



InALMH
InterACTIVE LIVING
FOR MENTAL HEALTH

Recommendations on EU Guidelines for the use of Physical Activity on Mental Health



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Recommendations on EU Guidelines for the use of Physical Activity on Mental Health

University of Thessaly

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What is InALMH?

The InALMH (Inter-Active Living for Mental Health) is a project funded by ERASMUS + Sport and is being conducted in collaboration with 12 partners (coordination by ENALMH).

Partners of the InALMH project

- ENALMH - Coordinator
- University of Thessaly – Trikala, Greece
- National & Kapodistrian University of Athens– Athens Greece
- ARISMA, Associazione per la Ricerca sulla Salute Mentale e Fisica dell'Anziano, Bologna, Italy
- FOKUS ČR- Prague, Czech Republic
- Instituto Politécnico do Porto, Health School - Porto, Portugal
- Merseyside Expanded Horizons - Liverpool, United Kingdom
- Greek Association of Alzheimer - Thessaloniki, Greece
- Mental Health Europe, EU Network – Brussels, Belgium
- Sport & Citizenship, EU Think Tank - Paris, France
- GAMIAN Europe, Global Alliance - Brussels, Belgium.
- ISCA, International Sport and Culture Association

The inALMH project aims

- to contribute to the update of the EU Physical Activity Recommendations for Health, in particular for Physical Activity and Mental Health

The Aim of this Document:

The aim of this document is to identify and present state-of-the-art evidence concerning Physical Activity and Mental Health.

This document is developed for stakeholders, health professionals and people aiming at protecting and improving mental health via the support of the therapeutic modality of physical activity.

What is included in this Document:

This Document includes state-of-the-art evidence regarding the role of Physical Activity in Mental Health across various mental health disorders and through various deliver formats of physical activity.

Method:

How we created this Document:

All partners of this project have contributed to the development of this document by providing the most recent evidence (after the year 2008) and comments on the structure and final structure and delivery of this document.

1. Introduction

1.1. Mental health

Mental health is one of the three main components of health according to the World Health Organization (WHO): “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 2001). In addition, health is considered a resource of living and the extent to which people satisfy needs or aspirations and cope with the usual milieu (WHO, 1986). Hence, comprehensive health conceptualization in daily life is endorsed by the Vienna Declaration referring to the multi-tiered health determinants (The Lancet Public, 2016). Mental health is described by WHO as: “... a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to his or her community”. Also, the WHO emphasizes that mental health is “more than just the absence of mental disorders or disabilities”. Peak mental health is about not only avoiding active conditions but also looking after ongoing wellness and happiness and includes "subjective well-being, perceived self-efficacy, autonomy, competence, inter-generational dependence, and self-actualization of one's intellectual and emotional potential, among others" (WHO, 2001).

Mental health is important at all ages, from childhood to older age, and is important at the individual, family and society level since it relates to people’s emotional, psychological, and social well-being. It influences how we think, feel, act and help us deal with stress, relate with others and make decisions. Mental, physical, social, and behavioural health problems may interact so as to strengthen their effects on our behaviour and well-being.

The most common and debilitating types of mental health problems include anxiety and mood disorders and schizophrenia spectrum disorders. Treatments and methods for managing mental health problems mainly include psychotherapy, medication, and self-help. Combinations of methods are common, but what works for one person may not work for another. According to cumulative evidence some strategies or treatments are

more successful in combination with others. For example, promotion of regular physical activity is a possible add-on treatment for improving symptoms across a variety of mental health problems.

1.2. Physical activity for the promotion of mental health and for the prevention and treatment of mental disorders

Researchers, stakeholders and practitioners often use the terms physical activity and exercise interchangeably. However, there are certain differences that need to be clarified. Physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure and can be performed at a variety of intensities, as part of work, domestic chores, transportation or during leisure time or when participating in exercise or sports activities (WHO, 2010). In line with the vast majority of the scientific community, stakeholders, and health professionals, the terms physical activity and exercise will be used interchangeably in this report.

Physical inactivity is among the leading risk factors for global mortality, whereas regular physical activity is a known protective factor for the prevention and management of non-communicable diseases, metabolic diseases, cancer, neurodegenerative diseases as well as mental health. Regular engagement in physical activity can contribute to maintain health and improved general wellbeing (WHO, 2020). Regular physical activity engagement has both preventive and treatment benefits for mental health.

Evidence reveals that greater amounts of physical activity are associated with a positive perception of quality of life for the general population. People who exercise regularly have higher self-esteem, better sleep, and lower anxiety symptoms; as well as enhanced mood and emotional-behavioural regulation (Tomasi, 2019). Moreover, evidence demonstrates that, for all ages, physical activity improves health-related quality of life when compared with minimal or no treatment controls. Hence, physical activity is a supportive means towards better disease management that ensures not only disease specific symptoms but also promotion of health related quality of life with significant enhancement of well-being properties.

1.3. Prevention

From the viewpoint of population health, fostering physical activity may operate as an important strategy for mental health promotion by decreasing the risk of developing depression and anxiety-related disorders. The evidence base supporting protective effects of physical activity for all ages and for special populations is growing. People participating in regular physical activity show more positive health outcomes for a range of physical and mental conditions. Prior research with RCT interventions promoting physical activity reveal better outcomes, for general health, health-related quality of life, functional capacity, and improved mood states.

There is growing evidence that supports the role of PA in promoting mental health and prevent mental ill-health, suggesting that even low doses of PA may be protective against depression and other health conditions at all ages.

1.4. Treatment

Among various treatment modalities in mental health disorders, physical activity can strongly complement the main treatment scheme. Supportive evidence for the role of physical activity is growing. People with light and moderate mental illnesses can experience a variety of benefits from participating in regular physical activity. Latest evidence supports the need for interventions to promote regular physical activity among persons with serious mental illnesses. In line, managing adverse mental health symptoms is an equally challenging and also effective avenue for the valuable action of physical activity.

Improvements in perceived or actual physical fitness can result in a decrease of symptoms for a variety of mental illnesses (schizophrenia, bipolar disorder, major depressive disorders, post-traumatic stress disorders and anxiety disorders). Multiple studies confirm that physical activity may help reducing symptoms related to mental health such as anxiety, depression, anger, muscle tension and managing stressors and triggers in order to support a more balanced and integrated sense of self (Tomasi et al., 2019). For example, the latest meta-review (Ashdown-Franks, 2020) provided robust evidence for the value of moderate-to-vigorous intensity exercise as an adjunctive

treatment for improving symptoms across a broad range of mental health disorders for all ages. Latest accumulating evidence demonstrated that effects of exercise and psychotherapeutic interventions were analogous. In addition, exercise also improved a series of secondary symptoms commonly seen among people with mental health disorders; these symptoms include low self-esteem and social withdrawal.

Given the manifold benefits, recommendations for physical activity need to be contained within standard mental health treatments (Fibbins, 2019). Mental health service workers could be trained to prescribe and/or suggest their patients to engage in regular exercise programs which are effective and evidence-based for people with serious mental illness.

Overall, one of the most central concerns is to have guidelines suggesting policies that could promote physical activity, both for prevention and treatment for mental health.

The 2020 WHO Physical activity guidelines and recommendations for the general population are relevant in this context, as they have been established to prevent mental health issues. They are presented below.

2. Latest physical activity guidelines and recommendations

2.1. Physical activity guidelines and recommendations for the general population (WHO, 2020)

Published by the WHO in 2020, the latest global recommendations on physical activity for health referred to the general population across three age groups (children under 18 years old, adults, and older adults over 65 years old). The overall aim is to provide policy makers with directions on the dose-response relationship between the frequency, duration, intensity, type and total amount of physical activity to prevent non-communicable diseases.

There is a significant difference on physical activity recommendation between WHO's latest advice and its previous *Global recommendations on physical activity for health*

(2010). Recent evidence shows that physical activity of any bout duration is associated with improved health outcomes, including all-cause mortality, whereas the previous 2010 recommendation stated that aerobic activity should be performed in bouts of at least 10 minutes duration. Consequently, the recommended amounts of moderate-to-vigorous physical activity can be accumulated in bouts of any duration.

According to the different age groups, the guidelines to improve health (including mental health) are the following:

For children and youth (5-17 years old):

Children and youth aged 5-17 should accumulate at least 60 minutes of moderate- to vigorous-intensity physical activity daily.

Amounts of physical activity greater than 60 minutes provide additional health benefits.

Most of the daily physical activity should be aerobic. Vigorous-intensity activities should be incorporated, including those that strengthen muscle and bone, at least 3 times per week.

For adults (18-64 years old):

For adults (18-64 years old):

Adults should do at least 150 minutes to 300 minutes of moderate-intensity aerobic physical activity throughout the week, or do at least 75 to 150 minutes of vigorous intensity aerobic physical activity throughout the week, or an equivalent combination of moderate- and vigorous-intensity activity for substantial health benefits.

Adults should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.

For older adults (65+ years old):

Older adults should do at least 150 minutes to 300 minutes of moderate-intensity aerobic physical activity throughout the week, or do at least 75 to 150 minutes of vigorous intensity aerobic physical activity throughout the week, or an equivalent combination of moderate-and vigorous-intensity activity for substantial health benefits.

Older adults should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.

As part of their weekly physical activity, older adults should do varied multicomponent physical activity that emphasizes functional balance and strength training at moderate or greater intensity on 3 or more days per week to enhance functional capacity and prevent falls.

Additional physical activity guidelines and recommendations have been published regarding chronic conditions and disability:

For people with *chronic health conditions*

All adults with chronic conditions should undertake regular physical activity.

Adults with chronic conditions should do at least 150 minutes to 300 minutes of moderate-intensity aerobic physical activity throughout the week, or do at least 75 to 150 minutes of vigorous-intensity aerobic physical activity throughout the week, or an equivalent combination of moderate- and vigorous-intensity activity for substantial health benefits.

Adults with chronic conditions should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional benefits. As part of their weekly physical activity, older adults with chronic conditions should do varied multicomponent physical activity that emphasizes functional balance and strength training at moderate or greater intensity on 3 or more days per week to enhance functional capacity and prevent falls.

Adults with chronic conditions should limit the amount of time spent being sedentary and replace sedentary time with physical activity of any intensity (including light intensity), which has health benefits.

For people with disabilities

Children and adolescents with disability should do at least an average of 60 minutes per day of moderate-to-vigorous intensity physical activity, across the week.

Most of this physical activity should be aerobic. Vigorous-intensity aerobic activities, as well as those that strengthen muscle and bone should be incorporated at least 3 days per week.

All **adults** with disability should undertake regular physical activity.

Adults with disability should do at least 150 minutes to 300 minutes of moderate-intensity aerobic physical activity throughout the week, or do at least 75 to 150 minutes of vigorous-intensity aerobic physical activity throughout the week, or an equivalent combination of moderate- and vigorous-intensity activity for substantial health benefits.

Adults with disability should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional benefits.

As part of their weekly physical activity, **older adults** with disability should do varied multicomponent physical activity that emphasises functional balance and strength training at moderate or greater intensity on 3 or more days per week to enhance functional capacity and prevent falls.

According to WHO (WHO Europe, 2018), in Europe, physical activity levels are lower in disadvantaged groups of society within lower levels of: income, socioeconomic status, education and employment, as well as according to age, gender, ethnicity, culture, or religion. For these groups, which are at higher risk of unhealthy behaviours (e.g. smoking, unhealthy nutrition), WHO recommends to design targeted approaches that take into account their cultural and environmental needs, since traditional approaches for promoting physical activity for health (including mental health) are often insufficient.

2.2. Physical activity guidelines and recommendations for mental health (WHO, 2020)

The latest guidelines of physical activity guidelines and recommendations (WHO, 2020) do not have a special section referring to mental health. Nevertheless, there are sections

where mental health disorders are mentioned, whenever high and moderate evidence exists from the current available literature reviews.

For example:

- “Moderate to high quality evidence indicates that higher levels of physical activity are associated with multiple beneficial health outcomes, including lower risk for all-cause mortality, incident CVD, site-specific incident cancer, and incident type-2 diabetes. There is an association with prevention of weight gain, *reduced symptoms of depression and anxiety and reduced risk of developing depression and anxiety overtime*, improvements in cognition and brain function and a reduced risk of developing cognitive impairment. There is also high-quality evidence that both acute bouts and regular physical activity improves sleep and health-related quality of life outcomes in adults and lowers risk of incident hypertension.”
- “High quality evidence demonstrates that physical activity decreases the risk of depression, and that PA intervention programs reduce depressive symptoms in children and adolescents.”

2.3. Physical activity for anxiety disorders: guidelines and recommendations

Anxiety and stress related disorders include, among others, generalized anxiety disorder, post-traumatic stress disorder, panic disorder, and various phobias including social phobia and agoraphobia. Anxiety disorders may co-occur with various physical and/or mental comorbidities. It may be experienced as a severe or less severe mental health condition. Although the causes of anxiety remain relatively unexplained, it has been said that a combination of biological factors and stressful conditions in early years may play a significant role in developing anxiety disorders. Anxiolytic treatment forms include pharmacotherapy and/or psychotherapy techniques. Exercise can help prevent anxiety disorders, specifically aerobic exercise, which can provide significant anxiolytic

support when implemented in small groups, at low and gradually at moderate intensity. The use of exertion tools such as the 6-20 Ratings of Perceived Exertion (RPE) by Borg represents a valuable tool to regulate intensity given the use of beta-blockers by anxious patients. Types of aerobic exercise include walking, running, swimming, and cycling.

