GUIDELINES FOR OUTDOOR EXERCISE

Immersion in nature
Temperature considerations
Tips for motor skill development
Exercise descriptions
Sustainable environment

In the frames of the
Green Physical Education Project
2024-25

Visegrad Fund

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CHAPTER 1

THE GREENPE PROJECT

WHAT IS GREENPE?

The Green Physical Education (GreenPE) is an innovative university physical education model developed in the frames of a Visegrad Fund project for a sustainable personal and environmental health. GreenPE experts deliver low-energy-cost outdoor physical activity to the general university student population to target mental and physical fitness, and health behavior, of which quantitative and qualitative pilot data is collected.

WHO ARE THE GREENPE EXPERTS?

GreenPE experts are a group of academic professors, PE teachers, and PhD students qualified and experienced in exercise physiology, kinesiology, psychology, education, recreation and tourism, fitness, athletics, strength training and conditioning, from four universities. GreenPE experts are strongly committed towards university physical education innovation by developing and validating a unique model for students and to disseminate its methodology Europe-wide.

WHAT MOTIVATES US?

The detrimental effects of physical inactivity amount to being the 4th leading cause of death worldwide. Reversing the evolution of sedentary behavior and physical inactivity is of utmost importance during university years. After university, by mid-life, only 20-30% of the European population meet WHO physical activity recommendations. However, the prevalence of sedentariness is much higher (50-60%) in university students than the global average. The university period is thus the 'last minute' to lay the foundation of positive health-related behaviors that support well-being into adulthood. There is also a lack of a unified and universal curriculum university students can rely on to get information and practice guides to become engaged in physical activity now and later in life. Moreover, 95% of PE classes are conducted in indoor facilities, producing unsustainable energy costs and unwanted impacts on the environment. GreenPE fills this gap by organizing most activities outdoors.

WHAT DO WE DO?

GreenPE proposes and validates a multi-dimensional PE model involving a one-semester-long outdoor physical activity with two conducted PE sessions, one supervised home-based exercise session, and one fitness theory lesson/week. The supervised home-based exercise is extended also to the exam period. Our trainers gradually get the students accustomed to the cold environment during outdoor sessions. Before and after the intervention, students are assessed on mental and physical health status and fitness knowledge using standard fitness test batteries and questionnaires.

CHAPTER 2

HEALTH FACTS IN THE V4 COUNTRIES

MARTA WILHELM

According to WHO, „Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition. The extension to all peoples of the benefits of medical, psychological and related knowledge is essential to the fullest attainment of health. Informed opinion and active co-operation on the part of the public are of the utmost importance in the improvement of the health of the people." Constitution of the World Health Organization (who.int)

Expected lifetime is an important parameter of general health in a society. There are many lifestyle factors modifying our health. One of them is physical activity (PA). Prevalence of insufficient PA in the EU (2016) was ranked as Portugal being the first on the list, Hungary 7th; Slovakia 12th, EU27 13th; Poland 16th; Czechia 20th. As the consequence of technical evolution mankind is moving less and less, sedentary lifestyle is one of the most important factors of mortality on Earth (WHO, 2019 www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death). The first one is heart disease, the ratio is increasing, just like non-communicable diseases (NCD), and many other problems appearing after a long lasting inactive life period. For adults (including older ones also) WHO recommends 150 min of moderate-intensity, or 75 min of vigorous PA, or a combination of them each week. According to Eurobarometer, nearly half (46%) of Europeans never exercise or play sports. Microsoft Word - ebs_472_EN_final.doc (europa.eu). Hungary is one of the highest in rates of preventable mortality in the EU. The ranking of Preventable causes of mortality are: First: Cyprus; EU27 average is 19th on the rank; Czechia 21th; Poland 22nd; Slovakia 25th; Hungary 30th. The rank is very similar if Treatable causes of mortality are summarized. First: Norway; EU27 average is 20th on the rank; Czechia 21th; Poland 22nd; Slovakia 25th; Hungary 26th

These high rates in Hungary reflect risky health behaviors, such as smoking, alcohol consumption, but deaths from treatable causes are also relatively high. OECD/European Observatory on Health Systems and Policies (2021), Hungary: Country Health Profile 2021. Fewer than 60% of Hungarian adults reported being in good health in 2019, which is below the EU average of approximately 70%. In circulatory diseases V4 countries are above the EU average, Hungary is the 4th, Slovakia 5th, Poland 7th and Czechia 8th on the list. Although the ratio of NCD is very high in Europe, Hungary is leading in the V4 Countries even in this term.

Eurostat facts in 2021 (sport.ec.europa.eu/sites/default/files/2021-11/PA%20European%20Report%202021%20Web_v1_1.pdf) show all the data collected in

Europe concerning PA of different age groups. Table 1 is presenting the most important data of V4 countries. Expected lifetime is strongly related to healthy lifestyle and the ratio of chronic diseases in a country.

	Age median (years)	Life expectancy Males (years)	Life expectancy Females (years)	Physical activity engagement 3-6 years (%)	Physical activity engagement 11-15 years (%)	Physical activity engagement 16-65 years (%)	Physical activity engagement above 65 years (%)
HUNGARY	43.3	72.3	79.1	100	19	34.19	20.4
SLOVAKIA	41	73.5	80.4	-	11.4	13.2	-
CZECHIA	43.4	75	81.3	-	22	18.6	4
POLAND	41.3	72.6	80.8	-	24.2	30.6	-

Table 1. Age, life expectancy, and physical activity engagement in the V4 countries.

It is also important to note that active life is a predictor of health, wellbeing and the expected lifespan without limitations. Active life is introduced as a behavior in early childhood already, so the number a PE lessons in schools are important in health education and aerobic work performance as well (Table 2). It is important to note that effects of a healthy lifestyle appear about 10-15 years later in life, increasing one's lifespan without limitations.

	Primary School	Secondary School
HUNGARY	5/wk	5/wk
SLOVAKIA	3/wk	3/wk
CZECHIA	2/wk	2/wk
POLAND	3-4/wk	3/wk

Table 2. Number of compulsory Physical Education lessons in public schools in the V4 countries.

Exercise or PA makes people feel good or happy (An et al, 2020) and the effects occur across the lifespan. The total amount of PA activity was more important than the specific type of exercise, so lifestyle was more important than a single type of PA. There is a bidirectional association between PA and life satisfaction/happiness. PA can improve physical and mental health, and then increase life satisfaction and happiness. On the other hand, happiness might be a protective factor to health, and people with higher life satisfaction/happiness might participate in more PA programs. Participants with higher educational degrees tended to have higher life satisfaction and happiness. People with higher education had more health knowledge or a better ability to deal with life problems in middle-aged and older adults, rather than in young adults.

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CHAPTER 3

SCIENTIFIC BACKGROUND

BENEFITS OF EXERCISE FOR HUMAN HEALTH

TIBOR HORTOBAGYI

"Living systems are worn out by inactivity and promoted by use" – said Albert Szent-Györgyi, the Hungarian-born physiologist, recipient of the 1937 Nobel Prize in Medicine or Physiology. Accordingly, 'movement' is a prerequisite of life. By extension, physical activity is a foundation for health. In contrast, physical inactivity diminishes life: it increases the risks for developing chronic illnesses. The purpose of this section is to provide scientific evidence for the health-promoting effects of physical activity and for the detrimental effects of physical inactivity.

Physical activity is perhaps the most natural form of human life-activity. We engage in physical active when we move around in our environment spontaneously and walk to the grocery store, attend to our plants in the garden, hop on the bicycle to go for a spin, swim a few laps in a lake during summer vacation, or ski the slopes in the Alps. Exercise is an organized and planned form of physical activity (1). Physical activity can improve quality of life at any age by reducing risks for premature death (2). Compared with being physically inactive, being physically active for about 30 minutes per day for five days of the week at a moderate intensity, is associated with ~20% reduction in risk for dying for any reason. This observation is based on data in ~1 million individuals, 67% of them women (3). There was a dose-response effect because being active 7 hours per week at a moderate intensity further reduced all-cause mortality up to by 24%. Physical activity has its greatest effects on all-cause mortality when someone converts from being sedentary to a moderately active state. This means to walk briskly, washing windows, playing golf, or riding a bicycle at 15 km/h. Such activities require about 3-4 times higher metabolic energy expenditure compared with watching TV while sitting. The ~25% reduction in all-cause mortality is the independent effect of physical activity (4). This is because researchers statistically accounted for the effects caused by other factors that would have also reduced all-cause mortality.

Being physically active may reduce all-cause mortality by preventing or delaying diseases. There is overwhelming evidence that regular physical activity and all forms of exercise can improve cardiorespiratory endurance and muscular fitness, body composition, bone health, and cardiovascular and metabolic health biomarkers in children and adults (5-8). Physical activity lowers the risks for heart disease, stroke, type-2 diabetes, high blood pressure, developing a poor blood lipid profiles, metabolic syndrome, colon and breast cancers, having a high body weight, and cardiorespiratory and muscular fitness, falls, becoming depressed, and losing cognitive function in adults (8). Most of these beneficial effects of exercise has been observed following aerobic training, resistance training, balance training, and multimodal training. In sum, it seems that regular physical activity at a moderate intensity can reduce the risks for disease and thus increase health-span, i.e., the number of years we live relatively free of disease. Beyond the generic effects of physical activity has on all-cause mortality, physical activity,

when delivered in certain ways, can have disease-specific effects on functional ability, cognitive function, mental state, and health.

Physical inactivity reduces quality of life and health-span. Physical inactivity is the fourth leading cause of death worldwide (9). The bidirectional effects of physical activity vs. inactivity provide powerful and mechanistic evidence for the health-promoting effects of conducting a physically active lifestyle. Although childhood obesity is on the rise caused in part by sedentariness (7, 10), sedentary behavior is most common among middle-aged office workers and old adults over age 65 (11-15). There is also strong evidence suggesting that university students tend to be highly sedentary (16). The level of sedentariness could be even more rampant than we think. This is because there is a large bias in humans assessing their own physical activity levels: 65% adults self-reported to be as active as recommended by national guidelines but when objectively tested, this number was only 5% (17).

GreenPE targets university students. Prolonged sitting and lying, a favored behavior also by many university students, have harmful effects on numerous physiological functions. Sedentariness has been associated with obesity (18), which in turn is linked to metabolic and even neural abnormalities. Prolonged sitting in the office or studying in the library for 8 hours on many days of the months (19) and at home nearly for 11 hours as done by many adults (15), has been linked to the development of modern chronic metabolic diseases. These include impaired insulin action, abnormal fat metabolism, type 2 diabetes mellitus, and hypertension (20). Not even regular exercise can counteract the negative systemic effects of prolonged sitting. There is now evidence for a causal relationship between sedentariness and obesity because prolonged sitting impairs insulin sensitivity and also decreased the capacity to use fat as fuel during physical inactivity, leading to fat storage (21). During prolonged sitting in the office the electrical activity in leg muscles becomes minimal, calorie burning drops to 1 kcal per minute, levels of enzymes that metabolize fat decrease by 80-90%, insulin sensitivity declines by 24%, and good (HDL) cholesterol drops by 20%. Office workers have twice the rate of cardiovascular disease compared with individuals who work predominantly in a standing posture. In addition to the metabolic aberrations, sedentary behavior through obesity modifies the structure of the brain. Even in metabolically normal obese middle-aged adults, there was cortical and white matter thinning in brain areas implicated in food intake behavior, reward processing, and appetite control (22-24). Sedentariness is further associated with poor fitness, steep rise in markers of inflammation, low motivation, poor academic performance, and low back pain. Relevant to the aims of GreenPE to ease stress and depression among college students, physical inactivity is associated with depression and anxiety (25).

GreenPE proposes to develop a physical education curriculum for university students. This program educates students how to become and remain physically active during their college years and after graduation. GreenPE proposes to perform physical activity in a sustainable manner so that students perform the bulk of activities outdoors. GreenPE will teach college students to perform these activities safely in cold and warm weather. Such a program hopes to improve students' physical abilities, mental function, health, and quality of life.

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CLIMATE FACTS IN THE V4 COUNTRIES

MIKLOS BANHIDI

CONSIDERATION OF WEATHER IN PHYSICAL EDUCATION

When choosing the location of each physical education class, a dilemma for the teacher is whether to accept the risks of outdoor conditions, which depends on the weather conditions and their influencing factors. These include the effects of sun, wind and heat, the nature of precipitation, and the quality of the track surface. The understanding of the teacher's verbal instructions decreases outside.

Part of the problem is how much the child's feeling of heat affects their motivation to play sports in weather that is much colder or hotter than their body temperature, and how much they can compensate for it with their sports clothing. The structure of the physical education class may change, as the form and time of the warm-up may change depending on the weather.

Being outside in the schoolyard or nearby park is recognized as providing a range of significant benefits. Most of the children like even extreme weather, because it is a challenge and risk, which allow pupils to test the limits of their physical, intellectual and social development (Little, H., & Wyver, S. (2008).

Physical activity levels vary with seasonality (Pivarnik, Reeves, & Rafferty, 2003), and the ensuing effect of poor or extreme weather has been identified as a barrier to participation in physical education. It is evident that cold and windy environment is stressful for pupils and has physical, subjective and physiological effects, such as increased blood pressure, which needs special attention among physically inactive and hypertensive pupils (Gavhed, 2003).

Weather conditions, along with day length, are proposed as the main drivers of the seasonal patterns in children’s physical activity (PA), but little is known about how they affect children at different ages.

Precipitation, wind, heating and cooling degrees speed are negatively associated with total physical activity. The rain can decline PA with an average of 14.0 (SE 2.9) and 11.4 (3.0) minutes compared to dry days respectively. These patterns were also apparent during school lunchtime and after school, however they were not seen during school commute times. Similar patterns were seen for other PA intensities (Harrison, et al., 2015).

CLIMATE CHANGE

Although the average climate conditions have been relatively stable for millennia, the last 50 years have witnessed an acceleration of changes, so that the average global temperature has increased by 0.7 °C and is expected to further increase between 1.8 and 4.0 °C by the year 2100 (Franchini & Mannucci, 2015).

In the Visegrad group countries, in the Czech Republic the average temperature has increased by around 2.4°C (Skalik, 2015), in Slovakia and Poland almost 2°C, in Hungary 1.15°C since the second half of the 19th century all of them outpaced the world average (0.0313°C per year). By 2050, it is expected to increase by approximately 1.4 to 1.9°C (www.climate.peopleinneed.ne).

Precipitation in all countries varies considerably depending on the year, season and location. Climate projections show up to 30% greater annual precipitation in 2075 than in 1961-1990, with marked seasonal and geographical variations (IEA, 2021).

The average weather conditions differ in the four countries up to 5.5 0C (Table 1). The coldest is Poland due to its northern location, although the differences in topography can differ significantly from this. For example, the Tatra highlanders say that they have 10 months of winter, and the rest of the year is summer. At the altitude of 1400 m the average temperature in January can be from -10C to -10 0C, in July from 90C to 180C (Overhere.eu, 2024).

The temperature around the schools can often differ from the national averages, which can be affected by the heating effect of the sun, intensity of precipitation or the protection of the buildings from the wind.

Table 1. Temperature and Precipitation in the Visegrad countries

	month	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.
Temperature (°C)	CZ	1	3	7	13	19	22	24	23	19	13	6	2
	HUN	1.4	3.4	7.7	13.3	17.7	21.4	23.3	23.2	18	12.7	7.2	2.2
	SK	1	4	9	14	19	23	25	24	20	14	7	3
	POL	-1.6	-0.1	3.5	9.3	14.5	18	20	19.6	14.9	9.7	5.1	0.9
Precipitation (mm)	CZ	23	19	27	35	57	67	66	61	40	31	29	25
	HU	37	29	30	42	62	63	45	49	40	39	53	43
	SK	44.1	39.8	44.6	48.8	78.9	87.6	86.2	70.7	62	50.7	54.8	52.1
	POL	47	41	51	43	65	70	92	60	57	47	47	49

Source: climatestotravel.com, en.climate-data.org, hikersbay.com

Current average temperatures are predicted to change due to climate change. The change will cause some increasing tendencies (Bernard et al., 2021) in air pollution, frequency of extreme weather conditions, greenhouse gas emissions, carbon footprint.

Among the effects one the most serious issues is to do physical activity in a polluted environment. One unit (µg/m3) increase in ambient particulate matter 2.5 concentration (PM2.5), the odds of physical inactivity increased by 1.1%. In Budapest is currently 1.1 times the WHO annual air quality guideline value and it is much worse in Prague (Table 2). The PM10 concentration is almost double in Warsaw than in Bratislava which can be harmful around schools causing short and long term effects, such as cardiovascular and respiratory diseases (Lu at al., 2015). Other problems can be the Nitrogen Dioxide (highest concentration

is in Bratislava), or sulfur dioxid (SO2) (highest in Budapest) which can damage the human respiratory system. The increasing level of Carbon monoxide (CO), (in Budapest is the highest value) cause of more than one-half of the fatal poisonings reported in many countries (Raub et al., 2000).

Table 2. Air pollution in the capital cities of Visegrad group (µg/m³)

	PM 2.5	PM10	O3	NO2	SO2	CO
BRATISLAVA	5	11	55	28	3	219
BUDAPEST	5.6	11.5	56.4	20	4.5	516
PRAGUE	11.5	16.9	56.1	15.7	1.3	354.9
WARSAW	4.7	21.9	93	8.2	0.9	0.1

Source: IQair, 2024

It became evident that outdoor physical education offer better environment to improve physical activity and train pupils to tolerate negative effects of weather conditions. In between it is well known that climate change is happening, which influences the outdoor conditions negatively. PE teachers should deal with the consequences, especially when they decide to teach outside or organize camps in the nature.

The positive effects for outdoor PE such as improve overall physical and mental health, enhance immune system, foster social connections, sharpens focus are strong argues. But the teacher should be aware that air pollution, the changing intensity of weather conditions can be distractions for a successful teaching.

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PHYSIOLOGICAL RESPONSES TO HEAT AND COLD EXPOSURE

KAROLINA TALAR

HEAT EXPOSURE

Exercising in hot and humid conditions can impose significant stress on the body, reducing exercise tolerance and increasing the perceived exertion due to the higher temperature of blood flowing to the brain. Exercising in temperature above 30°C can lead to heat exhaustion and heat stroke (Périard et al., 2021).

