverages. Alcohol should be strictly avoided, as it can dilate blood vessels, posing additional risks when entering the water and dealing with hydrostatic pressure.
- The ideal water temperature for swimming ranges from 26 to 32 degrees Celsius. Swimming in higher temperatures can lead to blood vessel dilation, making vigorous activity inadvisable.
- The recommended exercise intensity for seniors is between 50 to 60 percent of their maximum heart rate. For those in good physical condition, this intensity can be gradually increased to help strengthen the heart. Monitoring heart rate with devices can be beneficial, and a simple indicator of moderate exertion is the ability to converse comfortably during the activity.
- Engagement and social interaction are key elements of water exercise for seniors. The focus should not solely be on technique or competition, but rather on enjoying conversation and companionship. Friendships formed in these groups often extend beyond the water.

## 3.8 CURATIVE PROPERTIES OF EXERCISES IN THE WATER

Water is essential for cellular structure, temperature regulation, and detoxification through urine and feces. It plays a critical role in digestion, is vital for numerous biochemical reactions, lubricates joints, and provides elasticity and moisture to the skin. Additionally, water protects the kidneys, boosts energy levels, and enhances metabolism.

Water is fundamental to the structure and function of all tissues, with approximately two-thirds of the body's water contained within cells and one-third in the extracellular space. It is the most crucial substance on Earth, as life began in water, making it the primary element we consume. A significant share of the Earth's water is suitable for drinking.

Environmental changes driven by industrialization and global warming pose significant threats to water preservation and, consequently, our health. Therefore, it is essential to remain mindful of water intake, its quality, and efforts to prevent environmental pollution.

The advantages of water for our bodies are extensive, with some of the most critical benefits including its role in the functioning of bodily systems and cardiovascular regulation. Individuals with high blood pressure or cancer should ensure adequate water intake, as it aids in stabilizing blood pressure and supports cellular healing. Water also influences digestive health, helps manage obesity, regulates blood sugar levels, and contributes to maintaining energy. Furthermore, it serves as a source of mental and emotional rejuvenation, enhancing our overall quality of life.

Engaging in water-related activities, like all forms of physical exercise, has a profound and multifaceted impact on health. Consistent and appropriately managed physical activity is a vital component of a healthy lifestyle, significantly contributing to the prevention of various diseases.

When selecting activities for older adults, it is essential to consider factors such as age, gender, health status, and functional ability. Younger individuals may benefit from activities that enhance cardiovascular health, such as rowing and diving, while older adults are encouraged to engage in gentler pursuits like walking, running, cycling near water, and swimming.

Engaging in dynamic water sports with adequate duration, intensity, and frequency can elevate levels of high-density lipoproteins and reduce both systolic and diastolic blood pressure in individuals with mildly elevated blood pressure. Additionally, these activities can improve glucose tolerance, enhance blood fibrinolytic activity, decrease platelet aggregation, and contribute to weight loss and a reduction in body fat percentage, particularly among those who are overweight.

Prior to each exercise session, it is advisable to perform a warm-up consisting of 5 to 10 minutes of stretching or walking, with a similar cool-down routine recommended afterward.

As previously noted, water serves as a vital source of health and vitality, playing a crucial role in our overall well-being. It is indispensable for our physical survival and significantly contributes to our health through various activities. Engaging in water-based activities, such as swimming, rowing, sailing, and diving, offers numerous health benefits that go beyond mere physical fitness.

The significance of aquatic activities in promoting health is well-supported by scientific research. A study published in the "International Journal of Aquatic Research and Education (2010)" highlights that swimming can lower the risk of chronic illnesses, including heart disease and type 2 diabetes, thereby enhancing cardiovascular health and blood sugar regulation. Furthermore, research featured in the "Journal of Physical Activity's Health (2013)" indicates that consistent exercise can markedly improve muscle strength and endurance, which are critical for maintaining functional capabilities in older age.

## OBESITY

Obesity is a significant issue affecting millions globally, leading to heightened risks of hypertension and heart disease. Engaging in water-based activities as part of a physical fitness regimen enhances the balance between energy intake and expenditure, aiding in the reduction of excess body weight and facilitating weight management. Many sports involve vigorous physical exertion that effectively burns calories. Combining water activities with a balanced diet is an excellent strategy for shedding excess weight and achieving an

ideal body shape, often proving more effective than other methods. Obesity results from an accumulation of body fat, which can be reduced through regular exercise.

Consistent physical activity enhances the muscles' ability to metabolize pyruvate and fatty acids, thereby improving the muscle cells' capacity to produce ATP. This improvement is linked to an increase in both the number and size of mitochondria. Mitochondria expand due to a rise in protein mass, which correlates with the quantity and activity of enzymes. Individuals who are trained at submaximal levels tend to utilize more fat than glycogen and exhibit lower lactate levels in their blood and muscles after prolonged exertion. This efficiency is a result of the body's adaptation to exercise, characterized by a denser capillary network in the muscles that enhances oxygen extraction from the blood, leading to better energy utilization. Additionally, trained individuals show an increased glycogen concentration in their muscles, likely due to enhanced synthesis capacity. In contrast, those who are untrained display higher levels of free fatty acids, indicating lower fat consumption and a greater reliance on glycogen reserves, which limits their ability to sustain prolonged and efficient physical activity.

Daily caloric intake should be approximately 1,500 calories for individuals at complete rest, 2,600 calories for those who are primarily sedentary, and around 4,000 calories for athletes or individuals engaged in strenuous physical labor. Engaging in physical activities enhances the vascularization of digestive glands due to increased blood circulation, resulting in a higher production of digestive enzymes and facilitating easier digestion. Additionally, the sweat glands, kidneys, and lungs operate more vigorously during such activities.

Consistent physical activity, including water-based exercises, helps prevent rapid weight gain and the development of obesity-related health issues. A synergistic approach that combines a balanced diet with regular physical activity can significantly aid in weight reduction and metabolic changes, particularly in reducing body fat, thereby serving as a preventive measure against obesity, especially in younger school-aged children.

The therapeutic regimen for overweight children and adolescents emphasizes an increase in both physical and mental activities, alongside a controlled caloric intake.

There is a notable increase in the elimination of uric acid, cholesterol, and urea from the bloodstream. The activity of endocrine glands is also heightened, leading to an increased production of hormones.

Engaging in water sports and other forms of physical activity promotes the contraction of abdominal muscles, positively influencing the functioning of the stomach and digestive organs, while also benefiting intestinal peristalsis.

## DIABETES

Regular physical activity has long been recognized as a crucial factor in managing diabetes, alongside proper nutrition and prescribed treatments. However, it is only in the past twenty years that clinical studies have provided substantial evidence supporting the role of physical activity, particularly aquatic exercises, in diabetes management. Consistent engagement in physical activity is essential for regulating blood sugar (glucose) levels.