Regular exercise and good fitness levels reduce stress. Although research findings are divergent on whether exercise is more effective against stress at a high or moderate intensity, aerobic exercise shows larger effect than strength exercise. Aerobic exercise can involve walking, jogging, running, cycling, or swimming (Pedersen & Saltin, 2015). Research has repeatedly shown that acute exercise bouts improve state anxiety. Noteworthy, moderate evidence indicates that exercise improves state anxiety more for women adults <25 years of age and sedentary individuals, rather than for other population segments. Limited evidence support the effectiveness of regular participation in exercise or longer durations of moderate-to-vigorous physical activity to improve trait anxiety in adults of all ages (Smith & Merwin, 2021). Evidence also supports the beneficial effects of physical activity on anxiety among youth. Insufficient evidence is available to determine whether a relationship exists between physical activity and anxiety among individuals with dementia or intellectual disability.

Recommendation: On the basis of the available literature, moderate aerobic exercise, or aerobic sport activities such as walking, jogging, running, cycling, or swimming are suggested to improve the severity of symptoms of anxiety or prevent their onset.

2.4. Physical activity for Post-Traumatic Stress Disorder: current evidence and recommendation

Post-traumatic stress disorder (PTSD) is a severe psychiatric condition that can occur after exposure to a traumatic event, mainly characterized by symptoms such as depression, anxiety, flashbacks of the traumatic event, sleep problems and recurrent nightmares (Edmondson, von Känel R). Preliminary evidence indicates a significant association between PTSD and increased risk to developing metabolic and cardiovascular comorbidities, with 2-3 times higher rates of premature mortality

compared to general population (Ahmadi et al., 2011). It is not surprising that a growing number of studies investigate the effectiveness of physical activity in PTSD. However, available evidence is still limited to few small clinical trials, with encouraging results on physical status reported for submaximal physical fitness (Vancampfort et al., 2017; Hegberg et al., 2019).

Recommendation: Despite the available encouraging results on the effectiveness of physical exercise in subjects with PTSD, no firm conclusion can be drawn that is specific for this population. Given the high metabolic and cardiovascular risk, it is suggested that physical activity for PTSD should follow the current available guidelines of the International Organization of Physical Therapists in Mental Health (IOPTMH), recommending vigorous (75 minutes) or moderately (150 minutes) activity per week while engaging in resistance training exercises at least twice a week (Vancampfort et al., 2012).

2.5. Physical activity and cognition in dementia: guidelines and recommendations

In developed countries, the mean age of the general population is increasing. To this extent, maintaining an independent and healthy lifestyle for the elderly represents a major societal challenge. Moreover, neurocognitive disorders are increasingly common among the elderly. Dementia (also termed Major Neurocognitive Disorder) is an umbrella term for a variety of neurodegenerative disorders that impact cognitive abilities, behavioural patterns and social abilities. It is considered to be one of the most prominent healthcare issues of the 21st century (WHO, 2020). Current estimates indicate that approximately 50 million people live with dementia while prospective studies indicate that numbers will increase to 132 million by 2050. Early detection of dementia may offer an opportunity for prevention. In the context of dementia, Mild Cognitive Impairment (MCI) represents this early stage. MCI is an intermediate state between the cognitive changes of normal aging and dementia. MCI may entail deficits with memory, language, thinking and judgment that are greater than normal age-related

changes, but not to the extent that it is obvious in activities of daily living. There are several types of MCI, including amnesic, non-amnesic and single or multiple domains. MCI of the amnesic type includes memory loss and is considered to be a transition stage between normal aging and dementia (Petersen, 2004). Studies suggest around 5 to 20 percent of individuals with MCI will develop dementia each year (Karssemeijer et al., 2017; Langa & Levine, 2014).

Prevention and treatment strategies against dementia are of critical importance, and WHO has begun a Global Action Plan on the Public Health Response to Major neurocognitive disorder (WHO, 2017). Treatment forms against dementia include pharmacotherapy and cognitive behavioural therapies. However, there is a great need to further support dementia treatment/prevention. Cost-effective strategies should be prioritized. For further information see Davis et al. (2015).

Robust evidence suggests that physical activity is effective improving cognitive performance thus lowering the risk of developing dementia. For example, moderate to high physical activity levels resulted in a lower risk of dementia among the elderly people living in the community (Dupré et al., 2020). Furthermore, a 44-year longitudinal study in women suggested that the engagement in midlife cognitive and physical activities is associated with preserving cognitive health in old age and reduced risk of dementia (Najar et al., 2019). Also, higher cardiovascular fitness in mature adults shows decreased risk of subsequent dementia. To this extent, exercise ensuring higher cardiovascular fitness may be used against dementia (Horder et al., 2018).

Moderately robust evidence points towards a significant effect of long-term moderate-to-vigorous exercise improving cognitive and brain outcomes in adults aged ≥ 50 years. Limited evidence suggests that moderate-to-vigorous exercise may improve cognition in older adults compared to middle-aged and younger adults. Studies suggest a larger effect of moderate-to-vigorous physical activity among older adult women compared with older adult men. No evidence was observed for an effect of physical activity on cognition as a function of socioeconomic status, race/ethnicity, or body mass index. There is also an argument derived from a number of trials, that moderate regular physical activity or physical exercise (preferably aerobic exercise) has an effect on

cognitive performance and executive function in elderly people with MCI. There is also limited evidence that combined exercise programs may protect individuals diagnosed with MCI from developing a full-fledged major neurocognitive disorder (Baker et al., 2010; Song et al., 2018).

Of note, exercise may benefit individuals with Major Neurocognitive Disorder patients by improving their overall physical health, quality of life and prognosis in terms of disease progress. Combined (strength, balance, aerobic, flexibility) or walking exercise with light to moderate intensity seems to improve walking performance and reduce the decline in activities of daily living. There is also limited evidence that combined exercise training reduce depression levels in people with dementia , tends to reduce global levels of neuropsychiatric symptoms, and affect positively aberrant motor behavior (De Souto et al., 2015). Exercise needs to be individualized and supervised, and target gait, balance, and functional ability maintenance. Further, robust evidence from acute bouts of moderate to vigorous exercise indicates a transient improvement in cognition, including attention, memory, intelligence, processing speed, and executive control following a bout of exercise. In addition, robust evidence reports that larger amounts of exercise are linked to a reduced risk of developing cognitive impairment, including Alzheimer's disease.

Example of good practice.

Based on Poptsi et al. (2021), multicomponent combined cognitive- moderate physical training, targeting at improving upper and lower body strength, endurance, flexibility, balance, limb (upper and lower), cognitive function, such as visual perception, attention, memory, abstract thinking, and language, behavioral and psychological symptoms in major neurocognitive disorder and functional ability. Exercise is performed three times/week for 45 minutes/session. The aims of the exercises were a) to maintain muscle strength and joint flexibility, b) to provide a gentle cardiopulmonary workout, c) to help the participants maintain body awareness through the sensation of movement, d) to provide a pleasurable experience and a sense of competence in being able to participate along with the other members of the group and move freely, and e) to enhance their cognitive functions such as visual perception, attention, memory, abstract thinking, and

language. Example of an exercise session at a seated position. Shoulders: Shrug both shoulders x 10 (counting each repetition either using digits or the alphabet letters).

Recommendation: On the basis of the available literature, physical activity is recommended for the prevention for the improvement of cognitive functions. In particular, long-term moderate aerobic exercise should be a correct habit since the 50 years old in order to prevent the cognitive decline and preserve the cognitive functions in patients with evidence of cognitive disability.

2.6. Physical activity for schizophrenia spectrum disorders: guidelines and recommendations

Schizophrenia-spectrum disorders represent highly disabling disorders characterized by different clusters of clinical manifestations: positive symptoms, including hallucinations and delusions, negative symptoms, including avolition and withdrawal, and cognitive dysfunction in several domains, but particularly in executive functions (APA, 2013). Although the etiology of schizophrenia remains still largely unknown, an increasing amount of genetic, structural and functional abnormalities are found in schizophrenic patients compared to healthy individuals (APA, 2013). Treatments of schizophrenia-spectrum disorders include several pharmacological agents, mainly antipsychotic medications (Owen et al., 2016).

Aerobic, strength exercise, and yoga can reduce psychopathological symptoms and enhance health-related quality of life. A meta-analysis of Dauwan and colleagues examined the effectiveness of physical exercise on schizophrenia spectrum disorders, considering 10 randomized studies with 436 subjects. The results showed a significant effect of exercise improving the general psychotic symptomatology particularly for negative and depressive symptoms, and quality of life. Regarding cognitive domains, only yoga showed significant effectiveness in improving the long-term memory function (Dauwan et al., 2016).

In order to be effective, exercise interventions need to take in account the specificities of the physical environment and social structure of the patient. In particular, most patients tend to remain physically inactive and sedentary, as well as socially isolated. Thus, exercise interventions may need to be supervised to improve adherence. Aerobic exercise appears to be highly effective and could ideally be performed in small groups. Exercise intensity and duration should gradually increase to moderate intensity. Adults with schizophrenia who need to lose weight should exercise at least one hour per day. Schizophrenia patients may also benefit from strength training, even if not many studies yet have been done with this type of exercise. Moderate quality evidence indicates that moderate-to-vigorous physical activity can have beneficial effects on cognition and is associated with improved quality of life in individuals with diseases or disorders that impair cognitive function, including schizophrenia. In conclusion, there overall evidence for the benefits of physical exercise interventions in schizophrenia spectrum disorders is encouraging (Stubbs et al. 2018; Viljoen, & Roos, 2020).

Although few are randomized and controlled, available studies suggest that exercise added to standard pharmacological regimens may be associated with augmented effectiveness among patients with first-episode psychosis, exerting significant improvements of positive, negative and general symptoms, as well as precognitive effects. For further information see Pedersen et al. (2015).

Example of good practice.

Based on Wang et al. (2018), exercise targeting the improvement of aerobic capacity. Exercising was individually supervised and performed three times/week for 40 minutes/session for 12 weeks. The attendance goal was participation 5times/week, with the ultimate goal of at least 60% participation rate. All participants completed at least 60% of the exercise sessions. Supervision provided every participant with the opportunity to monitor participation. Training included both flexibility and toning and balance exercises. At intervention completion, patients improved their negative and positive symptoms typically seen in schizophrenic spectrum disorders. Accordingly, exercise brought about significant benefits in patients with schizophrenia.

2.7. Physical activity for major depression: guidelines and recommendations

Major depression is the most common mental health disorder affecting almost 300 million people worldwide. By 2030, major depression will become the top public health problem. There is now robust evidence indicating that physical exercise possesses antidepressant effects and impacts the severity of multiple depressive symptoms. Methodological appraisals of the literature on exercise and depression has confirmed the robustness of the scientific approach in addressing this issue (Ekkekakis, 2015). Exercise-based intervention have shown a large effectiveness on the severity of depressive symptoms both in clinical and non-clinical populations at any age, including children and adolescents (Alves Donato et al., 2021), adults and older adults (Bellón et al., 2021). Exercise interventions have been structured also in populations with severe depression within an inpatient psychiatric setting and are likely to improve suicidal ideation. Exercise might be one of the few safe, tolerable interventions to be delivered to pregnant women and those with postpartum depression.

Example of good practice.

Based on Morres et al. (2019), supervised aerobic exercise for an average of 45min per session, three times/week, for a period of 9 weeks. Also, tailored to individual needs/preferences, with gradual increases in intensity. In addition, preferred intensity exercise has shown large antidepressant effects compared to prescribed intensity exercise and has brought about significant improvement in quality of life. Exercise should not be competitive, and should be implemented in small groups, under supervision by qualified health professionals.

Recommendation: On the basis of the available literature, robust evidence indicate the effectiveness of moderate to intense aerobic exercise in relieve depressive symptoms at any age, both in inpatient and outpatient populations. Moderate evidence indicate the effectiveness of aerobic exercise also for subjects with subclinical depressive state.

2.8. Physical activity for addictive behaviours: guidelines and recommendations

Sports and physical activities have the potential to produce positive effects in drug addiction recovery. Research suggests that physical activity reduces anxiety and depressive symptoms, improves self-confidence, self-esteem and body image, enhances mood states, general well-being and quality of life, offers clients the opportunity to attain a pleasant mental state without substance use and adopt a positive lifestyle change. These psychological changes are linked to positive substance-related outcomes: reduced drug intake, increased abstinence rate, reduced acute craving, mood regulation, enhanced adherence to the rehabilitation program, altered behaviour and relapse prevention. Wang and colleagues (2014) summarized all the available evidence in a meta-analysis, which includes 22 randomized-controlled trials on the adult population with substance use disorder. They reported robust evidence of significant effects of physical exercise on the abstinence rate and relieving withdrawal, anxiety, and depressive symptoms (Wang et al., 2014).