Physiological responses to heat:

Cardiovascular Response:

- During exercise, blood flow to the muscles increases to supply oxygen and fuel sources for energy production, generating more heat.
- Blood flow to the skin also increases to facilitate heat loss. However, the shallow temperature gradient between the body and the external air limits heat loss through conduction, convection, and radiation, requiring an increased rate of blood flow to the skin (Périard et al., 2021).

Changes in Energy Metabolism:

- Increased blood flow to the skin can reduce blood flow to the muscles, limiting oxygen supply and decreasing the rate of aerobic respiration.
- This can lead to a reliance on anaerobic respiration, increasing glycogen breakdown and raising muscle and blood lactate levels, causing fatigue to set in more quickly under hot conditions (Racinais et al., 2021).

Sweating:

- Sweating increases to maximize evaporative cooling. However, excessive sweating reduces blood plasma volume, risking circulatory collapse (Périard et al., 2021).
- Evaporative cooling is less effective in high humidity, as sweat cannot evaporate efficiently and simply drips off the body.

Reasons for heat intolerance during exercise in hot environment:

- Lack of acclimatization,
- Low fitness,
- Large body mass,
- Dehydration,
- Age (the elderly or pre-pubertal children).

The range and severity of heat illness is shown in **Table 1.**

Heat acclimatization is a natural adaptation that enhances climate tolerance and exercise performance. Achieving heat acclimatization involves exercising in a hot environment for 10-14 days, leading to physiological changes that improve exercise performance (Pryor et al. 2019).

Condition	Causes	Signs and symptoms	Prevention
Heat cramps	Intense, prolonged exercise in the heat. Muscle fatigue. Sodium loss in sweat.	Pain. Involuntary spasms of active muscles. Low serum Na+.	Stop exercise; rehydrate. Massage/light stretching.
Heat syncope (fainting)	Peripheral vasodilation and pooling of venous blood. Hypotension. Hypohydration.	Light-headedness. Partial/complete loss of consciousness. Person looks pale. High core temperature.	Acclimatize. Rehydrate. Reduce exertion on hot days. Avoid standing still in the heat.
Heat exhaustion	Increasing negative water balance.	Fatigue/exhaustion. Loss of movement coordination/dizziness. Flushed skin. Reduced sweating. High core temperature.	Remove subject to shaded/air-conditioned area. Hydrate before and during exercise. Acclimatize.
Heat stroke (Hyperthermia)	Thermoregulatory failure. Dehydration.	Core temperature >41°C. Lack of sweating. Disorientation/twitching/seizures/ coma.	Immediate whole body cooling. Acclimatize. Adapt activities to climatic constraints.

Table 1. Potential heat-related disorders (in order of severity). Table adapted from: Sproule J. (2012), p. 181.

Physiological adaptations due to heat acclimatization:

Cardiovascular changes (occurring within 1-5 days)

- Increased plasma volume (by up to 25%) due to increased salt retention, improving sweat production during exertion.
- Increased stroke volume due to the higher plasma volume, allowing the heart rate to decrease by 15-25% to maintain total cardiac output.
- Reduced heart rate lowers the rating of perceived exertion.
- Altered blood distribution directs less blood to the skin and more to skeletal muscles, reducing the rate of muscle glycogen use through anaerobic respiration.

Thermoregulatory changes (occurring within 8-14 days)

- Decreased resting core temperature.
- Increased rate of sweating.
- More dilute sweat, reducing salt loss.
- Earlier onset of sweat production (i.e. at a lower temperature threshold)
- Increased sensitivity of the sweating response to rising core temperatures.

Due to these adaptations, heat acclimatization reduces the incidence and severity of heat-related disorders (Sproule J., 2012).

COLD EXPOSURE

Exercising in cold weather presents different physiological challenges and benefits. Exercising in temperatures below 0°C can lead to hypothermia and frostbite (Castellani & Young, 2020).

Physiological responses to cold:

Cardiovascular response:

- Vasoconstriction of arterioles leading to the skin surface, reducing heat loss to the environment.
- Arterioles supplying the skeletal muscles and skin also constrict, retaining heat within the core to sustain metabolic reactions, particularly in low temperatures where enzyme activity decreases.
- This vasoconstriction increases blood pressure and heart rate as the heart expends more effort to pump blood through the constricted vessels (Castellani & Young, 2020).

Changes in energy metabolism:

- Increased metabolic rate (non-shivering thermogenesis), resulting in increased heat production.
- Shivering (involuntary repeated rhythmic contractions of skeletal muscles), resulting in increased heat production.

Condition	Causes	Signs and symptoms	Prevention
Hypothermia	The rate of heat loss exceeds the rate of heat production (drop in core body temperature below 35°C).	Mild hypothermia (36.1-33.9°C): Shivering. Abnormal behavior. Breathing normal. Moderate hypothermia (33.9-32.2°C): Violent shivering. Inability to think and pay attention. Slurred speech. Poor body coordination. Slow, weak pulse. Slow, shallow breathing. Severe hypothermia (32.2-27.8°C): Shivering stopped. Unconsciousness. Dilated pupils. Weak, irregular or non-existent pulse. Little to no breathing.	Wear a warm head covering. Wear layered clothing. Protect your hands and feet.
Frostnip and Frostbite	Freezing of the skin.	Vasoconstriction. Skin tissue dies from lack of oxygen and nutrients (skin turns pale, hard and numb).	Move to a warm, dry area. Remove wet or tight clothing. Don't rub the affected area to prevent damage. Gently put the affected area in a warm 41°C water bath and keep it there for 25 to 40 min. Do not pour water directly on your skin.

Table 2. Health risks associated with exercise in a cold environment. Table adopted from: The National Institute for Occupational Safety and Health (NIOSH).

Physiological adaptations due to cold acclimatization:

- Habituation, a desensitization of the normal response to cold.
- Metabolic acclimatization, improved thermoregulation and metabolic responses.
- Insulative acclimatization, increased vasoconstriction to enhance heat conservation (Sproule J., 2012).

Understanding the physiological responses to different temperature exposures is crucial for optimizing performance and minimizing health risks. Heat and cold both present unique challenges and benefits, and proper acclimatization and preparation are key to safe and effective exercise in varying environmental conditions.

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BENEFITS OF SUBMERSION IN NATURE

TIBOR HORTOBAGYI

Regular physical activity is the cornerstone of health promotion and disease prevention. There is irrefutable evidence that following WHO guidelines of engaging in physical activity for at least 30 minutes for 5 days of the week delays the onset of non-communicable disease such as cardiovascular disease, diabetes, obesity, and even some forms of cancers (1). Yet survey of over 3,000 US adults found that less than 10% of the participants met these guidelines when measured objectively by accelerometry (2). Motivation to become and remain physically active needs a boost.

Being surrounded by nature improves mental as well as physical health. Nature heals! Indeed, hospitalized patients viewing versus not viewing nature recovered faster and more completely (3). Berleant's "aesthetic engagement" refers to the process that we actively observe our environs. While walking in a forest, we attend to the details of the trees, leaves, smells, and sounds, creating the sensory experience of forest bathing. Early studies revealed that improvements in blood pressure and mental health were greater when participants walked and jogged in pleasant rural and natural compared with indoor environments (4). Walking outdoors compared with viewing a video of nature scenes while walking on a treadmill had a significantly larger effects on wellbeing and was particularly effective to reduce stress (5). The health benefits are augmented by becoming connected to nature. Health benefits also increase if we perform physical activity in nature with peers due to a social cohesion (6). The nature-effects on physical and mental health occur mechanistically because viewing unpleasant scenes of degradation and pollution while walking affected mental wellbeing unfavorably.

GreenPE targets university students. This population is characterized by low levels of physical activity, stress, depression, anxiety, and loneliness especially around exam periods. Interacting with nature and performing physical activity outdoors in parks, urban green spaces, gardens and playgrounds, woods and forests, rural and agricultural land, freshwater and inland water, marine and coastal locations, caves and deserts are believed to have therapeutic and restorative effects in itself (7). When nature elements interact with physical activity, the physical and mental health benefits and adherence to the program tend to be even greater and quality of life improves (8). At this time it is not entirely clear if indirect use of nature elements (viewing waterfalls, forests, mountain tracks on video monitors and through virtual reality glasses while exercising on treadmill or stationary bike) would also augment physical and mental health benefits (9). Greening schools and increasing children's green time had consistent positive effects on cognition and physical activity (10). Not only did gardening improve physical and mental health, it also increased the dietary consumption of fruits and vegetables (11). University students could especially benefit from GreenPE's outdoor programs as such activities have been associated with stress reduction secondary to attention restoration, cognitive benefits, increased social interaction, and reduced loneliness (12, 13).

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CHAPTER 4

GENERAL GUIDELINES FOR EXERCISING OUTDOOR

EXERCISING IN HEAT

KAROLINA TALAR

Exercising in the heat requires careful management to prevent heat-related illnesses. It is crucial to stay hydrated, wear lightweight and breathable clothing, and take frequent breaks in the shade. Gradual acclimatization to the heat can enhance performance and safety by allowing the body to adapt to higher temperatures.

BEFORE EXERCISE

Monitor Local Weather:

- Plan to exercise during the cooler and/or less humid times of the day such as early morning or late evening (ACSM, 2019).

Stay Hydrated:

- Drink moderate amounts of water or isotonic sports beverages frequently instead of large amounts at once. Do not rely on thirst to assess your fluid needs.

Light Clothes:

- Wear lightweight, breathable, and moisture-wicking clothing to help with heat stress. Light colors are preferable as they reflect sunlight.

DURING EXERCISE

Take Frequent Breaks:

- Rest in the shade regularly to cool down and avoid overheating.

Stay Hydrated:

- Drink moderate amounts of water or isotonic beverages frequently. Don't rely on thirst alone; drink at regular intervals. Weigh yourself before and after exercise to monitor fluid loss and ensure adequate hydration.

Acclimate to Outdoor Exercise:

- Gradually increase the duration and intensity of outdoor activities to help your body adapt to the heat.

Monitor Your Condition:

- Be aware of signs of heat-related illnesses such as dizziness, nausea, headache, or excessive sweating. Stop exercise if any symptoms occur (ACSM, 2019).

AFTER EXERCISE

Cool Down:

- Gradually reduce your exercise intensity before stopping to help your body cool down.

Rehydrate:
- Continue to drink fluids even after exercise to replace what's lost through sweat.

Rest in a Cool Environment:
- Spend time in a cool or shaded area to help your body return to normal temperature.

WHAT TO WEAR

Appropriate Clothing:
- Choose lightweight clothing that promotes heat loss through convection, radiation, and evaporation. Change out of sweaty clothing frequently to maintain cooling.

Headgear:
- Use hats or visors to protect from direct sunlight and reduce heat exposure (Sproule, 2012).

WHAT TO EAT AND DRINK

Isotonic Beverages:
- Drink sports drinks that contain electrolytes to replenish those lost through sweat.

Avoid:
- Caffeinated, alcoholic, and high-protein drinks like soda, coffee, and tea, as they increase water loss through urination.

WHAT TO AVOID

Exercising in Extreme Heat:
- Avoid the hottest parts of the day.

Overexertion:
- Avoid pushing your limits too hard in hot conditions.

ACCLIMATIZATION STRATEGIES

To enhance performance and safety by allowing the body to adapt to higher temperatures, consider these key points for effective heat acclimatization:

Frequency:
- Acclimatization should be done daily or at intervals no more than three days apart, over 10 to 12 sessions, as the adaptations are transient and require repeated exposure.

Duration and Intensity:
- Exercise duration should gradually increase to between 60-90 minutes at 50-70% VO2 max, or at least to a level sufficient to provoke a sweating response.

Simulating Conditions:
- Temperature and humidity during training should closely match the competition conditions.

Hydration Monitoring:
- Coaches should monitor athletes' hydration status by checking urine color and output, and weighing athletes before and after training sessions to ensure dehydration does not occur (Heathcote et al., 2018).

TEMPERATURE CONSIDERATIONS

When outdoor temperature is above 26.6°C and humidity is greater than 75 percent, the risk for heat injury is high. It may be best to exercise indoors.

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EXERCISING IN COLD

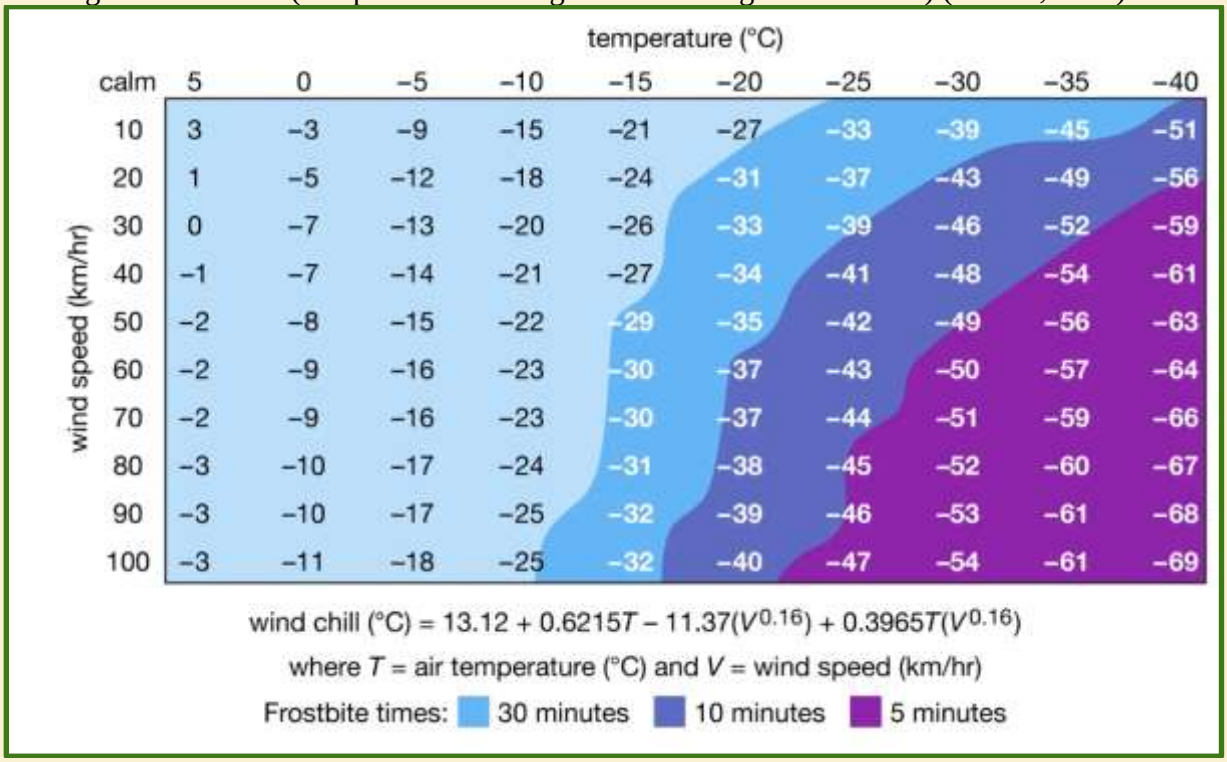
KAROLINA TALAR

Exercising in cold weather puts extra demands on your body. Recognizing the symptoms of cold stress, knowing simple treatment options, and understanding preventative strategies can reduce the risk of injury. This knowledge will enable you to safely engage in outdoor activities under extreme weather conditions.

BEFORE EXERCISE

Check the wind speed:

- If the air temperature is -1.1 °C and the wind speed is 10 mph, then the actual temperature will be -6.1 °C. Be aware that the faster the wind speed, the more rapidly the body cools, especially while running into headwind (compared to standing still or running with tailwind) (ACSM, 2019).



Source: Britannica (2024)

Wear appropriate clothing:

- Cover your head, face, legs, feet, and hands, as these areas are more vulnerable to cold-related injuries. The risk of cold injury increases in wet conditions, such as snow or rain. Wear appropriate footwear to prevent slipping. Adjust your clothing layers to maintain warmth while avoiding excessive sweating:
- Inner Layer (Base Layer) has direct contact with the skin and it does not readily absorb moisture but efficiently wicks it away. Moisture is transferred to the outer layers for evaporation.
- Middle Layer (Insulating Layer) provides primary insulation to retain body heat. Materials like fleece or down are commonly used.
- Outer Layer (Shell Layer) is designed to repel wind and rain. Allows moisture transfer to the air, maintaining comfort. Windproof and waterproof materials are essential (ACSM, 2019; Castellani et al., 2021).

Warm-Up:

- Engage in a dynamic warm-up to increase muscle temperature and enhance joint flexibility.

Stay Hydrated:

- Drink water to avoid dehydration and hypothermia. Proper fluid balance supports thermoregulation and performance.

DURING EXERCISE

Take Frequent Breaks:

- Regular breaks during cold-weather exercise allow for recovery and help prevent overexertion. Prolonged continuous activity in cold conditions may strain the cardiovascular system and increase the risk of hypothermia or frostbite (Gatterer et al., 2021).

Stay Hydrated:

- Regularly consume fluids during exercise to prevent dehydration. Remember that in cold temperatures, your thirst response will not be as present as in warm temperatures (Kenefick et al., 2004; Castellani et al., 2021).

Acclimate to Outdoor Exercise:

- Gradually increase the duration and intensity of outdoor activities to help your body adapt to the cold. This gradual acclimatization improves thermal comfort and reduces the risk of cold-related injuries.

Monitor Your Condition:

- Pay attention to signs of hypothermia (e.g., shivering, numbness) or frostbite (e.g., skin discoloration). Early recognition and intervention are critical to prevent severe consequences. Understanding these symptoms and responding promptly can mitigate the risks associated with cold exposure.

AFTER EXERCISE

Cool Down:

- Post-exercise cooling is necessary to gradually lower your heart rate and avoid abrupt temperature changes. Subsequent cooling through evaporation and conduction during periods of rest is recommended (Imrani et al., 2017).

Rehydrate:

- Replenish lost fluids promptly, dehydration can occur even in cold weather. Adequate hydration supports recovery and overall performance.

Rest in a Warm Environment:

- Allow your body to recover and rewarm after exercise. Resting in a warm environment helps to restore normal body temperature and reduces the risk of hypothermia.

