

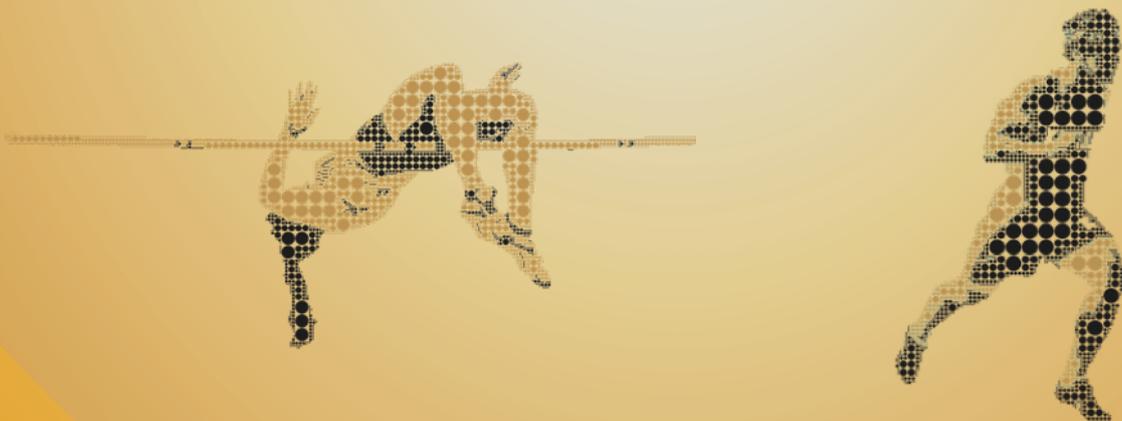


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# TRAINING GUIDELINES

## Theoretical Framework





## Partners



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## Introduction

This document is the second of a number of planned products from an ERASMUS+ funded EU project titled “[SPHERE – Sport Healing Rehabilitation](#)”.

### What is SPHERE?

SPHERE is a two-year project that aims to promote the use of physical activity as part of psychiatric rehabilitation programmes. Informed by contemporary research and examples of best practice, SPHERE will:

- Produce a set of physical activity guidelines to aid mental health practitioners.
- Following the creation of the guidelines, the SPHERE team will train teams of mental health practitioners and sport trainers in the use of these guidelines, relevant to their specific environments.
- Practice based partners will design, deliver and evaluate an intervention based on those guidelines.
- SPHERE will produce the following documents/guidance:
  1. Physical activity guidelines to aid those institutions that implement sport or exercise programmes in mental health rehabilitation.
  2. An online map providing examples of best practices through case studies across the EU in the use of physical activity for psychiatric disorders;
  3. An evaluation report of the interventions delivered as part of the SPHERE project.

The SPHERE project has seven partners from six EU countries, led by the networking organisation ECOS (European Culture and Sport Organisation), and includes third sector sport institutions and Universities. The project team includes the following organisations:

- European Culture and Sport Organization (Italy; Lead organisation)
- European Platform for Sport Innovation (Belgium)
- Everton in the Community (UK)
- Finnish Sport Federation Tampere Region (Finland)
- Rijeka Sports Association for Persons with Disabilities (Croatia)
- Cardiff Metropolitan University (UK)
- Technical University of Munich (Germany)

## What is the aim of this document?

The aim of this document is to:

1. Highlight the prevalence of mental health problems and their symptoms in today's society.
2. Highlight specific socio-medical procedures to manage patients with different diagnoses and backgrounds.
3. Provide specific training methods to encourage patients in participating in sports activities.
4. Provide practitioners and mental health professionals with practical guidance to design, deliver and evaluate sport and physical activity opportunities for people with mental health problems.

## What is included in the document?

The document includes four main sections referring to the document aims.

1. Psychiatric disorders
2. Overview of the benefits of exercise for mental health
3. Guidelines to manage patients in practicing exercise
4. Conclusion

## Section 1: Psychiatric Disorders

### What is mental health?

Mental health is a state of well-being, in which an individual realizes his or her own abilities, can cope with the normal stress of life, can work productively and is able to make a contribution to his or her community [1]. Good mental health is a critical part of individual well-being, and the foundation for balanced, fulfilled, productive lives.

### What is a psychiatric disorder?

Psychiatric disorders represent disturbances to a person's mental health that are often characterized by a combination of troubled thoughts, emotions, behaviour and relationships with others [2]. Psychiatric disorders or mental illness, can affect anyone at some point in their lives – whether experiencing mental illness themselves, or as a family member, friend or colleague of someone living with a mental disorder [3]. Without effective prevention and treatment, mental illnesses can have profound effects on people's ability to carry out their daily lives and often result in poorer physical health. The impact of poor mental health can affect people throughout their lifetime. For example, children and adolescents with poor mental health have been found to experience worse educational outcomes and reduced job opportunities. In adult populations, psychiatric disorders have been linked to reduced productivity at work and increased levels of unemployment. Elderly people with psychiatric disorders are more likely to be isolated and to be less active in their community [3].

The links between mental disorders and major non-communicable diseases (NCDs) such as diabetes or cardiovascular disease are well established. Mental disorders affect, and are in turn affected by, major NCDs (i.e., they can be a precursor or a consequence of chronic conditions such as cardiovascular disease, diabetes or cancer). Risk factors associated with both NCDs and mental disorders include sedentary behaviour, smoke and harmful use of alcohol. However, in clinical practice, such interactions and comorbidities are routinely overlooked, and as such premature mortality and disability could potentially be reduced if there were a greater focus placed upon addressing comorbidity. People with mental disorders die 20 years younger than the general population. The great majority of these deaths are not due to a specific cause (such as suicide) but rather to other causes, notably NCDs that have not been appropriately identified and managed [4].

## What are the most common types of psychiatric disorders?

Psychiatric disorders cover a wide range of illnesses. The most common types are:

### **Depression**

Depression is a common mental disorder and one of the main causes of disability worldwide. Globally, an estimated 300 million people are affected by depression, and more women are affected by it than men. Depression is characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, tiredness, and poor concentration. People with depression may also have multiple physical complaints with no apparent physical cause. Depression can be long-lasting or recurrent, substantially impairing an individual's ability to function and to cope with daily life. At its most severe, depression can lead to suicide [5].

### **Anxiety Disorders**

Anxiety disorders include disorders that share features of excessive fear and anxiety and related behavioural disturbances. These disorders include separation anxiety disorder, specific phobia, social anxiety disorder (social phobia), panic disorder, agoraphobia, generalized anxiety disorder, substance/medication-induced anxiety disorder, and anxiety disorder due to another medical condition. Symptoms related to anxiety disorders, for example, include challenges in controlling anxiety and worry, restlessness, being easily fatigued, having difficulty concentrating, irritability, muscle tension, and disturbed sleep [6].