Engaging in regular physical activity enhances the effectiveness of insulin on peripheral tissues, such as skeletal muscles, boosts glucose clearance in the liver, and diminishes glucose production. The activity of enzymes that control glucose storage and oxidation in skeletal muscles is heightened. Additionally, there is a shift from type IIb to type IIa muscle fibers and an increase in capillary density within the muscles. This leads to a reduction in

abdominal fat and intramuscular triglyceride levels, which helps lower insulin resistance. The liver becomes more responsive to insulin, improving its role in glucose regulation. Furthermore, there is enhanced management of free fatty acid metabolism, increased peripheral glucose clearance, and decreased hepatic glucose production.

It is important to distinguish between the immediate and long-term effects of physical activity. For up to two hours post-exercise, glucose uptake is elevated, partly due to insulin-independent mechanisms likely triggered by increased enzyme levels. A single session of exercise can enhance insulin sensitivity for at least sixteen hours afterward, benefiting both healthy individuals and those with diabetes.

Physical activity influences insulin sensitivity through various adaptive mechanisms related to glucose transport and metabolism, as well as fat metabolism and hepatic glucose output. It is advisable to implement non-pharmacological strategies concurrently, as dietary changes can also stimulate these beneficial adaptations.

The basic strategy for regulating diabetes should be to change lifestyles (reduction diet and regular physical activity), which leads to a reduction in the incidence of diabetes for more than half (58%) of people with impaired glucose tolerance.

Reduced physical activity is one, if not the most important factor associated with insulin resistance in type 2 diabetes, since the positive effect of physical activity on the effect of insulin has been confirmed. The existence of a strong and solid correlation between maximum aerobic power and insulin action was established.

Epidemiological studies have shown that physical activity can lower blood sugar levels for up to 24 hours or more after training, making our bodies insulin sensitive. That is why it is necessary to check the blood sugar level more often, before and after exercise, to see how the sugar level reacts to the activity.

## RAISED PRESSURE

Blood pressure refers to the force that blood exerts against the walls of blood vessels. This force fluctuates based on heart function, arterial elasticity, and the overall volume of circulating blood.

Systolic pressure, often referred to as the "upper" pressure, is recorded during the heart's contraction and indicates the peak pressure within the arterial system. Conversely, diastolic pressure, known as the "lower" pressure, is measured when the heart is in a relaxed state. A normal systolic pressure is typically around 120 mmHg, while a normal diastolic pressure is approximately 60 mmHg.

For adults at rest, a normal heart rate ranges from 60 to 100 beats per minute. A lower resting heart rate is indicative of superior heart function and cardiovascular fitness. For instance, a well-conditioned athlete may have a resting heart rate of about 40 beats per minute.

Inactivity is linked to elevated blood pressure (hypertension), whereas regular physical activity can help lower it (hypotension).

Engaging in physical activity can effectively reduce blood pressure, thereby promoting the health of the heart and blood vessels and decreasing the risk of heart disease and stroke. However, individuals with high blood pressure should consult a healthcare professional before initiating any exercise regimen to ensure safety.

While physical activity may lead to a temporary increase in blood pressure, this is generally not a cause for alarm, as levels typically normalize shortly after the activity ceases. If an

individual has significantly high blood pressure, a doctor may recommend medication to manage it prior to beginning an exercise program. In cases of very high blood pressure, it is crucial to seek medical advice before participating in any physical activities.

When blood pressure is elevated, it is advisable to prioritize aerobic exercises, as these are most beneficial for the heart and blood vessels. It is important to steer clear of activities that may excessively strain the heart. Effective exercises include those that engage the heart, lungs, blood vessels, and muscles, particularly utilizing large muscle groups found in the shoulders, arms, and legs. Swimming is an excellent example of such water-based activities. Conversely, certain types of exercise may be less beneficial. For instance, highly intense activities can lead to increased blood pressure and additional stress on the heart and blood vessels. Extreme sports, like diving, may pose risks if blood pressure is not well-managed.

Engaging in any form of physical activity, including aquatic exercises, can help lower heart rate, decrease both systolic and diastolic blood pressure, enhance physical endurance, and facilitate quicker recovery following intense exertion.

## CARDIOVASCULAR AND RESPIRATORY SYSTEM

During physical activity, the cardiovascular system goes through numerous changes, such as an increase in cardiac output, which are closely related to the degree of expansion of blood vessels in skeletal muscles, which means metabolic changes that occur in skeletal muscles during physical activity. In addition to this, there is reflex activation of sympathetic nerves in relation to the heart, as well as in relation to the resistance and capacity of the blood vessels of the systemic circulation.

As a result, there is a reflex regulation of peripheral vascular resistance, so that the increased cardiac output from the left ventricle is directed to the active muscles, and systemic arterial pressure is maintained within normal limits, despite a large increase in cardiac output.

The heart acts as a supply pump, and is able to expel any volume of blood it receives and able to meet the oxygen demands of increased work. When transitioning from rest to work, the heart rate increases, first quickly and then slowly, up to a relatively steady, stable state is reached.

Heart rate increases in an approximately linear fashion with increased oxygen consumption. Cardiac output also increases as a linear function of oxygen consumption. During exercise, the contractility of the heart muscle also increases, which is manifested by a rapid increase and rapid decrease in pressure in the heart, rapid changes in the dimensions of the heart. The ejection of blood from the heart is accelerated. The overall effect of these changes is to squeeze out almost the same stroke volume in a shorter systolic interval, with an increase in heart rate and cardiac output.

Engaging in water activities such as swimming, rowing, and kayaking is well-recognized for enhancing cardiovascular endurance. These aerobic exercises necessitate the heart to pump blood more effectively, resulting in improved cardiovascular function. This process strengthens and increases the elasticity of the heart muscle, which in turn boosts stroke volume and cardiac output. Additionally, a denser capillary network within the heart muscle diminishes the likelihood of heart attacks. Research indicates that consistent swimming can lead to lower arterial blood pressure and improved lipid profiles, thereby reducing the risk of cardiovascular diseases. Notably, regular exercise can decrease blood vessel pressure by approximately 10/8 mmHg, suggesting that physical activity can be as effective as medication in managing blood pressure.

The positive impacts on the respiratory system can be summarized as follows:

- Increased physical activity elevates the demand for oxygen.
- The respiratory muscles engage more vigorously, resulting in their enhanced strength.
- Stronger respiratory muscles facilitate more forceful chest movements, thereby improving elasticity.
- Lung capacity expands, allowing for deeper inhalation and exhalation, leading to more flexible breathing.
- The nasal cavity, pharynx, and bronchi are constricted, complicating the intake of air, while the diaphragm is positioned higher, the ribs are slightly angled, and the range of breathing movements is limited, all contributing to a heightened need for oxygen.