WHAT TO WEAR

Appropriate Clothing:

- Wear moisture-wicking and insulating layers to manage body heat effectively. Remove wet or sweaty attire promptly to prevent chilling, which can lead to hypothermia.

Headgear:

- Protect your head and ears from cold exposure. A warm hat or headband is essential as a significant amount of body heat can be lost through the head (Bogerd et al. 2015).

WHAT TO EAT AND DRINK

Hydration:

- Continue drinking water post exercise to maintain fluid balance.

Warm food and Beverages:

- Consider warm meals and drinks to maintain body temperature, e.g. soups, tea.

Avoid:

- Both alcohol and caffeine can dehydrate the body, limit consumption during cold weather.

WHAT TO AVOID

Exercising in Extreme Cold:

- Avoid exercising in extremely cold conditions where the risk of hypothermia and frostbite is increased.

Overexertion:

- Avoid exercising in extreme cold weather. Overexertion can strain the cardiovascular system and increase the risk of cold-related injuries.

ACCLIMATIZATION STRATEGIES

Frequency:

- Cold acclimatization should occur daily or at intervals no greater than three days apart. Aim for 10 to 12 sessions to allow transient adaptations to take place. Repeated exposure is essential for optimal adjustments.

Duration and Intensity:

- Gradually increase exercise intensity when adapting to cold. Monitor well-being and adjust accordingly.

Simulating Conditions:

- Exercise in conditions similar to anticipated competition environments.

Hydration Monitoring:

- Regularly assess fluid intake and maintain hydration (Kenefick et al., 2012).

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TRAINING LOAD AND ADAPTATION

MARK VACZI

Physical activity has various impacts on humans, including their physiological, mental, and social functioning, and personality. Similarly to the stress theory described in the mid-20th century by the famous Hungarian researcher, Janos Selye, physical exercise – also often used the term "training" – is a stimulus that evokes immediate or delayed responses in the aforementioned parameters. To accurately describe a stimulus or a set of stimuli during exercise, the term "training load" has been introduced.

TRAINING LOAD is defined as the cumulative amount of stress placed on an individual from a single or multiple training sessions over a period of time. These stressors can be single or multiple, physiological, psychological or mechanical stimuli.

A single bout of exercise can evoke immediate physiological responses in terms of fatigue and delayed onset muscle soreness, named as acute adaptation, while a number of exercise session will result in long-lasting changes in the human body, named as chronic adaptation.

TRAINING ADAPTATION is a response in humans' biological system induced by exercise, such as stronger muscles, increased cardiac work, improved neural function and cognition, reduced fat. Unaccustomed exercise stimuli are needed for favorable adaptation.

One principle is that the magnitude of the adaptation depends on the length of the training period, i.e. longer training period will induce longer-lasting adaptation. Second, stronger training stimuli (i. e. higher training load) will lead to earlier adaptation. The four typical types of load (also known as training variables) are as follows:

INTENSITY means how strong the exercise stimuli are. Intensity is increased for example if you run faster or you run uphill, or you increase the weight of to be lifted.

VOLUME is the total amount of stimulus during training, meaning how much your workout is. Often related to the number of repetitions in a given exercise, i.e. how many times you lift a given weight, perform a jump, or run a given distance.

DURATION is the temporal expression of load, meaning how long a given exercise lasts. Duration is expressed in minutes, and is used mainly to characterize endurance exercises.

FREQUENCY expresses how many times your repeat a task within a time period. Greater frequency will induce earlier fatigue. Frequency is actually the ratio of work and rest.

Should any of the four variables increase, the total load on your body will increase. Load variables are often conflicting. For example, you have to reduce running speed (reduce intensity) if you wish to run longer distance (increase duration and volume). Similarly, if you wish to increase the weight to be lifted (increase intensity), you have to reduce the number of repetitions (reduce volume). Higher intensity exercises acutely evoke grater physiological

responses such as higher heart rate, ventilation, and metabolism. These changes commonly refer to the phenomenon called fatigue.

In order to evoke adaptation, certain exercises should be performed repetitively, and you allow your body to partly or fully recover between repetitions.

REST INTERVAL expresses how much time you spend between repetitions or sets of exercises, which can be active or passive. Active rest is when you perform for example light stretching or walking, and passive rest is when you just sit or lay on the ground. The length of rest influences the intensity of the workout and the performance of the next repetitions as adequate rest time allows for muscle recovery.

With the manipulation of the training variables and the length of the rest period, it is possible to target specific conditioning skills such as strength, speed, and endurance. To increase strength and speed, for example, the intensity should be high, the number of repetitions (i.e. volume) should be small, and longer rest periods should be provided to avoid fatigue. In contrast, endurance development is favored by larger volume, less intensity, and shorter rest periods. All training variables should be progressively increased in your long-term workout program, resulting in low load at the beginning, and higher load in later periods.

TEMPERATURE-SPECIFIC TRAINING LOAD ADJUSTMENTS

MARK VACZI

Exercise itself acutely evokes various cardiorespiratory, neuromuscular, and metabolic responses in human body. In contrast with exercising in an indoor facility set to a constant and optimal temperature, outdoor activities require specific planning by considering several environmental conditions such as temperature, humidity, precipitation, pollution, UV radiation, etc. The aforementioned physiological responses to an outdoor exercise are probably the most sensitive to temperature, because excessive cold and hot environment can unwantedly diminish or augment the magnitude of response, respectively. Warm muscles are, for example, needed to avoid injuries during high intensity activity performed in cold, but too long and intensive warm-up procedure can overheat the body in hot weather. Because the nature and magnitude of physiological responses strongly depend on intensity, duration, volume, and frequency, the proper temperature- and season-specific adjustment of these training variables is strongly recommended in long-term outdoor physical activity planning.

Beside optimizing training load according to the outdoor temperature, risk factors of the practitioners (Leyk et al. 2019, Position Stand of the American College of Sport Medicine) should also be considered. Heat tolerance can vary greatly within a person. Heat illness develops more likely in case of infections, diseases, dehydration, electrolyte abnormalities, intake of prescribe drugs, or insufficient acclimatization. Children and elderly are more exposed to heat stress because children sweat less, and skin circulation is inefficient in elderly, while adult men and women can similarly withstand heat. Overweight and low fitness level reduce heat tolerance dramatically. In contrast, people with high percent fat maintain body temperature better then lean individuals in cold weather. Adult men and women with the same percent body fat exhibit the same decline in body temperature during exercise in cold weather, while older people are more susceptible to cold then younger adults.

TRAINING LOAD ADJUSTMENT PRINCIPLES IN OUTDOOR TRAINING

- Training load must be gradually increased in all weather conditions to get accustomed to outdoor temperature.
- Moderate intensity continuous (endurance-type) exercise is ideal to heat your body when the goal is to warm up. Such endurance type exercises are also ideal to elevate muscle temperature for high intensity training such as resistance and speed training.
- In contrast, long-lasting endurance exercises can overheat your body in hot weather.
- Activities requiring strong and long-lasting ventilation, i.e. endurance-type exercises can increase the risk of respiratory infections in cold weather.
- In cold weather, one strategy to maintain optimal body temperature is to reduce the length of the rest period among exercise repetitions.
- High intensity exercises, utilized mostly in strength and power development, require well warmed-up muscles, therefore, it is safer to implement them in warmer weather. The colder the weather, the longer the warm-up should last.

- Activities requiring overcoming (concentric) muscle actions such as stair climbing, uphill walking, and uphill biking should be avoided in hot weather, especially when the intensity is high and the rest interval is small.

The following table summarizes the most important positive and negative characteristics of the different exercise types covered in the present book, in terms of their applicability in hot and cold environment.

EXERCISE TYPE	TRAINING VARIABLE REQUIREMENTS	POSITIVE CHARACTERISTICS	NEGATIVE CHARACTERISTICS
AEROBIC ENDURANCE	○ Low to medium intensity ○ High duration ○ High volume	○ Heats up body in cold ○ Ideal for warm-up in cold	○ Overheats body in hot ○ Increases risks of respiratory infections in cold
MUSCLE ENDURANCE	○ Low to medium intensity ○ High duration ○ High volume	○ Heats up body in cold ○ Ideal for warm-up in cold	○ Overheats body in hot
STRENGTH	○ High intensity ○ Low duration ○ Low volume	○ Can be performed in hot ○ Does not heat up body in hot	○ Does not keep body warm in cold ○ Muscle injury risk is high in cold
POWER	○ High intensity ○ Low duration ○ Low volume	○ Can be performed in hot ○ Does not heat up body in hot	○ Does not keep body warm in cold ○ Muscle injury risk is high in cold
BALANCE	○ Low intensity ○ Low duration ○ Low volume	○ Can be performed at any temperature condition	○ Does not keep body warm in cold
FLEXIBILITY	not relevant	○ Can be performed in hot	○ Not ideal to perform in cold

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CHAPTER 5

THE OUTDOOR PILLAR PREPARATION

LEILA BOGDAN

Pillar preparation refers to exercises and techniques aimed at strengthening and stabilizing the body's central axis, including the shoulders, torso, and hips. The pillar preparation aims to enhance the functional strength and stability of this central axis to support efficient and safe movement. Effective pillar preparation involves activities that enhance core stability, hip mobility, and shoulder girdle strength. According to JC Santana we should think about exercises that integrate the entire kinetic chain, focusing on functional movements that replicate real-life activities. These include planks, bridges, and anti-rotation exercises, which target core muscles while also engaging the shoulders and hips. The NASM and OPT model also emphasize core stabilization exercises to enhance the neuromuscular control required for dynamic movements.

Pillar preparation is critical for athletes and individuals engaging in any physical activity, as it helps prevent injuries, improve performance, and maintain overall body alignment (Santana, 2015)

STABILITY

Stability in human movement pertains to the ability to maintain control of joint positioning and movement, particularly under varying loads and external forces. The importance of stability training to ensure that the body can efficiently manage forces and maintain proper alignment. Core stability is a primary focus, as it provides a foundation for limb movements and helps protect the spine. Stability can involve exercises such as single-leg stands, stability ball workouts, compound and functional movements that challenge balance and coordination. Stability is essential for both static and dynamic activities, ensuring that movements are performed efficiently and safely.

Over time, these exercises help enhance proprioception, coordination, and overall movement quality, reducing the likelihood of injury.

CORRECT POSTURE

Correct posture involves maintaining the body's alignment in a way that minimizes stress on the musculoskeletal system while allowing for optimal function and movement. Proper posture ensures that the spine maintains its natural curves, the head is aligned over the shoulders, and the pelvis is neutral. This alignment helps distribute forces evenly across the body, reducing the strain on muscles and joints. Key components of correct posture include:

- Head position: The head should be upright, with the chin slightly tucked and ears aligned with the shoulders.
- Shoulders: Shoulders should be relaxed and back, not rounded forward.

- Spine: The spine should maintain its natural curves without excessive arching or rounding.
- Hips: The pelvis should be neutral, not tilted forward or backward.
- Knees: Knees should be slightly bent and aligned with the feet.

To achieve, maintain and improve the optimal posture you should focus on corrective exercises and postural training to address imbalances and misalignments (Page, 2010)

COMMON ERRORS IN POSTURE AND ITS CONSEQUENCES

Common postural errors include forward head posture, rounded shoulders, excessive lumbar lordosis, posterior pelvic tilt and slouching. These deviations can lead to various adverse consequences:

- Forward head posture: Increases stress on the cervical spine, leading to neck pain, headaches, and upper back strain.
- Rounded shoulders: Often result in tight chest muscles and weak upper back muscles, contributing to shoulder impingements and poor breathing patterns.
- Excessive lumbar lordosis: Can cause lower back pain and increased risk of spinal disc injuries due to the excessive curvature.
- Posterior pelvic tilt: Leads to hamstring tightness and decreased lumbar curve, potentially causing lower back discomfort and hip joint issues.
- Slouching: Often results in back pain, reduced lung capacity, and digestive issues.

WARM-UP STRUCTURE

An effective warm-up should prepare the human body, including the musculoskeletal and nervous system and mind as well for physical activity by addressing multiple components:

- Mobility: Focuses on improving the range of motion in joints and muscles. Dynamic stretches and joint rotations are common mobility exercises.
- Stability: Enhances the control of joint movements through activities that challenge balance and coordination, such as single-leg exercises.
- Cardio: Increases heart rate and blood flow to muscles through activities like light jogging, jumping jacks, or cycling.
- Movement Integration: Combines various movements that mimic the demands of the upcoming activity, promoting neuromuscular coordination. Examples include sport-specific drills or dynamic exercises like lunges with a twist.

TEMPERATURE SPECIFIC WARM-UP

This approach involves gradually increasing the body's core temperature to enhance muscle elasticity, enzyme activity, and nervous system responsiveness. A structured warm-up typically includes:

- General warm-up: Low-intensity activities that gradually elevate the heart rate and increase blood flow, such as brisk walking or light jogging.
- Specific warm-up: Exercises that target the muscles and movements specific to the upcoming activity. For example, a runner might perform leg swings and high knees, while a weightlifter might do bodyweight squats and arm circles.
- Progressive intensity: Gradually increases the intensity of warm-up exercises, allowing the body to adapt to the higher demands of the main workout. This helps optimize muscle activation and neural readiness.

By following a temperature-specific warm-up protocol, individuals can improve performance, reduce the risk of injury, and prepare both physically and mentally for the activity ahead.

The integration of pillar preparation, stability, correct posture, and a structured warm-up into training routines is essential for optimizing human movement. By following these guidelines, athletes and fitness enthusiasts can achieve their performance goals while safeguarding their musculoskeletal health.

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DEVELOPING JOINT STABILITY AND POSTURE

LEILA BOGDAN

Joint stability is crucial for maintaining proper alignment and efficient movement patterns, reducing the risk of injury, and improving overall performance. Developing joint stability involves strengthening the muscles surrounding a joint, improving neuromuscular control, and work on proprioception. Effective joint stability exercises often incorporate functional movements and balance challenges to imitate real-life movement patterns.

POSTURE

Correct posture is essential for maintaining alignment, preventing musculoskeletal strain, and supporting optimal function. Proper posture involves the alignment of the spine's natural curves, with the head positioned over the shoulders, shoulders back and relaxed, and the pelvis in a neutral position. Developing and maintaining correct posture requires a combination of strength, flexibility, and awareness:

- **Strengthening Exercises:** Focus on strengthening the core muscles, including the abdominals, back extensors, and hip stabilizers. Exercises like planks, bridges, and bird-dogs improve core stability, which is vital for maintaining good posture.
- **Flexibility Training:** Tight muscles can pull the body out of alignment. Stretching routines targeting the hip flexors, hamstrings, chest, and shoulders can help maintain flexibility and proper posture. Dynamic stretches before activities and static stretches afterward are beneficial.
- **Postural Awareness:** Regularly checking and correcting posture throughout the day is crucial. Simple habits, like adjusting desk ergonomics, using supportive chairs, and taking breaks to stand and stretch, can prevent poor posture from developing. Mindfulness practices and exercises like yoga and Pilates can also result postural awareness and alignment.

INTEGRATED APPROACH

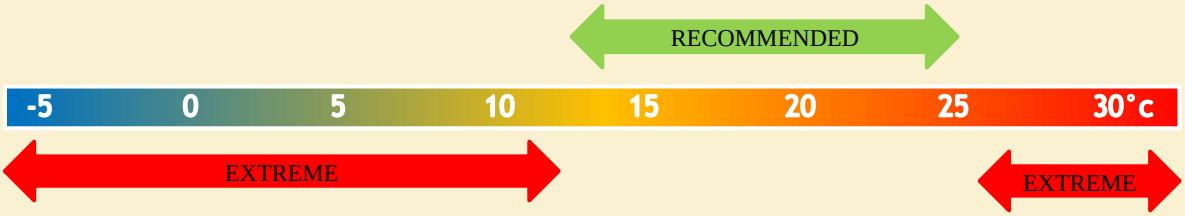
Combining joint stability and posture-focused exercises into a regular fitness routine ensures comprehensive support for the body's structural integrity. This integrated approach not only improves movement efficiency and performance but also reduces the risk of chronic pain and injuries. By prioritizing joint stability and correct posture, individuals can reach their overall physical health and well-being.

GENERAL GUIDELINES

- Strength Training: Focus on exercises that target the stabilizing muscles around joints. For example, the gluteal muscles for hip stability, the rotator cuff for shoulder stability, and the core muscles for spinal stability. Compound movements such as squats, deadlifts, and push-ups engage multiple muscle groups and improve joint stability.
- Balance and Proprioception Exercises: Activities that challenge balance help improve the body's ability to stabilize joints dynamically. Exercises like single-leg stands, stability ball workouts, and use of balance boards can be highly effective.
- Functional Movements: Incorporate movements that replicate daily activities or sports-specific actions. This can include lunges, lateral movements, and dynamic stretches that prepare the body for real-world tasks.

TEMPERATURE CONSIDERATIONS

Each joint stability and posture corrective exercise is considered low-load exercise according to workload principals during physical activity. Movements are performed at low velocity, with high concentration on coordination. Therefore, stability drills usually do not require much energy, and are not appropriate to maintain body temperature in cold environment. Moderate to warm periods are more suitable for developing joint stability and posture, yet exercises should not be neglected in cold weather since they are an essential part of the warm-up.



Bird-dog



DESCRIPTION

- Start on your hand and knees, palms under shoulders and knees underneath hips.
- Engage your core at all times, stay with neutral spine.
- Lift your right arm and extend it aligned your trunk and shoulder. At the same time lift and extend your left leg till hip height.
- Hold the position to 2-10 sec than approach the opposite elbow-knee and put them down.

FOCUSES

- Keep your core engaged, do not let your hips or shoulders drop.
- Beginners and with backpain may leave straight leg toes on the ground, advanced may lift knees 3-5 cm off the ground.
- Focus on slow, controlled movement.

Arabesque


DESCRIPTION

- Stand still on your right leg, find your balance.
- Slowly extend your left leg backwards and reach your hands above your head while keep your spine neutral, arms, head, trunk and left leg aligned and sheer to ground.
- Engage your core and focus on one point to maintain balance, slight bend on right knee.
- Hold for 5-10 sec and stand back and repeat to other side.

