

Original Research Article

PREVALENCE OF PHYSICAL EXERCISE AMONG PSYCHIATRIC OUTPATIENTS: A CROSS-SECTIONAL STUDY

Sudhanraj PP¹, Vivek Arun Kumar J K², D.Sai Balasubramanian³

¹Assistant Professor, Department of Psychiatry, Bhaarith Medical College and Hospital, Tamil Nadu, India

²Associate Professor, Department of Psychiatry, Bhaarith Medical College and Hospital, Tamil Nadu, India

³Professor & HOD, Department of Psychiatry, Bhaarith Medical College and Hospital, Tamil Nadu, India

Received : 18/05/2026
Received in revised form : 05/07/2026
Accepted : 22/07/2026

Corresponding Author:

Dr. Vivek Arun Kumar J K,
Associate Professor, Department of
Psychiatry, Bhaarith medical college
and hospital, Tamil Nadu, India.
Email:drvivekarunkumar@gmail.com

DOI: 10.70034/ijmedph.2026.3.289

Source of Support: Nil.
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (3); 1819-1826

ABSTRACT

Background: Physical inactivity is increasingly recognized as a major contributor to poor physical and mental health outcomes among individuals with psychiatric disorders. Although regular physical exercise has been shown to improve psychiatric symptoms, quality of life, and overall well-being, information regarding exercise participation among psychiatric outpatients remains limited. This study aimed to determine the prevalence of physical exercise among psychiatric outpatients and identify factors associated with exercise participation.

Materials and Methods: A cross-sectional observational study was conducted among 424 psychiatric outpatients attending a tertiary care teaching hospital. Participants aged 18 years and above with a confirmed psychiatric diagnosis were recruited consecutively. Sociodemographic and clinical information were collected using a structured questionnaire. Physical activity levels were assessed using the International Physical Activity Questionnaire–Short Form (IPAQ-SF).

Results: Among the 424 participants, the mean age was 38.7 ± 12.9 years, and 52.4% were male. The prevalence of regular physical exercise was 38.9% ($n = 165$), whereas 61.1% ($n = 259$) were physically inactive. Walking was the most commonly reported form of exercise (67.9%). Male gender (AOR: 1.82, 95% CI: 1.15–2.88; $p = 0.011$), graduate/postgraduate education (AOR: 2.14, 95% CI: 1.36–3.36; $p = 0.001$), and employment (AOR: 1.76, 95% CI: 1.11–2.78; $p = 0.016$) were independently associated with higher odds of engaging in regular physical exercise.

Conclusion: Physical inactivity is highly prevalent among psychiatric outpatients, with fewer than half meeting recommended physical activity levels. Sociodemographic and clinical factors significantly influence exercise participation.

Keywords: Physical exercise; Physical activity; Psychiatric outpatients; Mental illness; Prevalence; Schizophrenia; Lifestyle psychiatry.

INTRODUCTION

Mental disorders constitute a major public health concern worldwide and contribute substantially to disability, reduced quality of life, increased healthcare utilization, and premature mortality. According to the World Health Organization (WHO), mental health disorders account for a significant proportion of the global burden of disease, affecting individuals across all age groups

and socioeconomic backgrounds.^[1] Psychiatric illnesses such as depression, anxiety disorders, schizophrenia, bipolar disorder, and substance use disorders are frequently associated with impaired physical health, sedentary lifestyles, and increased risk of chronic medical conditions including obesity, diabetes mellitus, hypertension, and cardiovascular diseases.^[2,3]

Physical exercise has emerged as an important non-pharmacological intervention for improving both

physical and mental health outcomes among individuals with psychiatric disorders. Exercise refers to planned, structured, and repetitive physical activity performed with the objective of improving or maintaining physical fitness and overall health.^[4] Growing evidence suggests that regular physical activity exerts beneficial effects on mood, cognition, stress regulation, self-esteem, and social functioning. Furthermore, exercise has been shown to reduce symptoms of depression and anxiety and may serve as an effective adjunctive treatment in severe mental illnesses such as schizophrenia and bipolar disorder.^[5,6]