Several studies have applied a variety of sports and physical activities to addicted people while in drug recovery programs. The types of sport activities were: organized team sports, fitness aerobic and strength endurance programs, mind-body exercise (yoga and Tai-Chi) and outdoor adventure activities such as rafting, rappel, MTB, archery, river trekking/canyoning, etc. Compared with indoor activities, outdoor sport activities in nature are associated with increased revitalization, engagement, energy, and decreased tension, confusion, anger, and depression. Therefore, organized Drug Addiction Therapeutic providers around Europe use “Adventure Therapy methodology”, which exploits outdoor adventure activities as a primary therapeutic tool, using real or perceived physical and psychological risk as an element to activate emotional, behavioural or cognitive patterns or schemes that might not be activated through traditional therapy (Bowen & Neill, 2013; Gass et al., 2012) The fundamental elements of AT are the use of outdoor adventure activities as well as a range of activities including goal setting, confidence, and problem-solving approaches, that are physically and/or psychologically demanding, to promote personal change such as positive reinforcement of self-esteem and self-efficacy of the individual. It can be applied as an exclusive,

complementary or parallel therapeutic tool to a wide range of mental health disorders. Limited evidence reported the significant impact of adventure therapy on participants' view of themselves, by enhancing their self-efficacy and self-esteem, identifying their strengths, while also empowering them to take responsibility as they act in real situations and deal with the consequences of their actions.

Example of good practice

Based on Panagiotounis et al. (2020), an Adventure Therapy program consisting in a 5-day outdoor expedition with adventure activities for people in addiction treatment. 14 individuals undergoing inpatient treatment from the Therapy Center for Dependent Individuals (KETHEA) Therapeutic Communities. KETHEA is the largest addiction treatment and social reintegration network in Greece. KETHEA programs are drug-free and offer a comprehensive range of services, which seek to help the individual recover and build a new life for themselves, aiming to participate in society productively and on equal terms. The 5-day adventure program took place in the wider region of Zagori, Ioannina. Zagori is one of the most distinctive regions in the land of Epirus in Greece. The area boasts a unique geographical, historical and architectural unity in place and time. The program included adventure-based activities, camping experiences, and wilderness expeditions such as camping, rafting, rappel, fire building, cooking, orienteering, MTB, archery, and River trekking/canyoning, as well as group cohesion and cooperative activities, problem-solving and a variety of games implemented in a group context. A key component of this adventure therapy program was the matching of the activity to participants needs. The selection, the planning and the sequence of the activities were contained in a customized activity protocol and directly linked to the desired outcomes and the therapeutic goals of enhancing self-esteem and self-efficacy, as well as developing coping and problem-solving skills.

Recommendation: Based on the available literature, Adventure Therapy may offer an alternative therapeutic tool to addiction counselling by creating positive changes. Implementing interventions based on adventure therapy methodology can offer drug addiction therapy providers the opportunity to deliver more effective treatment reducing relapse and treatment dropout. However, although Adventure Therapy seems

promising, further investigation is needed to better understand the adventure therapy outcomes in drug addiction treatment.

2.9. Physical activity for perinatal depression: guidelines and recommendations

Physical activity has been repeatedly linked to improving pre-/post-natal depression. Particularly, various meta-analytic studies have provided evidence for the antidepressant effects of physical activity (e.g. Davenport et al., 2018; Pritchett et al., 2017). Although evidence is derived from low and low-medium quality trials, it is seen that physical activity is consistently associated with an improvement in perinatal depressive symptoms. Also, the literature is currently revealing the potential important role of the exercise dose of >150min/day derived from exercise participation in most days of the week.

In line, the recent Opinion Statement of the American College of Obstetrics and Gynaecologists (ACOG, 2020) states that physical activity is typically safe for perinatal women and can play a preventive role against postnatal depression. Further recent but currently anecdotal, meta-analytic evidence exclusively derived from perinatal health services is confirming previous meta-analytic findings for the antidepressant effects of physical activity. Collectively, accumulative evidence over the last years indicates the association of physical activity with lower perinatal depressive symptoms in the absence of side-effects or other drawbacks. Moreover, a large proportion of eligible perinatal women appear to be entering into exercise studies with depression outcomes and relatively low dropout rates are observed from ongoing exercise participation. In line with the recent ACOG Opinion Statement, this report indicates that perinatal women are encouraged to exercise for 20-30min/day on most if not all days of the week to increase the odds of preventing or tackling depressive symptoms.

Example of Good Practice

Twelve pregnant women experiencing minimal to mild depressive symptoms, with a singleton gestation from 22 to 26 weeks, and a clearance from their gynaecologist that they can safely take part in low to moderate exercise (LME) participated in an Exercise

Counselling (EC) intervention from their third trimester of pregnancy to their second month post-birth. The EC was implemented via eight individualized counselling sessions based on the Social Cognitive theory (Bandura, 1998) and the theoretical constructs, and the experiential and behavioural processes of the Transtheoretical Model of change (TTM) (Prochaska & Velicer, 1997). The intervention aimed to enhance participants' knowledge, skills, strategies and confidence to participate in regular self-paced exercise. The exercise goal was progressive over time taking into account participant's Stage of Change (SoC) for exercise at pre-intervention, targeting their engagement in at least 150min/week of self-paced exercise. The implemented EC intervention was beneficial for alleviating depressive symptoms. According to the results and participants' evaluation, two key components of the intervention were: i) participants' engagement in moderate intensity exercise of approximately 250 min/week and ii) their ability to regulate the intensity pace of the implemented exercise that appeared to attribute to the EC intervention adherence (Tzouma, 2021).

Recommendation: According to the World Health Organization and the American College of Obstetricians and Gynaecologists guidelines on PA, it is recommended that in the absence of contraindications women should i) undertake regular PA throughout pregnancy and postpartum, ii) do at least 150min of moderate-intensity aerobic PA throughout the week for substantial health benefits, iii) incorporate a variety of aerobic and muscle-strengthening activities while gentle stretching may also be beneficial, iv) limit the amount of time spent being sedentary and replace it with PA of any intensity (ACOG, 2020; WHO, 2020).

2.10. Physical activity and mental health for other clinical populations: guidelines and recommendations

Cancer. Research shows that exercise training/testing are safe for cancer survivors and that all cancer survivors should be aware that they should not live a sedentary lifestyle. Aerobic exercise, aerobic combined with resistance training, and/or resistance training can provide a substantial support towards the improvement of cancer-related health outcomes, such as anxiety, depression, fatigue, physical functioning, and health-related quality of life. Nevertheless, further research is required to advance exercise rational for cancer survivors. For further information see Campbell et al. (2019).

Multiple sclerosis. Exercise provides depression relief and quality of life enhancement to people with multiple sclerosis. Exercise needs to be individualized, vary according to the disease stage. It has to be supervised and combine both aerobic and muscle strengthening especially in the early stage. Noteworthy, patients may show deterioration in symptoms at the beginning of the exercise program. Nevertheless, after the initial stage of the exercise program side effects are vanished, and patients can carry on without worrying about potential deterioration. Given that some patients experience temperature sensitivity, exercise supervisors need to be aware that patients should not be cold when exercising. For further information see Pedersen and Saltin (2015).

Parkinson. Exercise needs to be tailored to the patient according to the disease stage in order to bring about psychological improvement. Specifically, exercise for 60 to 75 min, three times per week improves quality of life among patients with Parkinson's disease. Patients may participate in exercise programs comprising aerobic and strength training without excluding balance and coordination exercises. Aerobic exercise on a treadmill with external support is recommended; intensity should be regulated according to the patient's stamina. Also, intensity should be gradually increased every 10 minutes. Auditory rhythm stimulation could be used to enable patients towards increased walking speed. Balance and muscle strength exercises are also recommended. For further information see Pedersen and Saltin (2015).

3. Recommendation for policies to promote physical activity for mental health as a preventive and treatment behaviour

Below, we make an effort to summarize existing and new knowledge regarding guidelines that suggest priorities for policies that promote increased physical activity behaviour for mental health benefits for the general population (as prevention) and for clinical mental health population (as treatment). Examples of good practices are also provided.

3.1. Cross-sectoral approach

Cross-sectoral approach or *Multisector collaboration* can have a greater potential for sustainable change in complex challenges. Alliances of individuals and organizations from different sectors can use varied perspectives and resources to jointly achieve the goal to promote physical activity for prevention and treatment purposes. The strong point in this approach is that they can use their differences as an advantage (e.g., differences in perspective, scale, resources, experience, demographics, industries, and sectors). This way, stronger and more sustainable solutions will derive from designing with (and not just for) the communities most affected. In the case of physical activity promotion, this means decision makers of policy development adopt a human-centred design approach and engage key stakeholders with an iterative process.

In this way, PASS project (co-funded by the Erasmus+ Sport programme) recommends the creation of roadmaps for active cities within the community by involving children and young people from different socioeconomic backgrounds, minority ethnic groups, and people with disabilities in the design, planning, and delivery of activities.

(See <https://www.sportetcitoyennete.com/wp-content/uploads/2018/01/Recommandations PASS docfinal version web-2.pdf>)

3.2. Policy options

Choosing a policy usually depends on constraints e.g., practical, structural, and resource. When planning a complex behaviour change task, the best strategy is usually to combine policy options. For example, promoting physical activity at the local level supposes to build new walking and biking paths to the city centre (urban planning) and strives to maximize its use by a social marketing campaign to encourage people to choose active mobility (Communications and Marketing). The types of policy options for changing physical activity behaviour are the following (Public Health England, 2020):

Guidelines. Development and dissemination of documents that make evidence-based recommendations for actions regarding the promotion of physical activity for benefits on mental health.

Policy aims: to educate key people about what needs to be done and why, regarding the promotion of physical activity to benefit mental health. Includes cases to model good practices.

Urban and social planning

Urban and rural planning, location design, housing planning, social care, employment, equality, security, and education.

Policy aims: Broad range of policies affecting citizens' macro- and micro- environments with a focus on changing the physical and social environment where people live, in relation to the promotion of physical activity for benefits on mental health. These policies may support the policies that focus on changing people's behaviour(s).

Communications and Marketing

Mass media campaigns, digital marketing campaigns regarding the promotion of physical activity for benefits on mental health.

Policies' aims: to educate citizens at large about what to do, or why change is important or to persuade them of the importance of the promotion of physical activity for benefits on mental health and to trigger action.

Service provision

Provision of services, materials and/or social resources and aids, whether they will be structured or ad hoc, financed, or unpaid.

Policies' aims: to improve people's ability to adopt regular physical activity or change sedentary behaviour to be more active.

Legislation, regulation, and fiscal measures are also policy options, but they do not apply to physical activity promotion.

3.3. Choice of policy options criteria

The APEASE criteria (Michie, 2014) can be used to assess each planned policy choice in order to decide which ones will be used:

Acceptability. Is it acceptable to key stakeholders (target group, funders, practitioners delivering the policies' actions and other relevant groups?

Practicability. Can it be implemented at the planned scale? Is the context, material, and human resources enough to cover the intended scale that it will be implemented? What needs to be done to safeguard resources and does these policies create sustainable effects?

Effectiveness. Will the policy objective(s) meet by the intended actions? How far and how large the effect will be at the target groups?

Affordability. At what scale it can be afforded? Has the necessary budget be secured for it? Is the return on investment good enough?

Side-effects. Is there a possibility to cause unintended adverse or beneficial outcomes?

Equity. Does it create differences between advantaged and disadvantaged society groups?

APEASE judgements should always be used and adapted to the specific context and the specific target group that the policies will be applied, even if the policies have been proved as effective in other contexts or groups.

3.4. Criteria for effective policy development and implementation

Based on the latest knowledge (European Union Physical Activity Guidelines, 2008), quality criteria for effective policy development and implementation are the following:

- Develop and communicate goals: Define policy goals, target groups and settings.
- Plan specific steps of the implementation process: Plan the timeframe, identify milestones, and describe deliverables.

- Define responsibilities and obligations for implementation: Identify the strategic leadership and the legislative support for the policy actions.
- Allocate resources: Identify organizations with qualified personnel to implement the policy actions, or potential capacity development. Secure financial resources and potential sources of funding.
- Create a helpful policy environment: Identify helpful policy areas and policy actors. Establish policy alliances to support the action and to deal with potential political barriers.
- Increase public support: Raise the interest of the general population and the mental health population about the policy actions, by involving several forms of mass media channels.
- Monitor and evaluate implementation and outcomes: Identify key indicators for implementation and outcomes effectiveness.

Based on the above criteria for effective development of policy actions, member states need to customize their strategies to their specific contexts, reflecting the needs of people with mental health disorders and the settings in which they are targeted.

3.5. Policy levels

Policy for interventions at all levels represent arguably the broadest and most powerful means for enacting physical activity changes at the population level.

