Chapter 5
Active Lifestyle in Schizophrenia:
How to Combine Exercise and Therapy in Practice?

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ABSTRACT

Schizophrenia is a mental illness with intense effects on a person's life. In addition to the psychiatric symptoms, patients with schizophrenia generally have multiple somatic comorbidities, such as cardiovascular and metabolic disorders. High prevalence of an unhealthy lifestyle (smoking habits, poor diets, sedentarism) contributes to the increased risk in these patients. Even though schizophrenia treatment focuses on medication in conjunction with talking therapies, it is essential to address lifestyle choices. Nowadays there is a large body of evidence that suggests that physical activity and exercise can help improve not only schizophrenia patients' physical health but also their mental and psychological wellbeing. This chapter addresses the guidelines for physical activity and exercise interventions for schizophrenia, presenting some programs which combine exercise and therapies to treat schizophrenia, including some novel digital approaches. This chapter also gives some recommendations for an active lifestyle clinical integration providing a literature review on the subject.

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INTRODUCTION

Schizophrenia is considered a serious mental illness and it has been identified as a priority in terms of health policies due to the deficit of functioning and early mortality (Asher, Fekadu, & Hanlon, 2018). It is a chronic disorder characterized by positive symptoms such as hallucinations and delusions, negative symptoms such as avolition and withdrawal, and cognitive impairment (Patel et al., 2014).

Compared to the general population, people diagnosed with schizophrenia are also at risk for low levels of physical activity (PA) and sedentary lifestyle, which means that these populations are more likely to have high body mass index and chronic conditions such as cardiovascular disease and diabetes (Lee et al., 2018; Ringen et al., 2014). The mechanisms underlying these metabolic disturbances are multifaceted and encompass an interaction of genetic and external factors including lifestyle and environmental conditions (Henderson et al., 2015). In addition, the most effective second-generation antipsychotics, such as clozapine or olanzapine, have important metabolic side-effects, causing weight gain and metabolic impairments starting at young ages (Libowitz & Nurmi, 2021).

Over the past decade, there has been a rapid growth of evidence on the benefits of physical activity and the structured subset of exercise in people with mental illness. Studies have shown that even just a small increase in physical activity has effects on symptomatology, regardless of the severity of the condition. A recent meta-analysis (Swora, Boberska, Kulis, Knoll, Keller & Luszczynska, 2022) found a consistent pattern of associations between higher levels of physical activity and lower positive, negative, and general psychopathology symptoms in people with schizophrenia and those with other psychotic disorders. The benefits of PA include improvements in psychological wellbeing, reduced levels of psychiatric symptoms, improvements in physical and cognitive functioning, social integration, physical health, sleep quality, self-esteem, and quality of life (Fernández-Abascal, et al., 2021; Stubbs et al. 2018; Viljoen, & Roos, 2020). In addition, evidence suggests that participating in physical activity programs decreases self-perceived social stigma compared to other patients not participating in these activities (Moraleda, Galán-Casado & Cangas, 2019). Thus, moderate, and high intensity training are considered attractive forms of adjunctive therapy of schizophrenia, adjustable to patients' age, performance, and preferences (Lebiecka, Łopuszko, Rudkowski, & Dańczura, 2019). Participating in group activities and utilizing digital exercise interventions or exergames could also increase engagement, especially in younger patients (Aschbrenner et al., 2021; Francillette et al., 2021; Heinbach et al., 2021; Byrne & Kim, 2019), nevertheless, no clear recommendations can be provided currently related to these novel interventions (Carneiro et al., 2021).

Concerning schizophrenia treatment, literature claims that pharmacological interventions do not, by themselves, guarantee improvements in overall functioning and quality of life (Rubio & Kane, 2022). It seems essential to combine programs using physical activity and other interventions, such as psychoeducation or cognitive-behavioral therapy, because there is a relation between habits and schizophrenia symptom severity (Kalinowska et al., 2021). Therefore, it is important to highlight the importance of other therapies, with an emphasis on psychosocial rehabilitation, which values independence in performing occupations and roles important for the patients to live in their communities.

When services target and enact an active lifestyle for their patients, the existence of differentiated profiles is essential to enhance adherence to programs and behavioral changes (McCurdy et al., 2020). On one hand, several international organizations advocate for the integration of physical activity professionals into mental health settings such as exercise physiologists and physiotherapists, much needed for exercise prescription (Fibbins et al., 2019; Rosenbaum et al., 2018); on the other, mental health professionals

should also collaborate in recommending, discussing, and planning lifestyle changes, exploring patients' possible individual barriers (Schuch & Vancampfort, 2021). These professionals can be, for example, mental health nurses or occupational therapists (Carlbo, Claesson, & Åström, 2018; Lund et al., 2020; Xu et al., 2022), due to their competences for health promotion, illness prevention and occupation-focused lifestyle redesign interventions. For these reasons, it is desirable that mental health professionals have in their curriculum formal education about the importance of physical activity in mental health and the possibility of continued professional training in the field (Shrestha et al., 2021).