The relationship between physical exercise and mental health is multifaceted and involves several biological, psychological, and social mechanisms. Physiologically, exercise promotes the release of endorphins, serotonin, dopamine, and brain-derived neurotrophic factor, which contribute to improved mood and cognitive function.^[7] Psychologically, physical activity enhances self-efficacy, self-confidence, and resilience while providing opportunities for distraction from negative thoughts and stressors.^[8] Socially, participation in exercise programs may improve interpersonal interactions and reduce social isolation, a common challenge among psychiatric patients.^[9]

Despite the well-established benefits of physical exercise, individuals with mental illnesses are generally less physically active than the general population. A global systematic review and meta-analysis reported significantly lower levels of physical activity and higher levels of sedentary behavior among people with schizophrenia, bipolar disorder, and major depressive disorder.^[10] Similarly, studies have demonstrated that psychiatric patients often fail to achieve the recommended levels of physical activity proposed by international guidelines.^[11] This reduced participation in exercise contributes to poorer physical health outcomes and may further exacerbate psychiatric symptoms and functional impairment.

Several barriers contribute to low physical activity levels among psychiatric patients. These include lack of motivation, fatigue, medication-related adverse effects, low self-esteem, fear of social stigma, financial constraints, inadequate social support, and limited access to exercise facilities.^[12] Psychiatric medications, particularly second-generation antipsychotics, are associated with weight gain and metabolic disturbances, which may further discourage engagement in physical exercise.^[13] Additionally, symptoms such as anhedonia, cognitive impairment, and negative symptoms of schizophrenia can significantly reduce an individual's willingness and ability to participate in regular physical activity.^[14]

Psychiatric outpatients represent a particularly important population for the assessment of exercise behavior. Unlike hospitalized patients, outpatients live within the community and are expected to

manage their health behaviors independently. Understanding the prevalence of physical exercise among psychiatric outpatients is essential for identifying gaps in health promotion strategies and developing targeted interventions. Assessment of exercise patterns in this population may also provide insights into the relationship between lifestyle behaviors and mental health outcomes, thereby facilitating comprehensive psychiatric care.^[15]

Although substantial research has demonstrated the therapeutic benefits of exercise in mental health, data regarding the prevalence of physical exercise among psychiatric outpatients remain limited, particularly in developing countries. Most available studies focus on intervention outcomes rather than routine exercise participation. Consequently, there is a need for cross-sectional studies that evaluate exercise prevalence and associated sociodemographic and clinical factors among psychiatric outpatients. Such information may assist clinicians and policymakers in designing effective physical activity promotion programs within mental health services.^[16]

Therefore, the present study aims to assess the prevalence of physical exercise among psychiatric outpatients and to explore factors associated with exercise participation. The findings may contribute to the growing body of evidence supporting the integration of physical activity assessment and promotion into routine psychiatric practice, ultimately improving both mental and physical health outcomes among individuals with mental illness.

MATERIALS AND METHODS

Study Design and Setting: This cross-sectional observational study was conducted in the Psychiatry Outpatient Department of a tertiary care teaching hospital between _____ and _____. The study aimed to determine the prevalence of physical exercise among psychiatric outpatients and identify factors associated with engagement in regular physical activity.

Sample Size Calculation: The sample size was calculated using the single population proportion formula for prevalence studies:

$$n = Z^2 P(1-P)/d^2$$

where n is the required sample size, Z is the standard normal deviate corresponding to a 95% confidence level (1.96), P is the anticipated prevalence of regular physical exercise among psychiatric outpatients, and d is the desired absolute precision.

Based on previous literature reporting a prevalence of physical exercise of approximately 50% among psychiatric patients, a prevalence estimate of 50% was assumed to provide the maximum sample size. Using a precision of 5% and a 95% confidence interval, the calculated minimum sample size was:

$$n = (1.96)^2 \times 0.50 \times (1-0.50)/(0.05)^2$$

$$n = 384.16$$

Accordingly, a minimum sample size of 385 participants was required but the final sample size was increased to 424 participants. Consecutive eligible psychiatric outpatients were recruited until the required sample size was achieved.