## MENTAL ACTIVITIES (ANXIETY, DEPRESSION, DEMENTIA)

Significant psychological transformations occur in individuals as a result of engaging in physical activities. There is an increase in emotional stability, a reduction in aggression and depression, and a heightened motivation for adaptation. Additionally, the frequency of sick days and hospitalizations related to coronary heart disease declines, along with a decrease in the number of smokers.

The complexity of movements correlates with a more substantial effect on the nervous system. Coordination, facilitated by the central nervous system, is developed primarily through practice. Younger individuals experience a greater load on their central nervous system compared to older adults, and by gradually increasing the volume of exercises, the strain on the central nervous system can be alleviated.

Engaging in physical activity is one of the most straightforward and safest methods to achieve optimal health and well-being. The benefits are evident in the overall improved functioning of the body, enhanced efficiency in performing tasks, and a sense of relaxation that occurs despite physical exertion. Furthermore, it allows for quicker recovery of physical strength when the body is in a conditioned state.

Engaging in physical activity positively influences both physical and mental health. It alleviates stress, reduces anxiety and depression, and promotes a sense of calm within the nervous system.

Anxiety serves as the body's natural reaction to stress, often presenting as an overwhelming sense of fear or apprehension about future events. Anxiety disorders occur when this fear persists beyond significant stressors, potentially intensifying over time. The symptoms can disrupt daily life, affecting work, academic performance, and interpersonal relationships.

Depression is a mood disorder marked by profound feelings of sadness, disappointment, isolation, hopelessness, diminished self-esteem, and a sense of inferiority.

Dementia is a condition that profoundly impacts both the individual diagnosed and their loved ones. With the rising number of cases, there is increasing interest from both professionals and the public in exploring preventive measures and strategies that may positively influence the progression of dementia. Among the various lifestyle modifications studied, maintaining regular physical activity is one of the most crucial steps we can take to lower the risk of developing dementia.

Research indicates that consistent physical activity during middle age can significantly decrease the likelihood of dementia onset. It enhances circulation and metabolism,

improves oxygen delivery, and likely has a direct beneficial effect on neurons, fostering protective factors that help maintain brain health.

Engaging in exercise is advantageous for individuals with dementia, contributing positively to both their physical and mental well-being, and enhancing their quality of life throughout all stages of the condition. Activities such as walking near water, swimming, participating in sports, and undertaking fitness-focused exercises can significantly influence the progression of the disease and mitigate emotional and behavioral issues. Additionally, physical activity fosters social interactions, which can aid in preserving independence, a crucial aspect for those living with dementia.

It is essential to exercise within the limits of one's current physical capabilities, as overexertion can be detrimental to health. Moreover, maintaining an active lifestyle can enhance overall psychophysical health, yielding positive effects not only in preventing dementia but also in improving the quality of life for those affected. Water-based activities, in particular, offer substantial mental health benefits. Research indicates that engaging in activities like walking by the water can alleviate stress, anxiety, and depression, leading to improved mental well-being due to the calming influence of "blue spaces" on psychological health.

Engaging with water environments supports the idea of "blue therapy," highlighting that time spent near or in water can have therapeutic benefits, such as alleviating anxiety and potentially reducing symptoms of depression.

Participating in water-based activities fosters social connections and enhances our mental well-being. Whether through team sports or family gatherings, the interactions that occur in these natural settings can significantly strengthen social ties and family dynamics.

The psychological advantages of water activities contribute to lower stress levels and enhanced mental clarity and self-esteem. These activities often demand focus and coordination, which are crucial for cognitive improvement. For instance, sailing and rowing necessitate ongoing attention and adaptability to changing conditions, thereby honing our concentration skills.

Individuals who frequently engage in water sports tend to excel in tasks that require quick thinking and attention, suggesting that these activities can enhance cognitive abilities.

Overall, the mental health benefits of aquatic activities extend beyond mere physical exercise; they serve as vital tools for promoting mental wellness, offering opportunities for meditation, concentration, and personal growth.

As we delve into the various aquatic activities at our disposal, it is essential to acknowledge the extensive health benefits they offer. Research and studies substantiate the positive impacts of water sports and recreational pursuits on physical, mental, and social well-being.

## ASTHMA

Asthma is a chronic respiratory condition marked by symptoms such as difficulty breathing, wheezing, coughing, and a sensation of tightness in the chest. It ranks among the most prevalent respiratory issues affecting both adults and children.

Historically, it has been believed that engaging in sports could adversely affect individuals with asthma. However, recent research has challenged this notion, advocating for the inclusion of physical activities in the routines of asthma patients. Exercise enhances breathing depth, reduces the frequency of breaths, and improves lung capacity, circulation, and heart rate.

Careful consideration should be given to the types of sports recommended for those with asthma. Swimming is particularly beneficial due to the warm, humid environment that aids in respiratory muscle strengthening. Conversely, activities like diving are discouraged due to lower oxygen levels, and sports conducted in cold conditions, such as skating and ice hockey, may trigger asthma attacks.

For most individuals with well-managed asthma, regular physical activity can significantly enhance their quality of life. It reduces the need for excessive inhalation during daily tasks, facilitating easier engagement in routine activities with diminished breathlessness and fewer asthma episodes. Numerous studies indicate that consistent exercise can lessen both the frequency and intensity of exercise-induced asthma attacks.

## SKELETON MUSCULAR SYSTEM

Engaging in water sports activates a diverse array of muscles, encompassing those in the arms, shoulders, and legs, making these activities an excellent form of exercise suitable for individuals of all ages. Paddleboarding, in particular, has been demonstrated to enhance skeletal stability while promoting muscle growth in both the upper body and legs. This results in significant improvements in overall muscular strength, endurance, flexibility, and mobility.

Bone development primarily occurs during childhood, peaking by the age of twenty. Approximately ninety percent of bone growth takes place between the ages of ten and twenty, highlighting the importance of these formative years for building strong bones. The peak bone mass density is typically reached in the late twenties to early thirties. Following this period, women experience a gradual loss of 0.5% of bone mass annually, which accelerates during the ten to fifteen years leading up to menopause. Men also experience bone mass reduction, albeit at a slower rate. Therefore, it is crucial to focus on building robust bones during childhood to minimize future bone mass loss.

Increased physical activity is associated with enhanced bone mass, particularly when the body is subjected to loads approximately 2.5 times its weight. Regular exercise not only aids in bone development but also helps prevent calcium depletion.