FOCUSES

- Focus on slow and controlled movement.
- Advanced may take shoes off or find uneven surfaces to perform the exercise.
- Do not let your hips to drop and your lower back to bend.
- Breathe through the movement, open your chest to achieve great inhalation.

DEVELOPING JOINT MOBILITY

LEILA BOGDAN

Joint mobility is the ability of a joint to move through its full range of motion efficiently and without restriction. It is a critical aspect of overall physical fitness, impacting everything from daily activities to athletic performance. Good joint mobility ensures that movements are fluid and free from discomfort, thereby reducing the risk of injury and improving functional capability.

IMPORTANCE OF JOINT MOBILITY

- **Injury Prevention:** Limited mobility can lead to compensatory movements that place undue stress on other joints and muscles, increasing the risk of injury. The optimal joint mobility helps maintain proper movement patterns and distributes mechanical loads more evenly across the body.
- **Performance:** Athletes and active individuals benefit from greater joint mobility, as it allows for more efficient and effective movements. For example, in sports requiring dynamic and explosive actions, such as running, jumping, and throwing, optimal joint mobility can significantly improve performance.
- **Daily Functionality:** Good joint mobility is essential for performing everyday tasks such as bending, reaching, and lifting. It ensures that these activities are carried out with ease and without pain or discomfort.

INTEGRATED APPROACH TO JOINT MOBILITY

An integrated approach to improving joint mobility involves combining various methods into a cohesive routine. A well-rounded mobility program might start with a general warm-up to increase blood flow, followed by dynamic stretches to prepare the joints for activity. After the workout, static stretching and foam rolling can help maintain and improve flexibility. Gradually increasing the intensity and duration of mobility exercises ensures continued progress without overloading the joints.

GENERAL GUIDELINES

- Dynamic Stretching: Involves moving parts of your body through a full range of motion in a controlled manner. Exercises like leg swings, arm circles, and spinal rotations are effective dynamic stretches that prepare the joints and muscles for activity.
- Static Stretching: Post-activity static stretches can help lengthen muscles and improve flexibility around the joints. This involves holding a stretch for 20-30 seconds, targeting specific muscles and joints.
- Foam Rolling: Self-myofascial release using foam rollers can help alleviate muscle tightness and improve blood flow to the targeted areas, thus achieving joint mobility.
- Yoga and Pilates: These practices incorporate a variety of movements and poses that improve flexibility, strength, and joint mobility. They emphasize controlled, mindful movements.
- Functional Mobility Drills: Incorporate exercises that similar to everyday movements or sport-specific actions. Examples include hip openers, ankle mobility drills, and thoracic spine rotations.

TEMPERATURE CONSIDERATIONS

Joint mobility exercises are considered low-load exercises, even lower than stability exercises, according to workload principals during physical activity. Regarding the structure of our joints, muscles, and ligaments, concentrated relaxation is highly required for the best effect and for safe flexibility training. It is hard to reach in cold weather, even in proper outwear as our musculoskeletal structure becomes stiff. Therefore, the best weather condition is moderate to warm temperature to perform joint mobility drills, however, it cannot be completely ignored in cold weather conditions as well, as mobility drills are important parts of warm-up. In cold weather, mobility drills should rather be performed in a standing position, not sitting.

World's greatest stretch



DESCRIPTION	FOCUSES
○ Start in plank position, shoulders in line with wrist, step forward with your right leg outside of your right hand to deep lounge position, left knee straight or slightly bend. ○ Lift right hand and bend it below your trunk, than inhale and rotate to your right as reach up your right arm and look up. ○ Rotate back and change sides.	○ Breathe through the movement. Inhale during lift and exhale during rotation. ○ Keep your body aligned and focus on great posture. ○ Rotation shall be slow and easy in your full range of motion. ○ Repeat 8-10 times and slowly increase depth and length of rotation.

Downward dog hip opener


DESCRIPTION	FOCUSES
○ Start in plank position, shoulders in line with wrist, then push your hips up to downward dog position. Slight bend on knees if needed. ○ Lift your right leg as far from the ground as possible with straight leg, bend the knee and rotate towards your left side, open the hips through the movement. ○ Rotate back and repeat with your left leg.	○ Breathe through the movement. Inhale during lift and exhale during rotation. ○ Focus on great posture, chest open, shoulders far from ears, back straight, heels close to the ground. ○ Rotation shall be slow and easy in your full range of motion. ○ Repeat 8-10 times and slowly increase depth of rotation and open hips.

CHAPTER 6

OUTDOOR STRENGTH DEVELOPMENT

MARK VACZI

Locomotion is essential for survival in humans, and it is realized by the musculoskeletal system. Muscles, which are considered the active part of this system, surrounds joint and insert into bones. When muscles get activated by the nervous system, they produce force and move bones around joints, resulting in movement. Muscle force is also needed in vital functions such as respiration, swallowing, and heart pump. The term 'force' is rather used in physics, and its equivalent form 'strength' is used in the theory of physical training.

The importance of muscle strength is not limited to lifting heavy weights, but it is required the move own body weight during walking, running, jumping, or simply just maintaining posture or balancing. Therefore, it is crucial to develop strength during human maturation, and to maintain it life-long. In case of disuse/physical inactivity, muscle mass and strength reduce, a phenomenon commonly named as sarcopenia. In contrast, muscle mass can be increased (named as hypertrophy) with resistance training at all ages. With the lack of sufficient strength training stimulus, risks of orthopedic disorders, sports-related injuries, and the incidence of falls increase.

STRENGTH is a vital motor skill, which is defined as the ability to overcome resistance, regardless of whether it is own body or external resistance/weight.

In the followings, from physical fitness and health aspects, we list the most important types of strength:

MAXIMUM STRENGTH is the level of maximum force a single muscle or muscle group can exert voluntarily in a one-repetition task. It is also named as 'one repetition maximum', i.e. the maximum magnitude of weight one can lift once.

RELATIVE STRENGTH is the level of maximum strength relative to body weight. Individuals with high maximum strength and low body weight can move with less effort, and this is a key component in the quality of life. People with low relative strength are exposed to risks of falls, sports-related injuries, and early fatigue. Therefore, it is important to develop maximum strength and to optimize body composition at the same time.

MUSCLE ENDURANCE is the ability to maintain force against a given load consistently or repetitively over a period of time. Walking uphill, climbing stairs, or playing sports games typically require muscle endurance. Muscle endurance prevents practitioners from early fatigue in such activities.

In strength development, the concept is to expose muscles to unusual stimulus, called resistance. A training program targeting strength development, therefore, is commonly called resistance training. Resistance can be evoked in two ways: using the own body weight or using external resistance. Bodyweight exercises provide unlimited execution variations, can be more functional, and are used from children to elite athletes. In addition, performing body-weight exercises are less costly, and requires no specific facilities. External resistance can be dumbbells, weight bars, plates, machines, medicine balls, and elastic bands. The benefit of external resistance is the possibility to increase exercise intensity, i.e. provide stronger stimulus for the muscles with a hope of more adaptation. In traditional thinking, resistance training can be realized in well-equipped weight rooms. However, bodyweight training, the use of portable devices, and the use of outdoor environmental objects such as benches, stairs, trees, rocks, etc. could be the solution for those committed to exercise outdoors.

RESISTANCE TRAINING

JUDIT PROKAI
KITTY VADASZ

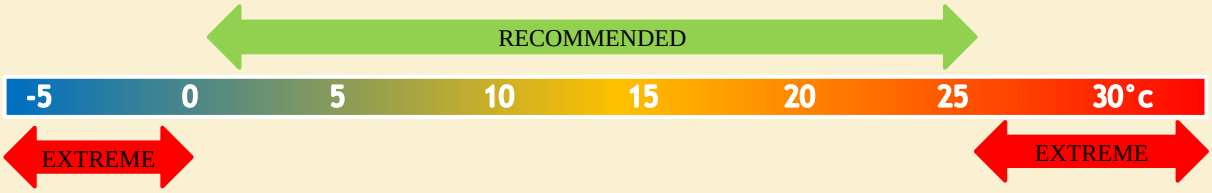
Resistance training (RT) and strength training are synonyms, general terms used to describe exercises that cause the muscles to contract against an external resistance and thus enhance muscular strength. The benefits of RT among the older adults are evident, especially in the prevention of sarcopenia and improving muscle strength, which reverse the age-related loss of functional ability (Sousa et al., 2013). But beside elderly, the increasing number of inactive and overweight youth and adults can also benefit from doing resistance exercises on a regular base. RT has been shown to produce many health benefits in these populations, including improvements in cardiovascular fitness, body composition, bone mineral density, insulin sensitivity in youth who are overweight, and mental health (Lloyd et al., 2014). As for the athletes, although building strength is often a primary goal, improvements in motor skill performance, gains in speed and power, developing physical literacy and reducing the risk of injury are also advantages of RT (McQuillian et al. 2020). RT involves different modes of training with a wide range of resistive loads, using free weights (dumbbells, barbells), weight machines, medicine balls, kettlebells, elastic bands, a person's own bodyweight, bottles of water or even a log or rock in the near park to provide the resistance needed to increase strength (Stricker et al., 2020). Before starting any RT programs, the fundamental movement skills and body awareness must be improved. The optimal characteristics of strength-specific programs include bilateral, unilateral, single- and multiple-joint exercises. In addition, it is recommended that strength programs sequence exercises to optimize the preservation of exercise intensity (large before small muscle group exercises, multiple-joint exercises before single-joint exercises, and higher-intensity before lower-intensity exercises). For untrained individuals with no RT experience or who have not trained for several years, it is recommended that loads correspond to a repetition range of an 8-12 repetition maximum (RM). For individuals with approximately 6 months of consistent RT experience and for advanced individuals with years of RT experience, it is recommended to use a wider loading range from 1 to 12 RM in a periodized fashion with eventual emphasis on heavy loading (1-6 RM) using 3- to 5-min rest periods between sets. The recommendation for training frequency is 2-3 days per week for beginners, 3-4 days per week for intermediate and 4-5 days per week for advanced training. To optimize long-term results, each phase of training should be built on the previous phase (ASCM, 2009).

GENERAL GUIDELINES

- Always learn to perform exercises correctly under the supervision of a qualified specialist.
- Take care of the right posture during the execution of the exercises. The greater the outer resistance, the greater the opportunity to cause any harm in case of improper technique.
- During upper and lower body exercises keep the spine in neutral position to avoid lumbar section injury.
- Use light loads when new skills are being learned.
- The degree of initial resistance is always determined by the target goals, current physical capacity, and training status.
- Increase external resistance always gradually to allow enough time for the muscles to adapt and to avoid overtraining.
- Never work with overextended joints.
- Lifting surfaces should be nonslip, firm, and level.

TEMPERATURE CONSIDERATIONS

Using heavy resistance or involving the work of more muscle groups in an exercise will increase the heart rate and body temperature rapidly. Therefore, these modalities are suggested to use under 30 degrees, especially in cold weather to avoid getting cold. Simple, or isolated exercises with low or moderate intensity are recommended in case of higher temperature.



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Deep squat to press

DESCRIPTION

- Improves the lower body muscles, chest, shoulders strength, and joint flexibility.
- Starting from the deep squat position, shoulder-width stance. Hold the log with both hands in front of your chest.
- With knee extension ascent to a standing position while pushing the log slightly forward and up in front of you.
- Slowly return to the starting position, and then repeat.

FOCUSES

- Deep squats require your hips to descend lower than your knees.
- Keeping your feet flat on the ground.
- Your trunk has to stay straight and stable.
- Always use only as weight as you can perform the exercise correctly.
- As you start to descend, keep your center of gravity above your feet.
- Keep your knees in line with your toes.

Side leg squat

DESCRIPTION

- Improves gluteal, quadriceps, inner thighs, shoulders and arms muscles strength and stability.
- Hold dumbbell or a log in your hand, starting from a right side squat position. Shift your body through a step to the center and step wide to the right side into the left side squat.
- Return and repeat with the other side.
- You can do it more speed whit a little jump.

FOCUSES

- Avoid shifting the front knee above the toes.
- Inhale when you go down and exhale when you go up.
- Lower your body until your right thigh is parallel to the floor while keeping your left leg straight.
- Keep your chest and shoulders open.
- Keep your core tight.

Trunk rotation

DESCRIPTION

- Improves the upper body muscles.
- Stand with your feet shoulder-width apart and your knees slightly bent.
- Hold dumbbell or a stone in your hand.
- Put your hands in front of you with your elbows bent.
- Twist your upper body left and right continuously.

FOCUSES

- Keep your core tight.
- Keep your head, chest, and torso in one vertical line as you move.
- Do not arch your lower back.
- Don’t bend your body in the direction of your movement.
- Keep the weight close to your body and near the middle of your torso.

Bulgarian split squat

DESCRIPTION

- Improves the lower body muscles, shoulders strength, and stability.
- Stand on one leg, and the other leg resting on a bench behind you, laces down, your arm high.
- Hold dumbbell or a stone in one hand.
- Sink your body and your arms down until the knee of your back leg almost touches the ground.
- Shift the weight to your other hand under your hips.
- Push up through your front foot to return to the starting position.

FOCUSES

- The front knee should be at a right angle; thigh is parallel to the ground.
- Keep your spine in a neutral position.
- Do not place your foot too close or too far forward.
- Keep your core tight.
- Perform the exercise first without a weight!

Trunk circles

DESCRIPTION

- Improves the upper body and core muscles.
- Stand with your feet shoulder-width apart and your knees slightly bent.
- Hold dumbbell or a stone in your hand.
- Put your arms high with your elbows bent.
- Start trunk circles sideways, bring the weight in front of your abdomen.
- Continue circling upwards in the other direction into the starting position.

FOCUSES

- Keep your core tight.
- Increase the speed gradually.
- Keeping your feet flat on the ground.
- Use the right weight.
- Do not perform the exercise with swinging movement.

BODYWEIGHT TRAINING

JUDIT PROKAI

Exercise is an important tool to be healthy and fight against the effects of aging. Among the possibilities of exercises, bodyweight training (BWT) has been highlighted in the last years as a safe option to improve health. (Monteiro et al., 2022) Physical inactivity remains prevalent (Silveira et al., 2022) with common cited barriers to regular physical activity such as a perceived lack of time, and access to appropriate equipment and facilities. BWT can provide a solution to these problems because of its time and cost effectiveness. It doesn't require any special facility or equipment, thus can be done anytime and anywhere. Due to its versatility, amongst many advantages, BWT improves not only coordination, balance (Goncalves et al., 2020) and flexibility, but also the more traditional fitness goals of strength, speed, endurance, and posture. (Patel, 2014) BWT is an alternative to traditional resistance training, considering the similarity in the magnitude of the effects, both proved to be effective for improving the functionality even of elderly population. (Santos et al., 2020)

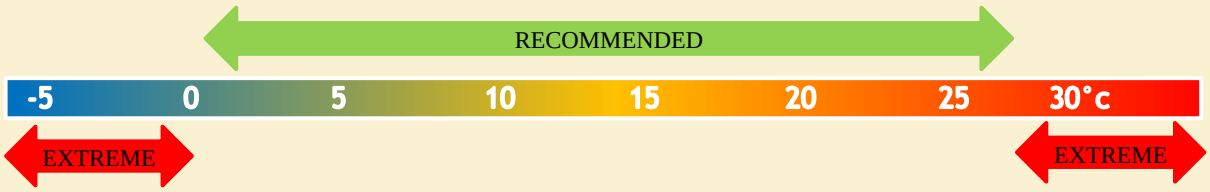
Any movement where additional load is not added to the body is considered a bodyweight exercise. BWT allow people to improve the level they manipulate their own bodies through space in a way that is both important for health and difficult to replicate with other training methods. Improving the control over the body can dramatically improve movement quality, quality of life, and performance and has become a foundation of training strategies. (Langton and King, 2018) In fact, it forms the basis for the development of any kind of motor skills. Because of its multiplanar nature, BWT is recognized as a functional movement training modality which mimics daily activities as it allows the body's musculature to work in concert. With the appropriate variation of exercises, even by just changing the starting positions, we get a wide range of exercises with circulation enhancing, strengthening, and stretching effects. To achieve strengthening effect, bodyweight exercises can be programmed the same as traditional resistance exercises, but good bodyweight training typically involves most or all major muscle groups of the body, balances training stress across individual joints, incorporates the surrounding environment efficiently, and is an appropriate intensity for the user. BWT use the weight of the body against gravity to provide resistance for your muscles. Bodyweight can be an adequate training load as long as it results in sufficient aerobic and resistance training intensities. (Klika and Jordan 2013) In case of lower level of muscle strength, it is suggested to start with developing strength capacity before getting into more intense power training. (Suchomel et al., 2018) A regular BWT program consists of multi-joint and complex exercises using simple abilities like pushing, pulling, squatting, bending, twisting, and balancing. Movements such as push-up, sit up and squats are among the most common bodyweight exercises.

GENERAL GUIDELINES

- Always learn the basic form of an exercise first, before using a complex version of it.
- Make sure to work on all major muscle groups during a training session.
- Do exercises in all planes.
- Take care of the right posture in each exercise.
- Begin your program with low intensity and number of repetitions.
- Increase intensity progressively to avoid side effects, like muscle soreness and tear.

TEMPERATURE CONSIDERATIONS

Bodyweight exercises can easily adopt to any kind of outside temperature. In cold weather, it is recommended to supplement the strengthening exercises performed in standing position with circulation enhancing exercises in an interval manner to maintain the correct body temperature. However, the higher the air temperature, less intense exercises, either lying or kneeling positions, are recommended.



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Box jump

DESCRIPTION

- Search for a higher, flat and non-slippery surface
- stand in front of it in a hip width straddle
- Jump up onto the platform into a squat position
- Jump down into start position
- Repeat the exercise in the desired number of repetitions

FOCUSES

- Use arm-swing.
- Extend ankle, hip, and knee joint fully at push-off.
- Land with the toes first touching the ground and then roll on to the feet.
- Make sure to avoid jumping on the edge of the surface.
- Take care of the knee does not pass the line of the toes during the squat
- Keep the spine in neutral position.