### **Obsessive-compulsive disorder**

Obsessive-compulsive disorder (OCD) is characterised by the presence of either obsessions or compulsions, but commonly both. An obsession is defined as an unwanted intrusive thought, image or urge that repeatedly enters the person's mind. Obsessions are often distressing, acknowledged as originating in the person's mind and not imposed by an external agency, and usually regarded by the individual as unreasonable or excessive. Common obsessions in OCD include: contamination from dirt, germs, viruses, and body fluids; fear of harm (e.g., door locks are not safe); excessive concern with order or symmetry; body or physical symptoms; religious, sacrilegious or blasphemous thoughts; urges to hoard useless or worn out possessions; and, thoughts of violence or aggression [7].

### **Adjustment Disorders**

Adjustment Disorders (AD) occurs when a person who has recently been exposed to one or more sources of stress fails to "adjust" to the experience but develops an abnormal emotional and behavioral response. Symptoms of these disorders are distinguished from normal reactions to difficult situations because they cause a marked impairment of functioning in the social, work, school or other important areas of the individual's life [8].

### **Post-traumatic stress disorder**

Post-traumatic stress disorder (PTSD) often develops in response to one or more traumatic events such as deliberate acts of interpersonal violence, severe accidents, disasters or military action. Those at risk of PTSD include: survivors of war and torture, accidents and disasters, and violent crime (e.g., physical and sexual assaults, sexual abuse, bombings and riots); refugees; women who have experienced traumatic childbirth; people diagnosed with a life-threatening illness; and, members of the armed forces, police and other emergency personnel [9].

### **Bipolar affective disorder**

Bipolar affective disorder affects approximately 60 million people worldwide. It typically consists of both manic and depressive episodes separated by periods of normal mood. Manic episodes involve elevated or irritable mood, over-activity, pressure of speech, inflated self-esteem and a decreased need for sleep. Depressive episodes include the symptoms of depression, and overall refer to a sense of feeling very low and lethargic. People who have manic attacks but do not experience depressive episodes are also classified as having bipolar disorder [5].

### **Schizophrenia**

Schizophrenia is a severe mental disorder, affecting approximately 23 million people worldwide. Psychoses, including schizophrenia, are characterized by distortions in thinking, perception, emotions, language, sense of self and behaviour. Common psychotic experiences include hallucinations (hearing, seeing or feeling things that are not there) and delusions (fixed false beliefs or suspicions that are firmly held even when there is evidence to the contrary). In addition to productive symptoms there are also negative symptoms such as emotional flattening, social withdrawal, loss of vital energy, poor thinking, and cognitive symptoms such as concentration and working memory deficits. The disorder can make it difficult for people to work or study effectively [5].

### **Substance use disorder**

A substance use disorder (SUD), also known as a drug use disorder, is a medical condition in which the use of one or more substances leads to a clinically significant impairment or distress. A SUD is characterized by a combination of mental, physical, and behavioural symptoms that may cause problems related to loss of control, strain to one's interpersonal life, hazardous use, tolerance, and withdrawal. Drug classes that are involved in SUD include alcohol, phencyclidine, inhalants, stimulants, cannabis, "other hallucinogens", opioids, tobacco, and sedatives, hypnotics, and anxiolytics [10].

### **Comorbidity of mental and physical illness**

Comorbidity of mental disorders and physical illnesses, and multiple mental illnesses, is common. Some mental disorders may affect individuals for only a short time, while others affect individuals their entire life. Psychiatric disorders often result from a complex interplay of many factors, including genetic, social and economic factors, and can be provoked or worsened by behavioural and environmental factors such as alcohol and drug abuse, poverty and debt, trauma, or physical ill-health [3].

### **What is the prevalence of psychiatric disorders in Europe?**

Although there are significant gaps in information about the prevalence of psychiatric disorders across EU countries, available evidence suggests that mental health problems affect tens of millions of Europeans every year. The data currently available from population-based surveys are often limited to a few specific mental health disorders, or specific age groups. However, the Institute for Health Metrics and Evaluation (IHME) provides estimates of the prevalence of a wide range of mental health disorders across all age groups based on a wide variety of data sources and a set of assumptions. According to the latest IHME estimates, more than one in six people across EU countries (17.3%) had a psychiatric problem in 2016 – that is, nearly 84 million people. The most common mental disorder across EU countries is anxiety disorder, with an estimated 25 million people (5.4% of the population) living with anxiety disorders, followed by depressive disorders, which affect over 21 million people (4.5% of the population). An estimated 11 million people across EU countries (2.4%) have drug and alcohol use disorders. Severe mental illnesses such as bipolar disorders affect almost 5 million people (1% of the population), while schizophrenic disorders affect another estimated 1.5 million people (0.3%) [11].

Several mental illnesses are more common amongst women, including anxiety disorders, depressive disorders and bipolar disorders. Some of these gender gaps may be due to a greater propensity of women to report these problems. However, one exception is drug and alcohol use disorders, which are on average more than two times more likely to occur in men than women across EU countries [11].

In addition to diagnosed mental disorders, many individuals have a poor mental health that does not reach the threshold to be diagnosed as a mental disorder. Diagnosed mental disorders and subthreshold mental disorders affect a large part of the population and are the diseases that contribute most to the chronic conditions that afflict the European population.

### **What are the bio-psycho-social approaches used to manage patients with different diagnoses and backgrounds?**

The fundamental strategies to tackle mental disorders are psychopharmacology, psychotherapy, and psychiatric rehabilitation. Generally, an effective therapeutic approach

will include all three of these strategies, and be adapted to the type of patient and their psychopathological condition [12].

For many years, the most conventional medical therapies have been accompanied by rehabilitative interventions using similar methods, and have aimed to achieve a rebalancing of the patient's social and psychological functioning.

### **Physical activity and psychiatric rehabilitation**

Psychiatric rehabilitation can be defined as a set of techniques and interventions useful for decreasing the effects of chronic mental illness and for actively promoting patient reintegration in the social and work context of reference [13]. Since the contexts in which psychic distress manifests are different, a good rehabilitation intervention must be multidisciplinary and involve the patient, the family, the community, and the environment.

The fact that there is a close relationship between physical and mental health indicates that poor physical health can cause mental disorders and vice versa [14]. Psychiatric patients, due to pathology, pharmacological treatments, and lifestyles, are particularly at risk for cardiovascular diseases, obesity, metabolic syndrome. Consequently, sport, exercise and physical activity, due to their positive impact on physical and mental health, are one of the most commonly used rehabilitation practices in addition to other approaches such as music therapy, neurocognitive therapies, and therapeutic horticulture [15].

Despite the scientific evidence produced in the literature, most of the rehabilitation programs in psychiatry do not include physical exercise and sporting activity and when they are present the modalities of action are not defined and the outcomes are not measured.

## Section 2: Overview of benefits of physical activity, exercise, and sport for mental health

The benefits of physical activity, exercise, and sport upon well-being and mental health have been frequently cited [16]. Specifically, the Royal College of Psychiatrists have recognised exercise prescription as a treatment modality for a wide range of mental health conditions [17].