3.5.1. European Union level

The European Union has a general physical activity strategy for the WHO European Region 2016–2025 (WHO, 2017). The strategy of health-enhancing physical activity (HEPA) Europe is an initiative with a mission to provide a forum for the advancement of health-enhancing physical activity research, policy, and practice, for better health and well-being across the WHO European Region. A recently published report of HEPA provided an excellent initial overview of the implementation of HEPA-related policies and actions at the national level throughout the EU. According to the results the main areas that need more investment overall at EU level are the “Senior Citizens” sector

followed by the “Working Environment”, and the “Environment, Urban Planning, and Public Safety” sectors.

Furthermore, the EU region recently published a position statement by the European Psychiatric Association and other allied health professionals, highlighting the important role of physical activity in tackling mental illness (Stubbs et al., 2018).

The PASS project recommends increasing the visibility and profile of active lifestyles and sport for all by improving data collection and measurement. On a European level, sport and education ministries could create a “European Observatory of Physical Activity” which would track the European inactivity crisis and evaluate the impact of European, national, and local policies on Sport and Physical activity levels in Europe, and the way they affect the economic, social, and health well-being of Europeans. They could also better disseminate existing measurement tools to Member States, such as the HEAT (Health Economic Assessment Tool), which aims to recognise, assess, and better accommodate the needs of active lifestyles throughout Europe. The project also recommends developing a European study on the economic impact of physical inactivity.

3.5.2. Central/National Government Level

Since 2012, when physical inactivity was recognized as a global pandemic, all sectors of governments and societies have been urged to take immediate action, and a growing request to apply effective strategies to increase physical activity levels of their population. Physical activity and public health require multidisciplinary work and a combination of expertise, like epidemiology, exercise and sport science, behaviour science, environmental health science, health science and other areas. Capacity building, workforce training, and intersectoral approaches and actions are needed in all regions for physical activity research, practice, policy, and advocacy and education. Finally, a systems approach to physical activity is needed with coordinated changes at the individual, social and cultural, environmental, and policy levels. According to Breda et al. (2018), National policy recommendations on physical activity for health have been established by 19 (70.4%) countries. Among these countries, 18 (66.7%) target adults,

17 (63.0%) target young people and 16 (59.3%) target older adults. Based on these results there is space for improvement for all EU national governments. The following recommended policies suggested by Reis et al., (2016) are the latest and most appropriate for unions of nations, regarding scaling up physical activity promotion across the globe.

Recommended policies

The following policy recommendations are a synthesis of those provided by Reis et al., (2016) to promote physical activity at the central government level and apply as well to the field of mental health prevention and treatment:

- Ministries of health should have plans for multilevel and multisectoral actions in order to increase physical activity;
- A monitoring mechanism of physical inactivity should be established by the clinical medical practice as an additional risk factor, at national and regional level. Additionally, physical activity counselling/prescription should be provided through the health care systems for the prevention and treatment of chronic diseases and mental health;
- Studies assessing the impact of applied physical activity interventions should be a priority for research funding agencies, researchers, and scientific journals, with a focus on interventions implemented at scale, regularly assessed. Effective interventions should be embedded in the system fully in order to achieve progress;
- Moreover, medical and public health practitioners need to highlight and underline the benefits of being regularly physically active beyond health effects (e.g. economic benefits, quality of life, productivity);
- For further scaling up, sectors outside of health (e.g. schools, urban planning, transportation, sports and recreation, the environmental sector) could contribute, for example: a. Ministries of education should adopt whole-of-school approaches for promoting physical activity among children and adolescents; b. Sport authorities should prioritise sports-for-all approaches; c. Urban planning and transportation policies should prioritise actions for all citizens that promote safe, equitable, and

- environmentally friendly active mobility and leisure options; d. Environmental policies should be linked to the promotion of active living;
- Policy makers, stakeholders, and city and state planners should improve policies, programmes, systems, and places to enable people to lead more active lives through scaling up approaches to increase physical activity of the population.

Example of good practice

The *Finnish Schools on the Move* programme (FSM – Liikkuva Koulu; <https://liikkuvakoulu.fi/english>) was established in 2010 as a national action programme aiming to implement the 2008 National recommendations and to generate a physically active culture in Finnish schools. Several of the elements of Finnish Schools on the Move contribute to its success as an initiative. The program was voluntary and was based on the needs of each individual school. While there was a framework for guidance, each school was able to select appropriate activities to implement in order to achieve the overarching goal of making the school more active and pleasant. Several of the implementation practices can be seen as strengths of the initiative including access to national trainings, a trained mentor, and funding opportunities to pursue the implementation of the activities they have selected.

According to the Interim Report 2015-2016:

- 49% of class teachers use activity-based methods during lessons in “all or most classes”; 59% were using active breaks; and school yards and surroundings are utilised in lessons other than PE in 65% of the schools.
- 18% of the schools agree on practices to break-up long sitting times.
- Regarding school yards and infrastructures, only 15% of headmasters declare not to have modified school facilities to make them more active; 46% of the schools improved attractiveness of the yards and 63% of them have a playing field and other areas for PA; 87% of the students spend their breaks outdoor and they can use the gym in 29% of the schools.
- Active mobility to and from the school is encouraged in 57% of the schools, and 63% of them have bicycle racks and helmet storage space.

- 37% of the schools cooperate with local clubs to organize sport activities.
- Concerning students' participation in planning and delivery of activities, 45% of schools trained students to act as recess activators for their peers; the uses and improvements of school yards have been discussed with students in 52% of the schools; and students participate in planning the activities in around 40% of the schools.
- 48% of schools implement a long recess during school day and 51% of them have a sufficient provision of goods and equipment to be used during recesses.
- Concerning staff agreement and wellbeing, 92% of school staff think that the program contributes to enjoyment at school, 83% that it contributes to a more peaceful learning environment, 35% that it promotes teachers' wellbeing, and 31% that it increases the workload.

The type of physical activities that were the most promising were:

- Asking students to plan fun physical activities during school breaks;
- Adding to the school schedule physically active breaks;
- Using physical activity-based methods during in-class courses;
- Improving schoolyards and facilities in order to encourage students to participate in physical activities;
- Promoting more physically active commuting to school.

3.5.3. Regional and Local Government Level

Regional and local government policymaking can have a big influence on the physical activity rates of citizens. Local governments are responsible for provide indoor and outdoor sport facilities, recreation parks, walking and cycling paths, etc. Through policies, planning and development, and the provision and management of these facilities and services, local governments can shape a physical activity-friendly environment for citizens. Since physical activity is a health behaviour, policy development procedure at the local government level should follow methods that exist for that purpose (e.g. Public Health England, 2020).

Recommended policies

The following policy recommendations to promote physical activity at the regional and local government level apply to the field of mental health prevention and treatment:

- Encourage walking and cycling as means of active mobility and recreation through improvements in the built environment.
- Promote programs that support walking and cycling for transportation and recreation targeting the needs of specific populations (children and adolescents, elderly people, people with disabilities, adult working population).
- Promote policies that build physical activity into daily routines, e.g. transportation, leisure time physical activity, and sport.
- Develop media and social marketing campaigns that emphasize the multiple benefits of sustained physical activity for children and families.
- Develop campaigns to raise awareness among citizens regarding the benefits of being physically active for their mental health
- Collect data and develop monitoring mechanisms for assessment and future planning purposes.

- Planning and delivering strategies for sport for all that reduce the cost of participation for people on low income.
- Making use and optimising existing resources: Low cost solutions exist by thinking of new ways to use facilities such as opening schools after hours, turning on park lights at night etc.
- Linking an Active City strategy to a problem that the city is facing: This provides credibility by showing that physical activity can solve problems in other areas.

Example of good practice

Based on the «Designed to Move Report», Copenhagen («Designed to Move Report» <https://static1.squarespace.com/static/53f7c512e4b05c22548e0a38/t/5cf2762e3835ff0001e1e878/1559393862645/active-cities-full-report.pdf>). Copenhagen has a strong physical activity culture. It is one of the most cycle-friendly cities in the world. Most residents have access to public swimming areas and accessible parks. In Denmark, the 11-year-olds meet the recommended levels of physical activity.

In the neighbourhood of Nørrebro (the most ethnically and economically diverse place in the country?), architects and city planners worked with neighbourhood residents to design a 1 km-long park called Superkilen, featuring a cycling track, running/walking lanes, traffic connections to public transport, and a sport square.

Some of the best practices they have applied are the following:

- *They prioritize physical activity as a solution. They use a multisector approach. For example, they include the department heads to the planning process when making city plans e.g., the heads of Culture and Leisure, Technical and Environmental (including transport), Finance, Children and Youth, Health and Care, Social and Employment.*
- *They use creative ways to encourage physical activity which exist throughout the city. For example, an artist created “Free Zone Signs” that they look like traffic signs, but show people running, jumping and dancing. They act as reminders to be more physically active.*

- *They design for the people. They involve local people in the decision making. For example, with Superkilen (a celebration of the neighborhood's diversity) ask from residents to provide inputs on elements that would reflect their needs and interests for their neighborhood.*
- *One municipality policy goal is that all Copenhagen citizens should be able to reach a park or beach in less than 15 minutes on foot. This way they create a legacy of physical activity because it would be impractical for a new administration to remove these solutions.*

Another example of good practice: TAFISA's Active Well Being Initiative helps cities and urban areas to promote physical activity, sport, and well-being through standards, supporting tools, and training modules.

3.6. Policy sectors

3.6.1. Health

There is now increased evidence pointing to the important role that physical activity/exercise can play in the public health sector. In particular, both individual experimental research and systematic reviews with meta-analytic findings have repeatedly confirmed the mental health benefits of physical activity/exercise. In addition, large-scale population studies have provided evidence that higher levels of physical activity/exercise participation have been repeatedly related with better mental health, whereas sedentary behaviour is inversely linked to mental health. This promising evidence stemmed from objectively measured physical activity monitors such as accelerometers, suggesting firm conclusions. Also, studies related to cost-effectiveness of physical activity/exercise for mental health have provided equally promising findings. Accordingly, Public Policies and Health Systems need to translate current evidence into specific actions to promote, prescribe and deliver physical activity/exercise. Decision-making institutions and stakeholders need to become aware of the evidence concerning the mental benefits and cost-effectiveness of physical

activity/exercise, and include relevant actions into primary and secondary mental health services. Although physical activity/exercise appears to be dissociated with side effects, careful monitoring of physical activity/exercise participation is always essential in order to ensure that no physical or mental adverse effects are recorded among mental health patients participating in physical activity/exercise programs.

Examples of good practice and list of policies

A list presenting physical activity/exercise on promotion, prescription and/or delivery can be found in Appendix 1. This includes physical activity/exercise fact sheets.

3.6.2. Education

3.6.2.1. School education for Children and adolescents

Depression and anxiety often emerge for the first-time during youth. By the age of 18, 20% of young people will experience a depressive episode or an anxiety disorder. Depression and anxiety are likely to be chronic conditions, with repetitive occurrence and with 10% to 50% comorbidity (Garber and Weersing, 2010; Scholten et al., 2013). This is a considerable public health problem, and young people who are diagnosed with depression and anxiety are most likely to develop worse clinical conditions over the lifespan, and they are more vulnerable to develop physical health problems, risky sexual behaviour, suicide risk, drug and alcohol abuse and poor academic outcomes (Donovan and Spence, 2000; Kessler et al., 2001). Although the focus of the current report is beyond the association of physical activity with mental health in children and adolescents, an updated recent review of systematic reviews and meta-analyses concerning physical activity and mental health in children and adolescents concluded that *“there are significant increases in research activity concerning physical activity and depression, self-esteem, and cognitive functioning in young people. The strongest evidence for a causal association appears to be for cognitive functioning, and there is partial evidence for depression”* (Biddle et al., 2019). These results along with the earlier findings suggest that the best way to prevent mental health burden not only during childhood but also later in life, is to focus on prevention. Therefore, school provide an

ideal environment to promote physical activity as a way to manage mental health symptoms such as stress, anxiety, and depression. Since physical education is a compulsory course in European schools, mental health prevention programs through physical education classes is considered to be an ideal setting for this purpose.

School-based prevention programs have the potential to reduce mental health burden. Overall, school-based prevention programs integrated into the school curriculum are associated with several advantages:

Mental health prevention programs at schools may prevent the incidence of a disorder occurring altogether, with research suggesting that it is possible to prevent 22% of new depression cases each year (Cuijpers et al., 2008). Even in cases where the disorder cannot be prevented, these programs can delay the onset of clinically significant symptoms (Bienvenu and Ginsburg, 2007; Merry et al., 2012), which confers considerable benefit, including reduced disability and health service use (Donovan and Spence, 2000).

Implementing physical activity promotion programs for mental health prevention in early school life, we increase their possible effectiveness, because lifestyle behavioral patterns are more prone to change. Whereas, later in life more rigid patterns of cognition and behavior are established and interventions have higher risk of failure to produce positive outcomes. (Donovan and Spence, 2000).

The *school environment* provides a setting that offer plenty of opportunities to teach students a variety of skills and knowledge that can delay or protect them from the onset of mental health problems.

The school *physical education class is the most advantageous context* to promote physical activity to prevent or deal with mental health issues. For example, the skills-based trainings, which are common in mental health prevention programs, fit better with the PE course contents. Life skills like goal setting, action planning, problem solving, time management, breathing and tension relaxation techniques, can all be practiced through sports and physical activities and then transferred to stress management or mood regulation. Children and younger adults enjoy and learn better the skills through play and games than? through physical activity. Compared to in-class theoretical learning on

how to manage stress or bad mood, experiential learning through a well-designed PE class can have better and longer effects on students' adoption of regular physical activity for mental health benefits.