Bent-over side lunges with lat pull down and shoulder press 1st and 2nd phase

DESCRIPTION

- Use a bar or tied-out rope at desired height
- Start the exercise in standing, with the arms in high position
- Lower into squat with abducting the right leg and pulling the arms down beside the trunk

FOCUSES

- The height of the rope shall be determined according to the range of motion of the joints
- Keep the trunk in neutral position
- Make sure to avoid the lateral movements of the knees, keep them in line with the feet
- Don’t let the knee pass the line of the toes
- Position the feet always parallel to each other
- Try to pull the arms in line with the trunk

Bent-over side lunges with lateral pull-down and shoulder press 3rd and 4th phase

DESCRIPTION

- Shift your bodyweight onto the left leg under the rope
- Raise back into standing while making a shoulder press
- Repeat the exercise on the other side
- Use the desired number of repetition by alternating the two sides

FOCUSES

- To learn the exercise, first put the hands on hip and practice the movements of the legs and trunk without the rope
- After getting comfortable with this technic, connect the arm movements
- For higher intensity, use the tight-out rope
- The lower the rope's height, the more intense the exercise is for the trunk, hip, knee extensors

Bent over lateral raises with leg lift

DESCRIPTION

- Start the exercise in squat position and keep the arms in front of the chest extended
- Raise, lean forward with the trunk and lift up the left leg extended backward and the arms to the side
- Lower back into starting position

FOCUSES

- Keep the trunk in neutral position, to avoid any injury of the back
- At the highest end point of the exercise, the trunk and lifted leg must be in one line
- Avoid hyperextension of the lumbar spine
- At the end of the arm movement, squeeze the shoulder blades together, to increase the effect of the exercise

Hip and knee extension in supine position

DESCRIPTION

- Support with upper part of the back on a bench and with the right leg lifted up bent at knee
- Extend the hip and right knee
- Lower back into start position
- Repeat the exercise with the desired number of repetition and do the exercise on the other side

FOCUSES

- The support surface is the height of the shoulder blades
- To decrease the intensity, keep the lifted leg bended
- Make sure not to let the hip drop on the side of the lifted leg.
- Keep the hip parallel to the ground

Invers row

DESCRIPTION

- Find a horizontal bar that you can lay under in a hanging support position with a wide grip
- Bend the elbow and pull yourself close to the bar, so the chest can touch it
- Lower yourself back to start position

FOCUSES

- Keep the head, trunk, hip and legs in one line
- Retract the shoulders at the highest point of the exercise and open up the chest
- Make sure to control the movements, don’t use the momentum, or release the muscles during the negative phase

Push up with torso rotation

DESCRIPTION

- Get down in a bent arm plank
- Extend the elbows and swing the left arm into side position with rotating the trunk left
- Lower yourself back into start position
- Repeat the exercise on the other side

FOCUSES

- Keep the spine in a neutral position
- The whole body must be in one line
- Keep breathing according to the pattern of the exercise
- For lower intensity, put your knees on the floor

Torso twist with alternating knee pull

DESCRIPTION

- Sit down on a higher platform, or bench
- Pull the left knee towards the chest and put your hands on nape
- Twist the trunk to the other side and change the position of the leg
- Repeat the two phases in the desired number of repetitions

FOCUSES

- Round your back a little bit by squeezing the abs towards the spine
- Stabilize the lumbar area by engaging the core muscles
- Try to touch the knee with the opposite elbow
- To decrease intensity, separate the lower and upper body movements

YOGA

ZSUZSANNA GEP

Yoga is not only good for the mind or the body, but also for mental health (Büssing, 2012). The purpose of yoga is to improve physical fitness and health to ensure well-being. It can improve health problems, like. headaches, stomach aches, constipation, backache, colds or sinus problems (Luby, 1998) and high blood pressure (Gupta et al., 2002; Sivasankaran et al., 2006). Practicing yoga can reduces the level of stress, anxiety symptoms (Chong et al., 2011), promotes psychological well-being, sense of self-efficiency and life satisfaction (Hendriks, De Jong, Cramer, 2017).

The basic idea of yoga is to calm the mind down through different postures and breathing and the methods vary from style to style (Feuerstein, 2003). Yoga is not just a physical exercise, but a holistic approach to well-being that originated in ancient India. It combines physical postures (asanas), breath control (pranayama), meditation, and ethical principles. Yoga consists of different key aspects. One of them are the Asanas (Physical Postures) which involves a series of postures that promote flexibility, strength, and balance. These postures help align the body and improve overall well-being. The second aspect is Pranayama (Breath Control). It Focuses on breathing techniques that are an integral part of yoga. Pranayama helps calm the mind, increase energy, and enhance mental clarity. the third aspect is Meditation, which encourages mindfulness and self-awareness through meditation. It allows you to connect with your inner self and find peace. Yoga also contains ethical guidelines and emphasize ethical principles such as non-violence (ahimsa), truthfulness (satya), and self-discipline (tapas). Regular practice of yoga can reduce stress, improve flexibility, boost immunity, and enhance mental health. (Woodyard, C. 2011). There are various styles of yoga. Hatha Yoga is like Vinyasa, Hatha combines asanas (poses) with specific breathing techniques. Classes move at a slower pace, ensuring the proper execution of the poses. Ashtanga Yoga is a challenging practice that purifies mind and body. It involves repetitive postures, dynamic flow, which make this kind of yoga practice very intense. Yin Yoga slows down movements, focusing on deep connective tissues. Poses are held for longer durations. Vinyasa Yoga is known for its fluid sequences, it emphasizes continuous movement. (Norberg, U. 2014). Sun salutations and synchronized breathing are key components. The sun salutation exercise series activates the muscles through controlled breathing, increases body awareness and improves concentration.

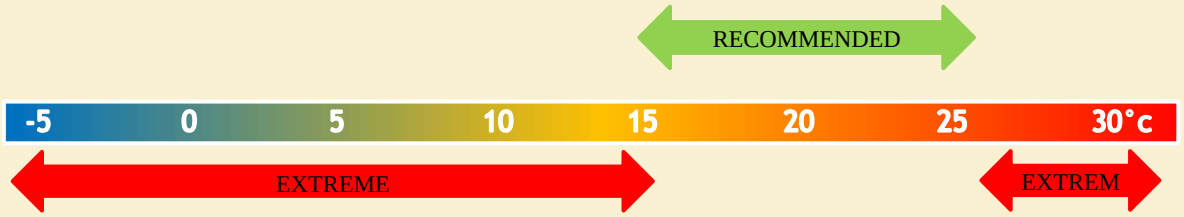
This type of coordinated movement is excellent at any time, but it is best done in the morning hours because it makes you feel energetic. It is not recommended in the evening when the body is preparing to rest. To choose the best style depends on your preferences and needs.

GENERAL GUIDELINES

- The postures are taken one after the other in a dynamic way, coordinated with the breath.
- The exercise sequence is a system of movements that gives the body strength, endurance and relaxation.
- The key is focus and rhythmic, controlled breathing. Breath - movement - body awareness brings you into a meditative state.
- The basis of meditation is concentration. It is important that the breath is not forced in coordination with the movement, but at the same time it is important to invest equal time and energy on both sides.
- Depending on your flexibility, perform each yoga pose comfortably and slowly.

TEMPERATURE CONSIDERATIONS

Practicing yoga requires high mental focus and concentration, therefore, the optimal temperature range is very narrow. For outdoor yoga, spring and autumn are best choice, when the sun is not so bright. Although you can find early or late periods in the summer when the sun is not so hot. It is recommended to practice yoga in windless weather and in around 15-25 degrees outside temperature. Of the yoga styles, ashtanga or Kundalini yoga are recommended in cooler weather, as these are the most energizing. From spring to early autumn, hatha yoga, vinyasa or yin yoga are recommended, as they focus mainly on breathing and stretching exercises, and temperature is not a negative factor.



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Sun salutation Steps 1-2-3



DESCRIPTION	FOCUSES
○ Step1: Pray position. Stand up straight, exhale and bring your palms together in front of your chest in a prayerful hand position. Form a right angle between upper arm and forearm. Lower shoulders. ○ Step2: Inhale and hold high, close palms together, stretch upwards. ○ Step3: Exhale, lean forward, touch the ground.	○ Stretch head up, sacrum down. ○ Forearm at right angles to upper arm. ○ Inhale and raise arms into a high position, torso bends. ○ Exhaling, bending forward.

Sun salutation Steps 4-5-6



DESCRIPTION	FOCUSES
○ Step4: Right leg swing back, kneeling support, roll shoulders back, stretch down with arms, lift chin, look up, inhale. ○ Step5: In a plank pose, gaze downward, head in line with the spine. ○ Step6: With exhalation, posture with hips in the highest position, palms, and feet on the ground, back stretching in focus.	○ With inhalation keep balance in kneeling position. ○ In desk position, tighten your muscles, and abdominals. The head forms a straight line with the body. The gaze is downward. ○ Exhale, hips at the highest point, palms and feet on the ground, knees and arms extended.

Sun salutation Steps 7-8

DESCRIPTION

- Step7: Eight points: exhale and place your knees on the floor, then your chest, then your chin. The hips stay in the air and the toes provide support.
- Step8: Cobra pose: While inhaling, lower your hips and stretch your toes. Lift your head, chest, and back bend. Legs closed, shoulders down.

FOCUSES

- In the eight-point position, keep yourself tight, palms just below the shoulders so as not to put too much stress on the joint.
- With cobra, the palms are under the shoulders, and it is not necessary to fully extend the arms if the spine is uncomfortable.

Sun salutation Steps 9-10

DESCRIPTION

- Step9: With exhalation, posture with hips in the highest position, palms, and feet on the ground, back stretching in focus.
- Step10: Right leg swing back, kneeling support, roll shoulders back, stretch down with arms, lift chin, look up, inhale.
- Finish with the Sun salutation Steps 11-12-13 according to the step 3-2-1.

FOCUSES

- In dog position, the head just hangs down, the body stretches, and the palms and soles drop to the ground.
- For each set of movements, pay attention to the correct execution of breathing and it is important that you only practice according to your flexibility. Execute with precision and concentration.

STAIR CLIMBING

MARK VACZI

Ascending stairs is manifested in two forms in humans' life. The majority of people use stairs for approaching locations such as their homes or work places. Scientific evidence exists that climbing more than five stair flights a day is associated with reduced risk of mortality and cancer in people who used stairs only in traffic and not for training, suggesting that stair climbing rather than riding the escalator provides an opportunity to promote health (Sanchez-Lastra et al, 2021). On the other hand, a wide range of practitioners such as young and old adults, overweight people, and rehabilitating patients use stair climbing as a low-cost and easily accessible form of exercise (Lim et al, 2021; Ozaki et al, 2019).

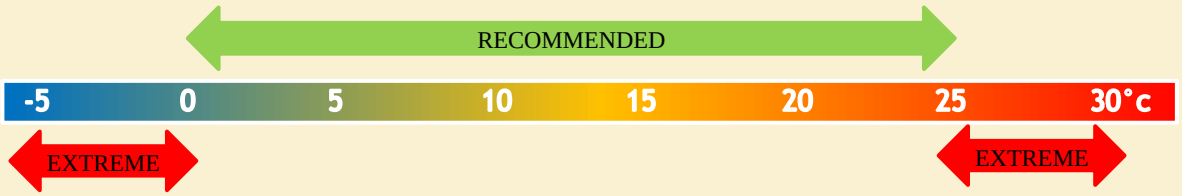
There are several mechanisms through which stair climb training exerts its quite complex health promoting effects. Overcoming the stairs during stair ascent provides sufficient stimulus for strengthening the lower extremity muscles. Faster ascent promotes greater strength and power development, while longer and less intensive ascent develops aerobic and muscle endurance. Stair climbing mostly involves the so called concentric muscle actions, which means that muscles do the majority of the work when they shorten. This consumes a lot of energy, therefore, stair climb training could be useful for reducing body fat and approaching optimal body composition. Another unique characteristics of stair climbing is the low-impact landing followed by every upward push-off. The reduced landing shock on lower extremity joints could be an advantage for beginners, obese people, fragile elderly, and for those suffering from joint instability by minimizing acute injury risks, though risk of fall could be still high among elderly with low coordination level. Due to small landing impact, exercise-induced muscle damage and its consequence, the so called delayed onset muscle soreness can also be minimized during stair versus level training (Váczi et al, 2013). Finally, in children, coordination, especially proprioception could be improved by learning the steps at a constant length and height forced by the stairs. Therefore, fundamental stair climb drills and their variations should also be incorporated into physical education curriculum.

GENERAL GUIDELINES

- Ascending a stair, especially at high velocity, may deteriorate your body posture. Therefore, mind your posture: keep your spine and head straight at all times.
- Mind your steps to avoid ankle sprain or falls: you can place colorful cones on stairs to increase visibility.
- Begin your program using low intensity drills to get accustomed to the stair height and deepness, and be able to coordinate your legs.
- Increase intensity progressively in order to achieve greater strengthening effect.
- Avoid this drill in darkness to prevent injury because of misstep.
- Avoid stair climbing in snowy and icy weather, stairs could be very slippery.

TEMPERATURE CONSIDERATIONS

Stair climbing typically activate muscles concentrically, meaning that muscles work when they shorten. This consume a lot of energy, eventually heating up your body. Therefore, stair climb training should be avoided in hot weather, and especially for those suffering from cardiovascular diseases. In contrast, because of the "heating" effect, it could be an ideal workout in cold weather.



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Stair marching

DESCRIPTION

- It can be your first stair climb drill if you are a beginner and you wish to get accustomed to the raise and the run of the stairs.
- Improves gluteal, knee extensor, and hamstring strength.
- Put your right leg one or two steps higher.
- Push-off with your right leg and arrive to sprint position by lifting your left thigh. Continue the cycles

FOCUSES

- Use alternate arm-swing.
- Extend ankle, hip, and knee joint fully at push-off.
- Keep center of gravity high.
- Begin with ascending one stair at one step.
- Increase to ascending two stairs at one step to increase intensity.
- Get accustomed with low velocity, and increase velocity later.

Forward lunge

DESCRIPTION

- Improves gluteal, knee extensor, and hamstring strength.
- Provides stronger strengthening stimulus compared to stair walking.
- Put your right leg two or three steps higher, depending on your leg length.
- Push-off with your right leg and arrive to sprint position, then land on left leg. Continue the cycles.

FOCUSES

- Use alternate arm-swing.
- Extend ankle, hip, and knee joint fully at push-off.
- Flex both knees softly at landing.
- Keep your upper body straight at all times.
- Avoid pelvic tilt and knee inward movement.
- Be careful, though taking large steps are very effective, gluteal muscle soreness can develop quickly, especially in novice.

Cross-lunge climbing

DESCRIPTION

- Improves overall lower extremity muscle strength and balance. Prevents knee injuries by stabilizing the knee joint.
- Take left foot and step to the left into side lunge position. Flex knee and lower center of gravity.
- Stand up with left leg into sprint position.
- Take right foot and step to the left into cross-lunge position.
- Continue the cycles.

FOCUSES

- You may put your hands akimbo if it is difficult to coordinate alternate arm swing.
- Keep your feet, pelvis, and shoulder always perpendicular to the direction of the stair.
- Focus on the push-off
- Avoid pelvic tilt at landings.
- Ascend two stairs at one step.

STREET WORKOUT

JAN KALUS
MICHAEL JANEK

Street workout is a dynamic and increasingly popular form of exercise that combines elements of traditional calisthenics and bodyweight training, often performed in outdoor public spaces like parks, playgrounds, and urban areas equipped with fitness bars and other structures. This form of workout emphasizes functional strength, agility, and overall physical fitness (Saeterbakken et al., 2011). Rooted in the urban landscape, street workout not only promotes physical health but also fosters a sense of community and accessibility, encouraging people of all ages and fitness levels to engage in physical activity.

The origins of street workout can be traced back to the early 21st century, particularly in urban environments where fitness enthusiasts sought creative and cost-effective ways to stay fit (Kravitz, 2021). This movement gained momentum through social media platforms, where enthusiasts shared their routines, challenges, and transformations, inspiring a global community. The essence of street workout lies in its simplicity and versatility; exercises such as pull-ups, push-ups, dips, and various forms of muscle-ups are fundamental to the practice (Li et al., 2023). These exercises utilize minimal equipment, primarily leveraging the individual's body weight to build strength and endurance.

Moreover, street workout is celebrated for its inclusivity and adaptability. Whether you are a beginner taking your first steps towards fitness or an advanced athlete seeking to push your limits, street workout offers a scalable and progressive approach to training. The exercises can be modified to suit individual capabilities, making it a sustainable and lifelong fitness journey. This chapter will delve into the foundational exercises of street workout, providing step-by-step instructions and visual aids to guide you through each movement, ensuring proper form and technique. By the end of this chapter, you will be equipped with the knowledge and inspiration to incorporate street workout into your fitness regimen, harnessing the power of your environment to achieve your health and fitness goals.

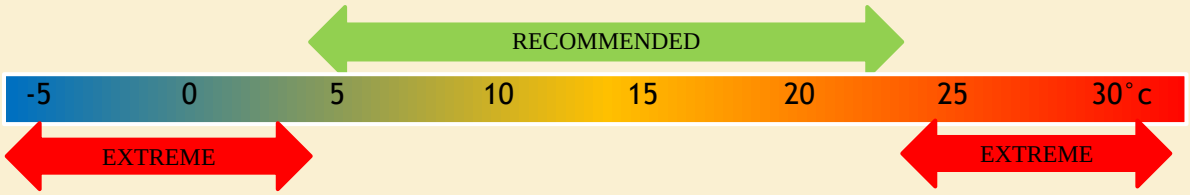
GENERAL GUIDELINES

- Warm-Up: Start with 5-10 minutes of light jogging, dynamic stretching, or jumping jacks to prepare muscles and joints.
- Maintain Proper Form: Focus on correct alignment and controlled movements to prevent injuries.
- Progress Gradually: Begin with basic exercises like push-ups and squats, then increase difficulty to advanced moves as you gain strength.
- Balanced Training: Target all major muscle groups (upper body, lower body, and core) to prevent imbalances.
- Safety First: Check outdoor equipment for stability, be mindful of your surroundings, and listen to your body.

TEMPERATURE CONSIDERATIONS

Street workouts can be physically demanding and consume a lot of energy, leading to an increase in body temperature. Hot temperatures, above 26 degrees Celsius, pose additional stress and strain on your body. Therefore, it's crucial to consider your physical health and your body's temperature regulation abilities. Always remember to stay hydrated and avoid excessive exertion in temperatures above 30 degrees Celsius.