Regarding muscle function during physical activity, muscle contractions lead to the engorgement of capillaries, resulting in increased blood flow. This enhanced circulation provides better nourishment to the muscles, contributing to their increased flexibility and strength.

Muscles serve as the "motor" force of the body, and various activities induce a range of changes in larger muscle groups before affecting smaller ones. An increase in muscle mass leads to enhanced strength and more efficient muscle function.

Bones function as a passive component of the movement system, acting as levers that convey muscle contractions, thereby facilitating movement. Engaging in water sports, like any form of physical activity, positively impacts bone health, enriching them with calcium and enhancing their strength and elasticity.

Joints, which connect bones, provide the body with flexibility and stability, a benefit achieved through regular and appropriately scaled exercise. Such activity positively influences the musculoskeletal system, resulting in stronger bones (maintaining adequate calcium levels for increased density and strength) and joints that are sufficiently mobile and robust to fulfill their roles.

Water-based activities are essential not only for enjoyment and relaxation but also for the enhancement and maintenance of physical health. Each activity offers unique advantages that contribute to improved bodily function, enabling a more active and healthier lifestyle. Swimming and other water exercises are particularly effective for enhancing overall physical condition and fitness, as the buoyancy of water supports the body, making these activities ideal for those looking to exercise with reduced strain on their joints and muscles. The body's attempts to remain buoyant or navigate through water provide significant advantages for cardiovascular health and the vascular system. Nearly all muscle groups are engaged, endurance is enhanced, and there is minimal strain on the joints, along with a reduced risk of overheating.

Swimming is an excellent option for those looking to stimulate their heart and blood vessels, especially when other forms of exercise may not be appropriate. It is particularly suitable for individuals who need to avoid overheating while remaining physically active, as the aquatic environment facilitates better temperature regulation. Unlike other physical activities, calorie expenditure ceases almost immediately upon exiting the water. The absence of joint stress, combined with the activation of nearly all muscle groups, contributes to improved physical fitness and overall health. For runners seeking to relieve stress on their joints and leg muscles while still engaging their upper body and achieving effective cardiovascular training, water sports are a viable alternative.

Injuries from sports or other activities should not deter individuals from maintaining healthy habits. Swimming is gentle on injured joints and muscles, helping to prevent physical inactivity and maintain fitness levels.

Athletes participating in water sports, particularly swimming, encounter unique challenges that differ from those faced by athletes in most land-based sports.

One such challenge is the requirement of mastering the four swimming strokes—freestyle, butterfly, backstroke, and breaststroke—which necessitate the coordinated movement of both the upper and lower body. To maximize efficiency while moving through water, a harmonious function of the musculoskeletal system is essential.

Swimmers must generate their own support in the water to execute movements effectively. Unlike athletes in land-based sports who rely on a stable surface to push off from, swimmers operate in an aquatic environment where they must establish their own stability. A robust and stable core, including the trunk and pelvis, serves as the central axis that coordinates the movements of the upper and lower limbs, creating a foundation for movement in the water. During swimming, muscles play dual roles as either movers or stabilizers. The trunk muscles, for instance, continuously engage to provide stability. Both the propulsive and stabilizing functions of these muscles are crucial for achieving proper stroke mechanics and facilitating efficient movement through the water.

Additionally, strong leg muscles are vital for swimmers. The legs not only provide a powerful and efficient push-off but also play a critical role in directing the body during starts and turns. They help maintain the mechanics of the stroke and contribute to achieving a hydrodynamic position in the water.

Through the example of swimming, we highlight the significance of the musculoskeletal system in aquatic activities, underscoring its essential role in ensuring health and functionality during these movements.

# 4.0. PARA SWIMMING

The aquatic environment is frequently selected by individuals, parents, fitness professionals, therapists, and other specialists due to the distinctive properties that water offers. This setting allows for the application of hydrostatic and hydrodynamic principles to create challenges that can enhance health and help individuals achieve various objectives. Being submerged in water provides advantages such as decreased joint stress due to buoyancy, resistance from turbulence, hydrostatic pressure, and the water's temperature. These distinctive features of water-based exercise may enable individuals to perform activities that would be difficult or impossible on land, while also offering safer or more favorable conditions compared to land-based exercise. Various methods are employed in both swimming instruction and aquatic rehabilitation for individuals with impairments in the water.

Aquatic programs are often highly regarded among individuals with disabilities. Research indicates that children with disabilities tend to participate in swimming activities and derive greater enjoyment from them compared to their non-disabled peers. The higher participation rates among individuals with disabilities may be partially due to the therapeutic prescription of aquatic exercise, along with benefits such as enhanced freedom of movement, reduced pain, and preferred sensory feedback.

There are various programs offering water activities for individuals with disabilities, such as Four B's, Michael Phelps' I'm Safe Swim School, and Autism Swim. However, the Halliwick philosophy stands out as a traditional, well-established, and thoroughly developed program.

## 4. 1. HALLIWICK CONCEPT

The Halliwick Concept, created by James MacMillan in the United Kingdom in 1949, utilizes principles of hydrostatics and hydrodynamics to help swimmers gain control over their movements in water, ultimately leading to independent and safe swimming. This approach is structured around The Ten-Point-Programme, of the Halliwick Concept which guides both swimmers and instructors through a systematic learning process aimed at achieving both psychological and physical mastery of aquatic movement. The term 'swimmer' refers to the learner as they navigate through the Ten Point Programme, highlighting the positive outcomes of future participation. Initially designed for individuals with physical disabilities, the Halliwick Concept is now embraced globally by diverse populations. Its unique methodology emphasizes not only physical abilities but also psychological and social growth. This comprehensive approach allows the program to cater to the specific needs of anyone wishing to engage with water. The Halliwick Concept maximizes the benefits of the aquatic environment while enhancing support through personalized instruction and promoting interaction among swimmers through games and collaborative activities. The various components of the Halliwick Concept create optimal conditions for learning and fostering independence in water. The primary objective is to ensure the swimmer's safety

and instil complete confidence in the aquatic setting. The Ten-Point Programme (TPP) Halliwick Concept integrates biophysical principles and emphasizes mental adaptation, independence, and the enhancement of motor control.