The National Institute for Health and Care Excellence (NICE, 2020) in the United Kingdom presents a set of evidence-based guidelines for psychosocial interventions in severe mental illness, in particular schizophrenia, most of which are very similar to those referenced by the APA (2020). In its most current guidelines, NICE (2020) presents cognitive-behavioral therapy, family psychoeducation, assertive community treatment, skills training, supported employment and relapse prevention, as well as evidence-based psychosocial interventions. NICE (2020) also recommends the involvement of people with severe mental illness, especially those taking antipsychotics, in programs that combine healthy eating and physical activity, for the control of comorbidities of physical illness. Indeed, several studies have shown that the weight of people diagnosed with schizophrenia can increase rapidly in the initial phase of treatment, not only because of the use of antipsychotic medication, but also because of a diet often low in fruits and vegetables and high in fat and sugar, lack of physical activity, and decreased motivation to change health behaviors (Manu et al., 2015).

The European Psychiatry Association (Sttubs et al., 2018) published a set of guidelines for prescribing physical exercise as a central part of the treatment of serious mental illnesses, including major depression and schizophrenia. According to these guidelines, "physical activity should be used as an adjunctive treatment for schizophrenia, to improve symptoms, cognition and quality of life" (Sttubs et al., 2018, p. 141). This meta-review underlines that the benefits of physical activity in terms of cognition appear to be comparable to other psychosocial interventions (e.g., cognitive remediation) and should be an essential part of multidisciplinary treatment. The most consistent evidence to date suggests engaging in aerobic exercise of 150 minutes of moderate to vigorous PA per week with supervision by qualified professionals (Sttubs et al., 2018).

These recommendations are supported by the exponential growth of scientific evidence that has been developed in the last decade about the benefits of PA in this field as a form of health promotion, illness prevention and treatment (Theodorakis et al., 2021).

Even so, people with severe mental illness face some barriers to physical activity – side effects of medication, complications from being overweight, lack of resources and support from specialized professionals close to the areas of residence and lack of motivation – which do not allow compliance with the recommendations for the practice of physical activity, placing this group with very high levels of sedentary lifestyle (Firth, et al., 2016; Romain et al., 2020). We therefore argue that PA is an essential part of the process of promoting mental health and the rehabilitation of people with schizophrenia and should continue to be studied and explored to a greater extent. It is also up to mental health and physical activity professionals to inform, guide and assume a role of facilitators of behavioral change for their users.

Throughout this chapter, the authors intend to address all these themes with depth and reflection beginning with a comprehensive and comparative presentation of the state of art of physical activity and exercise interventions in schizophrenia, describing the role of innovative digital technologies in this matter. Next, the authors will provide an analysis of how these programs and tools can profit from the inclusion of key stakeholders and potential patients right from the design phase and overcome some

of the most common challenges. Then, the authors will explore different professional profiles that can work in this area. To conclude, the authors will present some case studies which combine exercise and therapies to treat schizophrenia and give some recommendations for its clinical integration, as per our understanding this complementarity benefits the therapeutic outcomes.

SCHIZOPHRENIA

Serious mental disorders are characterized by being complex and multifactorial, affecting in a transversal way the lives of people who suffer from them, their family members and people who are related to them. Many of the characteristic factors of these disorders have an eminently psychosocial nature and derive fundamentally from the deficits and difficulties of functioning that significantly interfere in the level of autonomy, social inclusion, and quality of life. Psychiatric and pharmacological treatments have been shown to be insufficient and inefficient in responding to this multidimensionality (Vanasse et al., 2022).

One of these severe mental illnesses is schizophrenia. According to the Institute of Health Metrics and Evaluation (Global Health Data Exchange), schizophrenia affects approximately 24 million people or 1 in 300 people (0.32%) worldwide. Despite its relatively low prevalence, schizophrenia is associated with significant health, social, and economic concerns and it is one of the top 15 leading causes of disability worldwide.

Regarding symptomatology, schizophrenia has positive symptoms and negative effects that are characterized by the loss of contact with reality, resulting from changes in psychic functions (APA, 2014). Positive symptoms include delusions, hallucinations, thought disorganization, and disorganized behavior. Delusions are defined by fixed beliefs that the individual believes to be true (misinterpretation of the reality), these can be persecutory delusions, delusions of reference, delusions of grandeur, nihilistic delusions, erotomaniac delusions, and somatic delusions. Regarding hallucinations, these are characterized by experiences that occur without an external stimulus, that is, they act involuntarily at the level of the senses, creating the perception of things that do not exist. Hallucinations can occur in any sensory modality (auditory, visual, olfactory, gustatory, tactile, or kinesthetic), at that the most common is auditory hallucination, as it happens in half of the cases diagnosed (APA, 2014). Regarding disorganized speech, it is related to formal disturbance of thought and involves distortions of language and communication, loss of association of ideas, fragmented ideas, derailment, and inconsistency. Disorganized behavior or catatonic is defined by a disturbance of the self-control of the behavior, for example wearing inappropriate clothing for the time of year, or too extravagant (APA, 2014). Negative symptoms are characterized by lasting over time and are considered the most harmful in terms of psychosocial functioning, including: avolia (decrease in the ability to initiate and persist in self-directed purposeful activities), anhedonia (inability to feel pleasure in normally pleasurable activities), social isolation and affective blunting.