Recommended policies

- Develop monitoring mechanisms, tools, and adequate indexes to monitor physical activity consistently across all education levels (preschool to university level education settings).
- Provide high-quality physical education at schools.
- School personnel (e.g. schoolteachers, health educators and PE teachers) should be trained on how to deliver the promotion of physical activity as a preventive behaviour for mental health disorders.
- Open the schools' sport and exercise facilities during afternoons and weekends for extra-curricular physical activity of youth who most need PA.
- Open schools to outside stakeholders such as coaches, professional athletes, sport clubs, and fitness instructors.
- Invest in the improvement of sport and exercise facilities and equipment of schools.
- Promote sports development and sports facilities in neighbourhoods and communities located in impoverished areas.
- Increase hours of Physical Education classes per week in schools across all Europe, ideally 3 hours/week.
- Provide in-service PE teachers with regular training topics on how to promote health (including mental health) through sports and physical activity.
- Include in PE teacher education programs (i.e., universities) courses on how to promote health (including mental health) through sports and physical activity.
- Review and adapt the Physical Education curricula to make sure that physical activity for health (and mental health) is among the first main aims of PE teaching.

- Ensure that Physical Education teaching is made by PE specialists across all school grades.
- Require physical activity in early childcare and education.
- Create an “Active Schools” or “Sport minded schools” label to incite participation and motivation. This could take the form of a “Community Award” in the framework of the European Week of Sport. It would reward initiatives that inspire participation from children who are remote from physical activity.
- To create a passport for a healthy lifestyle with the list of activities and offers available with the municipalities, clubs, and schools. Children could collect points to take part in physical activities across the city.

Example of good practices

*Austria’s largest cooperation programme between the sports and education sectors, entitled FIT SPORT AUSTRIA (MOVING CHILDREN HEALTHILY 2.0) is a good practice example of an intersectoral cooperation on a national level. The program aims to build cooperation between sports clubs, preschools, and primary schools, and to promote an active lifestyle by offering a joyful and fun approach to physical activity for children aged 2–10 years. The focus is on needs-based cooperation between educational institutions and sports clubs for mutual benefit. Educational institutions benefit from high-quality exercise offers and sports clubs benefit from the possibility of long-term cooperation. In addition, with the creation of new exercise offers for children and young people, there is the possibility of associating children to the sports club. In the period from 09/01/2009 to 12/31/2019 the following services were provided: 842,291 exercise units (45-60 min. each), 24,941 partnerships with kindergartens and elementary schools, 14,920,006 children's exercise hours (Units * number of participating children), > 1,100 participating clubs, > 6,000 participating trainers. For more information see: www.fitsportaustria.at*

3.6.2.2. Education for adults and training of health professionals- Exercise prescription

Physical activity prescription for mental health should be part of the main studies for all health professionals. Although physical activity/exercise is associated with a series of mental health benefits across various mental health disorders, there is a substantial need to ensure appropriate education and training for relevant promotion, prescription and delivery. To this extent, all health professionals need to receive more education/training to effectively promote, prescribe and deliver physical activity/exercise. Nowadays, there is substantial evidence and knowledge on promotion, prescription and delivery of physical activity/exercise for patients with mental health issues. Moreover, there are both national and international initiatives with respect to all aspects involved in the frame of physical activity/exercise and mental health benefits.

In detail, health professional need to receive relevant training and become aware of national guidelines as to how physical activity/exercise is promoted to mental health patients. National guidelines are specifying the dose of physical activity exercise. Moreover, they clarify approaches to prescribe physical activity/exercise and effectively supervise relevant delivery. Monitoring and supervision of prescribed physical activity/exercise is essential by qualified health professionals to ensure highest effectiveness and to control any side effects caused by physical activity/exercise participation or dropout. In conclusion, both public and private health professionals should have trainings on prescribing exercise for patients with mental health disorders.

3.6.3. Transport and environment sector

The health benefits of non-motorized transport and commuting, commonly referred as active transport, on non-communicable diseases have been well-documented. Despite the fact that evidence on the effects of active transport on mental health is limited, the increased physical activity due to active transport may account for such a relationship. Further, active transport can result in positive environmental effects, which in turn, can positively affect citizens' mental health.

Active Mobility and Physical Activity

Active mobility, such as cycling and walking can add to the overall volume of individuals' physical activity enhancing the health-related benefits of physical activity, including those related to mental health. Further, physical activity through active transport may be the basis for enhanced leisure-time physical activity and exercise. That is, there is a carry-over effect of transport related physical activity. This effect may be facilitated by the positive mood created by physical activity and by the availability of respective infrastructure. Further, the increased energy expenditure caused by non-motorized transport can contribute to weight control. Additionally, increased physical activity is related to individuals' cognitive functioning and their perception regarding quality of life.

Active Transport and Sustainable Mobility

Active transport, besides enhancing physical activity, can also contribute to sustainable mobility and reduce the negative environmental effects of motorized transport. The increasing demand for urban travel (between city centres, suburbs, and peri-urban areas) affects, besides the volume of urban transport, its quality and overall conditions (speed, safety, gas emissions, noise etc.). Such effects of motorized traffic have negative effects on mental health. WHO (2011) reported that at least one million healthy life years are lost every year from traffic-related noise in the western part of Europe. Sleep disturbance and annoyance, mostly related to road traffic noise, comprise the main burden of environmental noise.

Therefore, active transport is a major target of health organizations. The World Health Organization's Global Action Plan on Physical Activity 2018 – 2030 (WHO, 2018) states that "Investment in policy actions to increase physical activity through, for example, more walking, cycling, active recreation, ... can contribute to achieving many of the Sustainable Development Goals (SDG): Increasing physical activity will directly contribute to SDG3 (good health and well-being) as well as other goals, including but not limited to SDG 11 (sustainable cities and communities) and SDG 13 (climate action).

Built and Social Environment

The built environment can have either positive or negative effects on mental health. Although a wide array of aspects of the built environment contribute to these effects, those related to enhanced physical activity are walkability, perceived and actual safety, connectivity of recreational areas, and urban green space. Sullivan and Chung (2011) posited that green settings have the capacity to alleviate mental fatigue and that places that encourage physical activity can both prevent and treat depression. In order to be effective, built environment developments for active transport should be coupled with interventions in the social environment such as campaigns that promote physical activity to the citizens.

Public Transport and Sustainable Mobility

Apart from active transport, the use of public transport enhances physical activity and at the same time contributes to sustainable mobility (United Nations, 2014). People who use public transport usually walk to and from bus and train stations and this adds to their overall physical activity. Further, the use public transport reduces traffic congestion and can enhance sociability. More specifically:

Individuals through active transport can meet the WHO (2020) recommendations for physical activity. Reviews of related studies confirm the health benefits of cycling and walking already observed in studies on general physical activity (Kelly et al., 2014). For example, a large national study (Fishman, Böcker & Helbich, 2015) showed that Dutch men and women who use active transport participate in 24 and 28 minutes of daily physical activity through walking and cycling, which is 41% and 55% more than the minimum recommended level.

Apart from enhancing physical activity, *active transport can contribute to reduce the adverse environmental effects of motorized transport* such as emissions, traffic congestion and noise. Although “substantial improvements in air quality and noise are improbable through active travel policies alone; small changes that affect long-term population exposures can have meaningful impacts” (De Nazelle et al., 2011:774).

A Lancet review (Bauman et al., 2012) showed that certain aspects of the built environment correlate with transport-related walking and cycling, and with leisure physical activity. These are: walkability, street connectivity, transportation environment (pavement and safety of crossings), aesthetic variables such as greenery, and proximity to recreation facilities.

Public transport use is an effective way to incorporate physical activity into daily life. For example, Patterson, Webb, Millett, & Lavery reported that UK public transport users accumulated about 20 minutes per day of physical activity as part of public transport journeys and (Risell et al., 2012) synthesis of related studies showed that a range of 8–33 additional minutes of walking could be attributable to public transport. Further, Reinhard et al. (2018) reported that a free bus travel scheme resulted in reductions in depressive symptoms and feelings of loneliness among older people.

Recommended policies

- Develop green pathways for pedestrians and bike riders and create links between parks with other common destinations and recreation sites.
- Tackle infrastructure issues that may discourage people from walking such as traffic volume and speed, lack of convenient road crossings, and poorly maintained footways.
- Install good lighting to ensure visibility and safety in pedestrian paths at night.
- Make public transport extensive, frequent and affordable
- Combine relevant built environment interventions with related campaigning.

In order to maximize the effects of such actions, a comprehensive approach based on local needs is suggested. Crone et al. (2017) provide a detailed method for developing and implementing related action plans.

Example of Good Practice¹

Switzerland: Zurich Limmatquai. Car free project on central road.

The project aimed to increase the quality of the inner-city and reduce car traffic in one of the most attractive areas of Zurich, through traffic calming the Limmatquai, a main road on the boarder of the river “Limmat” between the main train station and the lake. It is one of the main through-roads of the city, carrying about 20,000 cars and trucks per day.

In June 1999, a public vote was conducted, and the population of Zurich voted in favour of a car-free Limmatquai. However, it took until 2004 before opposition from politicians and local businesses could be overcome and the work started. The Limmatquai was completely rebuilt into a partly or fully car-free boulevard with wide sidewalks and 30km/h speed limits for all modes of transport (incl. trams and taxis).

A traffic study in 2007 and surveys with business owners and by-passers in 2008 and 2009 showed that:

- 94% of users preferred the new setting.
- 60% of business owners preferred the new setting.
- 16% of by-passers and 25% of business owners noted as a weakness the fact that the Limmatquai had not been made completely car-free.
- The mentioned advantages (less disturbance from traffic, more attractive for pedestrians, more lively etc.) clearly outweighed mentioned disadvantages by business owners (less parking spaces, more complicated delivery etc.).
- 80% of participants liked the Limmatquai setting. The most frequently mentioned argument was the traffic situation and the reconstruction.
- There was overall no negative effect on the inner-city traffic situation in peak hours (16:00-18:00).
- The number of pedestrians increased by 17% (or about 2'000 p./day).
- Including nearby street segments, pedestrian traffic increased in total by 5%.
- The number of bikes increased by 18% (or about 3700 bikes/day).



Before

After

¹ **Note:** This case study is a short version of Kahlmeier, S. (2017). Switzerland: Zurich Limmatquai. Car free project on central road. In N. Cavill (Ed.), *Environments for physical activity in Europe: A review of evidence and examples of practice* (pp. 50-52). SPACE. «Environments for physical activity in Europe: A review of evidence and examples of practice» is an output of the “Supporting Policy and Action for Active Environments – SPACE - <https://activeenvironments.eu/>” which was co-funded by the Erasmus+ Programme of the European Union. The case study is reproduced with permission by Sonja Kahlmeier (Author), Nick Cavill (Editor) and Diane Crone (Project Co-ordinator).

3.6.4. Working environment

A greater percentage of the workforce is now employed in occupations with low levels of activity (sedentary jobs such as office workers, motor vehicle operators etc.). Research suggests that up to 80% of contemporary jobs are sedentary or involve only light activity. As mentioned before, sedentary working life for 8 or more hours per day can lead to health problems. Poor health, together with pressure to extend work careers, are perceived to require investment in changes in employees' health behaviours.

Research suggests that healthy behaviours are related to better work ability and safety at work. Moreover, there is evidence that increasing the employees' level of physical activity not only has positive effects on their health and productivity, but also reduces

health care costs and sick leaves due to diseases or injuries, and reduces absenteeism. “Presenteeism” is a term that was created to describe the phenomenon of employees being at work but not being fully functioning, because of illness or injury. It is estimated that more work performance is lost based on presenteeism than on absenteeism. The most common reason for presenteeism is depression, followed by allergy, hypertension and type-2 diabetes. Physical activity can prevent and or treat most of these reasons, and can therefore play a major role in improving mental and physical health as well as the wellbeing of working-age people. Moreover, reducing sitting time and sedentary behaviour at work is a key issue for occupational health.

Recommended policies

- Policies promoting a corporate “culture of good health;”
- Policies targeting active travel to work;
- Policies targeting wide availability of information about physical activity and good mental health within and outside the workplace;
- Policies to communicate information regarding sedentary behaviour and health risks;
- “Flextime” policies.

Example practices related to promoting physical activity at workplace are the following:

- *Active travel.* Walking initiatives, stair instead of elevator use, cycle to work, walking meetings;
- *Counselling/information and advice.* Organization or company can provide information to educate employees about the benefits of physical activity;
- *Environmental changes.* Building inside the workplace individual showers and lockers so that workers can use bike to go, creating a gym room and hiring exercise specialists to run programs before, after, or during breaks.
- *Incentives.* At the central government level, development of fiscal incentives, and at the organizational level development of rewards and recognition programs of active employers.
- *Campaigns, Events.* Regular physical activity promotion campaigns, sport or physical activity events, yearly physical activity projects (e.g. “Lets’ walk to

Rome” employees collect steps for a year aiming to calculate the sum and reach a difficult target, as if you would walk to Rome).