Several studies [18] have indicated that sport, exercise, and physical activity can positively influence the prognosis of some mental disorders that represent the most frequent causes of mental disability – including major depression, schizophrenia and Alzheimer’s disease [19]. Sedentary life-style determines an important change of biological factors that support the good balance between mental and body functions and mood. In the human body there is a sophisticated system of molecules performing as extracellular messengers mostly belonging to the nervous, endocrine, immune and muscular systems. Many exercise-related improvements in cognitive function have been associated with local and systemic expression of growth factors in the brain, most notably, brain-derived neurotrophic factor (BDNF) [20]. BDNF promotes many developmental functions in the brain, including neuronal cell survival, differentiation, migration, dendritic arborisation, and synaptic plasticity [21]. Skeletal muscle can also act as an endocrine organ that, through contraction, stimulates the release of extracellular messengers (BDNF, dopamine, irisin, thermogenin, cytokines) influencing metabolism and modifying their production in tissues and organs. These substances, after they reach the brain, can also stimulate the development of new nerve cells and increase the number of synapses, enhancing memory, learning and cognitive abilities preventing or contrasting the effects of psychiatric disorders.

Sport has a bio-psycho-social perspective and an important impact throughout life. Physical activity promotes neuroendocrine changes with antidepressant and anti-stress effects, improving mood and reducing arousal excess, constantly stimulating the sympathetic and parasympathetic nervous system [22]. Physical exercise raises the levels of norepinephrine and dopamine and the release of endorphins.

Many studies suggest that the strong correlation between mental disorders and metabolic syndrome is due to the sedentary lifestyle of people suffering from these problems, which is an important risk factor for the onset of cardiovascular diseases, diabetes and tumours. In this regard, some recent meta-analyses have estimated that the 32.5% of individuals suffering from schizophrenia also have metabolic syndrome [23].

International scientific literature and guidelines on the treatment for mental disorders suggest to integrate pharmacological treatments with psychological and psychosocial interventions aimed at the prevention of risk factors and the modification of lifestyles [24].

Just as there are risk factors for mental disorders and mental suffering there are also protective factors, among these factors physical activity and sport are very important.

Exercise represents an opportunity to observe the close relationship linking the three dimensions that characterise the psychophysical health of the human being: mind, body and social life; on the other hand, it represents a place of action and of the relationship opposed to the "non-places" of mental distress and isolation.

### Psychological benefits

Psychological benefits of physical activity include improvements in mental illness symptoms, reduced depression, improved mood, alertness, concentration and sleep patterns. Further, physical exercise may reduce or provide a distraction from psychotic symptoms (e.g., hallucinations), improve interpersonal relationships, have a beneficial effect on one's sense of identity and enhance self-esteem [25].

### Physiological benefits

The physiological effects of physical activity include reduced blood pressure, enhanced cardiovascular fitness, weight loss, and prevention of chronic diseases such as cancer, diabetes, hypertension, obesity, metabolic syndrome, osteoporosis and cognitive conditions like Alzheimer's disease [26].

### Social benefits

Physical activity can contribute to improved quality of life for people who experience mental health problems, as it provides opportunities for social interaction, meaningful use of time and purposeful and goal-directed activity [27].

Scientific acquisitions on the role of motor functions and targeted movements (mirror neurons) in social learning and relationship management give the experience of sports activity in functional mental disorders an effective and integrated role on the biological, psychological and psychosocial level.

## Section 3: Guidelines to support mental health patients in practicing exercise

Within the realm of **psychiatric rehabilitation**, the SPHERE project team has put together a set of guidelines seeking to best harness the psychological, physiological and social benefits of sport and physical activity to facilitate patient recovery in sport-based interventions. The guidelines have been developed from a combination of an evidence synthesis from scientific literature (detailed below), and a survey on the current practices of sport and physical activity for mental health in seven EU countries [28].

Based on these sources, the SPHERE team drafted a set of punctual recommendations together with additional considerations that surround their application.

### 1. Sport and physical activity-based interventions in psychiatric rehabilitation

The guidelines may be adopted by different actors seeking to implement sports or exercise-based interventions for mental health. As different professionals and organizations will face differing and diverse circumstances such as the preferred type of sport, fitness aims, weather conditions, staff competencies, financial resources, or the surrounding environment, the guidelines have been developed as modules adaptable to particular sets of conditions. Depending on the circumstances, a particular program may adopt as many of these recommendations as possible, and adjust them to their own training and delivery protocols.

#### **SPHERE pilot intervention**

Considering the differing contexts where the guidelines may be implemented, the SPHERE project team will test them in a pilot intervention conducted in different settings by organizations in four partner countries, each with its own particular context and conditions. The evaluation of the pilot intervention will be published in a future document.

Based on a person-centred approach that relies on the benefits of sport and exercise practice, the SPHERE intervention is guided by the following aims:

- Main aim: To support people with mental health problems to proactively enhance their life quality and develop an integrated sense of self through sports and physical activity.
- Secondary aims: To, where appropriate, support participants in symptom reduction, coping, mood regulation, comorbidity prevention, socialization, enjoyment, a sense of purpose, physical and social confidence, and provide a positive activity to take part in.

### **Person-centred approach in physical activity interventions**

The guidelines emphasize a person-centred approach [29, 30] where the patient plays a proactive role in their own recovery, becoming an active participant in the process, aided by the trainer and community. Apart from helping to stabilize mood and regulate the body's biochemical processes, sport and physical activity can serve as a conduit for people with mental health conditions to enrich personal experience, develop new perceptions of the self, provide purposeful and enjoyable experiences, improve social cognition and functioning, and elaborate new meanings in personal life. This is facilitated as the participants work to achieve goals individually set with their trainers/coaches/sports leaders in the sport and physical activity sessions. Such deeper psychological developments are also important in preventing exercise addiction [31].

For these reasons, great importance is placed in keeping regular feedback and dialogue with participants, where people can share their own personal training experience while trainers/coaches/sports leaders provide an environment that allows integration with others and the achievement of goals. It is therefore recommended that goal setting, reviewing of the goals and regular feedback are used in the sport and physical activity programs to ensure that they are not only used as a tool for mood regulation but also to promote personal enrichment, a sense of purpose and enjoyment.

### **Guidelines**

When implementing sport and physical activity to support people with mental health problems, please consider each of the following recommended guidelines. Depending on the circumstances, a particular program may adopt as many of these recommendations as possible and adjust them to their own training and delivery protocols.

1. The sport and physical activity program encourages parallel medical, psychological and social enhancement.
2. Attendance to the program is voluntary.
3. Where possible, sessions or training take place at least three times per week.
4. Sessions are designed for a duration of at least 30 min, and at most, 2 hours. This duration should be dependent on ability, fitness level, and availability.
5. Training sessions end at least 2 hours before sleep time.
6. The intervention or program is designed for a minimal duration of 3 weeks, but longer duration is preferable. Shorter interventions require more sessions per week.
7. The activity is in groups, in an aim to develop social integration and social confidence, with an optimal group size between 5 and 15 people per 1 trainer.
8. When possible, training to take place before mid-day.
9. Where possible, sessions should incorporate activity in open air or natural environments.