The etiology of schizophrenia is complex, it is believed that the interaction of different factors - biological (genetic), psychological and social (interaction of the individual with the environment) - can contribute to a person's vulnerability to the disease (Hosák & Hosakova, 2015). According to the vulnerability-stress model, both stress and an individual's biological vulnerability contribute to the onset of psychiatric symptoms. It is assumed that external and/or internal challenges cause crises in any person but depending on the intensity of the stress provoked and one's tolerance threshold - i.e. personal vulnerability - the crisis will be contained, or it may lead to an episode of disturbance (Gonçalves-Pereira, Xavier, & Fadden, 2012).

Physical Health Problems in Schizophrenia

Individuals diagnosed with schizophrenia have their life expectancy cut in 15 to 20 years less on average than the rest of the population. Most of these individuals have unhealthy habits that include sedentarism, poor diets and dependence on drugs, tobacco, and alcohol in addition to prescribed drugs like antipsychotics to control symptoms. These habits along with the ingestion of antipsychotic drugs can lead to metabolic changes like overweight, high cholesterol levels, cardiovascular issues or even cancer (Vancampfort et al., 2017). In addition, the diagnosis of schizophrenia is associated with poorer body composition compared to healthy subjects (Marthoenis et al., 2022).

Several studies have highlighted the link between mental problems and coronary heart disease, which has been argued to be bidirectional, meaning that both may cause one another (Hert et al., 2018). Furthermore, compared to patients without a mental diagnosis, schizophrenia patients got poorer care in terms of revascularization, secondary prevention strategies such as the prescription of statins, beta-blockers, and antiplatelets, and follow-up (Hannoodee et al., 2021). Peritogiannis and colleagues (2022) presented several factors that contribute to the risk of mortality due to cardiovascular disease in patients with schizophrenia – social factors (e.g., stigma, poverty), patient factors (e.g., metabolic syndrome, smoking, substance abuse, sedentary lifestyle), disease factors (e.g., symptomatology, antipsychotic treatment), low health literacy and lack of preventive interventions.

A large-scale survey evaluated data from 204.186 people in 46 low- and middle-income countries discovered that the diagnosis of a psychotic condition, particularly among males, was associated with physical inactivity. Further investigation revealed that patients' low activity levels were mediated by mobility issues, self-care difficulties, depressive symptoms, cognitive abnormalities, pain, and discomfort (Stubbs et al., 2017).

It is evident that low PA and sedentarism have a huge negative impact on quality of life in schizophrenia patients, increasing comorbidities and mortality rate among this population, which points for the importance of more studies that focus on different strategies of psychosocial interventions that aim the improvement of quality of life by promoting a healthier lifestyle and changing habits (Peritogiannis et al., 2022). Studies show that patients with schizophrenia tend to have less PA compared to control groups. Moderate and vigorous PA is less performed by these individuals while they spend more time lying down and sleeping. On top of that, they show on average worse cardiorespiratory fitness (Scheewe et al., 2019; Strassnig et al., 2021).

Low socioeconomic status, low education level and social isolation may also have a negative impact in the adoption of healthy behaviors, which can be worsened by some of the symptoms of schizophrenia like amotivation, apathy and cognitive deficits (Kalinowska et al., 2021). Additionally, some of these patients are oblivious or have little knowledge of their own condition and how to prevent some damaging behaviors (Kim et al., 2019).

Also, psychiatrists frequently focus on their patients' mental rather than physical health, rarely perform physical examinations, and frequently have poor collaboration with primary care physicians or other clinicians, so, there is an under-recognition and under-treatment of cardiovascular disease in patients with schizophrenia, which may contribute to significant premature death (Fiorillo & Sartorius, 2021; Smith et al., 2013). Nevertheless, a recent systematic review and metanalysis (Correll et al., 2022) indicates that the excess mortality in schizophrenia is associated with several modifiable factors and that is where the focus of researchers and clinicians should be.

PSYCHOSOCIAL INTERVENTIONS

The American Psychiatric Association (APA, 2020) currently lists the following psychosocial interventions as evidence-based practices for the treatment of severe mental illness, in particular schizophrenia:

- **Cognitive-Behavioral Therapy for Psychosis**. The use of Cognitive-Behavioral Therapy (CBT) in individuals with schizophrenia has several benefits, including reduced symptoms, improvements in global, social, and occupational functions and, consequently, in quality of life. In the specific case of psychosis, CBT seeks to guide people in the process of building understanding and attributing meaning to their beliefs and delusions. Thus, CBT includes the development of a collaborative and non-judgmental therapeutic relationship, in which people can learn to monitor their thoughts, feelings and behaviors and reflect on their perceptions, beliefs and cognitive processes (Avasthi, Sahoo, & Grover, 2020; Lincoln & Peters, 2019).
- **Psychoeducation**. Psychoeducation is defined as the provision of systematic and structured information about the disease and its treatment, including emotional aspects that facilitate disease management, both for patients and their families. Typically, topics related to the signs and symptoms of the disease, relapse prevention and selection and access to different types of treatment are addressed. Psychoeducation also aims to help people with mental illness to find meaning in their illness and to adopt a constructive and positive attitude towards their experience of psychosis. Thus, psychoeducation can be expected to have a significant impact on several functional determinants, such as active participation in the definition of treatment plans, the person's ability to seek help, increased resilience, and decreased self-esteem (Motlova et al., 2017).
- **Supported Employment.** Supported employment differs from other vocational rehabilitation services because it advocates support in finding and maintaining competitive employment, at the same time as skills training. One of the most used models in this context is the Individual Placement and Support (IPS). In addition to a focus on quickly securing competitive employment, the IPS emphasizes the preferences of people with mental illness experience in the types of jobs sought, the nature of services provided, and close collaboration with companies and other employers. The principles of the IPS include long-term individualized professional support and integration of employment specialists working closely with the rehabilitation team (Bond, Lockett, & van Weeghel, 2020).
- **Assertive community treatment**. Assertive community care is a well-evidenced multidisciplinary approach that focuses on providing individualized support outside the formal clinical setting. People with severe mental illness can be followed up at home, at work, or elsewhere in the community. Support is provided twenty-four hours/seven days a week, by a multidisciplinary team, accompanying people with experience of mental illness, who often have difficulties in adhering to health services (Bond & Drake, 2015).
- **Family interventions**. Family intervention shares several characteristics of psychoeducation. Family interventions aim to provide family members and informal caregivers of a person with mental illness with information about the disease, symptoms, diagnosis, and treatment criteria, to help them better manage and support their family member. These types of interventions usually help to identify and act on early warning signs of disease and relapse. In family intervention programs, strategies for problem solving, disease management, communication and interpersonal relationships, stress management and emotional support are often addressed. These interventions

are particularly important early in the illness but are useful at any stage of the rehabilitation process (McFarlane 2016; Onwumere & Kuipers, 2018).

- **Illness self-management**. Illness self-management programs aim to help the person with a mental illness experience to deal with their own illness condition and consequently with their symptoms and behaviors (Grady & Gough 2014; Lean et al., 2019). Recently, several technological solutions have emerged, namely mobile applications, with the aim of facilitating and making this process of self-management of the disease more efficient, providing its users with instruments to support medication intake, appointment scheduling, symptom monitoring, stress management, problem solving, among others (Chivilgina et al., 2020; Simões de Almeida, Couto, Marques, Queirós, & Martins, 2018).
- **Cognitive remediation**. Cognitive remediation is an intervention based on behavioral training with the aim of improving different cognitive processes (attention, memory, executive function, social cognition, or metacognition) and promoting their integration, transfer, and generalization to people's daily functioning. Cognitive remediation approaches can assume different characteristics, namely individual or group, paper, and pencil or computerized (Bowie et al., 2020). Some cognitive remediation programs have a metacognitive approach, to teach people with mental illness experience to overcome the cognitive limitations imposed by their condition (Cella, Reeder, & Wykes, 2015).
- **Social skills training**. People with severe mental illness often have deficits in social skills, with a significant impact on their functioning and social participation. Social skills training can improve not only social competence, but also the control of disease-associated symptomatology. It is usually carried out in a group and includes the training of components related to the reception, processing and emission of information, the development of adaptive cognitive-behavioral, socio-cognitive, interpersonal, and functional skills. Whenever possible, training should be carried out in the context where people are inserted, to facilitate the integration and generalization of learning. Although social skills training programs may differ in the way they are implemented, in essence, they all use a similar approach, which includes goal setting, role-plays, behavioral rehearsals, positive reinforcement, corrective feedback, among others. others (Almerie, Al Marhi, Alsabbagh, Jawoosh, Matar, & Maayan, 2011; Mueser & Bellack, 2007).

Effects of Exercise and Physical Activity on the Health of People With Schizophrenia

First, it is important to clarify two concepts. Exercise is defined as a planned, structured, and repetitive activity with the goal of improving or maintaining physical fitness and physical activity in any bodily movement produced by skeletal muscles that results in energy expenditure (Caspersen et al., 1985).

As previously said, NICE also recommends the involvement of people with severe mental illness in programs that combine healthy eating and physical activity. The European Psychiatry Association (Stubs et al., 2018) published a set of guidelines for prescribing physical activity as a central part of the treatment of serious mental illnesses, including major depression and schizophrenia. According to these guidelines, "physical activity should be used as an adjunctive treatment for schizophrenia, to improve symptoms, cognition and quality of life". This meta-review underlines that the benefits of physical activity (PA) in terms of cognition appear to be comparable to other psychosocial interventions (e.g., cognitive remediation) and should be an essential part of multidisciplinary treatment. The most consistent evidence

to date suggests engaging in aerobic exercise of 150 minutes of moderate to vigorous PA per week with supervision by qualified professionals (Sttubs et al., 2018).

These recommendations are supported by the exponential growth of scientific evidence that has been developed in the last decade about the benefits of PA in this field as a form of health promotion, disease prevention and treatment. Other studies present PA benefits that include improvements in psychological well-being, improvements in physical and cognitive functioning, social integration, sleep quality, and self-esteem (Schuch, Vancampfort, Rosenbaum, Richards, Ward, & Stubbs, 2016; White et al., 2017).

Some studies also point that patients with severe symptoms are more resistant to exercise-based treatment and that aerobic exercise seems to be the type of exercise that achieves more compliance (Girdler, Confino, & Woesner, 2019). Nevertheless, physical exercise prescription has significant evidence gaps indicating what types of training might be most effective at improving patients with schizophrenia symptoms.