### 4.1.1. Ten-Point-Programme

The Halliwick Concept is structured around a Ten-Point-Programme, which includes the following elements:

1. **Mental Adjustment**
2. **Disengagement**
3. **Transversal Rotation Control**
4. **Sagittal Rotation Control**
5. **Longitudinal Rotation Control**
6. **Combined Rotation Control**
7. **Upthrust**
8. **Balance in Stillness**
9. **Turbulent Gliding**
10. **Simple Progression and Basic Swimming Movement**

The initial two components, mental adjustment and disengagement, are continuously refined as the swimmer develops subsequent physical skills. Mental adjustment involves fostering comfort within the aquatic environment, with a particular emphasis on mastering breath control to achieve both mental and physical relaxation. This focus on the individual's psychological state cultivates a genuine and perceived sense of safety, allowing swimmers to build confidence in their abilities in the water. Disengagement refers to the process of gaining both physical and mental autonomy, enabling swimmers to take control of their movements. This is facilitated by instructors who intentionally lessen the physical, cognitive, and emotional support provided to the swimmer. Consequently, the Halliwick approach does not incorporate flotation devices.

The third to sixth points of the Ten Point Program emphasize achieving three-dimensional movement control. This begins with a discrete focus on each movement plane before integrating them. Such a structured approach provides significant flexibility for therapists who aim to enhance bodily function and facilitate the transfer of benefits from aquatic settings to land-based activities or daily living tasks. The arrangement of these points indicates a systematic advancement in motor control, allowing swimmers to be challenged according to their individual skill levels.

The seventh and eighth points, which address buoyancy and stability in stillness, require swimmers to synchronize their movements to resurface after submersion and to maintain equilibrium in the water.

The ninth and tenth points of the Ten Point Program guide swimmers toward independent movement through the water, starting with the aid of turbulence and progressing to self-generated propulsion. At this juncture, swimmers can safely participate in a range of activities within the aquatic environment.

The Ten Points framework enables the ‘swimmer’ to progressively enhance their breathing, balance, and movement control, fostering greater confidence and freedom in the water. This development occurs through personalized instruction, where an instructor provides

tailored support, allowing the 'swimmer' to learn without relying on flotation devices. Whenever feasible, 'swimmers' are encouraged to initiate and manage their movements, with the instructor offering assistance as needed. For many, the Ten Point Programme serves as a pathway to achieving competent swimming skills, while for others, it opens doors to participate in various aquatic activities.

**ALSO READ AND WATCH:**
https://www.halliwick.org/wp-content/uploads/2024/05/Halliwick-Concept-2010-Paper-Updated-2015.pdf

## EXAMPLES OF EXERCISES FOR BEGINNERS WITH POOR ADAPTATION

1. Blowing bubbles at the pool's edge, either pairs or as a group.
2. Navigating through the water using various movements: sideways, jumping, walking backward, or taking wide steps.
3. Floating on the back with the support of a coach or partner, where the swimmer rests their head on the coach's shoulder. The coach assists by holding the swimmer's hips and guiding them through the water. The swimmer can also alternate their pull in both directions, similar to kayaking or canoeing, with their hips elevated above of the water. At the conclusion of the exercise, the swimmer should transition to a sitting position, initially with assistance and eventually independently, by lifting their head, drawing their legs in, and extending their arms forward on the s water's surface.

## EXAMPLES OF BEGINNER EXERCISES FOR INTERMEDIATE SWIMMERS

Retrieve objects from the bottom of a shallow pool. Encourage the swimmer to exhale while reaching for the items.
Practice gliding along the water's surface.
Swim on the back with minimal support. Provide assistance by placing your hands under the swimmer's arms and gently guiding them in a transverse direction.

## EXAMPLES OF BEGINNER EXERCISES WHO ARE WELL ADAPTED TO THE WATER

Glide freely with the head submerged. The swimmer begins by gliding face down, then transitions to a sitting position as previously described.
Sponge exercise. The swimmer contracts like a sponge, inhaling and holding their breath. The coach gently pushes the swimmer below the water's surface, where they wait to resurface. Upon surfacing, the swimmer should extend their arms and legs, rotate onto their back using longitudinal rotation, achieve a balanced back position, and then transition to a sitting position in the water through transverse rotation.
The Halliwick approach is tailored to meet specific objectives, which will be evident in the improvements at the level of body function and structure, as well as the benefits related to participation.

Example 1:
If the goal is to teach swimming, the 10 Point Programme (10PP) can be utilized to cultivate the necessary skills and confidence for floating, coordinating breathing, and changing body positions, all of which are essential for swimming or engaging in activities in a pool or the ocean.

Example 2:
To enhance speech and voice production for easier engagement in daily conversations, the 10 Point Programme, along with tailored activities, offers a framework to focus on lip coordination and the strengthening of the diaphragm and other muscles essential for breathing and vocalization.

Example 3:
For those looking to address spinal weakness and malalignment associated with developing scoliosis, the 3-Dimensional control of rotation included in the 10 Point Programme, combined with resistance exercises in water, serves as an effective therapeutic approach to mitigate deformity and alleviate physical discomfort.

Example 4:
The Halliwick method and its 10 Point Programme present excellent opportunities for improving health-related fitness, including cardiovascular endurance, flexibility, and muscle strength. If your goal is to engage in activities that promote health and well-being, Halliwick allows for a concentrated focus on these areas.

Example 5:
For individuals with autism spectrum disorder seeking to enhance task structuring or develop social and conversational skills, Halliwick group sessions provide structured games and activities that facilitate communication and relationship-building with fellow swimmers.

Example 6:
To assist individuals with mental disorders in learning how to organize tasks and enhance their social and conversational skills, structured games and activities, along with opportunities for communication and relationship-building with fellow swimmers, can be highly beneficial in Halliwick group sessions. The presence of one instructor dedicated to each swimmer within the group provides essential support and fosters the development of relationships, including friendships. Halliwick Instructors emphasize the strengths of each swimmer, and this positive approach can significantly boost motivation and engagement.
For more information, the complete 10 points program is available on the IHA International Halliwick Association website: https://vimeo.com/channels/halliwick

## 4.1.2. Why reduce or eliminate the use of flotation aids

The Halliwick method is designed to foster independence, confidence, and freedom of movement in water for individuals with disabilities or physical challenges. A key principle of the Halliwick approach is to reduce or completely avoid the use of flotation devices whenever feasible.

By eliminating external supports, individuals are encouraged to engage their own muscles and movements to maintain stability and control their body position in the water. This strategy seeks to improve the individual's proprioception (awareness of body position) and neuromuscular control.

There are several reasons why Halliwick advocates against the use of flotation aids:

1. Independence:
2. Minimizing reliance on flotation devices encourages individuals to cultivate their own skills for staying afloat and navigating in the water autonomously. This not only fosters a sense of achievement but also enhances self-confidence and overall functional independence.
3. Body awareness and control:
4. Why reduce or eliminate the use of flotation aids?

1. Body awareness and control:

By not depending on flotation devices, individuals become more aware of their body's movements and sensations in the water. This heightened awareness allows for a better understanding of how their body interacts with the water, leading to improved control over their movements.