- *Group-led social exercise.* Provision of a variety of physical activity program options to meet different needs (involve employees in the planning).
- *Active breaks.* Model and encourage active breaks between worktime or during lunch.
- *Collaborations with sport clubs or gyms* in the area of the working place and cover part of the cost of memberships for the employees.
- *“Flexitime”.* Flexible working schedule, because start and end of work on a range of time each day may provide more physical activity opportunities for employees.
- *Use physical activity experts.* Hire qualified and experienced people to manage the physical activity programs.
- *Monitor physical activity* promotion programs. Define indicators, collect data and develop monitoring mechanisms and disseminate reports and results to all employees.
- *Access to all employees.* Avoid “elite sport club” approaches.
- *Multi-component* (any combination of the above).

Example of good practice

Performance et Responsabilité Michelin. (European Commission, 2017). The Michelin company (French, specialised in tyres) runs a multicomponent health behaviour promotion program since 2009.

Performance et Responsabilité program promotes a healthy lifestyle at work and physical and psychological health through sport. It comprises of three sub-programmes: ‘Oxygène’, ‘Second souffle’, ‘Éducation posturale globale’ to address the different needs of different categories of employees (manual labour workers, desk-based workers, drivers...).

Sport facilities are provided at the workplace funded by the company. Oxygène focuses on the prevention of diseases directly or indirectly caused *by a sedentary lifestyle and stress*. Every employee is invited to participate in an induction test to measure their physical fitness based on nine indicators such as flexibility, speed, and arms strength. Based on this test, a group of experts made of doctors and personal coaches advise the employee on what physical activity they should practice to improve their performance. Employees can then access sport facilities and/or train individually or collectively in coaches-led sport sessions. Oxygène's entry cost is €80 a year per person, up to 50% of which is covered by Michelin. Finally, a number of activities are carried out to support all programs, like regular conferences on nutrition, health, ageing and sport; professional nutrition counselling and coaching; company canteen meals tailored to the type of physical exercise practiced by employees; free cooking classes with a chef and a nutritionist for best performing participants.

Outcomes and learning points:

- The programme is based on a strong internal collaboration of departments as well as the employment of an external specialist sport company.
- A particular feature of the programme is the fact that it seeks to address a wide range of different needs depending on each professional category of Michelin employees.
- A key success factor of the programme is its innovative management. *Project leaders enjoy significant freedom in the way in which they implement the components of the programme* and this represents a significant incentive.
- Another success factor of the programme is the *strong support coming from the management*.

Based on results achieved in France, Michelin has expanded the programme to some of its international sites including in the USA and Poland.

3.6.5. Senior citizens

Ageing is associated not only with somatic disorders but also with an increase of a number of mental health problems in older adults, mainly dementia and depression.

Ageing is accompanied with progressive decline in activity levels, but regular physical activity can reduce morbidity and mortality, delay disability, and prolong independent living.

Physical activity is among the best strategies of mental health promotion for seniors with recent reviews of randomized control trials suggesting that exercise has positive effects on cognitive functioning (Northey, Cherbui, Pumpa, et al., 2018) and reduction of depressive symptoms (Rhyner & Watts, 2016). Earlier meta-analytic reviews of experimental and correlational studies (Arent, Landers & Etnier, 2000) and qualitative assessments of physical activity interventions (Fox, Stathi, McKenna, & Davis, 2007) reported that light and moderate physical activities had positive effect on mood and positive affect.

Regular physical activity in older age not only has preventive effects on physical and mental health, but also may function as an add-on treatment for mental illnesses. A recent meta-analysis of randomized control trials (Miller et al., (2020) indicated that different types of exercise, such as resistance, aerobic and mind-body exercise had significant effects on reducing depression symptoms in older adults.

A recent systematic review, Amireault, Baier, and Spencer (2019) denoted that older adults prefer to engage in lower intensity physical activities such as walking especially in the morning. Therefore, policymakers and community organizations should consider walkability in their efforts to promote physical activity in older adults. (Amireault, et al, 2019, p. 136). Further, Franco, et al., (2015), based on a systematic review of qualitative studies on older people perceptions regarding exercise, proposed two sets of strategies to enhance physical activity participation among older people: a) raising awareness of the benefits and minimize the perceived risks of physical activity and b) improving the environmental and financial access to physical activity (p. 1268).

In conclusion, physical activity carries a series of mental health properties among older adults (Kazeminia et al. 2020; Heinzl et al., 2015).

Recommended policies

Among the priority policies and interventions of European WHO for European senior citizens is the promotion of physical activity. This prompts member states to develop and apply multiple strategies aiming to increase awareness, to create supporting environments for physical activity to take place and provide help at the individual level to assist the physical activity behaviour change of elderly people.

Below are some of the recommended policy actions (WHO -Europe, 2012):

- Raise public awareness about the benefits of physical activity for the elderly.
- Build facilities which make physical activity more accessible and attractive to elderly people, for example walkability characteristics such as proximity of desirable destinations, pedestrian amenities including sidewalks or footpaths, adequate lighting, and intersection crossing features.
- Design exercise programs and courses for older people.
- Train the health care providers of elderly people in health care institutions and at home to be able to make sure that older people have the adequate regular physical activity according to their health condition.
- Organize local events for activities (including physical activities) for seniors (crafts, gardening, etc.).

Example of good practice

The Groningen Active Living Model (GALM) (de Jong et al. 2007) is one of the successful initiatives implemented in the area and is dedicated to the promotion of the active ageing, particularly with regard to regular physical activity to improve elderly people's functional capacity and quality of life. The model implies two phases: the neighbourhood-oriented recruitment phase, where the elderly are approached through a door-to-door campaign, and the recreational sports activity program which is based on behavioural change and evolutionary-biological play theories. The Groningen Active Living Model (GALM) has been applied to over 60% of the target group (citizens of age 55-65) and around 68.000 elderly people have participated in the programme. The results showed that:

- 12.3% of older adults were included, and 79.4% of them could be considered sedentary or underactive.
- Leisure-time physical recreational sports activities increased from baseline to 12 months and positive changes in performance-based fitness outcomes occurred in the long-term.
- Cardiovascular functioning improved significantly from baseline to 18 months.

Due to its success, the GALM has been scaled up and implemented in all the provinces of the Netherlands (815 projects).

4. Mental health, physical activity, and gender differences

Gender differences are evident both to mental health and physical activity. According to WHO, *“Gender is a critical determinant of mental health and mental illness. The morbidity associated with mental illness has received substantially more attention than the gender specific determinants and mechanisms that promote and protect mental health and foster resilience to stress and adversity”* (WHO, Gender and women's mental health). Men are more likely to be diagnosed with antisocial personality disorder whereas, women are more likely to be diagnosed with depressive disorders (41.9%) than men (29.3%) and depression may be more persistent in women than men. For schizophrenia and bipolar disorder no gender difference has been detected. Moreover, gender differences of insufficient physical activity were more than 8 percentage points (23.4% for men vs 31.7% for women) based on data from 1.9 million participants (Guthold et al., 2018). Differences of physical inactivity are independent of the Human Development Index according to data from 142 countries based on WHO Data Repository (Mielke et al., 2018).

Although physical activity reduces depression among both men and women (Zhang & Yen, 2015), promoting regular physical activity to women improves their psychological health, promote their self-esteem and their confidence, and can serve as a mean for equality in society.

5. Social stigma and physical activity

Social stigma is often related to discrimination (Corrigan & Watson, 2002) and represents a major barrier to treatment acceptance among people with mental health disorders. In particular, conventional interventional/treatment approaches are related to stigma concerns and to this extent they are often rejected by people with mental health disorders (Economou et al., 2016). In light of this major treatment barrier, physical activity appears to be capable of providing significant support as it appears to be dissociated with social stigma. In particular, evidence suggests that people with mental health disorders experience significant decreases in self-perceived social stigma compared to peers not participating in physical activity programs (Moraleta, Galán-Casado & Cangas, 2019). This buffering effect of physical activity appears to be seen in people with mental health disorders regardless of individual diagnoses. Hence, the value of physical activity in supporting mental health treatments receives additional merit.

In this vein, physical activity appears to be an important interventional/therapeutic tool against mental health disorders. An additional positive and enforcing element to this approach involves consideration that physical activity is widely accepted by mental health patients. Specifically, more than half of people with mental health disorders prefer physical activity at admission to a mental health service (Sigurdsson, Ólafsdóttir & Gottfredsson, 2008). Also, the majority of mental health patients who are eligible to participate in physical activity programs organized by relevant trials eventually enter these programs, and only < 15% drop out (Morres et al., 2019). Overall, physical activity emerge as an important tool that could tackle, minimize, and overtake stigma barriers commonly seen in conventional treatment forms for people with mental health disorders.

6. Indicators, Monitoring and Evaluation

Additional national and international initiatives are needed to address the promotion, prescription and delivery of physical activity/exercise.

In line with the 2008 EU physical activity for health guidelines, indicators need to identify and record the global role of physical activity/exercise in the society. Relevant

indicators include proportions of population meeting recommended weekly physical activity participation, and corresponding levels of physical fitness. For this purpose, both objective and subjective tools are essential. Objective tools include accelerometer devices to record the weekly levels and corresponding intensities of physical activity. Subjective tools include self-rated psychometrics to record the mental health status of populations in relationship to physical activity and inactivity. Psychometrics can be either self- or clinician-rated.

Monitoring state policies with respect to physical activity is essential to reveal potential influences, in a negative or positive direction. For example, promotion of cycling in urban environment is essential and should involve constant monitoring as to whether pollution may affect cyclist's mental health. The monitoring of state policies should also include whether established policies are effectively disseminating the significant public health role of physical activity in today's society, and whether health systems are preventing or treating mental health disorders through physical activity/exercise.

An unexplored area that needs to be considered for future investigation deals with the monitoring of individual needs and preferences. Moreover, the enforcement and facilitation of self-administrated physical activity participation should be prioritized.

References

- Ahmadi, N., Hajsadeghi, F., Mirshkarlo, H. B., Budoff, M., Yehuda, R., & Ebrahimi, R. (2011). Post-traumatic stress disorder, coronary atherosclerosis, and mortality. *The American journal of cardiology*, 108(1), 29–33 <https://doi.org/10.1016/j.amjcard.2011.02.340>
- Alves Donato, A. N., Waclawovsky, A. J., Tonello, L., Firth, J., Smith, L., Stubbs, B., Schuch, F. B., & Boulosa, D. (2021). Association between cardiorespiratory fitness and depressive symptoms in children and adolescents: A systematic review and meta-analysis. *Journal of Affective Disorders*, 282, 1234–1240. <https://doi.org/10.1016/j.jad.2021.01.032>
- American College of Obstetricians and Gynecologists (2020). Physical activity and exercise during pregnancy and the postpartum period: ACOG Committee Opinion Summary, Number 804. *Obstetrics & Gynecology*, 135(4), 991-993. doi:10.1097/aog.0000000000003773
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). <https://doi.org/10.1176/appi.books.9780890425596>
- Amireault, S., Baier, J.M., & Spencer, J.R. (2019). Physical activity preferences among older adults: A systematic review. *Journal of Aging and Physical Activity*, 2019, 27, 128-139. <https://doi.org/10.1123/japa.2017-0234>
- Arent, S.M., Landers, D.M., & Etnier, J.L. (2000). The effects of exercise on mood in older adults: A meta – analytic review. *Journal of Aging and Physical Activity*, 8, 407-430.
- Ashdown-Franks, G., Firth, J., Carney, R. et al. (2020). Exercise as medicine for mental and substance use disorders: A meta-review of the benefits for neuropsychiatric and cognitive outcomes. *Sports Medicine* 50, 151–170.
- Baker LD, Frank LL, Foster-Schubert K, Green PS, Wilkinson CW, McTiernan A, Plymate SR, Fishel MA, Watson GS, Cholerton BA, Duncan GE, Mehta, P.D, & Craft S. (2010). Effects of aerobic exercise on mild cognitive impairment: A controlled trial. *Archives of Neurology*, 67 (1),71-79. doi: 10.1001/archneurol.2009.307. PMID: 20065132; PMCID: PMC3056436.
- Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. *Psychology and Health*, 13(4), 623-649. <https://doi.org/10.1080/08870449808407422>
- Bauman et. al. (2012). Correlates of physical activity: Why are some people physically active and others not? *Lancet*, 380, 258-271.
- Bellón, J. Á., Conejo-Cerón, S., Sánchez-Calderón, A., Rodríguez-Martín, B., Bellón, D., Rodríguez-Sánchez, E., Mendive, J. M., Ara, I., & Moreno-Peral, P. (2021). Effectiveness of

exercise-based interventions in reducing depressive symptoms in people without clinical depression: systematic review and meta-analysis of randomised controlled trials. *The British Journal of Psychiatry: The Journal of Mental Science*. Advance online publication. <https://doi.org/10.1192/bjp.2021.5>