Participants: Adult psychiatric outpatients attending the Psychiatry Outpatient Department during the study period were screened for eligibility.

Inclusion Criteria

- Age ≥ 18 years.
- Diagnosis of a psychiatric disorder established by a consultant psychiatrist according to DSM-5 or ICD-10/11 diagnostic criteria.
- Ability to understand study procedures and provide written informed consent.

Exclusion Criteria

- Acute psychiatric emergencies requiring immediate intervention.
- Severe cognitive impairment affecting reliable participation.
- Severe neurological or physical disabilities limiting independent physical activity.
- Refusal to participate.

Data Collection: Eligible participants were recruited consecutively during routine outpatient visits. Following informed consent, data were collected using a structured interviewer-administered questionnaire. Sociodemographic variables included age, sex, educational status, occupation, marital status, residence, and socioeconomic status. Clinical variables included psychiatric diagnosis, duration of illness, treatment duration, psychotropic medications, psychiatric comorbidities, and medical comorbidities.

Assessment of Physical Exercise: Physical activity was assessed using the International Physical Activity Questionnaire–Short Form (IPAQ-SF), a validated instrument widely used in epidemiological studies. The questionnaire evaluates the frequency and duration of vigorous-intensity activity, moderate-intensity activity, walking, and sedentary behaviour during the previous seven days.

Participants were classified according to the World Health Organization physical activity recommendations. Individuals performing at least 150 minutes of moderate-intensity physical activity per week, 75 minutes of vigorous-intensity physical activity per week, or an equivalent combination were categorized as physically active. Participants not meeting these criteria were categorized as physically inactive.

Outcome Measures

Primary Outcome: Prevalence of regular physical exercise among psychiatric outpatients.

Secondary Outcomes:

- Association between physical exercise and sociodemographic factors.
- Association between physical exercise and psychiatric diagnoses.
- Identification of predictors of regular exercise participation.

Ethical Considerations: The study protocol received approval from the Institutional Ethics Committee prior to commencement. Written informed consent was obtained from all participants. Confidentiality and anonymity of participant information were maintained throughout the study. The study adhered to the principles outlined in the Declaration of Helsinki.

Statistical Analysis: Data were analysed using IBM SPSS Statistics version 26 (IBM Corp., Armonk, NY, USA). Continuous variables were summarized as mean $\pm$ standard deviation or median (interquartile range), depending on distribution. Categorical variables were expressed as frequencies and percentages.

The prevalence of physical exercise was calculated with corresponding 95% confidence intervals. Associations between categorical variables were assessed using the Chi-square test or Fisher's exact test. Continuous variables were compared using the independent-samples t-test or Mann–Whitney U test, as appropriate.

Variables with $p < 0.10$ in univariate analyses were entered into a multivariable logistic regression model to identify independent predictors of regular physical exercise. Adjusted odds ratios (AORs) and 95% confidence intervals (CIs) were reported. Statistical significance was set at $p < 0.05$.

RESULTS

A total of 424 psychiatric outpatients were enrolled in the study. The mean age of participants was 38.7 ± 12.9 years. Males constituted 52.4% of the study population. Depression (31.6%) was the most common psychiatric diagnosis, followed by anxiety disorders (24.8%), schizophrenia spectrum disorders (18.6%), bipolar affective disorder (13.2%), and substance use disorders (11.8%).

The prevalence of regular physical exercise according to WHO recommendations was 38.9% ($n=165$), whereas 61.1% ($n=259$) participants were classified as physically inactive.

Table 1: Sociodemographic Characteristics of Study Participants (N=424)

Variable	Frequency (n)	Percentage (%)
Age (years)		
18–29	118	27.8
30–39	126	29.7
40–49	92	21.7
≥ 50	88	20.8
Gender		

Male	222	52.4
Female	202	47.6
Marital Status		
Married	248	58.5
Unmarried	138	32.5
Divorced/Widowed	38	9.0
Educational Status		
Primary School	76	17.9
Secondary School	158	37.3
Graduate	138	32.5
Postgraduate	52	12.3
Employment Status		
Employed	208	49.1
Unemployed	132	31.1
Student	48	11.3
Retired	36	8.5

[Table 1] The majority of participants belonged to the 30–39-year age group. Males slightly outnumbered females. More than half of the

participants were married and approximately half were employed.