Global Action Plan on Physical Activity 2018–2030 of the World Health Organization (WHO, 2018) aims "more active people for a healthier world" since actual rates are unsatisfactory; physical activity levels are even lower for people with mental illness. Even so, people with severe mental illness face some barriers to physical activity – side effects of medication, complications from being overweight, lack of resources and support from specialized professionals close to the areas of residence, lack of motivation – which do not allow compliance with the recommendations for the practice of physical activity, placing this group with very high levels of sedentary lifestyle (Firth, Rosenbaum, Stubbs, Gorczynski, Yung, & Vancampfort, 2016). We therefore argue that PA is an essential part of the process of promoting mental health and the rehabilitation of people with schizophrenia and should continue to be studied and explored to a greater extent. It is also up to health and physical activity professionals to inform, guide and assume a role of facilitators of behavioral change on the part of their users.

Physical activity has a very positive impact on an individual's health but also in public health, preventing a big share of physical conditions and diseases. Team sport for instance has a valuable role in helping patients with mental illness to overcome social isolation and its negative effect. By participating in sports, individuals with mental illness are exposed to positive experiences that help them gain social confidence and become more autonomous. It also provides a sense of meaning and achievement and promotes social interactions distracting from negative thoughts and focusing on positive experiences. It is however important to create an adequate environment to guarantee a successful experience - which may include promotion of sports, progression in difficulty and peer support (Soundy, et al., 2015). Moreover, evidence suggests that sport-based interventions are also adequate to individuals recovering from their first psychotic episode and not only to individuals who suffer from mental illness for a larger period (Peng, Menhas, Dai, & Younas, 2022).

According to Schuch & Vancampfort (2021), there is a relationship between physical activity levels and mental health burden. The benefits of sport-based interventions both on physical and mental perspectives seem so evident that they should be part of the routine care of people with mental disorders. For patients diagnosed with schizophrenia, higher levels of physical activity are associated with less positive, negative, and general psychopathology symptoms, as presented in a 2022 meta-analysis by Swora and colleagues. By itself, aerobic exercise may reduce other health problems that are associated with schizophrenia like obesity and diabetes. But the benefits are also visible in other aspects such as improvements in synaptic plasticity, cognition, increase of hippocampal volume, brain-derived neurotrophic factor levels (BDNF) and global functioning (Girdler, Confino, & Woesner, 2019; Falkai et al., 2022). Aerobic exercise is also effective in improving social functioning in people with schizophrenia

(Kimhy et al., 2021) and reducing isolation (Quirk et al., 2020) when physical activity is executed in community-based group settings.

Promoting active living where people with severe mental illness (SMI) are encouraged to "move more and sit less" across different settings and throughout the day may be the most appropriate approach to reduce sedentary behavior in this population group (Bort-Roig et al., 2020). Mental health services should not only focus on patients' moderate-to-vigorous-intensity physical activity but gradually replace sedentary activities that occur throughout a typical day with low-intensity physical activity.

The inclusion of PA in mental health care is a multidisciplinary task which requires collaboration of different mental health professionals (Schuch & Vancampfort, 2021). Therefore, a multidisciplinary team is recommended and may include a general practitioner, social worker, peer support person, occupational therapist, psychologist, dietitian, exercise physiologist, psychiatrist, nurse.

Exploring and identifying barriers is a multidisciplinary effort that needs to be taken before any exercise-based prescription is made for a given individual. Although the positive effects of exercise are immense, the barriers and the strategies to overcome them must be discussed in a larger consensus to optimize the positive impacts of exercise. In that sense, to build a true multidisciplinary team, all stakeholders must be aware of the overall challenges, which calls for the need of training in physical activity prescription for mental health professionals and mental health care training for experts in exercise prescriptions.

Findings from Thomas et al. (2020) systematic review suggest that physical activity interventions may be a viable alternative to psychological therapies, but a combined approach produces greater increases in PA levels. The benefits and positive impacts of PA vary immensely considering the type of exercise, time spent and intensity. Regarding type, a study (García-Garcés et al., 2021) compared the effects of three different physical exercise types - aerobic, strength, or mixed exercise - on the symptomatology and other indicators of individuals with schizophrenia. The findings indicated that a 16-weeks program of moderate to vigorous exercise, three times a week, improved the symptomatology of all individuals in the three types of exercise showing no differences. Regardless, the benefits and effects declined to baseline level after 10 months without exercise, which suggests that exercise-based interventions should have continued to keep the symptomatology improvements.

A recent systematic review (Méndez-Aguado et al., 2023) presented various benefits at different levels regarding physical activity programs for people with severe mental disorders. On the physical level, improvements were observed in anthropometric measures and aerobic capacity which contribute to enhancing functional exercise capacity and reducing cardiometabolic risk. At the psychological level, it has been proven to have a direct impact on quality of life, environmental mastery, and the reduction of negative symptoms associated with mental diseases. Physical activity has also been linked to higher self-esteem and autonomy. Improvements in social and personal functioning were reported at the social level. These physical activity programs promote socializing by providing opportunities for contact between participants and can help to mitigate the effects of stressful situations and protect against undesirable symptoms.