10. Training activities are supervised by an instructor, who should provide motivation and support for the participant and adjust the program accordingly to their needs on a weekly basis.
11. The training or program involves the setting of individualized goals to gradually increase the participant's fitness, confidence and skills.
12. The intensity of physical exercise should aim towards a moderate level according to the participant's capability and fitness level.
13. Sessions should be designed in order to develop mastery of skills, facilitating cognitive stimulation in the form of skill learning (e.g. concentration, coordination, memorization, competence, use of equipment, game strategy, etc.).
14. The participant's goal progression and personal experience are supervised through regular feedback.
15. The program is flexible regarding participant involvement and attendance in each session, depending on the condition of the participant at the time of the session.
16. The sport or physical activity takes place in a welcoming environment where people feel comfortable and a part of.
17. The program encourages the participant to continue taking part in sport and physical activity once the program has finished.

## 2. Best practices/example of good practice used to develop the guidelines

The recommendations above were developed from a literature search and a survey to synthesize evidence on the use of sport and physical activity for mental health. The effects of such practices were assessed according to the physiological, psychological and social dimensions of psychiatric rehabilitation. Although these three dimensions are highly interconnected and influence each other, we follow a logic where the effects of physical activity first promote physiological enhancement, which sets the conditions where psychological improvement can better take place, and the process is aided by a supportive social environment.

### **Physiological dimension**

Physical activity produces a range of immediate physiological effects lasting from between 30 min and 4 hours [32-34], which can in turn produce psychological benefits for patients [32, 35, 36]. Most notably, these physiological modulations facilitate mood enhancement [32, 33, 37-39]. In this way, physical activity helps regulating mood since the early stages of treatment, before deeper psychological change has been achieved by the patient, [40-42]. Participants in programs shorter than 3 weeks can still benefit from the immediate aftereffects of exercise. To reach positive results, close collaboration with medical staff is important to determine the suitability of a patient for different exercise regimes by screening their physical capabilities, comorbid complications and medication status [40, 43].

During exercise, the brain's energy supply prioritizes areas related to motor learning and coordination over areas related to cognitive processing, producing hypo activation of the latter [33, 40]. This would favour the interruption of rumination processes common in psychiatric patients [40, 44] before normal brain activation ratios are restored following exercise [33]. After exercise, a slight increase in the power of electro-cortical activity in the alpha band called "alpha waves", is observed, resulting from the multiple modulations produced by exercise in the brain [33, 45, 46]. This increase lasts for up to 30 minutes, and is greater if the exercise is executed during morning time [45]. Once induced, increased alpha power reflects a state of relaxed wakefulness [33, 47, 48], which can be interpreted as a "calm mind".

A single exercise session produces the release of several neural and vascular growth factors. Among them, the brain-derived neurotrophic factor (BDNF) and vascular endothelial growth factor (VEGF) favour neural plasticity, and as a consequence, facilitate learning [32-34]. It follows that prolonged sportive practice promotes neurogenesis [32, 34, 49]. Nonetheless, the elevated concentration of growth factors is constrained to the period following active exercise, and basal levels do not change in trained individuals when they are not exercising [34], so that continual training is necessary to favour neural development. The regulation of neurotransmitter expression, most notably dopamine and serotonin also aids neural plasticity [33], while at the same time, serotonin helps in regulating mood, sleep and appetite, and dopamine favours motivation, memory, reward and attention [33]. The intensity and duration of exercise are important factors that affect the balance between the many biochemical modulations of exercise within the body to promote beneficial results for the patient [32-34].

A moderate/intermediate intensity of exercise is more often suitable to harness the physiological effects of physical activity with lower risk of physical overstrain or under-stimulation, while vigorous/high intensity exercise presents its own risks and advantages, suitable under certain circumstances [32-34, 39, 40, 43]. Although the criteria to measure exercise intensity differs between authors [43], moderate exercise can be broadly defined as that which produces a slight increase in breathing and heart frequency without being exhaustive [50], such as cycling for pleasure, racket sports, brisk walking, conditioning exercise or general calisthenics [50]. Within the moderate intensity, exercise needs to remain challenging and stimulating to enhance dopamine release [33, 34]. Such challenge and stimulation can come from gradual intensity increases as the participant's fitness develops with occasional high intensity exercise [43], cognitive challenge in the form of skill learning or through competition, socialization, exploration or stimulating environments [33, 34, 51, 52]. Low intensity exercise is an alternative for patients who are unable or unwilling to participate in more intense physical activity. However, to produce therapeutic effects like hypo-frontality or dopamine secretion, low intensity exercise needs a greater reliance in cognitive and social stimulation [34, 37, 51, 52], or exposure to natural environments [34, 44]. The SPHERE survey revealed that sports like archery, tai chi, table tennis or kicker are popular among patients [28].

Vigorous/high intensity exercise presents its own risks and advantages, which require special consideration. For instance, if the intensity of exercise surpasses the current physical capacity, exercise becomes physiologically stressful, leading to an elevated secretion of cortisol, which annuls the facilitation of learning and neural plasticity [33]. Exercising above threshold is related to negative affective responses that decrease motivation for further exercise [43]. Likewise, the risk of potential injuries, pain and overtraining can be detrimental in the mental recovery process [31-33]. On the other hand, high intensity exercise appears effective to cope with episodes of acute stress [39]. High intensity aerobic exercise can accelerate the peak frequency of cortical oscillation [46, 53], a correlate of information processing speed [53, 54]. Hence high intensity exercise is correspondingly known to produce a greater cognitive enhancement than moderate exercise [33, 35]. In the long run, greater cardio-pulmonary fitness correlates with greater brain connectivity [33]. These observations suggest that high intensity exercise could help to alleviate cognitive deficits in psychiatric and neurological conditions, but more research is still required on the subject [41, 55].

Overall, while moderate exercise intensity is safer to gradually improve the patient's physical and mental condition, especially mood regulation, high intensity exercise may be used in particular circumstances, always under close supervision from trainers, assuring that intensity does not surpass current physical capacities [41, 43]. For example, a special protocol of high intensity aerobic training has been used to improve positive affect, well-being and reduced anxiety in depressed and schizophrenic patients [39]. The effects were only visible after exhaustion was reduced, 15 min after exercise, and lasted up to 3 hours [39].

The duration of the session is also a relevant factor to prevent boredom or exhaustion from exercise, and in this way facilitate a favourable state where the patient feels a positive mood and is motivated to carry on further activities in the day. Animal models suggest that the ratio between serotonin and dopamine after exercise affects the subsequent state of mood and motivation [33]. During the course of exercise, dopamine first increases and then decreases, while serotonin only increases, eventually surpassing dopamine and producing a state of decreased motivation [33]. From this research it can be extrapolated that exercise should be terminated before the point of exhaustion or boredom to facilitate a balanced secretion of dopamine and serotonin that in turn produce a pleasurable state following exercise.