Cold weather also presents certain risks. Dress warmly and extend your warm-ups to avoid hypothermia; you can even cover your mouth to warm the air you breathe. Wear shoes with good traction and continue to stay hydrated. Exercising outdoors in temperatures below 4 degrees Celsius should be avoided unless you are very experienced, as there could be ice on the surfaces of the constructions and on the ground.



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Australian Pull-Up (Inverted Row)

DESCRIPTION

- Builds upper body strength, improves posture.
- Position yourself under a bar at waist-shoulder height (higher the bar, easier it is) hold it with an overhand grip (palms down) shoulder-width apart or a bit wider.
- Extend your arms, keeping your body in a straight line. Engage your core and pull your chest up towards the bar.
- Squeeze your shoulder blades together at the top of the movement, and push your shoulders down.
- Perform 8-12 repetitions for 2-3 sets.

FOCUS

- Keep rigid body; avoid sagging hips or arching.
- Maintain neutral head position; look up at the bar and push chest up.
- Exhale when pulling; do not hold breath.
- Adjust bar height or foot position to scale for different fitness levels,
- If strong enough, aim for scapular or regular pull-ups with hanging fee (see the next exercise).

Scapular pull-ups with or without resistance band assistance, regular pull-ups

DESCRIPTION

- Builds upper body strength (esp. lats, traps, rear delts, biceps) improves shoulder stability.
- Hang from a pull-up bar with an overhand grip, arms straight, and body fully extended.
- Pull your shoulder blades down and together to raise your body slightly and engage shoulders.
- Hold for 1-3 seconds, then release.
- Perform 8-12 controlled repetitions.
- If strong enough, bend elbows up to 45 degrees. Progress to full pull-ups if capable.

FOCUSES

- Keep your core engaged to maintain a stable body position.
- Avoid using use your arms to pull up; the movement comes from your shoulder blades.
- Scapular pull-ups help you to prepare for full pull-ups.

Scapular dips on parallel bars



DESCRIPTION

- Strengthens triceps, shoulder and shoulder blade muscles, enhances stability, improves posture.
- Grip two parallel bars (use a resistance band to reduce some weight if needed), and lift yourself with arms fully extended.
- Keep arms straight and elbows extended, push shoulders down, and engage core and abdominal muscles (pic.1), lower slightly by elevating shoulder blades without bending elbows (pic.2).

FOCUSES

- Focus on controlled movements and proper form.
- Move slowly and controlled to maximize muscle engagement.
- Keep the core engaged and maintain a straight body line.
- Exhale when depressing scapulae, inhale when lowering.

Bulgarian Split Squat


DESCRIPTION

- Builds leg and glute strength, improves balance and stability, and enhances hips mobility.
- Stand a few feet in front of a low bar, extend one leg behind and place instep on the bar, keep torso upright, core engaged, and shoulders back.
- Descend the body by bending the front knee until front tight is parallel to the floor, dropping back knee down.
- Push on the front heel to return to the starting position.
- Perform 8-12 reps per leg, 2-3 sets

FOCUSES

- Keep weight centered over the front foot; avoid leaning forward or backward.
- Adjust the depth of the squat to match your flexibility and comfort level.
- Ensure the front foot is positioned so the knee stays above foot.
- Ensure you perform the same number of repetitions for both legs.

ELASTIC RESISTANCE TRAINING

JUDIT PROKAI

Elastic resistance training (ERT) is a popular method of resistance training. It makes possible to perform movements in any direction, alternative to traditional free weights. ERT is used in warm up, injury prevention, strengthening and rehabilitation programs due to its low cost, versatility, and applicability to all populations. (Seguin et al., 2022) These exercises have received support for their simplicity and feasibility among elderly populations (Chen et al., 2013), effective home-based programs (Ooi et al., 2021), and for their usefulness for those with higher fitness level and athletic populations by providing a varied form of resistance (Andersen et al., 2018). The easy access of elastic bands for training could combat the common barriers to strength training such as the fear of injury, high costs of training equipment, and the intimidation of using fitness facilities. (Pate et al., 2011) Its benefits include improved functional capacity, increased strength and endurance, improved body composition and quality of life in various age groups. (Andersen et al., 2018) ERT can also significantly improve muscle strength and quality (Zhao et al., 2022), osteoporosis and obesity in elderly populations. (Liu and Lee, 2024)

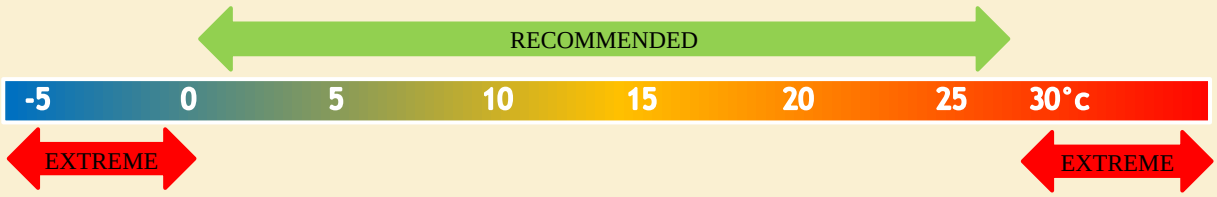
The group of elastic resistances include training equipments of various lengths, designs and strengths, such as elastic bands and tubes, minibands, power bands, agility bands, gymsticks and the RIP trainer, which also combines a metal rod with elastic resistance. With their help, all muscle groups can be trained with isolated or complex exercises, even in multicomplex mode. Exercises with such equipments create constant resistance and thus load on the specific muscle groups. There are no dead phases when performing exercises, unlike using dumbbells. When performing the different exercises with elastic resistances, in addition to the dominant strengthening effect on the muscles/muscle groups that create the main movement, the effort of the stabilizing muscles also play an important role, which may have significance in avoiding low back pain (Vinstrup et al., 2015) With using these equipments, in addition to sparing joints, the working muscle groups can be efficiently loaded. In the case of elastic resistances the dynamics of power transmission is different than using free weigths. Due to the resistance of the device, the effort is the smallest when starting the movement and during the exercise it increases progressively, depending on the length of it. The largest force transmission, which is static, occurs in the final phase of the movement. Exercises with elastic resistances can be used successfully primarily during general strength development, and are less suitable for inducing sport-specific effects for the reasons mentioned.

GENERAL GUIDELINES

- Choose the degree of difficulty of the equipment according to age, fitness level, the muscle group employed and the goal to be achieved.
- The elastic resistances should always be held tight and pulled out through the exercise.
- Begin your program using low resistance bands for proper adaptation of the muscles.
- Increase intensity progressively in order to achieve greater strengthening effect.
- To avoid injury, exercise with caution, never release the band suddenly.
- Always loop the band around the palms or feet, or step on it to prevent the equipment from slipping out and causing injury.

TEMPERATURE CONSIDERATIONS

During elastic resistance exercises the muscles are working both concentrically and eccentrically in an anaerobic condition. Due to the endless variations of modalities, it is applicable in all-weather condition. According to the outside temperature, lower intensity exercises are suggested in warmer weather such as isometric variations, but complex and multicomplex exercises are preferred in cold weather, since they are activating more muscle groups and thus elevate efficiently heartbeat and muscle and body temperature.



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Squat with biceps curl and shoulder front press 1st, 2nd and 3rd phase



DESCRIPTION

- Stand on the elastic band in hip width straddle and loop the ends of it around the palms
- Lower into squat and bend the elbows at the same time
- Raise back into the straddle and push your arms up above the head in front of the body simultaneously

FOCUSES

- Make sure to keep the knees parallel to each other and don't let the knees pass the toes during the squat
- Keep the upper arm and elbow parallel to each other and the wrist in neutral position during the press
- Hold the spine erected in neutral position

Squat with biceps curl and shoulder front press 4th and 5th phase


FOCUSES

- Make sure that the elastic band has tension through the whole exercises, never let it loose
- Always control the movements during the use of the elastic band. Decelerate the pulling force that it generates

DESCRIPTION

- Lower back into the squat and flex the elbow with pulling the arms beside the trunk
- Raise into the straddle and extend the elbow back into starting position
- Repeat the 5 phases

Split squat with overhead triceps extension

DESCRIPTION

- Attach the elastic band to a lower point
- Loop the band around the palms, stand facing away from the anchor point in straddle with stepping one leg forward with the arms extended and raised above the head
- Lower into split squat and band the elbows
- Extend the knees and elbows and raise back into starting position and repeat the two phases
- Do the exercise on the other side

FOCUSES

- Make sure to keep the upper arm beside the ear during the whole exercise
- The centre of the body lowers exactly between the two legs
- In the lowest end point, both knees are in right angle
- don't let the knees pass the toes during the squat
- Inhale during the eccentric phase and exhale during the concentric phase

Plank with leg raises

DESCRIPTION

- Put the mini band above the ankle
- Try to find a platform and put your hand support on it in a plank position
- Extend the hip and lift up one of the legs
- Lower it back into the starting position
- Do the required numbers of repetitions
- Repeat the exercise on the other side

FOCUSES

- The trunk, hip and legs must be in one line
- Squeeze the abs and support the lumbar spine from under to avoid injuries
- Push yourself away from the platform during the exercise, so the shoulder blades can lay on the back
- At the end of the lift, make a conscious contraction at the hip extensors for better effect

Pull down with squat

DESCRIPTION

- Attach the elastic band to a higher point which can be a branch of a tree
- Loop the ends of the band around the palms and stand in hip width straddle
- Lower into squat and pull the arms down beside the trunk
- Raise back into starting position and repeat the exercise in the desired number of repetitions

FOCUSES

- The elastic band should always be tight during the exercise
- Do not squat too deep as the tone is on the movement of the pull down
- Control the movement of the arms both in the concentric and eccentric phase as well
- Keep breathing according to the pattern of the exercise
- Make sure to hold the spine in neutral position

Side plank with hip extension and shoulder press

DESCRIPTION

- Loop the middle of the band around the right foot and the ends around the right hand
- Get down into left side plank and lower the hip with bending the left leg at right angle and with the right arm at shoulder
- Extend the hip, lift the right leg and press the right arm above the head
- Lower back to start position and repeat the exercise in the desired number of repetitions
- Do the exercise on the other side

FOCUSES

- The trunk, hip, thighs must be in one line
- Don’t let the hip drop backward, keep it vertical
- Push yourself away from the ground by the shoulder

CHAPTER 7

OUTDOOR POWER DEVELOPMENT

MARK VACZI

We have previously emphasized that the ability to move is vital for humans, and immobility eventually leads to dependency, depression, increased risks of diseases and mortality. Loss of functionality (i.e. the ability to perform daily activities such as walking, stair climbing, standing up from a chair or doing household activities) are the most threatening consequences of both physical inactivity and ageing.

SARCOPENIA means the simultaneous loss of muscle size and strength developed by long-term physical inactivity or ageing.

While loss of muscle size and strength is one of the most important factors contributing to immobility, decline in movement speed can increase the risks of falls and its related injuries such as strains and fractures, which could require hospitalization (Simpkins and Yang, 2022).

POWER is the ability to generate force rapidly. In physics, it is the product of force (*F*) and velocity (*V*). Moving a heavy object or own body quickly suggests high power generating ability.

There are certain situations when the own body, especially the lower extremities must be moved quickly to avoid the aforementioned accidents, for example stepping aside when descending a stair or stepping on the sidewalk, or when a bus stops suddenly and people loose balance. Therefore, maintaining not only muscle size and strength but power from young adulthood is a key strategy in increasing quality of life and reducing the injury-related health care costs Pinedo-Villanueva et al, 2019). Moreover, decline in power is even faster than the process of sarcopenia (Reid et al, 2014).

Every exercise that is performed at 90 to 100% intensity can be considered power training, still, the most typical drills involve sprints or jumps. It is commonly believed that power training is specifically devoted to athletes, but it is well documented that jump training, for example, versus conventional resistance training favors power development among untrained university students (Vissing et al, 2008). It important, however, that untrained individuals carefully pre-condition before beginning any power training because high impact power exercises can induce unwanted injuries such as muscle pulls and tears or tendinitis. This involves flexibility and stability as well as body-weight or resistance training, also covered in the present manual. Also, jumping or sprinting on uneven surfaces can increase the risk of ankle injuries. Therefore, it is recommended to use outdoor running tracks installed in certain parks.

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JUMP TRAINING

MARK VACZI

Jumps are natural movements that also formed the basis of humans' survival in prehistoric times. Though today jump movements are mostly recognized as part of sports, and jump training (also named plyometric training) is fundamental in athletic preparation, they are essential in childhood motor development. Moreover, performing various modalities of jumps (aerobics, kangoo, rope jumping, trampoline, etc.) is popular in the non-athletic population for recreational or fitness purposes.

Regular jump training can evoke various health related benefits, and its most prominent effect is the improved muscle power (Vaczi et al, 2013). High power provides the ability to move own body quickly, which is extremely important in the prevention of falls in middle and old age. Balance is another important factor in fall prevention, and its improvement is also evident after jump training (Park et al, 2012). We previously found that 8 weeks of jump training improved not only muscle strength and vertical jump height but also running economy, confirmed by the reduced oxygen needed to run at the same speed after the training in female university students (Meszler et al, 2019). Finally, jump training is a potential protocol for long-lasting bone mass development in young individuals as well as in the prevention of osteoporosis (Gregov and Salaj 2014).

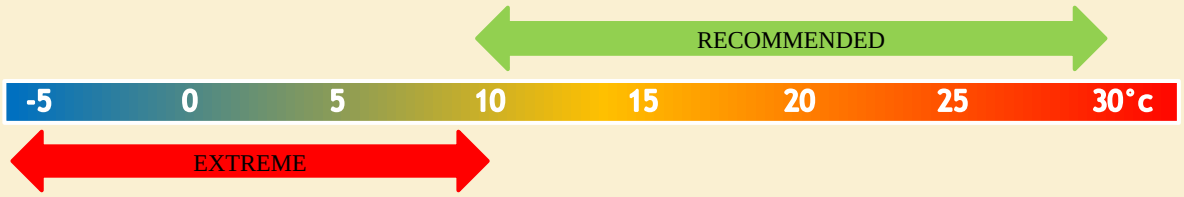
Despite the favorable health related, jumps should be performed with caution. At landings, high ground reaction force develops, inducing temporary muscle damage and soreness. In addition, improper posture at landings may develop orthopaedic injuries such as ankle or knee sprains, muscle tears, and the lumbar spine injury is at high risk. Therefore, preparatory steps including the development of muscle strength and joint stability (described in Chapter 5) as well as learning proper take-off and landing technique are essential. Adjusting landing impact to optimal is also important. Landing after higher jumps performed from the floor, landing from higher boxes, or landing on one leg, all increase ground impact and risks of injuries.

GENERAL GUIDELINES

- Develop proper joint stability (ankle, knee, and spine) and posture before performing any jump training. See Chapter 5.
- Develop lower body and trunk strength using body-weight or weight resistance exercises before performing any jump training. See chapter 6.
- All-around warm-up is needed before jump training. See chapter 5.
- Learn the fundamental vertical jump techniques properly (see present chapter) before you progress to more complicated jumps.
- Progressively increase impact. Begin learning with low impact/low intensity execution.
- Learn double leg drills before you perform single-leg ones.
- Learn vertical jump drills before you begin horizontal or lateral boundings, direction changes.
- Remember that with horizontal and lateral jumps, there is a high risk of posture deterioration, leading to injuries such as sprains and ruptures.
- Your lumbar spine is at extreme risk in high impact jumps. Avoid jumps in case of spine abnormalities (scoliosis, disk herniation, pain)

TEMPERATURE CONSIDERATIONS

Performing high intensity jumps require proper cardiovascular warm-up and neural activation. At very low temperature it is difficult to keep muscles warm, and the risk if muscle injuries may increase at jumps that require fast and forceful actions. In cold weather it is recommended to reduce intensity, and increase repetition, but this develops muscle endurance rather than power. In contrast warm weather favors high intensity jump training.



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Squat jump

DESCRIPTION

- Improves knee extensor, gluteal, and calf power.
- Stand in a shoulder-wide straddle and half squat position.
- Keep your feet slightly turned out.
- Stay in stationary squat position for 2-3 seconds.
- Perform full effort vertical take-off by extending your hip, knee, and ankle.
- Land softly, arriving to the squat position.

FOCUSES

- Keep your spine and head straight at all times.
- Keep your knees in line with your feet during squat (slightly out), avoid knee valgus.
- Extend your joint simultaneously at take-off.
- Do not land with stiff joints.
- Lean slightly forward with your trunk when landing.
- Alternatively, you can land on one leg.

Countermovement jump



DESCRIPTION	FOCUSES
○ Improves knee extensor, gluteal, and calf power. ○ Stand in a shoulder-wide straddle position. ○ Keep your feet slightly turned out. ○ Lower your center of gravity quickly to arrive to half squat position. ○ After arriving to squat, perform immediate full effort vertical take-off by extending your hip, knee, and ankle. ○ Land softly, arriving to the squat position.	○ Follow all focuses given at squat jump. ○ Lower center of gravity as fast as possible. ○ Joint extension should follow flexion without delay (quick transition). ○ Load your legs equally, avoid any posture asymmetries. ○ Alternatively, you may use arm-swing.

Split countermovement jump



DESCRIPTION	FOCUSES
○ Improves front leg gluteal and hamstring power, and rear leg knee extensor power. ○ Stand in a split straddle position. ○ Keep your feet straightforward. ○ Lower your center of gravity quickly to arrive to lunge position. ○ After arriving to lunge, perform immediate full effort vertical take-off by extending your hip, knee, and ankle. ○ Land softly, arriving to the lunge position.	○ Keep your spine and head straight. ○ Lower center of gravity as fast as possible. ○ Joint extension should follow flexion without delay (quick transition). ○ Avoid lateral imbalances and asymmetries such as pelvic or shoulder tilt. ○ Keep your knees aligned with your feet. ○ Alternatively, you can perform ○ split jumps continuously by ○ switching leg positions.