- Biddle, S. J. H., Ciaccioni, S., Thomas, G., & Vergeer, I. (2019). Physical activity and mental health in children and adolescents: An updated review of reviews and an analysis of causality. *Psychology of Sport and Exercise*, 42, 146-155. doi:<https://doi.org/10.1016/j.psychsport.2018.08.011>
- Bienvenu, O. J., & Ginsburg, G. S. (2007). Prevention of anxiety disorders. *International Review of Psychiatry*, 19 (6), 647-654. doi:10.1080/09540260701797837
- Bowen, D., & Neill, J. (2013). A meta-analysis of adventure therapy outcomes and moderators. *The Open Psychology Journal*6 (Article 28–53). <https://doi.org/10.2174/1874350120130802001>
- Breda J, Jakovljevic J, Rathmes G, Mendes R, Fontaine O, Hollmann S, et al. (2018). Promoting health-enhancing physical activity in Europe: Current state of surveillance, policy development and implementation. *Health Policy*, 122 (5), 519-527
- Campbell KL, Winters-Stone KM, Wiskemann J, et al. (2019). Exercise guidelines for cancer survivors: Consensus statement from international multidisciplinary roundtable. *Medicine and Science in Sports and Exercise*. 51 (11), 2375-2390. doi:10.1249/MSS.0000000000002116
- Cavill, N. (Ed.) *Environments for physical activity in Europe: A review of evidence and examples of practice* (pp. 50-52). SPACE Project. ISBN 978-1-86174-225-4. (Downloadable from <https://activeenvironments.eu/>)
- Corrigan, P. W., & Watson, A. C. (2002). Understanding the impact of stigma on people with mental illness. *World Psychiatry: Official Journal of the World Psychiatric Association* , 1 (1), 16-20.
- Craske MG, Stein MB. Anxiety. *Lancet*. 2016 Dec 17;388(10063):3048-3059. doi: 10.1016/S0140-6736(16)30381-6. Epub 2016 Jun 24. PMID: 27349358.
- Crone, D., Kahlmeier, S., Onatsu, T., Cavill, N. and Goudas, M. (2017) How to create an Urban Active Environment (UActive) Action Plan: Lessons learnt and case studies from five European cities from the SPAcE EU project. ISBN 978-1-86174-234-6. (Downloadable from <https://activeenvironments.eu/>)
- Cuijpers, P., van Straten, A., Smit, F., Mihalopoulos, C., & Beekman, A. (2008). Preventing the onset of depressive disorders: A meta-analytic review of psychological interventions.

The American Journal of Psychiatry, 165 (10), 1272-1280.
doi:10.1176/appi.ajp.2008.07091422

- Davis JC, Bryan S, Marra CA, Hsiung GY, Liu-Ambrose T. (2015). Challenges with cost-utility analyses of behavioural interventions among older adults at risk for dementia. *British Journal of Sports Medicine*, 49 (20), 1343-1247. doi: 10.1136/bjsports-2013-092743. Epub 2013 Nov 6. PMID: 24195918; PMCID: PMC4318691.
- Dauwan, M., Begemann, M. J., Heringa, S. M., & Sommer, I. E. (2016). Exercise improves clinical symptoms, quality of life, global functioning, and depression in schizophrenia: A systematic review and meta-analysis. *Schizophrenia Bulletin*, 42 (3), 588-599. <https://doi.org/10.1093/schbul/sbv164>.
- de Jong J, Lemmink KA, King AC, Huisman M, & Stevens M. (2007). Twelve-month effects of the Groningen active living model (GALM) on physical activity, health and fitness outcomes in sedentary and underactive older adults aged 55-65. *Patient Education and Counseling*, 66, 167-76. doi: 10.1016/j.pec.2006.11.008.
- de Nazelle, A., et al., (2011). Improving health through policies that promote active travel: A review of evidence to support integrated health impact assessment. *Environment International*, 37, 766-777.
- Designed to Move. (2015). A Guide for City Leaders. Designed to Move Active Cities (DesignedToMove.org).
<https://static1.squarespace.com/static/53f7c512e4b05c22548e0a38/t/5cf2762e3835ff0001e1e878/1559393862645/active-cities-full-report.pdf>
- de Souto Barreto, P., Demougeot, L., Pillard, F., Lapeyre-Mestre, M., & Rolland, Y. (2015). Exercise training for managing behavioral and psychological symptoms in people with dementia: A systematic review and meta-analysis. *Ageing Research Reviews*, 24, 274-285. doi:<https://doi.org/10.1016/j.arr.2015.09.001>
- Davenport, M.H, McCurdy, A.P, Mottola, M.F., et al.(2018). Impact of prenatal exercise on both prenatal and postnatal anxiety and depressive symptoms: a systematic review and meta-analysis. *British Journal of Sports Medicine*, 52 (21), 1376. doi: 10.1136/bjsports-2018099697.
- Dishman, R. K., McDowell, C. P., & Herring, M. P. (2021). Customary physical activity and odds of depression: a systematic review and meta-analysis of 111 prospective cohort studies. *British Journal of Sports Medicine*. Advance online publication. <https://doi.org/10.1136/bjsports-2020-103140>

- Donovan, C. L., & Spence, S. H. (2000). Prevention of childhood anxiety disorders. *Clinical Psychology Review*, 20 (4), 509-531. doi:[https://doi.org/10.1016/S0272-7358\(99\)00040-9](https://doi.org/10.1016/S0272-7358(99)00040-9).
- Dupré, C., Bongue, B., Helmer, C., Dartigues, J. F., Hupin, D., Roche, F., . . . Carrière, I. (2020). Physical activity types and risk of dementia in community-dwelling older people: the Three-City cohort. *BMC Geriatrics*, 20(1), 132. doi:10.1186/s12877-020-01538-3
- Economou, M., Peppou, L. E., Souliotis, K., Lazaratou, H., Kontoangelos, K., Nikolaidi, S., . . . Stefanis, C. N. (2019). Attitudes to depression and psychiatric medication amid the enduring financial crisis in Attica: Comparison between 2009 and 2014. *International Journal of Social Psychiatry*, 65 (6), 479-487. doi:10.1177/0020764019858653
- Edmondson, D., & von Känel, R. (2017). Post-traumatic stress disorder and cardiovascular disease. *The Lancet. Psychiatry*, 4 (4), 320-3 [https://doi.org/10.1016/S2215-0366\(16\)30377-7](https://doi.org/10.1016/S2215-0366(16)30377-7)
- Ekkekakis, P. (2015). Honey, I shrunk the pooled SMD! Guide to critical appraisal of systematic reviews and meta-analyses using the Cochrane review on exercise for depression as example. *Mental Health and Physical Activity*, 8, 21-36. <https://doi.org/10.1016/j.mhpa.2014.12.001>
- Caitlin, E., Knox, L., Musson, H., & Adams, E. (2017). Workplace policies and practices promoting physical activity across England: What is commonly used and what works? *International Journal of Workplace Health Management*. 10, 391-403.
- European Union Physical Activity Guidelines (2008). Recommended Policy Actions in Support of Health-Enhancing Physical Activity. Retrieved from <https://eacea.ec.europa.eu/sites/eacea-site/files/eu-physical-activity-guidelines-2008.pdf>
- European Commission (2017). Physical activity at the workplace: Literature review and best practice case studies. Brussels: European Commission, Directorate - General for Education, Youth, Sport and Culture.
- Fibbins, H., Ward, P., Stanton, R., Czsonok, L., Cudmore, J., Michael, S., Steel, Z., & Rosenbaum, S. (2019) Embedding an exercise professional within an inpatient mental health service: a qualitative study. *Mental Health and Physical Activity*, 17, 100300. <https://doi.org/10.1016/j.mhpa.2019.100300>.
- Fishman, E., Böcker, L., & Helbich, M. (2015). Adult active transport in the Netherlands: An analysis of its contribution to physical activity requirements. *PLoS ONE*, 10(4): e0121871. doi:10.1371/journal.pone.0121871.

- Fox, K. R., *Stathi, A.*, McKenna, J., & Davis, M. G. (2007). Physical activity and mental well-being in older people participating in the Better Ageing Project. *European Journal of Applied Physiology*, 100(5), 591-602. 10.1007/s00421-007-0392-0
- Garber, J., & Weersing, V. R. (2010). Comorbidity of anxiety and depression in youth: Implications for treatment and prevention. *Clinical Psychology: A publication of the Division of Clinical Psychology of the American Psychological Association*, 17(4), 293-306. doi:10.1111/j.1468-2850.2010.01221.x
- Gabrscek, L., Kokaridas, D., Maggouritsa, G., Loules, G., Stoforos, P., Theodorakis, Y., & Krommidas, C. (2019). The effects of a goal setting exercise program on improving upper body strength, lower extremity strength, balance and commitment to exercise of patients with schizophrenia. *European Journal of Physical Education and Sport Science*, 5, 12-215-229. doi: 10.5281/zenodo.3555581.
- Gass, M. A., Gillis, H. L., & Russell, K. C. (2012). *Adventure therapy: Theory, research, and practice*. Routledge
- Kohl, H.W. 3rd, Craig, C.L., Lambert, E.V., Inoue, S., Alkandari, J.R., Leetongin, G., & Kahlmeier, S., (2012) for the Lancet Physical Activity Series Working Group. The pandemic of physical inactivity: Global action for public health. *Lancet*, 380: 294–305.
- Heinzl, S., Lawrence, J. B., Kallies, G., Rapp, M. A., & Heissel, A. (2015). Using exercise to fight depression in older adults: A systematic review and meta-analysis. *GeroPsych: The Journal of Gerontopsychology and Geriatric Psychiatry*, 28 (4), 149–162. <https://doi.org/10.1024/1662-9647/a000133>
- Hegberg, N. J., Hayes, J. P., & Hayes, S. M. (2019). Exercise intervention in PTSD: A narrative review and rationale for implementation. *Frontiers in Psychiatry*, 10, 133. <https://doi.org/10.3389/fpsy.2019.00133>
- Horder, H., Johansson, L., Guo, X, Grimby, G., Kern, S., Ostling, S., Skoog, I., (2018). Midlife cardiovascular fitness and dementia: A 44-year longitudinal population study in women. *Neurology*, 0:e1-e8. doi:10.1212/WNL.0000000000005290
- Karssemeijer, E. G. A., Aaronson, J. A., Bossers, W. J., Smits, T., Olde Rikkert, M. G. M., & Kessels, R. P. C. (2017). Positive effects of combined cognitive and physical exercise training on cognitive function in older adults with mild cognitive impairment or dementia: A meta-analysis. *Ageing Research Reviews*, 40, 75-83. doi:<https://doi.org/10.1016/j.arr.2017.09.003>
- Kazemina, M., Salari, N., Vaisi-Raygani, A., Jalali, R., Abdi, A., Mohammadi, M., . . . Shohaimi, S. (2020). The effect of exercise on anxiety in the elderly worldwide: a

systematic review and meta-analysis. *Health and Quality of Life Outcomes*, 18 (1), 363. doi:10.1186/s12955-020-01609-4

- Kelly, P., Kahlmeier, S., Gotschi, T., et al. (2014). Systematic review and meta-analysis of reduction in all-cause mortality from walking and cycling and shape of dose response relationship. *International Journal of Behaviour, Nutrition and Physical Activity*. 11, 132-148.
- Kessler, R. C., Avenevoli, S., & Ries Merikangas, K. (2001). Mood disorders in children and adolescents: an epidemiologic perspective. *Biological Psychiatry*, 49 (12), 1002-1014. doi:https://doi.org/10.1016/S0006-3223(01)01129-5
- Langa, K. M., & Levine, D. A. (2014). The diagnosis and management of mild cognitive impairment: a clinical review. *Journal of the American Medical Association*, 312 (23), 2551-2561. doi:10.1001/jama.2014.13806
- Lucove, J.C., Huston, S.L., & Evenson, K.R. (2007). Workers' perceptions about worksite policies and environments and their association with leisure-time physical activity. *American Journal of Health Promotion*, 21 (3), 196-200.
- McDowell, C.P., Dishman, R.K., Gordon, B.R., & Herring, M.P. (2019). Physical activity and anxiety: A systematic review and meta-analysis of prospective cohort studies. *American Journal of Preventive Medicine*, 57 (4), 545-556. doi: 10.1016/j.amepre.2019.05.012. PMID: 31542132.
- Merry, S. N., Hetrick, S. E., Cox, G. R., Brudevold-Iversen, T., Bir, J. J., & McDowell, H. (2012). Cochrane Review: Psychological and educational interventions for preventing depression in children and adolescents. *Evidence-based child health: A Cochrane Review Journal*, 7(5), 1409-1685.
- Michie, S., Atkins, L., & West, R. (2014). *The behaviour change wheel: A guide to designing interventions*. London: Silverback Publishing
- Miller, K.J. et al., (2020). Comparative effectiveness of three exercise types to treat clinical depression in older adults: A systematic review and network meta-analysis of randomised controlled trials. *Ageing Research Reviews*, 58 (2020) 100999
- Mittal, V. A., Vargas, T., Osborne, K. J., Dean, D., Gupta, T., Ristanovic, I., Hooker, C. I., & Shankman, S. A. (2017). Exercise treatments for psychosis: A review. *Current Treatment Options in Psychiatry*, 4(2), 152-166. https://doi.org/10.1007/s40501-017-0112-2
- Moraleda, Á., Galán-Casado, D., & Cangas, A. J. (2019). Reducing Self-Stigma in People with Severe Mental Illness Participating in a Regular Football League: An Exploratory Study. *International journal of environmental research and public health*, 16(19), 3599. doi:10.3390/ijerph16193599