Barriers and Facilitating Factors to Exercise and Physical Activity

Physical activity and fitness are good predictors of cardiovascular disease and premature mortality than bodyweight or waist circumference. Individuals must, however, engage in a substantial amount of activity to be effective. Evidence suggests that barriers to engaging with physical exercise include lack of motivation, stress to be exposed in public, tiredness, lack of support and other comorbid health issues

such as obesity with immediate impact on mobility. These barrier factors are linked to symptoms of depression and side effects of medication (Yung & Firth, 2017).

Being male, single, unemployed, with low education, high body mass index, taking antidepressant and antipsychotic medication to treat a long-term schizophrenia is the typical portrait that is associated with lower PA levels and higher resistance to comply with PA guidelines (Vancampfort et al. 2017). The most common barriers to not engage with PA include not having fun, procrastination and not feeling good mentally or physically (van Rijen & ten Hoor, 2022). For inpatient mental health services specifically, besides the perceived patient factors (lack of motivation), lack of support available and the least importance given to exercise, limited resources and specific risks and responsibility in these contexts could be barriers (Ball, Young, & Bucci, 2022).

Nevertheless, there are factors which may increase exercise participation in people with schizophrenia, for instance the individual's motivation to improve its own physical condition, stress reduction, choosing the type of activity that is more on the person's interest or the will to join a training partner or a fitness group (Yung & Firth, 2017). Other positive factors such as the forecast of good weather, having fun, positive progress or a friendly and stimulating environment have an impact on engaging in PA (van Rijen & ten Hoor, 2022). Also, the positive experiences, the improved sensations of mental well-being and self-esteem, and the positive effects of PA on one's body are a powerful positive-feedback loop that promotes self-engagement. Some patients pursue this feeling of wellbeing as the result of PA despite sometimes struggling with side effects of medication or feeling low (Karlsson & Danielsson, 2022).

The Facilitators and Barriers to Physical Activity Scale for People with Mental Illness (FBPAS-MI) is a framework that assesses and examines the barriers and negative factors that affect the engagement of people with mental illness in PA in a systematic way and that can be used by health professional and multidisciplinary teams to customize PA programs on a case-by-case basis (Chen et al., 2022).

Another curious finding is that there seems to be a relation between the likeliness of PA prescription and the level of physical activity of the prescriber. If a healthcare professional is engaged in physical activity and sports, they will likely prescribe PA as part of the intervention (Kleemann, Bracht, Stanton, & Schuch, 2020). Even so, exercise prescription varies across different conditions and cultures, and it is necessary to understand what factors really weigh in this situation.

Programs

It is easier to target better interventions when the different aspects of physical activity are better understood. Demographics, social environment, or motivation are important factors to consider when designing interventions (Romain & Bernard, 2018).

Lifestyle interventions can include a range of interventions that are beneficial for mental health, which at the same time improve the physical health variables that contribute to the life expectancy gap for patients with severe mental illness. Literature refers to different behavior change techniques (e.g., social incentives, goal setting, graded tasks) which must be included to help the initiation and maintenance of PA (Carraça et al., 2021).

Furthermore, lifestyle approaches to mental health are both warranted and evidence-based at the clinical level. A multidisciplinary team may be required to comprehensively meet the medical and psychosocial needs of a patient living with mental illness, particularly when addressing lifestyle-related factors. The roots of many lifestyle, psychological and physical chronic diseases also lie in social risk factors such as isolation, lack of accommodation, financial distress, lack of education and occupation.

There are a variety of programs that have been successfully implemented in rehabilitation centers and other structures for people diagnosed with schizophrenia. For instance, one of the most well-known models is by providing supervised, group-based, moderate to high intensity exercise training delivered by non-health professionals in a non-clinical setting. For younger people and with first-episode psychosis, these non-stigmatizing surroundings support better physical activity adherence and recovery (Larsen et al., 2019). Another approach tried with success consists in integrating physical therapists into the clinical team and using on-site gym facilities (Curtis et al., 2016).

There are clear advantages to providing systematic educational interventions on physical exercise and healthy food habits to schizophrenia patients (Kalinowska et al., 2021). For inpatients, it may be possible to establish a transversal program to change habits. For instance, Deenik and colleagues propose a lifestyle enhancing treatment based on three main vectors: decrease sedentarism, increase PA and improve diet habits. Patients are encouraged to participate in sports activities like running, walking, biking or team sports, and are involved in work activities like gardening or hospital services and lectured in dietary habits and soft skills such as shopping and cooking. The type of activities, frequency, and intensity changes from patient to patient (Deenik et al., 2019).

One program that we would like to highlight is STEPWISE – STructured lifestyle Education for People WIth SchizophrEnia. A team of experts in the development of obesity and lifestyle intervention programs, mental healthcare professionals and researchers, and service users collaborated to create the STEPWISE intervention. It was based on self-regulation and self-efficacy theories, as well as the relapse prevention paradigm (Holt et al., 2019). However, intervention was neither clinically nor cost-effective and further research is needed to determine how to manage overweight and obesity in people with schizophrenia (Gossage-Worrall et al., 2019; Holt et al., 2019). Perhaps the program would be more beneficial if it integrated a personalized exercise prescription for each patient.