Table 2: Clinical Characteristics of Psychiatric Outpatients

Variable	Frequency (n)	Percentage (%)
Psychiatric Diagnosis		
Major Depressive Disorder	134	31.6
Anxiety Disorders	105	24.8
Schizophrenia Spectrum Disorders	79	18.6
Bipolar Disorder	56	13.2
Substance Use Disorders	50	11.8
Duration of Illness		
<1 year	84	19.8
1–5 years	186	43.9
>5 years	154	36.3
Presence of Medical Comorbidity		
Yes	146	34.4
No	278	65.6

[Table 2] Depression was the most frequently diagnosed psychiatric condition. Nearly 44% of patients had been living with their psychiatric illness

for 1–5 years, while one-third had a coexisting medical illness.

Table 3: Prevalence and Pattern of Physical Exercise Among Participants

Variable	Frequency (n)	Percentage (%)
Physically Active	165	38.9
Physically Inactive	259	61.1
Type of Exercise*		
Walking	112	67.9
Jogging/Running	28	17.0
Gym-based Exercise	16	9.7
Yoga	9	5.4
Frequency per Week		
1–2 days	38	23.0
3–4 days	64	38.8
≥5 days	63	38.2

*Among physically active participants (n=165).

[Table 3] The prevalence of regular physical exercise was 38.9%. Walking was the most commonly reported form of exercise, accounting for

more than two-thirds of physically active participants.

Table 4: Association Between Sociodemographic Factors and Physical Exercise

Variable	Active n (%)	Inactive n (%)	p-value
Male	102 (45.9)	120 (54.1)	0.008
Female	63 (31.2)	139 (68.8)	
Graduate/Postgraduate	92 (48.4)	98 (51.6)	0.001
Primary/Secondary Education	73 (31.2)	161 (68.8)	
Employed	97 (46.6)	111 (53.4)	0.004
Unemployed/Others	68 (31.5)	148 (68.5)	

[Table 4] Male gender, higher educational attainment, and employment status were

significantly associated with greater participation in regular physical exercise.

Table 5: Association Between Clinical Variables and Physical Exercise

Variable	Active n (%)	Inactive n (%)	p-value
Depression	58 (43.3)	76 (56.7)	0.041
Anxiety Disorders	49 (46.7)	56 (53.3)	
Schizophrenia	19 (24.1)	60 (75.9)	
Bipolar Disorder	24 (42.9)	32 (57.1)	
Substance Use Disorder	15 (30.0)	35 (70.0)	
Illness Duration >5 years	43 (27.9)	111 (72.1)	0.003
Medical Comorbidity Present	42 (28.8)	104 (71.2)	0.001

[Table 5] Patients with schizophrenia, longer duration of illness, and medical comorbidities

demonstrated significantly lower levels of physical exercise participation.

Table 6: Multivariable Logistic Regression Analysis of Factors Associated with Physical Exercise

Variable	Adjusted Odds Ratio (AOR)	95% CI	p-value
Male Gender	1.82	1.15–2.88	0.011
Graduate/Postgraduate Education	2.14	1.36–3.36	0.001
Employment	1.76	1.11–2.78	0.016
Duration of Illness >5 years	0.58	0.36–0.93	0.024
Medical Comorbidity	0.54	0.33–0.88	0.013
Schizophrenia Diagnosis	0.47	0.26–0.84	0.010

[Table 6] After adjustment for potential confounders, higher education, employment, and male gender independently predicted regular physical exercise participation. Conversely, schizophrenia, medical comorbidity, and longer illness duration were independently associated with lower odds of engaging in regular physical exercise.

(38.9%) and physically inactive (61.1%) according to World Health Organization physical activity recommendations.