On average, research suggest a minimal duration of exercise of 30 min to achieve relevant psychophysiological modulations under moderate intensity [32, 33, 35], although intensive exercise can produce relevant effects on shorter intervals [33]. Meanwhile, the SPHERE survey revealed maximal durations of 2 hours among the surveyed institutions with positive effects on patients [28]. The survey also revealed other activities like Nordic Walking, mountain climbing or boating expeditions may take longer than 2 hours, but these represent complex and highly engaging activities divided in periods of rest and activity.

The timing of physical activity may also modulate the effectiveness of the physiological after-effects. Research suggest that the increase in the brain's alpha-power after exercise is greater in the morning [45], enhancing the state of relaxed-wakefulness. Morning exercise also has

a greater effect enhancing cognitive performance than later exercise [35]. Additionally the SPHERE team considered that morning exercise would allow patients to experience other aspects of daily life while still holding the multiple psychophysiological aftereffects of physical activity, like the aforementioned mood regulation, neural plasticity or relaxed-wakefulness. It is likely that factors like the day routine, time availability or restricted access to sports facilities make it impossible to hold morning exercise sessions, nonetheless, morning time is considered as an enhancer and not an indispensable condition for the therapeutic effects of physical activity.

One common concern regarding timing involves the effect of evening exercise on sleep quality, as a state of elevated physiological arousal after late exercise could potentially disrupt the sleep cycle [56]. In a recent review and meta-analysis of studies with healthy participants [56], the authors conclude that exercise that concludes 1 hour before sleep time does not disrupt sleep quality, even if the exercise had been vigorous. A previous poll of 1000 adults also showed that evening exercise did not disrupt sleep quality [57], however, evening exercise was defined as ranking anytime under 4 h prior to sleep time. Based on such evidence, and considering individual variability in clinical populations we assumed a safe period of 2 hours. Still, it may be advised to monitor the sleep quality of participants in evening exercise programs. If sleep was disrupted, possible adjustments to implement could be switching exercise to earlier time, reducing intensity, or devoting greater time for relaxation at the session's end.

Finally, frequent repetition of the training sessions is necessary for their physiological effects to build into long-term clinically relevant changes [32, 40, 42]. In average, the literature suggests an optimal frequency of three sessions, or up to six hours per week, and a minimal intervention duration of three weeks to stabilize effects, but longer durations are preferable [32, 37, 40]. Among long-term effects, increments in physical fitness relate to a reduction of hyperactivity of the hypothalamic-adrenal-pituitary axis, which translates into reduced physiological reactivity to psychosocial stressors and faster stress-recovery from stress [32, 33]. Physical training also leads to greater tolerance to overall somatic sensations such as those present during anxious episodes [40, 42]. Continual engagement in sports and exercise has shown to have antidepressant effects, equal or greater than antidepressant medication [32, 33, 58]. Likewise, improved cognitive function has been reported for patients who engage on physical activity programs [33, 34, 41, 51]. Particularly, moderate intensity exercise improves executive function [33], while high intensity seems to enhance processing speed [33, 46, 53].

### **Psychological dimension**

Psychological change is of vital importance to produce durable improvement in the mental condition beyond the physiologically mediated mood enhancement that follows each exercise session [42]. In this regard, continual sportive practice facilitates personal experiences of learning, social interaction, enjoyment and achievement [42, 59, 60], which

sum to the aforementioned effects of enhanced mood and cognition, relaxed wakefulness and neural plasticity. Together, they allow for a susceptible period where a patient can begin to experience daily life from a different perspective, and develop new personal meanings, attitudes, and thought patterns [40, 61]. The sport or exercise intervention therefore serves as a conduct for personal development, helpful for coping with, or overcoming psychopathology [61-64]. To support this development, training can be guided under a person-centred approach, where patients become active participants in their own recovery, as they work towards achieving individually set goals together with trainers [29, 30, 42, 60]. For the purpose of an exercise intervention, it is important to remember that within the frame of psychiatric rehabilitation, rehabilitative exercise does not replace psychotherapeutic treatment, and is rather an additional component [13]. Close collaboration of the training and the psychotherapeutic staff is important to achieve positive results [13, 40]. For example, physical training can prompt the emergence of inner feelings or thoughts that can be later elaborated upon in psychotherapy.

A modification of maladaptive attitudes, beliefs, behaviours or thought patterns is important to promote resilient clinical improvement beyond the physiological aftereffects of exercise [40, 42, 63]. Such deeper psychological change is also important to prevent the development of exercise addiction, where a person becomes exclusively dependent on exercise to physiologically regulate mood and stress levels [31]. The personal experiences that sportive training enables can be harnessed to generate new perspectives and promote psychological change. Among these personal experiences, the participant may for example, enjoy a new activity, develop skills, face obstacles, express feelings, receive insightful feedback, help and be helped by partners [30, 63].

Along the intervention, a person-centred approach is best suited to promote meaningful psychological change. In it, the training staff adopts a role of “autonomy support” where they assist participants towards greater levels of independence while incorporating the perspectives of the person being supported [30]. This technique allows for decision taking together with participants in contrast to authority-based approaches [30]. Voluntary participation is another important element in the person-centred approach, as it appeals to the participant’s self-determination to improve and their freedom to choose, fostering intrinsic motivation for training [30]. In clinical interventions, a patient who is mandated to attend a rehabilitation program would likely be less motivated to comply than a patient who could freely choose to participate [30]. Despite voluntary participation, reminders and encouragement sometimes are necessary to keep motivation, especially if a patient has missed a session [60, 64]. With these elements in place, a person-centred exercise intervention would enable psychological change by allowing meaningful experiences to combine with the physiologically mediated mood enhancement, relaxed wakefulness and neural plasticity to facilitate the emergence of new perspectives and personal meaning for the patient.

Meaning in life is a quality where persons create and maintain a sense of order, certainty and

value of the self, the external world and their relation [62]. In this way, personal meaning is a central factor in psychological well-being whose disruption can lead to mental distress, for example, after a traumatic event [65]. As humans constantly search for meaning, one characteristic is that finding or reaffirming meaning in one life domain, transfers into other domains in a process termed “fluid compensation” [62]. For example, the experience of self-efficacy during sport practice can enhance a damaged self-esteem after academic failure; completing a task with clear outcomes can compensate for feelings of uncertainty in the world. In this sense, a sport or exercise intervention can serve as a conduit for fluid compensation. In the process, a patient can eventually build a sense of meaning that extends beyond the sportive practice and into fields like self-esteem, need for certainty or affiliative needs [62], often disrupted in mental health problems. During rehabilitation, the affirmation of personal meaning can also help in coping difficult phases when positive affect is not present [65], for example when the mood regulating effects of exercise have dissipated.