SPRINT TRAINING

KITTY VADASZ

Running is one of the fundamental natural movements of humans. It is a very popular form of exercise, and can be practiced at low cost, and almost everywhere. There are often situations in life when, often needed to move faster than walking, we choose to run at higher speeds, e.g. after a bus. However, the use of advanced technology means that we are choosing natural movements more rarely. We are also getting our children into the habit of convenience by driving them to school and for specific activities. There are several types of running: sprint, middle and long distance running, cross-country running.

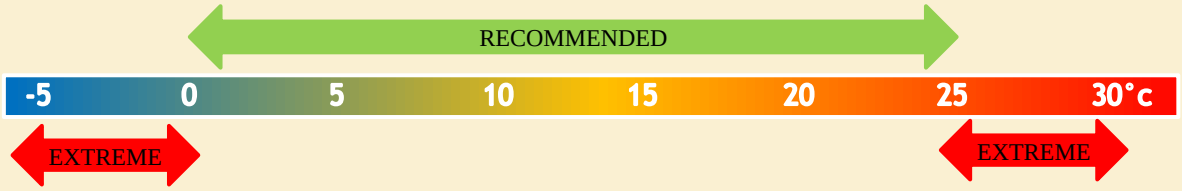
Sprinting is a highly complex form of exercise that activates almost the whole body and has positive physiological effects. While sprinting, the muscles of the body work in a coordinated way, with much of the muscles working eccentrically. Eccentric contractions occur when a muscle is lengthened during loading, i.e. the action is performed during stretching. Eccentric exercises are the most effective way to increase muscle mass. Sprint training improves toning, endurance, explosiveness and speed. Sprinting increases heart rate and involves the coordinated work of many muscle groups. In addition to the muscles of the lower limbs, the muscles of the trunk and arms (abdomen, back, biceps and shoulders) also work hard during sprinting, so these muscle groups can be optimally developed. At the same time, toxins are eliminated from the body through sweating. Sprinting is good for the health of your veins, arteries and capillaries. Researchers have demonstrated that short sprint interval training twice a week improves vascular health and physical function in the elderly (Adamson et al., 2019). In young athletes, this type of running training can improve the running speed, VO2max, vertical take-off height and change of direction ability (Thurlow et al., 2024). Sprinting may be beneficial in the management of type 2 diabetes (Wang et al., 2019). Excellent stress reducer, improves sleep quality. Regular outdoor sprint training strengthens the immune system. It stimulates metabolism, improves brain function and slows down the ageing processes. Sprinting is good for bones and joints. As well as the benefits, there are also disadvantages. If performed incorrectly, the risk of injury is significantly increased. It is therefore very important to warm up properly, to know the correct sprinting technique and to do stretching exercises and recovery after sprinting. Sprinting exercises can be found in the physical education curriculum at school as well as in the training programs of elite athletes.

GENERAL GUIDELINES

- Natural ground (grass, forest) is the best place to do the exercises, as it is gentle on your joints. The quality of the ground should be checked before performing the exercises, avoiding holes.
- Rekortan covered track has the advantage of being soft and flexible, which is gentle on the joints.
- It is very important to warm up properly, especially in cold weather. If necessary, you can use a heating cream to avoid injuries and muscle strains.
- It is also important to use the right quality running shoes.
- Start the program with low intensity exercises to get used to the workload.
- Increase the intensity gradually to achieve a greater strengthening effect.
- To reduce the risk of injury from a bad step, avoid exercises in the dark.
- Always hydrate!
- Avoid training in snowy and icy weather, because the ground can be very slippery.
- If you feel any sharp pain, stop immediately.

TEMPERATURE CONSIDERATIONS

Sprint training increases heart rate, which is heating up the whole body, so should be avoided in hot weather, especially for people with cardiovascular disease. In hot weather, if possible, you should train in a shaded area, and do not forget to use sunblock and a cap. In cold weather, make attention to wearing appropriate layers of clothing, warming up thoroughly and take short rest periods during training to avoid cooling down your body muscles.



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Ankling

DESCRIPTION

- Develops general lower limb muscular strength, improves coordination, sense of rhythm, and the running technique.
- One leg extended, other leg slightly flexed, toes touching the ground, trunk vertical.
- Ground contact is on finger tips, then the heel is moved close to the ground.
- Keep the centre of gravity high

FOCUSES

- Use alternate arm-swing
- Foot is slightly off the ground.
- Duration of flight phase is minimal, hips and knee joint fully extended, with plantar flexion at the ankle joint.
- The exercise should be performed in short (15-20 cm) steps.
- Start with a few repetitions and gradually increase the number of repetitions as you get stronger.

High knee running

DESCRIPTION

- Improves coordination, sense of rhythm, and the running technique.
- Activate quads, hamstrings, calves, glutes, and hip flexors.
- Leading leg thigh rising up to horizontal and then the other continue the cycles.
- Can be performed at slow, medium and fast speeds, and with frequency increase over distances of 20-30 m.

FOCUSES

- Focus on driving the foot down and letting it spring back up off the ground.
- Use alternate arm-swing.
- Ground contact is on finger tips.
- Foot should remain in a dorsiflexion position as you lift the knee high.
- The exercise should be performed in short (25-30 cm) steps.
- Avoid tilting your torso back during the exercise.
- Keep the centre of gravity high, with tight muscles.

Butt kicks running

DESCRIPTION

- Develops general lower limb muscular strength, improves coordination, sense of rhythm, and the running technique.
- The heel should approach the gluteus maximus from below, with the knee slightly raised at the front.
- The supporting leg hip, knee and ankle joints are extended.

FOCUSES

- Use alternate arm-swing.
- Ground contact is on finger tips.
- The exercise should be performed in short (25-30 cm) steps.
- Avoid tilting your torso back, relaxing your shoulders.
- Keep the centre of gravity high, with tight muscles.

CHAPTER 8

OUTDOOR ENDURANCE DEVELOPMENT

MARK VACZI

It is perhaps surprising but walking and jogging are the most popular physical activities in the world, and with these forms of exercise, considerable improvements can be achieved in endurance. Endurance is one of the three major conditioning skills.

ENDURANCE is the ability to maintain physical activity at a given intensity for longer time.

To understand the above definition, first, it is important to know that endurance-type of workout does not only mean very long-lasting (1-2 hours) physical activity. Even shorter bouts such as 5-10 seconds of sprints require certain endurance if they are performed repetitively. Therefore, in terms of duration, volume, and intensity, several variations of endurance workout exist. The concept is that at higher intensity, we are forced to reduce duration. In contrast, at smaller intensities, we are able to exercise longer. The ratio of intensity and duration will determine whether the exercise requires aerobic or anaerobic work, eventually leading to aerobic or anaerobic endurance development.

AEROBIC ENDURANCE is the ability to maintain physical activity at low intensity. The term "aerobic" means "using oxygen". During an aerobic exercise, the energy is mainly provided by the aerobic energy supply system, in which energy sources such as carbohydrates and fat are perfectly broken down with the use of oxygen.

Aerobic workouts typically involve long-lasting and continuous walking, jogging, swimming or cycling movements, and evoke moderate elevations in heart rate and ventilation. As soon as one increases intensity (e.g. increases running speed or begins running uphill), energy demand increases, and a faster energy supply is needed in order to maintain intensity.

ANAEROBIC ENDURANCE is the ability to maintain physical activity at high intensity. The aerobic energy supply system is not able to support the physical activity any more, and quick energy production is performed by the anaerobic energy supply system.

While low-intensity aerobic workout feels somewhat comfortable, untrained people often give up anaerobic workout due to unbearable ventilation, excessive fatigue, discomfort, and pain. Beside the heavy ventilation, the source of the unbearable pain is the so cold "lactate", which is a side product during anaerobic work. From health promotion perspectives, performing regular aerobic workout is preferential. Aerobic endurance, often measured by maximal oxygen uptake (VO2 max), is related to functional capacity and human performance and has been shown to be a strong and independent predictor of all-cause and disease-specific mortality

(Strasser and Burtcher, 2018). Evidence also exists that moderate intensity endurance training improves cognitive performance and emotional well-being among sedentary older adults (Zheng, 2024). Furthermore, aerobic exercise promotes neuroplascticity in patients with brain storek (Ploughman et al. 2015). Finally, Results of most epidemiological and laboratory studies suggest an inverse relationship between regular aerobic exercise and the risk of certain malignancies, such as intestinal, colon, pancreatic, breast, lung, skin, mammary, endometrial, and prostate cancer (Na and Oliynyik, 2011).

Despite the aforementioned benefits of endurance exercise, the possible adverse effects of long-distance jogging/running should also be noted. Those who only engage in running, could be exposed to orthopaedic injury risks. Twenty to eighty percent of amateur marathon runners reported running-induced injuries, mostly in the knee joint (Van Gent et al, 2007), and age, BMI, and running years are considered significant risk factors (Shen et al, 2024). Therefore, practitioners who are passionate about running, are encouraged also to engage in regular strength, stability, and balance training to protect joint health against the damaging effect resulting from the large number of landing impacts.

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WALKING

JOANNA GRADEK

Walking, next to running, is the most natural form of movement. Nowadays, you may notice "heaviness of gait" and shuffling of the legs, so it is worth focusing on the correct walking technique, which should be characterized by flexibility and smoothness of movement. When we walk naturally, correctly, we put the heel on the ground and then roll the entire foot in a smooth, semicircular movement, from the heel, through the midfoot (to the midfoot), to the tips of the toes, from which we rebound. This cycle is repeated in each step, where each leg alternates between supporting and swinging. It is connected with running by a double step, considered a motor cycle. The most important difference is the cyclical occurrence of the flight phase in running, which is absent in walking. Humans are the only creatures whose lower limb can be fully extended at the knee while walking. Rolling the limb over the foot produces the typical up-and-down movement of the torso unique to humans. It is worth noting that nowadays many of us bend the knee joints while walking, thus eliminating the possibility of elastic stretching of the tissues and then obtaining a flexible rebound from the ground and accelerating the limb forward, alternating in the support and swing phases.

The gait should be energetic, with quite long steps, with the pelvis raised and the trunk slightly tilted forward to induce a stabilizing effect of the muscles and fascia of the trunk. When walking, we actively use our arms, which we move alternately in relation to our legs. Such work allows both the pelvis and shoulders to become stronger and thus rotate more effectively in the transverse (horizontal) plane, which will lead to effective stretching of the fascial structures. In track and field, a variety of marching exercises and walking techniques are used to improve fitness, coordination and muscular strength.

Power walking is a form of intense walking that combines elements of traditional walking and running, but without the flight phase (no contact with the ground). It is an effective and safe form of physical activity for people of all ages and fitness levels, and has many health benefits. It is also an excellent alternative for those looking for intense physical activity without the load connected with running. It can also be a great addition to other forms of training, such as strength training or yoga. Power walking pace usually happens at a speed of 5 to 8 km/h (8:30 -7:30 min/km). This fast walking involves not only the leg muscles, but also the arm muscles. You should keep your arms near your torso and move them alternately at the same pace as your legs. During training, all parts of the body are strengthened: including the back and abdomen (entire torso). The goal of power walking is to maintain a constant, fast rhythm, but in a comfortable way to maintain the pace, without getting out of breath.

Nordic Walking is a form of physical activity used outdoors, consisting of dynamic walking with alternating work of arms and legs using specially adapted poles. Thanks to the use of poles, Nordic walking involves about 90% of the body's muscles, which makes it more effective than regular walking. By bouncing off the poles, the muscles of the shoulder girdle and torso are activated and the load is relieved on the knee, hip and lumbar spine joints. The use of poles also lengthens your stride and increases your walking pace. Thanks to this, you will burn more calories than walking without Nordic walking poles. Nordic walking can be practiced anywhere, at any time of year and day, in any terrain (soft surfaces, such as a dirt road, sand, or meadow, are especially recommended). The length of the poles is individual for each person and depends on the length of the upper and lower limbs and torso. The easiest way

to choose the length of the Nordic walking poles is to hold the pole vertically in a standing position, and the arm and forearm should form a right angle (90 degrees) or slightly obtuse. There are many health benefits connected with walking:

- Improving the condition of the cardiovascular system (cardio training), increasing the efficiency of the heart and lungs.
- The intensity of walking promotes calorie burning, which helps in weight control.
- Engaging many muscle groups, including legs, buttocks, abdomen and arms, leads to their strengthening and stabilization.
- It is less stressful on the joints than running, which reduces the risk of injuries.

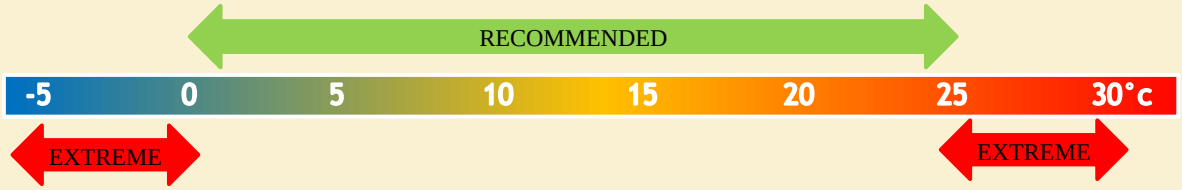
Before starting power or Nordic walking, warm up to prepare your muscles and joints. Incorporate speed intervals to boost intensity. After your session, do short stretches to relax muscles and aid recovery.

GENERAL GUIDELINES

- When walking, pay attention to your body posture so as not to slouch or lean forward too much, and look straight ahead, not down at your feet. Keep your arms relaxed and your elbows bent at a 90-degree angle. Work with them alternately together with your legs, forwards and backwards, not sideways.
- Place your feet optimally, not too narrow or too wide, straighten your leg at the knee and place it on the heel, but softly without hitting the ground. Roll it all the way down to your toes. Bend your rear leg slightly at the knee and actively push off the toes to start the next step.
- Breathe naturally, through your nose, activating lower rib breathing (diaphragmatic breathing). Adjust your walking pace to your current physical condition. Start with light walking of 4-5 km/h (15:00-12:00 min/km) and gradually increase the intensity of 6-7 km/h (10:00-8:30 min/km).
- In the case of Nordic walking, adjust the Nordic walking poles to your body height, do not lean too heavily on the poles while walking, but use them for a dynamic rebound and relieving the spine and legs.

TEMPERATURE CONSIDERATIONS

When the outdoor temperature is above 26.6°C and below 0°C, the risk of getting walking injury is high. It may be the best to exercise indoors.



High knee march

DESCRIPTION

- This exercise enhances body stability, coordination, and strengthens the leg and torso muscles. Start by lifting one leg to hip height while alternating arm movements. Transition from a single-leg stance to a reverse lunge, adjusting hand positions as you step back. The leading leg supports the body in the lunge, with the torso aligned. Repeat several times on one leg before switching, or alternate legs for added difficulty and coordination.

FOCUSES

- Keep your posture straight while moving, do not bend your hips, keep them high.
- Don't tense your neck and shoulders. The head is in extension of the body, eyes looking straight ahead.
- Gradually increase the intensity of the exercise while maintaining the correct posture.

Lunges with knee raise

DESCRIPTION

- This exercise improves stability, coordination, and strengthens the legs and torso. Lift one leg to hip height while alternating arm movements.
- Transition to a reverse lunge, adjusting hand positions. The leading leg supports the body.
- Repeat on one leg, then switch, or alternate legs for more difficulty and coordination.

FOCUSES

- Keep your core engaged and hips high. Move dynamically with bent arms.
- In the single-leg position, maintain right angles with your torso and leg.
- In the lunge, keep your head, torso, and leg aligned without arching your back.

JOGGING

JOANNA GRADEK

Running differs from walking primarily in faster body movements and step frequency. Each subsequent step must be taken immediately after the foot touches the ground. To do this, the upper body should be upright, leaning slightly forward to maintain momentum. The landing of the swing leg (anterior leg) should be on the midfoot with the heel low above the ground, which has a shock-absorbing effect and allows the foot to come into "soft" contact with the ground. Unfortunately, many people run using the walking step, hitting the ground with their heel, which negatively affects the technique and running economy. To eliminate this situation, place your foot directly in front of your center of gravity so that your upper body does not lag behind and you can start the next step by lifting your leg, rather than pushing it off. When shaping your running technique, you can use a variety of surfaces, such as running on moss, deep snow, water, or barefoot on grass or sand. This has a positive effect on the correct positioning of the feet on the ground. The upper limbs cooperate with the legs by making an alternating movement towards them. A common feature of all running techniques is the presence of a flight phase.

Jogging is recreational running and is defined as rhythmic, not too fast outdoor running, practiced to maintain good physical condition, without any element of competition. It is running of moderate intensity, usually at a speed of about 7-9 km/h (9:00 - 6:30 minutes/km) in low intensity zones of about 60-70% HR max, with the possibility of continuing it without excessive effort.

Slow jogging is running at a very slow pace, focused on landing on midfoot, with the inner part of the foot, making contact with the ground on the side of the big toe. At this point, the body forms a straight line, aligned from the head through the pelvis and knees to the feet, so it is a gentle movement that does not affect the knees. It is important to maintain a cadence of 180 steps per minute. The run occurs at a niko niko (Jap) pace, which means running with a smile and not getting tired. Everyone has their own individual pace depending on their fitness. For beginners it may be 4 km/h (15 min/km), and for more advanced people even 9-10 km/h (6:30-6:00 min/km). While jogging, the body posture is upright and slightly leaning forward. Low intensity running does not cause shortness of breath, so breathing happens naturally and calmly through the nose. The goal of slow jogging is to minimize the stress on joints and muscles, which makes it ideal for overweight people who are returning to physical activity after an injury.

Sprint is a very fast run that requires extraordinary muscle strength for a short period of time, resulting in a very high cadence. It is an intense form of running that requires a lot of physical effort and appropriate preparation. Sprints are an effective method for improving speed, strength and muscular endurance. Due to the high intensity, sprints should be introduced into training gradually to avoid injuries.

Natural running is a style of running that imitates the way people ran before the development of modern athletic footwear. Natural running is often associated with running barefoot or in minimalist shoes that have a thin sole and little cushioning. This type of footwear allows for better feeling of the ground and natural movement of the foot. Natural running emphasizes landing on the midfoot. This way of landing reduces the load on the joints and spine. Strides in such running should be shorter and more frequent, which helps maintain body

stability and reduces the risk of overloading muscles and joints. The ideal cadence is around 170-180 steps per minute. Natural running promotes an upright posture with a slight forward lean, which allows for better use of the force of gravity and the natural movement of the hips.