[Figure 2] Showing the frequency of major depressive disorder, anxiety disorders, schizophrenia spectrum disorders, bipolar disorder, and substance use disorders in the study population.

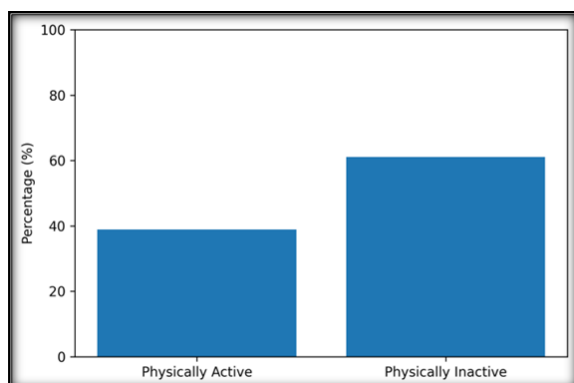


Figure 1: Prevalence of physical exercise among psychiatric outpatients

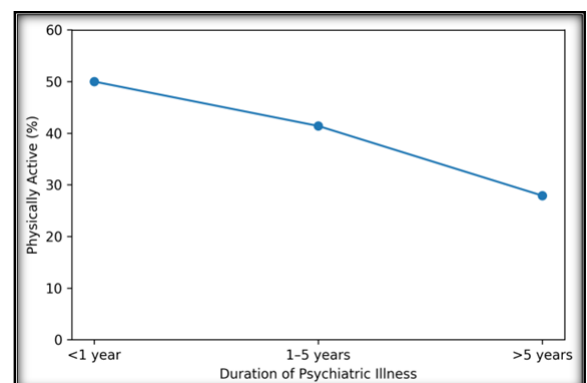


Figure 3: Relationship between duration of psychiatric illness and prevalence of physical exercise.

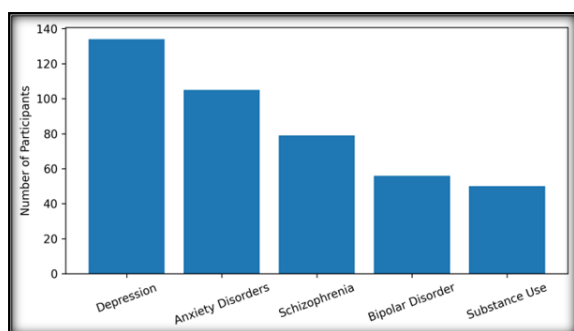


Figure 2: Distribution of psychiatric diagnoses among study participants

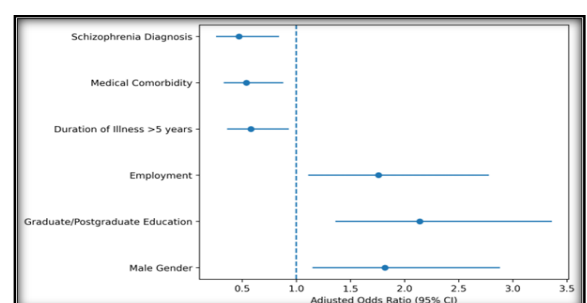


Figure 4: Forest plot showing independent predictors of physical exercise participation from multivariable logistic regression analysis.

[Figure 1] Bar chart showing the proportion of psychiatric outpatients classified as physically active

[Figure 3] The proportion of physically active participants decreased progressively with increasing

duration of psychiatric illness, indicating lower engagement in regular physical activity among patients with longer disease duration. [Figure 4] The plot presents adjusted odds ratios (AORs) and 95% confidence intervals for factors independently associated with regular physical exercise among psychiatric outpatients. The vertical reference line at AOR = 1 indicates no association.

DISCUSSION

The present cross-sectional study evaluated the prevalence of physical exercise among psychiatric outpatients and identified sociodemographic and clinical factors associated with exercise participation. The findings demonstrated that only 38.9% of psychiatric outpatients met the World Health Organization recommendations for physical activity, while the majority (61.1%) were physically inactive. These findings highlight the substantial burden of sedentary behavior among individuals receiving outpatient psychiatric care and reinforce concerns regarding the physical health disparities experienced by people with mental illness.