2. Balance and coordination:

Engaging in activities without flotation aids compels individuals to actively use their muscles to maintain balance and coordination. This practice enhances core stability, motor skills, and overall body control.

3. Targeted therapeutic objectives:

In certain instances, individuals may have specific therapeutic objectives concerning strength, range of motion, or coordination. Removing flotation aids enables therapists to design targeted exercises or activities that more effectively address these objectives.

It is essential to recognize that the choice to use flotation aids in aquatic therapy or swimming instruction can differ based on an individual's abilities, needs, and therapeutic goals. While Halliwick advocates for minimizing flotation aid usage, there may be circumstances where their temporary or selective application is warranted for specific therapeutic reasons.

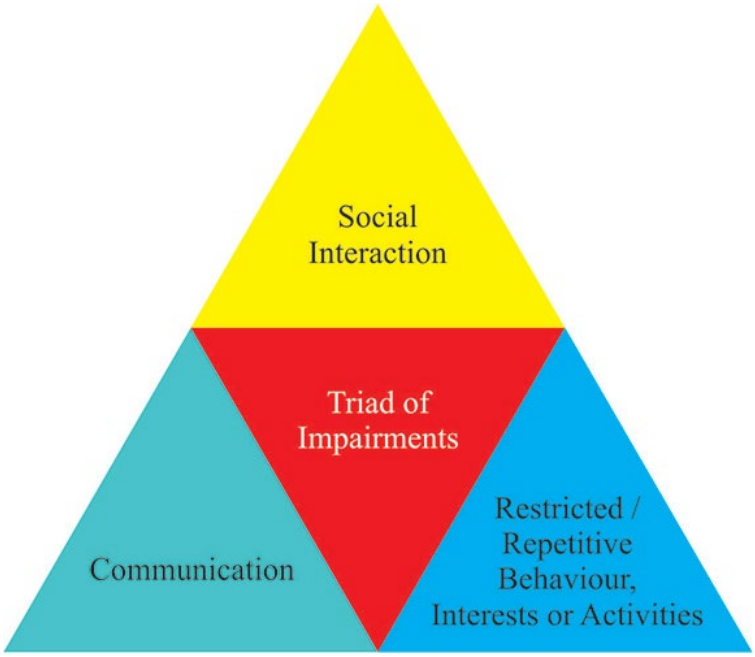
## 4.2 Autism Spectrum and Sensory Disorders

The prevalence of autism diagnoses among children is increasing within the population. Autism is a developmental disorder marked by challenges in speech, both verbal and non-verbal communication, as well as emotional development. It may also manifest through nonsensical vocalizations and repetitive behaviors.

Autism Spectrum Disorder (ASD) serves as an overarching term for a collection of neurodevelopmental disorders that primarily impact an individual's behavior, communication, and social interactions. Autism is the most frequently diagnosed form of ASD.

ASD encompasses a variety of symptoms that can present in different combinations, with variations in severity and levels of functional independence. Based on these characteristics, other disorders classified under the ASD umbrella include Asperger's Syndrome, Rett Syndrome, and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), among others.

Typically, parents begin to observe signs of ASD in their children before the age of 2 or 3. While motor milestones are often achieved on schedule, there may be noticeable delays or atypical behaviors in other developmental areas.




Picture 4. https://www.neurogen.in/autism

The pool serves as a unique environment for children on the autism spectrum. It offers nearly limitless opportunities for sensory modulation. Engaging in water activities can transform therapy into enjoyable experiences, particularly when music and games are incorporated to facilitate relaxation and other therapeutic goals. The cheerful atmosphere of Halliwick is ideal for involving a child in a nurturing and secure aquatic setting, addressing their sensory needs effectively. Within the pool, programming can integrate both mental and physical aspects, allowing for exploration of sensations, emotions, creativity, imagery, and relaxation.

Aquatic sessions can also foster family bonding, enabling siblings and parents to participate alongside children in a setting that promotes equality.
Weight-bearing activities should be conducted in a or progressive manner.

**Enhancing proprioceptive awareness during exercise and functional task simulation is essential:**

- The implementation **of resistance** should occur in a structured or **progressive manne**r.
- Support for **limb movements against gravity** should be provided, utilizing **buoyancy**.
- Promoting **social** interaction **in a "normal" recreational** setting allows for **non-competitive** enjoyment and **socialization.**
- A secure **environment** is one where individuals can experience **"failure"** as part of the learning process.
- An **environment** characterized by natural **competition** and peer **emulation** is beneficial.
- **Hydrostatic pressure naturally** offers **resistance to inhalation and exhalation,** thereby facilitating **speech** development.
- Preventing **muscle atrophy and contractures** is crucial, especially **in the absence of exercise.**
- A reduction **in muscle tone and spasticity** can be achieved through appropriate interventions.
- An **environment** that may **eventually be "barrier- free"** and devoid of **assistive devices** is ideal.
- It provides the **opportunity** to address **multiple** issues simultaneously **without appearing** to be **"work"** for the **child.**
- **Aquatic therapy** presents **a unique opportunity** to combine **ease and effort, stimulation and relaxation, joy and much more**.

Educational institutions are increasingly incorporating specialized "pool classrooms" within autism rehabilitation centers. The advantages are numerous, and with an appropriate program in place, adherence is seldom a concern. A remarkable presentation titled "Physical Exercise for a Better Quality of Life of Children with Disabilities," delivered by Halliwick instructor and kinesiologist Lorena Draženović, illustrated effective methods for engaging with children diagnosed with Asperger's syndrome and Down syndrome through various video demonstrations. Throughout her experience, Draženović observed significant improvements in the lives of children with disabilities: 27% exhibited enhanced motor skills, 14% showed improved concentration, 21% demonstrated better social cooperation, 24% interacted more frequently with peers, and 14% communicated more effectively. Following the lecture, a discussion emerged regarding the necessity for both formal and informal training for physical education teachers working with children with disabilities. Educators shared the numerous challenges they encounter, yet unanimously agreed on the importance of including children with disabilities in physical education classes.

**ALSO SEE:** https://www.facebook.com/100462608871146/posts/288373726746699/:

### 4.2.1. Stimulated Sensory System

Life originates in water, even before birth, as we exist within this vital element. In the womb, we thrive and engage in our early experiences in the aquatic environment known as Aqua Vitae. The unborn child naturally navigates this space, with sensory systems activated by both its own movements and those of the mother. The buoyancy of water facilitates unrestricted movement in three dimensions.