To facilitate fluid compensation of meaning through training, meaning can be approached as a personal purpose that helps focusing attention on those aspects relevant to its consecution [62, 66]. This approach helps promote a sense of coherence, reducing the perception of complexity in the environment, orienting behaviour and reducing anxiety to facilitate meaning finding [62, 67]. Exposure to natural environments has also proven beneficial in the derivation of personal meaning [68]. It is hypothesized that nature exposure can trigger a set of innate cognitive and emotional reactions that favour positive affect, facilitating meaning creation [68]. This feature can be helpful when a patient cannot engage in moderate or vigorous exercise. In the same manner, nature exposure can be helpful in coping with personal loss [66].

Goal setting provides a clear aim for the participant to remain motivated and engaged in training [69], allowing the rest of the training benefits to happen. Moreover, goal setting calls upon the patient’s own volitional resources to organize behaviour, focus attention and mobilize effort towards goal consecution [70]. Within a person-oriented framework, this goal is to be determined by the participant together with the pertinent training and medical staff to assure that the goal is personally relevant, and lies within the available possibilities [29, 30]. An important specification for the clinical context is that goals should be set in terms of performance in the activity, and not in terms of clinical improvement, such as reducing symptoms [60]. In the clinical context, performance goals can be set in small and incremental fashion, achievable to the participant [69]. Making the goal specific and measurable or clearly observable further enhances commitment and the subsequent satisfaction after goal completion [70]. At the initial stages of training, it might be especially important to arrange conditions to facilitate effective performance of the participant to better promote feelings of self-efficacy and foster motivation for training [71]. To keep goals relevant, they must be reviewed and updated [70], in the context of clinical intervention, we propose to do so once per week.

In the dual process of goal achievement and psychological change, regular feedback with participants is of vital importance. During training, feedback allows to monitor goal

progression and make the necessary adjustments, providing information for the participant to focus attention on specific aspects and fostering motivation [69, 70]. Most importantly, in the current person-centred approach, feedback allows participants to express their thoughts and emotions, elaborate personal meaning, and integrate the training experience in the process of psychological change. Certain topics may emerge which are more appropriate for the context of psychotherapy, in which case the trainer can refer the participant to this context.

Feedback may be delivered in a format appropriate to the circumstances of the intervention program and the sport in question. Along with monitoring during training, plenary feedback sessions can be delivered for example, after each training, or once every week when sessions are frequent. However, feedback under vigorous training regimes might require special adjustments, since high intensity exercise can impair subsequent learning [33]. In this case one may opt to hold feedback rounds before training starts, addressing the previous training session, or otherwise delay feedback until exhaustion has subsided [39], for example after relaxation exercises. In most cases, it is important to remember that the generated feedback material needs to remain oriented towards performance in the sport or physical activity as the guiding theme in the intervention.

### **Social dimension**

The experiential and learning and processes triggered by sportive practice are enhanced within a favourable social environment [42, 59-61]. Indeed, the participants of exercise interventions frequently report the socializing component as one of the main benefits [42, 61, 64]. In this sense, interactions of the participant with the group and the trainers are an important component in the process of psychological change. The trainer/group leader is actually the central figure to keep participants motivated [59, 60]. Competency of the trainer in physical and skill training is the most valued characteristic by patients in exercise programs [59, 60, 64], however personal trust-worthiness and confidentiality are also important [64].

A group size between 5 and 15 participants is considered to best enrich the intervention, as it provides diversity of characters, allows members to get to know each other, facilitates the mutual sharing of the experience while letting the trainer keep track of each member [72-74]. Nonetheless, group size may be affected by the conditions present at each institution, such as patient demand, sessions available per day, waiting lists or sport format. In bigger groups, a possible compensator strategy could be adding more training staff to help supervise each member. Alternatively, larger groups may be split into sub-groups to complete certain training tasks, while feedback may also be split into smaller sub-groups. Groups smaller than 5 members may not provide all the benefits of group dynamics [72, 74, 75]. In this case, the trainer needs to assure greater cohesion between group members, and hold a closer interaction with them [75].

There are no scientific papers on social learning reported in the literature. It is strongly recommended to implement researches on the possibility that team sports can modify

patients' "Theory of mind" skills, with consequent improvement in empathic abilities.

At the end of the intervention, it is advisable to offer patients with further options to continue practising sport and exercise either in the same or in a different group. Depending on patient history, the healing process may need to continue even after the patient is emotionally stable, and in this regard, continual sportive practice can help preventing clinical relapse. The SPHERE Best Practices Report revealed that most institutions offer continuation options for patients, either by signing up to a new cycle in modular programs, or through continual participation in uninterrupted programs [28]. Patient engagement for over a year was not uncommon.

### 3. Meeting, contact, communication and relationship with the patient

Considering the aforementioned benefits of exercise for mental health, within the frame of a person-centred intervention, the program can be introduced to patients as a proactive action that they can take to aid their recovery process, or to support the management of their condition.

Overall, it can be explained that physical activity regulates the somatic component of feelings like anxiety or sadness, and can prevent comorbidities such as coronary heart disease, diabetes, hypertension. Sport and physical activity also help to focus the senses, mind and body and in this way, balance the body's biochemistry. Psychologically, sport and exercise can provide new and valuable experiences, and socially provide opportunities for social integration and address issues of isolation.

In the frame of the current guidelines, it is important to clarify to the patients that the attainment of the benefits of sport and exercise is a gradual process in which they take a very active role where persistence is key.

Many patients appreciate having detailed information about the mechanisms how exercise helps stabilizing the mental condition [64]. This specific information can be provided to the patients through separate information sessions [64] or by providing written materials to the patients [40].

## Section 4: Conclusion

These guidelines are designed to provide evidence and practical recommendations for practitioners such as sports coaches, fitness instructors etc., and health professionals such as psychiatrists, physiotherapists, mental health nurses etc., have information to enable them to design, implement and evaluate sport and physical activity opportunities for people with mental health problems.

There are holistic and far reaching benefits for people to be more active, these guidelines are designed to increase those opportunities across the EU.

*The Training Guidelines have been developed and endorsed by the SPHERE Scientific Committee which includes representatives from psychiatry, neuroscience, exercise science, sports psychology, clinical psychology and physical activity promotion, from the UK, Italy and Germany. The Scientific Committee includes the following individuals from the SPHERE project:*

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- Dr Stefania Cerino - Psychiatrist experienced in Psychiatric Rehabilitation through Sport (Italy)*
- Dr Francesca Cirulli - Senior Researcher at the Italian National Institute of Health (Italy)*
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## References