The prevalence of regular physical exercise observed in the present study is consistent with previous international research demonstrating lower physical activity levels among individuals with psychiatric disorders compared with the general population. A multinational study by Stubbs et al. reported that patients with severe mental illness exhibited significantly reduced physical activity participation and increased sedentary behavior across diverse healthcare settings.^[17] Similarly, Vancampfort et al. observed that individuals with schizophrenia, bipolar disorder, and major depressive disorder frequently failed to achieve recommended levels of physical activity, contributing to elevated cardiometabolic risk and premature mortality.^[18] The relatively low prevalence observed in our study may be explained by illness-related symptoms, medication effects, reduced motivation, social isolation, and limited access to structured exercise opportunities.

Walking emerged as the most common form of physical activity among participants who exercised regularly. This finding is consistent with previous studies indicating that walking is often the preferred form of exercise among psychiatric populations because of its accessibility, low cost, minimal equipment requirements, and perceived safety.^[19] The predominance of walking suggests that community-based interventions encouraging routine walking may represent a practical and sustainable strategy for increasing physical activity among psychiatric outpatients.

The present study found a significant association between male gender and regular physical exercise participation. Male participants demonstrated higher levels of physical activity than female participants, a finding that has been reported consistently across

both psychiatric and general populations.^[20] Several explanations have been proposed, including gender differences in societal roles, cultural expectations, access to recreational opportunities, and perceived barriers to exercise. Women with mental illness may face additional challenges related to caregiving responsibilities, stigma, safety concerns, and lower self-efficacy regarding physical activity participation.^[21]

Educational attainment was independently associated with exercise participation. Participants with graduate or postgraduate education were significantly more likely to engage in regular physical activity than those with lower educational levels. Higher education may facilitate greater awareness of the health benefits of exercise, improved health literacy, and enhanced motivation to adopt healthy lifestyle behaviors.^[22] This finding emphasizes the importance of psychoeducational interventions aimed at improving awareness regarding the role of physical activity in mental health management.

Employment status was another significant predictor of physical exercise participation. Employed individuals demonstrated greater engagement in physical activity compared with unemployed participants. Employment may provide financial stability, structured daily routines, improved social interaction, and increased opportunities for active commuting or recreational exercise.^[23] Conversely, unemployment has been associated with social withdrawal, reduced motivation, and poorer physical and mental health outcomes, all of which may negatively influence exercise behavior.

An important finding of the present study was the significantly lower prevalence of physical exercise among patients with schizophrenia spectrum disorders. After multivariable adjustment, schizophrenia remained an independent predictor of reduced physical activity participation. This observation is consistent with previous evidence indicating that individuals with schizophrenia experience some of the lowest levels of physical activity among all psychiatric diagnostic groups.^[24] Negative symptoms, cognitive impairment, social dysfunction, medication-induced weight gain, and reduced intrinsic motivation have been identified as major barriers to exercise engagement in this population.^[25] Given the increased cardiovascular mortality associated with schizophrenia, targeted physical activity interventions should be prioritized for these patients.

Longer duration of psychiatric illness was associated with reduced exercise participation. Patients with illness duration exceeding five years demonstrated significantly lower levels of physical activity compared with those with shorter illness duration. Similar findings have been reported in longitudinal studies showing that chronic psychiatric illness may contribute to progressive functional decline, social disengagement, and increased sedentary behavior over time.^[26] Early incorporation

of lifestyle interventions into psychiatric treatment plans may therefore help prevent the development of persistent physical inactivity.

Medical comorbidity was also independently associated with lower exercise participation. Patients with coexisting medical conditions were less likely to engage in regular physical activity. This finding is clinically significant because psychiatric patients already experience disproportionately high rates of cardiovascular disease, diabetes mellitus, metabolic syndrome, and obesity.^[27] Physical inactivity may further exacerbate these conditions, creating a cycle of worsening physical and mental health outcomes. Integration of exercise counseling into routine psychiatric care may therefore provide substantial benefits for this vulnerable population.