Water engages the Tactile System across the entire surface of the body, with sensory input continuously varying as both the water and the child shift, causing different body parts to intermittently break the surface. The tactile receptors remain responsive due to the constant changes in stimulation.

b) Hydrostatic pressure provides deep pressure across the body, and tactile defensiveness is rarely encountered in this aquatic setting.

c) The Vestibular System also receives abundant stimulation in water, allowing for movement in vertical, horizontal, and all intermediate planes. This environment offers a wider range of positions and movements compared to land. Balance is perpetually tested by the water's turbulence. The body rotates in response to asymmetrical shapes, necessitating effort to maintain balance and control movements. These postural adjustments generate vestibular input. With most of the body submerged, children cannot rely on visual cues to compensate for any difficulties in processing vestibular information, as they are unable to see their own bodies.

d) The proprioceptive sense is significantly heightened in water. In the absence of a solid support surface, movement becomes unrestricted, leading to a pronounced sensation of motion due to the water's resistance. However, buoyancy reduces proprioceptive feedback from the legs and trunk when standing shoulder-deep in a pool compared to standing on solid ground. The diminished pressure on joints and reduced muscle resistance necessitates increased awareness of body positioning while stationary in the pool. Since water is constantly in motion, maintaining a stable position requires counteracting the forces exerted by the water, which in turn generates proprioceptive input.

Beyond the tactile, vestibular, and proprioceptive systems, other sensory systems also experience different stimuli in an aquatic environment. Aquatic therapy offers opportunities for active engagement in enhanced tactile, vestibular, and proprioceptive experiences, prompting adaptive responses.

## 4.3. Associations for Para Swimmers to Engange In

Once swimmers gain confidence in the water, they can begin to learn specialized swimming techniques tailored to their needs. As they progress in their training, it is essential for them to participate in various competitions. They have a wide range of opportunities available to them:

- **IPC – International Paralympic Committee:** https://www.paralympic.org/ -
- **WPS – World Para Swimming:** https://www.paralympic.org/swimming -
- **World Abilitysport:** https://worldabilitysport.org/
- **Virtus:** https://www.virtus.sport/
- **ImageDown Syndrome International Swimming Organisation**: https://www.dsiso.org/
- **Specila Olympics**: https://www.specialolympics.org/
- **Halliwick Association of Swimming Therapy:** https://halliwick.org.uk/wp-content/uploads/2011/01/CompIntro11.pdf
- **World Aquatics:** https://www.worldaquatics.com/

And of course, the involvement in national swimming associations, national paralympic associations, national special Olympics, and Halliwick clubs.

### 4.3.1. IPC – International Paralympic Committee, World Para Swimming

Para swimmers compete across various classifications, ranging from S1 to S14. The designation 'S' refers to swimmer, 'SB' indicates breaststroke, and 'SM' denotes medley events.
Classifications from S1 to S14 are swimmers with motor impairments, while S11 to S13 designated for those with visual impairments.

#### ELIGIBLE IMPAIRMENTS FOR PARA SWIMMING

World Para Swimming accommodates three categories of impairments: physical, intellectual, and visual impairments. There are ten recognized impairment types in Para swimming, including three related to vision and one pertaining to intellectual impairment.

Table 7. A list of qualifying disabilities for para swimming, covering the ten recognized impairment categories (https://www.paralympic.org/swimming/classification).

| Eligible Impairment | Examples of Heath Conditions |
|---|---|
| **Impaired Muscle Power**<br>Athletes experiencing Impaired Muscle Power possess a health condition significantly diminishes or completely inhibits their ability to voluntarily contract muscles for movement or force generation. | Conditions that may result in Impaired Muscle Power include spinal cord injuries (whether complete or incomplete, such as tetraplegia or paraplegia), muscular dystrophy, post-polio syndrome, and spina bifida. |
| **Limb Deficiency**<br>Athletes with Limb Deficiency exhibit total or partial absence of bones or joints. | Underlying health conditions that can cause Limb Deficiency include traumatic amputations, medical conditions (such as amputation due to bone cancer), or congenital limb deficiencies (such as dysmelia). |
| **Leg Length Difference**<br>Athletes with Leg Length Difference have legs that vary in the length. | Underlying health conditions that may lead to Leg Length Difference include dysmelia and congenital or traumatic disruptions in limb growth. |
| **Short Stature**<br>Athletes with Short Stature exhibit a decrease in the length of the bones in the upper limbs, lower limbs and/or trunk. | Underlying health condition that may contribute to short stature include achondroplasia, growth hormone deficiencies, and osteogenesis imperfecta. |
| **Hypertonia**<br>Athletes experiencing hypertonia display heightened muscle tension and a diminished capacity for muscle stretching, often resulting from central nervous system damage. | Underlying health conditions that can result in hypertonia include cerebral palsy, traumatic brain injury, and strokes. |

▼▼▼

| Eligible Impairment | Examples of Heath Conditions |
|---|---|
| **Ataxia**<br>Athletes experiencing ataxia exhibit uncoordinated movements due to damage within the central nervous system. | Underlying health conditions that may contribute to the development of ataxia include cerebral palsy, traumatic brain injury, stroke, and multiple sclerosis. |
| **Athetosis**<br>Athletes affected by athetosis display persistent slow involuntary movements. | Underlying health conditions that can result in athetosis include cerebral palsy, traumatic brain injury, and stroke. |
| **Impaired Passive Range of Movement**<br>Athletes with Impaired Passive Range of Movement face limitations or a complete absence of passive movement in one or more joints. | Underlying health conditions may lead to Impaired Passive Range of Movement include arthrogryposis and contracture resulting from prolonged joint immobilization or trauma to a joint. |
| **Vision Impairment**<br>Athletes experiencing vision impairment have diminished or absent vision due to damage to the eyes structure, the optical nerves, the visual pathways, or the brains visual cortex. | Underlying health conditions that may lead to vision impairment include retinitis pigmentosa and diabetic retinopathy. |
| **Intellectual Impairment**<br>Athletes with intellectual Impairment face limitations in intellectual functioning and adaptive behavior, impacting their conceptual, social, and practical skills necessary for daily living. This impairment must manifest before the age of 18, with an IQ score below 75. In the S14 classification, swimmers typically have IQ scores ranging from 70 to 75.<br>Virtus is a suitable organization for these athletes, and in 2024, Virtus will officially join the IPC. | Intellectual disabilities are ‘categorized into four levels based on IQ score and their adaptive functioning: mild, moderate, severe and profound. |


Picture 7. Classification from S1 to S14 (https://www.idm-schwimmen.de/home.html ).

## 4.3.2. World Ability Sport

The World Ability Sport Games represent a leading multi-sport competition and serve as a platform for aspiring Paralympians. The initiative emerged from the collaboration between the International Wheelchair and Amputee Sports Federation (IWAS) and the Cerebral Palsy International Sports and Recreation Association (CPISRA), both of which are key founding organizations of the Paralympic movement.