Activity-based lifestyle interventions for people with schizophrenia aim to improve well-being by encouraging daily physical activity. Individually designed supports provided by health care experts to boost older individuals' abilities and motivation to participate in movement are frequently included in these interventions. Lifestyle Redesign is one example of an evidence-based, activity-focused intervention guided by occupational therapists that is appropriate for this population (Leung et al., 2018; Ercan Doğu et al., 2023).

As an alternative for patients with low exercise tolerance, mind–body exercises such as Tai Chi, Yoga, and Qigong, have been widely accepted as a complementary therapy. A systematic review with meta-analysis (Wei et al., 2020) showed that these are effective interventions to improve symptoms of schizophrenia. The simple act of walking is an enjoyable activity for people with mental illnesses and may have benefits regarding cognitive function (Huang et al., 2021; Mandini et al., 2022).

RECOMMENDATIONS

It appears that improving access to physical treatment for persons with schizophrenia is critical if we are to effectively diagnose physical morbidity and reduce excess mortality. However, fragmentation in coordinated care across physical and mental health facilities, as well as between primary care physicians and tertiary hospitals, has been emphasized in the literature and may be a mediator of poorer physical health outcomes in patients with schizophrenia-spectrum disorders. In this context, integrated care has arisen as a method of meeting those patients' physical health demands. This model of care may include,

among other things, the co-location of physical and mental health services, liaison services, shared protocols, and information sharing platforms (Rodgers et al., 2018).

Although there are a respectable number of studies that point to the efficacy of PA prescription and lifestyle interventions, there is still a lack of implementation research which is a blocker to transform these findings into policies, standards, best practices, or routine clinical care (Deenik et al., 2020). Co-designed lifestyle interventions with the involvement of patients and their families and caregivers, focusing on promoting physical health literacy and social support is fundamental for sustainable behavior change (Hui, Garvey, & Olasoji, 2021). Moreover, the most successfully implemented interventions were multidisciplinary and integrated into standard care (Koomen et al., 2022). Besides nurses, physical therapists and occupational therapists are two profiles well positioned to provide health promotion and wellness services, but research indicates that entry-level educational programs inadequately prepare them for this role (Morris & Jenkins, 2018) and therefore they are not always part of these rehabilitation teams.

The combination of exercise and therapy in practice, must always consider that self-determination and empowerment are crucial factors, so these rehabilitation programs must be based on the person's needs, seeking effective answers to their problems, interests, motivations, abilities, difficulties, and fears. The possibility of people with schizophrenia choosing and being involved in the decisions of your recovery process and obtaining healthier lifestyles will have an impact on the results obtained (Pratt et al., 2013). The involvement of family members and significant others in the rehabilitation process is also often beneficial (Waller, Reupert, Ward, McCormick & Kidd, 2019). This means that energy expenditure activities carried out by the person together with people from their support network in their natural contexts can be thought of.

Despite the lack of official policies that regulate the implementation of PA programs, it is possible, based on the evidence available, to suggest practices towards the effective implementation of PA programs. That is what we describe below.

Multidisciplinary Teams

- Exercise programs for people with mental illness should involve the input of physical therapists or exercise physiologists due to their training in the design and provision of specific programs for specific populations (Firth, Schuch and Mittal, 2020).
- Good collaboration and communication between all members of the multidisciplinary team and between them and patients is crucial to improve health behaviors and the achievement of their lifestyle goals (Albury et al., 2019; Leemrijse, de Bakker, Ooms, & Veenhof, 2015).
- Training and education about physical activity and mental health is fundamental, and these themes should be addressed in healthcare professionals' curricula (Netherway, Smith, & Monforte, 2021).

Support

- Support availability must be continued, and the support offered must be related to the amount and type of support the person wants to have at each moment (Soundy, Freeman, Stubbs, Probst, & Vancampfort, 2014). A strong therapeutic alliance with patients is important.
- Develop trust, social identity and sense of belonging to the group may enhance commitment to maintain an assiduous participation in the PA programs (Di Bartolomeo & Papa, 2019).
- Education about physical health should be provided to patients with schizophrenia in a psychoeducational and motivational logic for the practice of these activities (Kim et al., 2019).

Activity Choices

- Patients' opinion about which activities are suitable and interesting for them should be valued, and that is why exercise activities should be delivered flexibly and in a customized manner (Aboagye, 2017). The choice of sports can also be a possibility to consider, as long as institutions are able to do so in terms of space and equipment conditions.
- Even for older people with schizophrenia during hospitalization for an acute medical illness physical activity should be incorporated into their routines focusing on functionality and independence on their daily living activities (Baldwin et al., 2020).

Operational

- Identify, through interviews and questionnaires (for example SIMPAQ) (Rosenbaum,et al, 2020), previous PA experiences, expectations, and lifestyle choices during the patient's life cycle.
- Design and plan the interventions for small groups to facilitate patients/professionals interaction and to facilitate being attentive to each element and correct any postures or movements that are not correct (Bastos, Gomes, Costa, & Corredeira, 2018).
- Graded programs should be privileged and they should start very slowly and gradually increase over time negotiating with the person, for example, duration, intensity, or frequency of the activities (Collado-Mateo et al., 2021).