The findings of the present study have important clinical implications. Routine assessment of physical activity should become an integral component of psychiatric outpatient evaluation. Mental health professionals should actively promote exercise as an evidence-based adjunctive intervention alongside pharmacological and psychotherapeutic treatments. Multidisciplinary approaches involving psychiatrists, psychologists, physiotherapists, exercise specialists, and community health workers may facilitate sustainable improvements in physical activity behavior among psychiatric patients.

Despite its strengths, several limitations should be acknowledged. The cross-sectional design precludes causal inference between physical activity and associated factors. Exercise participation was assessed through self-report, which may be subject to recall and social desirability bias. Furthermore, the study was conducted at a single tertiary care center, potentially limiting generalizability to other settings. Future multicenter longitudinal studies utilizing objective measures such as accelerometers may provide more comprehensive insights into physical activity patterns among psychiatric populations.

Overall, the present study demonstrates that physical inactivity remains highly prevalent among psychiatric outpatients. Male gender, higher educational attainment, and employment status were positively associated with exercise participation, whereas schizophrenia, medical comorbidity, and longer illness duration were significant barriers. These findings underscore the need for targeted physical activity promotion strategies within psychiatric services to improve both mental and physical health outcomes.

CONCLUSION

The present study demonstrated that physical inactivity is highly prevalent among psychiatric outpatients, with fewer than half of the participants meeting the recommended levels of physical

exercise. Walking was the most commonly practiced form of physical activity, highlighting its feasibility as a low-cost and accessible exercise option for individuals with mental illness. Regular physical exercise was significantly associated with male gender, higher educational attainment, and employment status, whereas schizophrenia, longer duration of psychiatric illness, and the presence of medical comorbidities were independently associated with lower participation in physical activity. These findings underscore the need for routine assessment of physical activity within psychiatric services and the integration of structured exercise promotion into comprehensive mental healthcare. Targeted interventions addressing barriers to exercise, particularly among patients with chronic psychiatric disorders and comorbid medical conditions, may contribute to improved physical health, enhanced mental well-being, and better overall treatment outcomes. Future multicenter longitudinal studies are warranted to further explore causal relationships and evaluate the effectiveness of tailored physical activity interventions in psychiatric populations.

REFERENCES

1. World Health Organization. Mental health: strengthening our response. Geneva: WHO; 2022.
2. Walker ER, McGee RE, Druss BG. Mortality in mental disorders and global disease burden implications: a systematic review and meta-analysis. *JAMA Psychiatry*. 2015;72(4):334-41.
3. Correll CU, Solmi M, Veronese N, Bortolato B, Rosson S, Santonastaso P, et al. Prevalence, incidence and mortality from cardiovascular disease in patients with severe mental illness: a large-scale meta-analysis. *World Psychiatry*. 2017;16(2):163-80.
4. World Health Organization. WHO guidelines on physical activity and sedentary behaviour. Geneva: WHO; 2020.
5. Schuch FB, Vancampfort D, Firth J, Rosenbaum S, Ward PB, Silva ES, et al. Physical activity and incident depression: a meta-analysis of prospective cohort studies. *Am J Psychiatry*. 2018;175(7):631-48.
6. Firth J, Solmi M, Wootton RE, Vancampfort D, Schuch FB, Hoare E, et al. A meta-review of lifestyle psychiatry: the role of exercise, smoking, diet and sleep in the prevention and treatment of mental disorders. *World Psychiatry*. 2020;19(3):360-80.
7. Zschucke E, Gaudlitz K, Ströhle A. Exercise and physical activity in mental disorders: clinical and experimental evidence. *J Prev Med Public Health*. 2013;46(Suppl 1).
8. White RL, Vella SA, Biddle SJH, Sutcliffe J, Guagliano JM, Uddin R, et al. Physical activity and mental health: a systematic review and best-evidence synthesis of mediators and moderators. *Int J Behav Nutr Phys Act*. 2024;21(1):91.
9. Rosenbaum S, Tiedemann A, Sherrington C, Curtis J, Ward PB. Physical activity interventions for people with mental illness: a systematic review and meta-analysis. *J Clin Psychiatry*. 2014;75(9):964-74.
10. Vancampfort D, Firth J, Schuch FB, Rosenbaum S, Mugisha J, Hallgren M, et al. Sedentary behavior and physical activity levels in people with schizophrenia, bipolar disorder and major depressive disorder: a global systematic review and meta-analysis. *World Psychiatry*. 2017;16(3):308-15.
11. McKeon G, Curtis J, Rosenbaum S. Promoting physical activity for mental health: an updated evidence review and practical guide. *Curr Opin Psychiatry*. 2022;35(4):270-76.