### VIRTUS – International Federation for Athletes with Intellectual Impairment

Established in 1986, Virtus (previously known as INAS) has expanded from 14 members to a community of over 500,000 athletes from more than 90 countries worldwide, including regions such as Europe, Africa, Asia, North and South/Central America, and Oceania.

In 2020, the Virtus sports program included featured 15 annual events encompassing both summer and winter sports, with more than 7,000 athletes registered international competition. Virtus is also a founding member of the International Paralympic Committee.

Virtus categorizes athletes into three distinct classes:

- Intellectual impairment
- Significant Impairment – including Down syndrome, Mosaic syndrome, etc.
- Individuals with high functioning autism

### The Down Syndrome International Swimming Organization

The Down Syndrome International Swimming Organization (DSISO) was established to provide swimmers with Down Syndrome the chance to compete at a World Class level through its biennial World Championships. Additionally, the World and European Games for swimmers with Down Syndrome are held every four years. DSISO is affiliated with the broader Sport Union for Down Syndrome. Athletes with Down Syndrome or Mosaic syndrome participate in various swimming disciplines, categorized into different classes.

### Special Olympics

In 1960, Eunice Kennedy Shriver initiated the first summer camp for her child with an intellectual disability, as mainstream camps were not accepting children with such needs. At that time, the public education system struggled to accommodate special-needs children, let alone provide them with summer activities. This marked the inception of the Special Olympics.

The 2010s have witnessed significant advancements in the visibility and impact of Special Olympics, transforming lives globally. During this decade, the Unified Sports program surpassed 1 million participants, while the health program experienced substantial growth due to both public and private funding. The total number of athletes with intellectual disabilities and their Unified Sports teammates reached 5.3 million. As the movement expands, the joy of Unified Sports continues to unite individuals with and without intellectual disabilities across all continents.

## MATP

MATP is an unspecialized program tailored for athletes of all ages who have Profound and Multiple Learning Difficulties (PMLD) or complex needs.
The swimming program encompasses all disciplines from the aquatics world program, and there are multiple opportunities for recognition, as swimmers in each group can earn medals. Each group consists of swimmers with similar performance times.
Additionally, there are Unified swimming events, including unified relays and Unified open water swimming.

## Gala Halliwick

Many disabled swimmers find enjoyment and benefit from the competitive environment, and it is important encouraged their participation in Galas. However, it is crucial that swimmers are not pressured or bullied into competing if they do not wish to, as they may have personal or medical reasons for opting out. Races can be organized in various formats: a traditional race where all participants start simultaneously and the first to cross the finish line is declared the winner may work for some, particularly those who are deaf or blind and otherwise fit. Conversely, for some disabled individuals, winning may not be a feasible outcome, which could lead to discouragement and a potential withdrawal from swimming altogether—these are the very individuals we aim to support. Therefore, exploring alternative race formats is essential.
A commonly regarded equitable approach is the implementation of a 'timed handicapped system.' This can involve swimmers participating in a race within a designated time frame or utilizing the method established by the Halliwick Association of Swimming Therapy. In this approach, swimmers are timed prior to the race, and their best recorded times are submitted to the Race Timing Coordinator (RTC). The RTC then organizes the race so that the slowest swimmer starts at "GO," with subsequent swimmers beginning at calculated intervals based on the difference between their entered times and that of the slowest swimmer. This system is designed to ensure that all swimmers finish simultaneously; however, the thrill of competition and the rush of adrenaline motivate them to perform at their best, resulting in genuine competition.
In this handicapped system, the race effectively commences at the finish line, with all participants nearly aligned at the pool's edge.

# 5.0. CONTRAINDICATIONS FOR WATER ACTIVITIES

It is advisable for individuals to consult their personal physician regarding their health status and to undergo a medical evaluation prior to engaging in any physical activity.
While physical exercise generally offers health benefits and enhances quality of life, the instructor must be informed about the health conditions and potential illnesses of participants that may necessitate prompt and specific interventions. Consequently, all participants in aquatic aerobics are required to complete a fitness questionnaire upon joining the program, with additional health assessments provided for pregnant women and seniors.
Individuals experiencing acute illnesses should refrain from participating in water-based exercises. For those with chronic conditions, it is crucial to consult a healthcare provider beforehand. Special caution is warranted if any of the absolute or relative contraindications listed below apply.

**Absolute contraindications** include:

- Severe heart conditions (such as newly developed angina pectoris or exacerbation of existing angina, occurrence of heart arrhythmias during physical activity despite medication, recent heart attack, or evident clinical signs of heart failure or angina during activities requiring less than 4 MET).
- Elevated blood pressure during physical activity (systolic RR > 250 mm Hg and diastolic RR > 120 mm Hg).
- Severe renal conditions.
- Infectious illnesses (such as influenza, viral infections, tuberculosis, and hepatitis C).
- Acute inflammatory disorders (affecting nerves, blood vessels, joints, muscles, veins, or skin).
- Ongoing infectious diseases.
- Involuntary loss of urine and feces.
- History of stroke.
- Elevated body temperature.
- Open wounds.
- Episodes of dizziness.

**Relative contraindications** include:

- Unmanaged diabetes
- Poorly regulated thyroid disorders
- Inadequately controlled epilepsy
- Disfunction of the adrenal glands
- Irregular respiratory conditions (including chronic obstructive pulmonary disease, and asthma)
- Acute arthritis
- Inadequately managed blood pressure
- Severe anemia, and
- Head pain

**Limitations for aquatic exercise** include:

- Neurological disorders
- Peripheral vascular conditions
- Water phobia
- Rapid onset of fatigue
- Chlorine sensitivity
- Vital capacity below 1000 ml,
- Skin wrinkling from prolonged exposure to water

# 6.0. CONCLUSION

Water is more than just a vital resource; it is a realm where we can thrive, connect, and evolve. This book has guided you through a variety of water activities, highlighting their capacity to improve health and overall well-being. Each chapter illustrates the essential role of aquatic literacy and the physical and mental health benefits of swimming and breathing techniques, underlining the powerful impact water can have on both our bodies and mind. We have also focused inclusivity through para swimming, demonstrating how water activities can break down barriers and create opportunities for everyone to experience the freedom and joy of movement. Whether you are an experienced swimmer, a coach, or newcomer to the aquatic environment, these activities encourage you to explore your potential, challenge your limits, and enjoy the calming yet invigorating qualities of water.

As you finish with reading this book, we hope it inspires you to delve deeper into learning, take action, and build a lasting relationship with water. The surface is merely the beginning. Water awaits you.

# 7.0. LITERATURE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