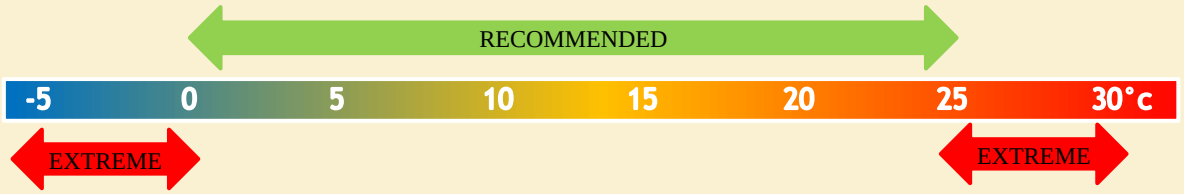
Choosing the right running surface is essential for joint and muscle health. Soft surfaces like grass or special treadmills reduce injury risk compared to asphalt or concrete. Beginners should avoid uneven terrain to prevent ankle sprains. A 5-10 minute warm-up with stretches and dynamic exercises (e.g., walking, skipping, squats) prepares the body for running, reducing injury risk and improving performance. Gradually increase training intensity to avoid overloading the body, with no more than a 10% increase in volume per week and rest days between intense sessions. Proper footwear, weather-appropriate clothing, and reflective gear for low visibility are also key to safe, enjoyable running.

GENERAL GUIDELINES

- When running, remember your posture, keep your head straight and look straight ahead, avoid looking down, which can lead to tension in the neck and shoulders. Arms relaxed with elbows bent approximately at 90 degrees. Don't raise your arms too high or tense them.
- The torso leans slightly forward, which helps in natural running. Avoid leaning back. Try to land on the midfoot, which reduces the impact force and reduces the risk of injury. Avoid running on your heels.
- Remember to warm up and do stretching and cool-down exercises after running.
- Listen to your body, pay attention to the signals sent by your body.
- Choose soft surfaces for running, preferably grass or forest roads, avoid running on asphalt and concrete terrain, which may lead to overload.
- Increase the intensity and volume of your running gradually. Introduce days of rest or light training between intense runs to recover your muscles and joints.

TEMPERATURE CONSIDERATIONS

When the outdoor temperature is above 26.6°C and below 0°C, the risk of getting injury is high. It may be best to exercise indoors.



March in place with High Knees Butt Kickers



DESCRIPTION	FOCUSES
○ This exercise activates posture and leg muscles, enhancing stability and coordination. ○ Start by lifting one knee while moving the opposite arm, then switch to bending the other leg with the heel to the buttock. ○ Repeat in place, then progress to walking and jumping with leg switches. Master the movement before increasing intensity.	○ The body is upright, stepping on the entire foot. ○ Maintain a straight posture with hips high and gaze forward. Arms move freely, shoulders relaxed. ○ Move smoothly, landing on the midfoot with a bent knee when switching legs.

Alternating Leg Jump from a High Plank



DESCRIPTION	FOCUSES
○ This exercise strengthens the core, improves stability, balance, and hip mobility. ○ Start in a high plank, jump one foot to the same hand, then switch legs. ○ Begin by stepping, then progress to jumping once mastered.	○ During the exercise, try to balance the fulcrum (hands and legs that touch the ground). ○ Keep your back straight during starting position and anterior leg phase. Don't raise your head, keep your eyes on the ground.

HIKING

ELENA BENDIKOVA

Hiking is an endurance exercise of a cyclical nature with moderate intensity of load, where aerobic energy is the priority. The advantage of this physical activity is its technical simplicity. The disadvantage is the time required to perform the activity to obtain the same aerobic effect, i.e. walking takes about three times longer than running. The basic physical activity in hiking is **walking**, the core of which is based on the deep stabilization system, manifested in the correct coordination of movements through foot stepping, upright posture and arms coordination.

Proper walking in hiking is economical with a reasonably long stride and frequency of upper limb movement, depending on speed. Care should be taken to ensure that the gravity centre fluctuations are not increased by an unnaturally long stride and sideways rotation of the feet. The pelvis rotates forward and backward around the vertical axis of the body in harmony with the swing leg. The shoulders rotate opposite to the pelvis. The arms are loose against the body, working in harmony with the movement of the legs in an alternating rhythm. If more challenging terrain is chosen, greater coordination of the arms and a slight bend (flexion) at the elbow joint will be necessary. The head and trunk are upright when walking, at higher speeds the trunk goes into a slight forward bend. In flat terrain, the body is always upright, while a hilly terrain requires a slight bend. Foot strike remains natural, on the entire foot, slightly over the heel in flat terrain. While ascending, we step on the forefoot, and then on the entire foot. While descending, we step on the heel and continue across the entire foot.

Gait speed depends on the length and frequency of the step - on a flat surface it reaches on average of 4 - 6 km/hour. The speed in mountainous terrain is on average 3 to 4 km/h, in high mountain terrain even lower. The extensors of the thigh, the knee, the flexors of the foot and the flexors of the thigh play a decisive role. The work of the muscles when climbing and descending is 5 to 10 times greater than when walking on flat ground. In addition to speed, the degree of strain placed on the body by walking depends on the weight of the body, the load carried, the profile of the track (flat, downhill, uphill), the quality of the surface (sand, snow, mud, grass, scree), the type of footwear and clothing, and the weather conditions (wind strength and direction, rain, heat).

Health benefits of hiking: it improves the performance of the circulatory and respiratory systems. The work of the heart is economized, heart attack is prevented, the viscosity of blood vessels is improved, blood pressure is regulated, and, consequently, the blood supply to and outflow from the lower limbs is improved as well. Also lowers blood sugar, improves the breathing capacity of the lungs, helps with digestive problems, and acts as osteoporosis prevention. Also contributes to increased muscle strength of the quadriceps, hamstrings, and gluteal muscles as well as stabilization of the lower back.

GENERAL GUIDELINES

- Before starting the activity, dynamic stretching (the whole body) for 10 - 15 minutes is recommended, focusing on the lower limbs and back.
- 10 - 15 minutes after the start of the hike, take a short break to adjust your hiking equipment.
- Take a 5 - 10 minutes break after every hour of walking, a longer break at noon (1.5-2 hours). At high altitudes, rest breaks should be more frequent.
- It is necessary to have regular fluid intake, to have enough drinking water (min. 1 liter).

DESCRIPTION

- The qualitative gait stereotype is determined by the interplay between of the spine, pelvis and lower limbs
- Correct hiking gait is elastic and flexible.
- The gait cycle has four basic phases: heel strike, stance phase (accounts for 60 % of one gait cycle), pre-swing phase – toes off, swing phase.
- The body is upright, stepping is done on the entire e foot (slightly over the heel).

FOCUSES

Flat terrain:

- The body is upright, stepping on the entire foot.
- Each arm swings with the motion of the opposing leg.
- The heel lifts off the ground up to about 2 cm, (depending on the terrain).
- Step length and walking pace remain constant.

Uneven terrain:

- The body is slightly bent forward (10° – 15°) (sometimes even more).

TEMPERATURE CONSIDERATIONS

Hiking can be done all year round depending on the weather (sunny, partly cloudy and overcast). The ideal air temperature is from 15 to 23 degrees. Autumn, spring and summer are ideal**.** Attention: Cardiac patients are sensitive to the weather.

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CHAPTER 9

OUTDOOR BALANCE DEVELOPMENT

MICHAEL JANEK
JAN KLAUS

Balancing is an essential skill practiced daily in activities such as walking, standing, sitting, and household chores, and it is even more critical during sports. Balance, the ability to maintain equilibrium, involves keeping the body's center of gravity within its base of support. It can be categorized into static balance, maintaining a fixed posture, and dynamic balance, maintaining postural stability while the body or its segments are in motion (Trainer Academy, n.d.).

Balancing is metabolically demanding and requires high levels of neuromuscular control. Performing balance exercises in outdoor settings can enhance balance as a skill, improve cardiovascular health, strengthen postural muscles, stabilize joints, and increase lower body strength (Saeterbakken et al., 2011). These exercises are widely used in both team and individual sports to improve coordination, stability, strength, enhance proprioreception and neuromuscular control. They focus on movement quality and emphasize joint control in all three movement planes. Incorporating balance exercises into your fitness routine can significantly reduce the risk of injuries by enhancing stability and coordination (Vasta et al., 2020). Simple balance activities can include standing on one foot while brushing your teeth or tying your shoes, standing on tiptoes while washing dishes, or balancing on one leg during TV commercials with eyes closed, etc. Always prioritize safety, starting with easier tasks and progressing gradually. Developing balance is a critical aspect of physical fitness that benefits individuals of all ages.

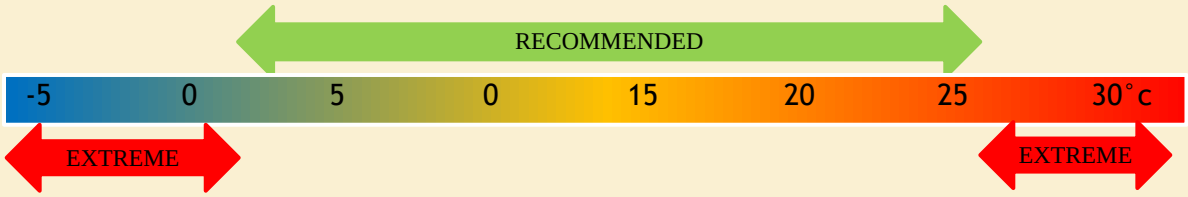
A great activity based on balancing exercises is also yoga, which we discuss in a separate chapter. In this chapter, you will learn about balance exercises that don’t require any equipment, including slackline walking and the use of balance boards. An excellent outdoor balance training option is walking or exercising on a slackline. Exercises with conventional balance tools used to improve balance abilities and postural control significantly differ from slackline in terms of the movement of the balance tool. Conventional balance tools always maintain a more or less fixed position in space but exhibit unstable properties. In contrast, a slackline moves freely in space within a relatively large range, so the supporting lower limb must suppress and balance the lateral movements of the foot to align the body's center of gravity over the moving point of support. For this reason, balance training with conventional balance tools primarily activates the muscles surrounding the ankle joint, whereas training on a slackline simultaneously activates the muscles of the ankle joint, knee joint, and hip joint (Keller et al., 2012). Balancing on a slackline is metabolically demanding and slackline training is suitable not only to develop neuromuscular control but also to meet cardiovascular fitness demands (Baláš et al., 2023).

GENERAL GUIDELINES

- Warm-Up: Start with 5-10 minutes of light jogging, dynamic stretching, or jumping jacks to prepare muscles and joints.
- Start with basic exercises such as standing on one leg or easy semi-squats.
- Use support initially: benches, trees, walls can assist until balance improves.
- Maintain proper posture, alignment, and engaged core for stability.
- Breathe steadily to relax muscles and improve balance.
- Safety first: Make sure your exercise area is free of obstacles to prevent falls. When performing exercises with a higher risk of falls, use a mat or soft surface to cushion any fall. When exercising outside on grass, first clear the area from any branches, rocks and other objects.

TEMPERATURE CONSIDERATIONS

Balance exercises typically activate muscles concentrically, meaning that muscles work when they shorten, or isometrically, meaning that muscles work without changing their length. This consumes a lot of energy, eventually heating up your body. Therefore, balance exercises could be an ideal workout in colder weather, however a wide temperature range is suitable. Avoid balance exercises when the temperature drops close or below zero degrees Celsius because of the risk of slipping on icy surfaces.



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Outdoor balance beam knee touch downs

DESCRIPTION

- Stand tall on the balance beam in a wide tandem stance with your feet about one meter apart.
- Engage your core muscles to maintain stability, tilt your pelvis backward, and keep your posture upright.
- Relax or extend your arms to the sides for balance.
- In this stance, squat down and touch the beam with your back knee, keeping your upper body upright.

FOCUSES

- Walk over the balance beam a few times to get used to it.
- Fix your gaze on a stationary point to maintain balance.
- Extend arms out to the sides for support.
- Position your feet far enough apart to ensure the knee of your front leg doesn't extend beyond your toes.
- Move slowly to avoid wobbling and engage stabilizing muscles.

Balance clock

DESCRIPTION

- Start with feet hip-width apart and arms relaxed at your sides. Imagine standing in the centre of a clock face.
- Shift weight onto one foot, slightly bending the knee for stability.
- Move your free foot to the 12 o'clock position, tap the ground, and return.
- Repeat for the 3, 6, and 9 o'clock positions, then optionally continue taping at 1, 2, 4, 5, 7, 8, 10, and 11 o'clock.

FOCUSES

- Stand tall with an upright upper body.
- Bend the knee of your standing leg to enhance range of motion/difficulty.
- Fix your gaze on a stationary point to maintain balance.
- Engage your core, move your leg slowly and deliberately
- to maintain balance.
- Extend your arms out to
- the sides for extra balance if needed.

CHAPTER 10

OUTDOOR RECREATIONAL GAMES

TAMAS SARUS

ABOUT RECREATION, PLAYING SPORTS

What is recreation? Simply put, recreation is a voluntary, meaningful, and enjoyable way of spending free time that results in physical and mental rejuvenation. Recreational activities can vary, such as gardening, reading, but in line with the spirit of our book and chapter, we suggest choosing a sports game for recreation. Why?

Regardless of age, playing games provides an opportunity for enjoyable leisure time activities, and it can improve our social, cognitive and affective abilities. Doing sports (regularly) also have beneficial effects on the cardiovascular system, nervous system, skeletal structure, muscles, respiratory system, brain function and mental health.

You may wonder, can't we do sports indoors, which might be more comfortable, so why is it necessary to go outdoors? After all, we might get wet, sunburned… Similar to sports, the natural environment also has several positive effects on the human body. It helps to relax, effectively deal with stress, and improves overall well-being. In this regard, here is an interesting example: German researchers found a reverse relationship between the size of green spaces in cities and the amount of antidepressants given to patients (Marselle et al, 2020).

In the following, we present some examples about outdoor recreational sports games. The aim of this chapter is to provide ideas how to play different games and encourage creative and environmentally conscious thinking rather than detailed game and rule descriptions.

BALL GAMES WITH A LITTLE TWIST

When we talk about sports games, we might think of the "classic" ball games: soccer, handball, volleyball, basketball. However, these games have lesser known variations that are just as entertaining as the original game.

Korfball is a coeducational ball game, many of its rules resemble basketball, with the most interesting difference relating to ball handling: dribbling or running with the ball is not allowed. As a result, passing plays a particularly important role in this game, emphasizing communication as well.

A similar game is netball. There is no dribbling in this game as well, but a significant difference compared to korfball is that players have different positions and roles, for example only one person in the team allowed to score points. As a curiosity, there is a game called walking basketball. As indicated by its name, running is not allowed. This game is primarily aimed to provide the experience and joy of playing basketball for older people, but anyone can play it.

Many people are hesitant to play basketball due to difficulty in dribbling. Therefore, the above-mentioned games can be ideal alternatives to traditional basketball. Although both

korfball and netball require a special a goal ring, or hoop, you can simply put up a T-shirt, towel, or a bag to a tree branch as a makeshift hoop.

If you're tired of traditional soccer, try teqball! This 2-4 player game features a unique, curved table with a solid net in the middle. The rules are similar to table tennis, with the exception that the ball can be touched with any part of the body except arms and hands, although players mostly use their legs. This game is exciting and fast-paced, but it requires a special table to play.

Football tennis, or futnet, can be an ideal game if you don't have a teqball table in your environment. Officially, you need a net to play the game, but since the aim is to get the ball on the ground in the opponent's court, you only need to divide your makeshift court into two equal parts by drawing a line on the ground. You can place your bags on the line, or connect two trees with a rope, in order to make a “net”. You can choose a fallen tree trunk to serve as a net and dividing line as well.

GRAB THE RACKET

A popular game is table tennis. Whether you are an amateur or a professional, the game is relatively simple. It can be played in pairs of two against two, in which case the members of the pair are responsible for one part of their section on the table, or take turns to hit the ball. But what if there are more than four of us? If you just want to pass the ball back and forth, you go around the table and the player who is at the end of the table and hits the ball. What if not everyone has a racket? And you want to add a little competition? Simple. Two teams line up at each end of the table, the first person in the group has the racket. The first player serves or receives the ball. After hitting the ball, he passes his racket to his partner behind him and goes to the back of the line. The team scores a point if the opponent makes a fault.

Even less equipment is needed to play badminton. The rules say you need a net, but if your goal is to have fun and do a little sport, you really need two rackets and a badminton ball. You can vary the rules, customize them to your own liking. If you're tired of hitting back and forth, simply lay a towel, or any object on the ground, as a target area, see who amongst you can hit the target more accurately.

A PIE PLATE, WHAT CONQUERED THE WORLD

For this game, you only need a frisbee disc. The game's full name is Ultimate Frisbee. According to the rules, two 7-player teams compete against each other. The goal of the teams is to pass the disc to each other and place it to the designated zone on the opponent's side, scoring points. Moving with the frisbee is not allowed, but players without the disc can move freely. An interesting aspect of the game is that there are no referees in matches; players are responsible for enforcing the rules themselves.

SOME TIPS FOR OUTDOOR RECREATIONAL GAMES

Be creative and use your surroundings. No basketball hoop? Lines? Draw lines on the ground with a stick, mark the field with rocks, or improvise a target area on a tree. Create your own game rules! An ingenious solution can be, for example, that scoring a point is only possible after each member of the team has possessed the ball at least once, or you can eliminate the possibility of a back pass, or specify how many times players can get the ball or how long they can possess it.

Take care of your environment! Litter scattered in nature is a sad sight, especially when there is a trash bin nearby! If there is no trash can, keep the garbage until you can find a trash bin. If you utilized the environment to set up your game space, try to rearrange everything as you found it initially. Do not alter the environment in a way that causes harm in it, for example, do not break a branch just to draw lines for your game on the ground.

Remember that the goal of playing sports games is to have fun together, utilize your time for useful, active, and enjoyable activities. Consider that your fellow players, friends also want to have a good time. Keep this in mind while playing sports games and creating rules together.

We hope our chapter has provided useful ideas and perspectives for spending leisure time in a fun way. All that's left is to grab your racket, ball, and head to the beach, forest, or park!

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