1. World Health Organization. *Mental health: a state of well-being*. 2014; Available from: [https://www.who.int/features/factfiles/mental\\_health/en/](https://www.who.int/features/factfiles/mental_health/en/).
2. World Health Organization. *Mental disorders*. Available from: [https://www.who.int/mental\\_health/management/en/](https://www.who.int/mental_health/management/en/).
3. OECD, *Promoting mental health in Europe: Why and how?*, in *Health at a Glance: Europe 2018: State of Health in the EU Cycle*. 2018, OECD Publishing: Paris.
4. Cohen, A., *Addressing comorbidity between mental disorders and major noncommunicable diseases*. WHO regional publications. European series, 2017.
5. World Health Organization. *Mental disorders*. 2018; Available from: <https://www.who.int/news-room/fact-sheets/detail/mental-disorders>.
6. Brown TA, O.L.T., Barlow DH, *Generalised anxiety disorder*, in *Clinical Handbook of Psychological Disorders: a Step-by-Step Treatment Manual*. 3rd ed., B. DH, Editor. 2001, Guilford Press: New York. p. 154–208.
7. Lochner, C. and D.J. Stein, *Heterogeneity of obsessive-compulsive disorder: a literature review*. Harv Rev Psychiatry, 2003. **11**(3): p. 113-32.
8. Bachem, R. and P. Casey, *Adjustment disorder: A diagnosis whose time has come*. J Affect Disord, 2018. **227**: p. 243-253.
9. Foa, E.B., et al., *Effective treatments for PTSD: Practice guidelines from the International Society for Traumatic Stress Studies, 2nd ed*. Effective treatments for PTSD: Practice guidelines from the International Society for Traumatic Stress Studies, 2nd ed. 2009, New York, NY, US: Guilford Press. xiii, 658-xiii, 658.
10. National Alliance on Mental Illness. *NAMI Comments on the APA's Draft Revision of the DSM-V* Available from: [https://web.archive.org/web/20150122085833/http://www.nami.org/content/contentgroups/policy/issues\\_spotlights/dsm5/substance\\_use\\_disorder\\_paper\\_4\\_13\\_2010.pdf](https://web.archive.org/web/20150122085833/http://www.nami.org/content/contentgroups/policy/issues_spotlights/dsm5/substance_use_disorder_paper_4_13_2010.pdf).
11. Institute for Mental Health Metrics and Evaluation, *Global Health Data Exchange* 2018.
12. World Health Organization, *Management of physical health conditions in adults with severe mental disorders WHO guidelines*. 2018.
13. Ba, G., *Strumenti e tecniche di riabilitazione psichiatrica e psicosociale*. 2016, Milan: Franco Angeli.
14. Kim, Y.S., et al., *Relationship between physical activity and general mental health*. Prev Med, 2012. **55**(5): p. 458-63.
15. Carozza, P., *Principi di riabilitazione psichiatrica. Per un sistema di servizi orientato alla guarigione*. 2006, Milan: Franco Angeli.
16. Harvey, S.B., et al., *Exercise and the Prevention of Depression: Results of the HUNT Cohort Study*. Am J Psychiatry, 2018. **175**(1): p. 28-36.
17. Royal College of Psychiatrists. *Physical Activity and Mental Health* Available from: <http://www.rcpsych.ac.uk/healthadvice/treatmentwellbeing/physicalactivity.aspx>.
18. Rössler, W., et al., *Size of burden of schizophrenia and psychotic disorders*. Eur Neuropsychopharmacol, 2005. **15**(4): p. 399-409.
19. Blumenthal, J.A., et al., *Understanding prognostic benefits of exercise and antidepressant therapy for persons with depression and heart disease: the UPBEAT study--rationale, design, and methodological issues*. Clin Trials, 2007. **4**(5): p. 548-59.

20. Cooper, C., H.Y. Moon, and H. van Praag, *On the Run for Hippocampal Plasticity*. Cold Spring Harb Perspect Med, 2018. **8**(4): p. a029736.
21. Park, H. and M.M. Poo, *Neurotrophin regulation of neural circuit development and function*. Nat Rev Neurosci, 2013. **14**(1): p. 7-23.
22. Corsale, B., *Lo sport una palestra per la psiche*. Strength and Conditioning, 2012.
23. Mitchell, A.J., et al., *Is the prevalence of metabolic syndrome and metabolic abnormalities increased in early schizophrenia? A comparative meta-analysis of first episode, untreated and treated patients*. Schizophr Bull, 2013. **39**(2): p. 295-305.
24. World Health Organization. *Mental health action plan 2013 - 2020*. 2013; Available from: [https://www.who.int/mental\\_health/publications/action\\_plan/en/](https://www.who.int/mental_health/publications/action_plan/en/).
25. Cerino, S., *Incontro e Relazione con il paziente psicotico*. In press, Rome: Aracne.
26. Ruegsegger, G.N. and F.W. Booth, *Health Benefits of Exercise*. Cold Spring Harbor Perspectives in Medicine, 2018. **8**(7): p. a029694.
27. Carbutti, P. and S. Caramia, *Sport e riabilitazione: resoconto di un'esperienza di riabilitazione psichiatrica attraverso lo sport*. Rivista di Psicologia Clinica, 2010. **1**.
28. Cross-Villasana, F., et al., *Sport Healing Rehabilitation / Best Practices Review*. 2019.
29. Tomasi, D., S. Gates, and E. Reyns, *Positive Patient Response to a Structured Exercise Program Delivered in Inpatient Psychiatry*. Glob Adv Health Med, 2019. **8**: p. 2164956119848657.
30. Raeburn, T., et al., *Clubhouse model of psychiatric rehabilitation: how is recovery reflected in documentation?* Int J Ment Health Nurs, 2014. **23**(5): p. 389-97.
31. Landolfi, E., *Exercise addiction*. Sports Med, 2013. **43**(2): p. 111-9.
32. Schulz, K.H., A. Meyer, and N. Langguth, *[Exercise and psychological well-being]*. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz, 2012. **55**(1): p. 55-65.
33. Basso, J.C. and W.A. Suzuki, *The Effects of Acute Exercise on Mood, Cognition, Neurophysiology, and Neurochemical Pathways: A Review*. Brain Plast, 2017. **2**(2): p. 127-152.
34. Voss, M.W., et al., *Bridging animal and human models of exercise-induced brain plasticity*. Trends Cogn Sci, 2013. **17**(10): p. 525-44.
35. Chang, Y.K., et al., *The effects of acute exercise on cognitive performance: a meta-analysis*. Brain Res, 2012. **1453**: p. 87-101.
36. Ruegsegger, G.N. and F.W. Booth, *Health Benefits of Exercise*. Cold Spring Harb Perspect Med, 2018. **8**(7).
37. Chekroud, S.R., et al., *Association between physical exercise and mental health in 1.2 million individuals in the USA between 2011 and 2015: a cross-sectional study*. The Lancet Psychiatry, 2018. **5**(9): p. 739-746.
38. Bartholomew, J.B., D. Morrison, and J.T. Ciccolo, *Effects of acute exercise on mood and well-being in patients with major depressive disorder*. Med Sci Sports Exerc, 2005. **37**(12): p. 2032-7.
39. Heggelund, J., et al., *High aerobic intensity training and psychological States in patients with depression or schizophrenia*. Front Psychiatry, 2014. **5**(148): p. 148.
40. Stathopoulou, G., et al., *Exercise Interventions for Mental Health: A Quantitative and Qualitative Review*. Clinical Psychology: Science and Practice, 2006. **13**(2): p. 179-193.
41. Firth, J., et al., *Aerobic Exercise Improves Cognitive Functioning in People With Schizophrenia: A Systematic Review and Meta-Analysis*. Schizophr Bull, 2017. **43**(3): p. 546-556.