Engagement Strategies

- Try to increase autonomous motivation for PA, fostering autonomy, competence, and social relationship - the framework of self-determination theory (Teixeira, Carraça, Markland, Silva, & Ryan, 2012).
- Establish contacts (e.g., telephone, SMS) with patients when they miss scheduled sessions without justification for maintenance to the PA program (Bastos, Gomes, Costa, & Corredeira, 2018).
- Deliver exercise interventions with long-term sustainability through community-based exercise programs via referral schemes, facilitating access to exercise facilities and integrating activities into patients' daily routine (Firth, Schuch and Mittal, 2020).

Outcomes

- Make detailed records of sessions and patients' performance to carry out adjustments (Bastos, Gomes, Costa, & Corredeira, 2018). Encouraging self-monitoring is also important.
- Regularly disseminate the outcomes of the physical activity programs to patients, family members and other team members analyzing its impact on patients' lives. Ask patients to define small goals and incentive them to monitor progress (Collado-Mateo et al., 2021).

FUTURE DIRECTIONS

Bearing in mind the importance of physical activity and exercise for the health of people with schizophrenia, it is necessary to continue exploring how to combat a sedentary lifestyle and promote a healthier one.

With the digitalization of healthcare, new approaches to PA promotion in mental healthcare using digital technologies are coming into play every day. The most visible face of this process is the ubiquity of smartphones that are leveraging this change (Firth, 2019). Mobile health (mHealth) devices and wearables are natural means to guide patients through the treatment plan and assess the effectiveness of PA

interventions and how it impacts patients' lives by monitoring daily activities and providing feedback (Cadmus-Bertram et al., 2015; Fonseka & Woo, 2022).

There are already applications to conduct and implement PA prescriptions designed for people with psychiatric disorders like WellWave, that promotes PA and physical well-being by incentivizing the practice of exercise with a high engagement rate (Macias et al., 2015). But even applications designed for the general population like the activity tracker FitBit, are well accepted by people with mental illness to guide and track their PA interventions, which can be an alternative to custom development of apps for specific user targets (Naslund et al., 2016).

Exergames are another strategy to use digital devices to promote and encourage physical activity. This approach mixes exercise with videogames, making the body movement as the primary form of interaction between the player and the videogame. Evidence shows that exergames can be effectively used as part of an intervention even for older adults with severe mental illness (Heinbach et al., 2021).

Virtual reality fitness is also a proven approach to engage people with the practice of exercise. This technology can be an effective alternative to gyms or public spaces to practice physical activity and it was very helpful during covid19 pandemic. It can be easily adapted to people suffering from schizophrenia (Peng, Menhas, Dai, & Younas, 2022).

Additionally, group exercise via videoconferencing (pilates and/or fitness, twice a week) was feasible for people with severe mental illness, during covid19 pandemic, improving physical and psychological quality of life (Koomen et al., 2021).

Another interesting trend is the use of green spaces for physical activity. The term green exercise is defined as "a physical activity in green places that may bring both physical and mental health benefits" (Pretty et al., 2003, p.7), and it includes diverse activities (e.g., walking, running, swimming, cycling). A systematic review and meta-analysis published in 2019 by Rojas-Rueda and colleagues gathered evidence on the association between green space and mortality and the results showed that living in green environments can reduce mortality. Exposure to green environments during childhood appears to lower the risk of developing schizophrenia later in life being a preventive strategy (Freitas & Valadas, 2021). Some authors explored the relationship between greenspace exposure and psychopathology symptoms and results revealed that higher greenspace and nature based outdoor activities are associated with lower symptom burden (Conventry et al., 2021; Henso, Pearson, Keshavan, & Torous, 2020; Tran, Sabol, & Mote, 2022).

The American Psychiatric Association advocates for more research on patient-centered outcomes (2022); further studies are required to identify the most effective exercise interventions (type, duration, frequency, setting) for better quality of life and recovery.

CONCLUSION

Lifestyle choices are influenced by multiple factors like genetic heritage, environment, or sociodemographic status. Each choice influences the quality of one's life. For people suffering from schizophrenia, the illness is one more factor to consider. There is evidence that physical activity interventions can improve various physiological and psychological indicators and guidelines recommend that supervised physical activity should be offered as treatment for severe mental illness recovery. Thus, combining exercise and therapy is fundamental for schizophrenia patients to achieve a healthier lifestyle. These activities would include aerobic fitness, resistance training, and sports groups according to patients' preferences.

Unfortunately, physical activity and exercise are still underrated and underused as a treatment despite the existing guidelines.

Nevertheless, more robust research is needed to understand how physical activity and exercise programs should be implemented in clinical practice for people with schizophrenia. Barriers to participation in physical activity and exercise must be overcome. According to the recommendations presented in this chapter, exercise routines spanned over large periods of time should be considered, as many studies point to PA intervention length as one of the success factors in the long-term. Besides, the differentiated roles of health professionals must be considered in this context and more education and training should be provided.

As mental disorders and sedentarism are increasing, it is up to everyone to end this gap between research and practice and ensure the best possible care for people with mental illness (and even to prevent it) by providing programs based on evidence and adapted to peoples' condition and needs. This is the only way to guarantee better mental health and ultimately better health.

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