- Morres, I.D., Hatzigeorgiadis, A, Stathi, A, Comoutos, N., Arpin-Cribbie, C., Krommidas, C., Theodorakis, Y. (2019). Aerobic exercise for adult patients with major depressive disorder in mental health services: A systematic review and meta-analysis. *Depression and Anxiety*, 36(1), 39-53. doi:org/10.1002/da.22842
- Morres, I.D., Hinton-Bayre, A., Motakis, E., Carter, T., & Callaghan, P. 2019. A pragmatic randomised controlled trial of preferred intensity exercise in depressed adult women in the United Kingdom: Secondary analysis of individual variability of depression. *BMC Public Health*, 19(1), 941. doi:10.1186/s12889-019-7238-7
- Morres, I. D., Hatzigeorgiadis, A., Krommidas, C., Comoutos, N., Sideri, E., Ploumpidis, D., Economou, M., Papaioannou, A., & Theodorakis, Y. (2019). Objectively measured physical activity and depressive symptoms in adult outpatients diagnosed with major depression. *Clinical perspectives. Psychiatry Research*, 280, 112489. doi.org/10.1016/j.psychres.2019.112489
- Najar, J., Östling, S., Gudmundsson, P., Sundh, V., Johansson, L., Kern, S., Guo, X., Hällström, T., & Skoog I. (2019). Cognitive and physical activity and dementia: A 44-year longitudinal population study of women. *Neurology*, 19, 92 (2), e1322-e1330. doi: 10.1212/WNL.0000000000007021.
- Northey, J.M., Cherbuin, N., Pumpa, K.L., et al. (2018). Exercise interventions for cognitive function in adults older than 50: A systematic review with meta-analysis. *British Journal of Sports Medicine*, 52, 154–160.
- Owen, M.J., Sawa, A., Mortensen, P.B. (2016). Schizophrenia. *Lancet*, 388 (10039), 86-97. doi: 10.1016/S0140-6736(15)01121-6. PMID: 26777917; PMCID: PMC4940219.
- Panagiotounis, F., Theodorakis, Y., Hassandra, M., & Morres, I.D. (2020). Psychological effects of an adventure therapy program in the treatment of substance use disorders. A Greek pilot study. *Journal of Substance Use*, 1-7. doi:10.1080/14659891.2020.1807630
- Patterson, R., Webb, E., Millett, C., & Laverty, A. (2018). Physical activity accrued as part of public transport use in England. *Journal of Public Health*, 41, 222–230.
- Pedersen, B.K. & Saltin, B. (2015). Exercise as medicine - Evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scandinavian Journal of Medicine and Science in Sports* 25, Suppl 3l, 1-72. DOI: [10.1111/sms.12581](https://doi.org/10.1111/sms.12581)
- Perales M, Refoyo I, Coteron J, Bacchi M, Barakat R. (2015). Exercise during pregnancy attenuates prenatal depression: A randomized controlled trial. *Evaluation in the Health Professions*, 38, 59-72. doi: 10.1177/0163278714533566
- Petersen, R. C. (2004). Mild cognitive impairment as a diagnostic entity. *Journal of Internal Medicine*, 256(3), 183-194. doi:10.1111/j.1365-2796.2004.01388.x

- Physical activity guidelines advisory committee scientific report, 2018. <https://health.gov/our-work/physical-activity/current-guidelines/scientific-report>
- Poptsi, E., Tsatali, M., Agogiatou, C., Bakoglidou, E., Batsila, G., Dellaporta, D., et al. (2021). Longitudinal cognitive and physical training effectiveness in MCI, based on the experience of the Alzheimer's Hellas day care centre. *Journal of Geriatric Psychiatry and Neurology*. DOI: 10.1177/08919887211016057
- Pritchett, R.V., Daley, A.J., Jolly, K. (2017). Does aerobic exercise reduce postpartum depressive symptoms? A systematic review and meta-analysis. *British Journal of General Practice*, 67, :e684-e691. doi: 10.3399/bjgp17X692525.
- Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion*, 12(1), 38-48. <https://doi.org/10.4278/0890-1171-12.1.38>
- Public Health England. (2020). Achieving behaviour change. A guide for local government and partners. <https://www.gov.uk/government/publications/behaviour-change-guide-for-local-government-and-partners>
- Reinhard E, Courtin,E, Lenthe, F., & Avendano, M. (2018). Public transport policy, social engagement and mental health in older age: a quasi-experimental evaluation of free bus passes in England. *Epidemiology and Community Health*, 72, 361–368.
- Reis, R. S., Salvo, D., Ogilvie, D., Lambert, E. V., Goenka, S., Brownson, R. C., & Lancet Physical Activity Series 2 Executive Committee (2016). Scaling up physical activity interventions worldwide: stepping up to larger and smarter approaches to get people moving. *Lancet*, 388 (10051), 1337–1348. [https://doi.org/10.1016/S0140-6736\(16\)30728-0](https://doi.org/10.1016/S0140-6736(16)30728-0)
- Rhyner, K.T. & Watts, A. (2016). Exercise and depressive symptoms in older adults: A systematic meta-analytic review. *Journal of Aging and Physical Activity*, 24, 234-246 <http://dx.doi.org/10.1123/japa.2015-0146>
- Rissel, C., Curac, N., Greenaway, M., & Bauman, A. (2012). Physical activity associated with public transport use. A review and modelling of potential benefits. *International Journal of Environmental Research and Public Health*, 9, 2454-2478.
- Scholten, W. D., Batelaan, N. M., van Balkom, A. J. L. M., Wjh. Penninx, B., Smit, J. H., & van Oppen, P. (2013). Recurrence of anxiety disorders and its predictors. *Journal of Affective Disorders*, 147 (1), 180-185. <https://doi.org/10.1016/j.jad.2012.10.031>

- Schuch, F. B., Vasconcelos-Moreno, M. P., Borowsky, C., & Fleck, M. P. (2011). Exercise and severe depression: preliminary results of an add-on study. *Journal of Affective Disorders*, 133 (3), 615–618. <https://doi.org/10.1016/j.jad.2011.04.030>
- Sigurdsson, E., Ólafsdóttir, T., & Gottfredsson, M. (2008). Public views on antidepressant treatment: Lessons from a national survey. *Nordic Journal of Psychiatry*, 62 (5), 374-378. doi:10.1080/08039480801984156
- Smith, P. J., & Merwin, R. M. (2021). The role of exercise in management of mental health disorders: An integrative review. *Annual Review of Medicine*, 72, 45–62. <https://doi.org/10.1146/annurev-med-060619-022943>
- Song, D., Yu, D. S. F., Li, P. W. C., & Lei, Y. (2018). The effectiveness of physical exercise on cognitive and psychological outcomes in individuals with mild cognitive impairment: A systematic review and meta-analysis. *International Journal of Nursing Studies*, 79, 155-164. <https://doi.org/10.1016/j.ijnurstu.2018.01.002>
- Stubbs, B., Koyanagi, A., Hallgren, M., Firth, J., Richards, J., Schuch, F., Rosenbaum, S., Mugisha, J., Veronese, N., Lahti, J., & Vancampfort, D. (2017). Physical activity and anxiety: A perspective from the World Health Survey. *Journal of Affective Disorders*, 208, 545–552. <https://doi.org/10.1016/j.jad.2016.10.028>
- Stubbs, B., Vancampfort, D., Hallgren, M., Firth, J., Veronese, N., Solmi, M., . . . Kahl, K. G. (2018). EPA guidance on physical activity as a treatment for severe mental illness: a meta-review of the evidence and Position Statement from the European Psychiatric Association (EPA), supported by the International Organization of Physical Therapists in Mental Health (IOPTMH). *European Psychiatry*, 54, 124-144. doi:<https://doi.org/10.1016/j.eurpsy.2018.07.004>
- Stubbs, B., Vancampfort, D., Rosenbaum, S., Firth, J., Cosco, T., Veronese, N., Salum, G. A., & Schuch, F. B. (2017). An examination of the anxiolytic effects of exercise for people with anxiety and stress-related disorders: A meta-analysis. *Psychiatry Research*, 249, 102–108. <https://doi.org/10.1016/j.psychres.2016.12.020>
- Sullivan, W. C. & Chung, C. Y. (2011). Mental health and the built environment. In A.L. Dannenberg et al. (eds.), *Making Healthy Places: Designing and Building for Health, Well-being, and Sustainability* (pp.106-116).. Island Press.
- The Lancet Public, H. (2016). 1986-2016: from Ottawa to Vienna. *The Lancet Public Health*, 1(2), e37. doi:10.1016/S2468-2667(16)30025-1
- Tomasi, D., Gates, S. & Reyns, E. (2019). Positive patient response to a structured exercise program delivered in inpatient psychiatry. *Global Advances in Health and Medicine*, 8, 1–10.

- Tzouma, N. A. (2021). *The Effectiveness of Physical Activity Interventions in the reduction of Depressive Symptoms in Pregnant Women and the Prevention of Perinatal Depression* [unpublished doctoral dissertation]. University of Thessaly.
- United Nations (2014). Mobilizing sustainable transport for development. Retrieved: <https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=2375&menu=1515> (26/6/2020).
- Vancampfort D, De Hert M, Skjerven L, et al. (2012). International Organization of Physical Therapy in Mental Health consensus on physical activity within multidisciplinary rehabilitation programs for minimising cardio-metabolic risk in patients with schizophrenia. *Disability Rehabilitation*, 34, 1–12
- Vancampfort, D., Stubbs, B., Richards, J., Ward, P. B., Firth, J., Schuch, F. B., & Rosenbaum, S. (2017). Physical fitness in people with posttraumatic stress disorder: a systematic review. *Disability and Rehabilitation*, 39 (24), 2461–2467. <https://doi.org/10.1080/09638288.2016.1226412>
- Viljoen, M., & Roos, J. L. (2020). Physical exercise and the patient with schizophrenia. *Australian Journal of General Practice*, 49 (12), 803-808. doi:10.31128/ajgp-04-20-5384
- Wang, P.W., Lin, H.C., Su, C.Y., Chen, M.D., Lin, K. C., Ko, C.H., & Yen, C.F. (2018). Effect of aerobic exercise on improving symptoms of individuals with schizophrenia: A single blinded randomized control study. *Frontiers in Psychiatry*, 9, 167-167. doi:10.3389/fpsy.2018.00167
- Wang, Y. Wang, R. Li, and C. Zhou, "Impact of physical exercise on substance use disorders: a meta-analysis". *PLoS One*, vol. 9, no. 10, p. e110728, 2014, doi: 10.1371/journal.pone.0110728.
- World Health Organization, (2020). Fact sheets - Dementia. <https://www.who.int/news-room/fact-sheets/detail/dementia>
- World Health Organization (2019). EUR/RC65/9 Physical activity strategy for the WHO European Region 2016–2025. Geneva. Switzerland
- World Health Organization (2018). Global action plan on physical activity 2018–2030: More active people for a healthier world. Geneva: Licence: CC BY-NC-SA 3.0 IGO.
- World Health Organization (2017). Global action plan on the public health response to dementia 2017–2025. Geneva. Switzerland
- World Health Organization Europe (2012). Policies and priority interventions for healthy ageing. Geneva. Switzerland.

- World Health Organization (2011). Burden of disease from environmental noise. WHO. Regional Office for Europe.
- World Health Organization (2005). Promoting mental health: Concepts, emerging evidence, practice: A report of the World Health Organization. Department of Mental Health and Substance Abuse in collaboration with the Victorian Health Promotion Foundation and the University of Melbourne. World Health Organization. Geneva.
- World Health Organisation (2001). "The world health report 2001 – Mental Health: New Understanding, New Hope" (PDF). WHO.
- World Health Organisation (1986). The Ottawa Charter for Health Promotion. Geneva, Switzerland.
- WHO – Europe (2012). Policies and priority interventions for healthy ageing. https://www.euro.who.int/data/assets/pdf_file/0006/161637/WHD-Policies-and-Priority-Interventions-for-Healthy-Ageing.pdf
- World Health Organization. Gender and women's mental health. Gender disparities and mental health: The Facts. <https://www.who.int/teams/mental-health-and-substance-use/gender-and-women-s-mental-health>
- Guthold R., Stevens GA, Riley LM., Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1.9 million participants. Lancet Glob Health, 6 (2018), pp. e1077-e1086.
- Mielke GI., da Silva ICM., Kolbe-Alexander TL., Brown WJ. Shifting the physical inactivity curve worldwide by closing the gender gap. Sports Med, 48 (2018), pp. 481-489.
- Zhang J. & Yen S.T. (2015). Physical activity, gender difference, and depressive symptoms. Health Serv. Res., 50 (5) (2015), pp. 1550-1573).



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