12. Bantham A, Taverno Ross SE, Sebastiao E, Hall G. Overcoming barriers to physical activity in underserved populations. *ProgCardiovasc Dis*. 2021;64:64-71.
13. De Hert M, Detraux J, van Winkel R, Yu W, Correll CU. Metabolic and cardiovascular adverse effects associated with antipsychotic drugs. *Nat Rev Endocrinol*. 2012;8(2):114-26.
14. Vancampfort D, Stubbs B, Ward PB, Teasdale S, Rosenbaum S. Integrating physical activity as medicine in the care of people with severe mental illness. *Aust N Z J Psychiatry*. 2015;49(8):681-82.
15. Rosenbaum S, Ward PB. The simple physical activity questionnaire. *Lancet Psychiatry*. 2016;3(1).
16. Bichler CS, Niedermeier M, Gufler A, Gálffy M, Sperner-Unterweger B, Kopp M. A case-control study on physical activity preferences, motives, and barriers in patients with psychiatric conditions. *Compr Psychiatry*. 2021;106:152276.
17. Stubbs B, Vancampfort D, Hallgren M, Firth J, Veronese N, Solmi M, et al. 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. *Eur Psychiatry*. 2018;54:124-144.
18. Vancampfort D, Rosenbaum S, Schuch F, Ward PB, Richards J, Mugisha J, et al. Cardiorespiratory fitness in severe mental illness: a systematic review and meta-analysis. *Sports Med*. 2017;47(2):343-352.
19. Soundy A, Freeman P, Stubbs B, Probst M, Coffee P, Vancampfort D. The value of social support to encourage people with schizophrenia to engage in physical activity: an international insight from specialist mental health physiotherapists. *J Ment Health*. 2014;23(5):256-260.
20. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016. *Lancet Glob Health*. 2018;6(10).
21. White RL, Babic MJ, Parker PD, Lubans DR, Astell-Burt T, Lonsdale C. Domain-specific physical activity and mental health: a meta-analysis. *Am J Prev Med*. 2017;52(5):653-666.
22. Pampel FC, Krueger PM, Denney JT. Socioeconomic disparities in health behaviors. *Annu Rev Sociol*. 2010;36:349-370.
23. Schuch FB, Vancampfort D. Physical activity, exercise, and mental disorders: it is time to move on. *Trends Psychiatry Psychother*. 2021;43(3):177-184.
24. Firth J, Carney R, Elliott R, French P, Parker S, McIntyre R, et al. Exercise as an intervention for first-episode psychosis: a feasibility study. *Early Interv Psychiatry*. 2018;12(3):307-315.
25. Vancampfort D, De Hert M, Stubbs B, Soundy A, Rosenbaum S, Ward PB, et al. Negative symptoms are associated with lower autonomous motivation towards physical activity in people with schizophrenia. *Compr Psychiatry*. 2015;56:128-132.
26. Rosenbaum S, Morell R, Abdel-Baki A, Ahmadpanah M, Anilkumar TV, Baie L, et al. Assessing physical activity in people with mental illness: 23-country reliability and validity of the Simple Physical Activity Questionnaire. *BMC Psychiatry*. 2020;20:108.
27. Firth J, Siddiqi N, Koyanagi A, Siskind D, Rosenbaum S, Galletly C, et al. The Lancet Psychiatry Commission: a blueprint for protecting physical health in people with mental illness. *Lancet Psychiatry*. 2019;6(8):675-712.