42. Happell, B., C. Platania-Phung, and D. Scott, *Placing physical activity in mental health care: a leadership role for mental health nurses*. *Int J Ment Health Nurs*, 2011. **20**(5): p. 310-8.
43. Garber, C.E., et al., *American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise*. *Med Sci Sports Exerc*, 2011. **43**(7): p. 1334-59.
44. Bratman, G.N., et al., *Nature experience reduces rumination and subgenual prefrontal cortex activation*. *Proc Natl Acad Sci U S A*, 2015. **112**(28): p. 8567-72.
45. Crabbe, J.B. and R.K. Dishman, *Brain electrocortical activity during and after exercise: a quantitative synthesis*. *Psychophysiology*, 2004. **41**(4): p. 563-74.
46. Gutmann, B., et al., *Exercise-induced changes in EEG alpha power depend on frequency band definition mode*. *Neurosci Lett*, 2018. **662**: p. 271-275.
47. Cheron, G., et al., *Brain Oscillations in Sport: Toward EEG Biomarkers of Performance*. *Front Psychol*, 2016. **7**(246): p. 246.
48. Cahn, B.R. and J. Polich, *Meditation states and traits: EEG, ERP, and neuroimaging studies*. *Psychol Bull*, 2006. **132**(2): p. 180-211.
49. Pereira, A.C., et al., *An in vivo correlate of exercise-induced neurogenesis in the adult dentate gyrus*. *Proc Natl Acad Sci U S A*, 2007. **104**(13): p. 5638-43.
50. Pate, R.R., et al., *Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine*. *JAMA*, 1995. **273**(5): p. 402-7.
51. Borgi, M., et al., *Effectiveness of a Standardized Equine-Assisted Therapy Program for Children with Autism Spectrum Disorder*. *J Autism Dev Disord*, 2016. **46**(1): p. 1-9.
52. Cerino, S., et al., *Non conventional psychiatric rehabilitation in schizophrenia using therapeutic riding: The FISE multicentre Pindar project*. Vol. 47. 2011. 409-14.
53. Gutmann, B., et al., *Effects of Physical Exercise on Individual Resting State EEG Alpha Peak Frequency*. Vol. 2015. 2015. 717312.
54. Klimesch, W., *EEG alpha and theta oscillations reflect cognitive and memory performance: a review and analysis*. *Brain Research Reviews*, 1999. **29**(2-3): p. 169-195.
55. Kimhy, D., et al., *Aerobic Exercise for Cognitive Deficits in Schizophrenia - The Impact of Frequency, Duration, and Fidelity with Target Training Intensity*. *Schizophrenia Research*, 2016. **172**: p. 213-215.
56. Stutz, J., R. Eiholzer, and C.M. Spengler, *Effects of Evening Exercise on Sleep in Healthy Participants: A Systematic Review and Meta-Analysis*. *Sports Medicine*, 2019. **49**(2): p. 269-287.
57. Buman, M.P., et al., *Does nighttime exercise really disturb sleep? Results from the 2013 National Sleep Foundation Sleep in America Poll*. *Sleep Med*, 2014. **15**(7): p. 755-61.
58. Toups, M., et al., *Exercise is an effective treatment for positive valence symptoms in major depression*. *J Affect Disord*, 2017. **209**: p. 188-194.
59. Crone, D., *Walking back to health: a qualitative investigation into service users' experiences of a walking project*. *Issues Ment Health Nurs*, 2007. **28**(2): p. 167-83.
60. Thomas, V., *Elan für Körper und Seele*. *Psych. Pflege Heute*, 2015. **21**(06): p. 282-287.
61. Cullen, C. and E. McCann, *Exploring the role of physical activity for people diagnosed with serious mental illness in Ireland*. *J Psychiatr Ment Health Nurs*, 2015. **22**(1): p. 58-64.

62. Heine, S.J., T. Proulx, and K.D. Vohs, *The meaning maintenance model: on the coherence of social motivations*. *Pers Soc Psychol Rev*, 2006. **10**(2): p. 88-110.
63. Crone, D., A. Smith, and B. Gough, *'I feel totally at one, totally alive and totally happy': a psycho-social explanation of the physical activity and mental health relationship*. *Health Educ Res*, 2005. **20**(5): p. 600-11.
64. Crone, D. and H. Guy, *'I know it is only exercise, but to me it is something that keeps me going': a qualitative approach to understanding mental health service users' experiences of sports therapy*. *Int J Ment Health Nurs*, 2008. **17**(3): p. 197-207.
65. Steger, M.F., et al., *The meaning in life questionnaire: Assessing the presence of and search for meaning in life*. *Journal of Counseling Psychology*, 2006. **53**(1): p. 80-93.
66. Klinger, E., *Meaning & void: Inner experience and the incentives in people's lives*. *Meaning & void: Inner experience and the incentives in people's lives*. 1977, Minneapolis, MN, US: University of Minnesota Press. xiv, 412-xiv, 412.
67. Eriksson, M. and B. Lindstrom, *Antonovsky's sense of coherence scale and the relation with health: a systematic review*. *J Epidemiol Community Health*, 2006. **60**(5): p. 376-81.
68. Howell, A.J., H.A. Passmore, and K. Buro, *Meaning in Nature: Meaning in Life as a Mediator of the Relationship Between Nature Connectedness and Well-Being*. *Journal of Happiness Studies*, 2013. **14**(6): p. 1681-1696.
69. Glanz, K. and D.B. Bishop, *The role of behavioral science theory in development and implementation of public health interventions*. *Annu Rev Public Health*, 2010. **31**(1): p. 399-418.
70. Locke, E.A., et al., *Goal Setting and Task-Performance - 1969-1980*. *Psychological Bulletin*, 1981. **90**(1): p. 125-152.
71. Bandura, A., *Self-efficacy: Toward a unifying theory of behavioral change*. *Advances in Behaviour Research and Therapy*, 1978. **1**(4): p. 139-161.
72. Fulkerson, C.C., D.M. Hawkins, and A.R. Alden, *Psychotherapy groups of insufficient size*. *Int J Group Psychother*, 1981. **31**(1): p. 73-81.
73. Krampen, G., *Einführungskurse zum Autogenen Training: ein Lehr-und Übungsbuch für die psychosoziale Praxis*. 1992: Verlag für angewandte Psychologie.
74. Steward, L., A. Uscher, and K. Allenby, *A review of optimal group size and modularisation or continuous entry format for program delivery Research Report R-215*. 2009, Correctional Service Canada: Ottawa.
75. Cohen, S.L. and C.A. Rice, *Maximizing the Therapeutic Effectiveness of Small Psychotherapy Groups*. *Group*, 1985. **9**(4): p. 3-9.



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