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RUNNING FROM DEPRESSION: A REVIEW OF AEROBIC EXERCISE AS AN ADJUNCTIVE TREATMENT FOR MOOD DISORDERS

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ABSTRACT

Background: Mood disorders, including major depressive disorder (MDD) and anxiety disorders, significantly impact global mental health, contributing to disability and reduced quality of life. While pharmacotherapy and psychotherapy are standard treatments, many patients experience residual symptoms or treatment resistance. Aerobic exercise has emerged as a promising adjunctive intervention due to its psychological and neurobiological benefits. This review examines its efficacy, mechanisms, optimal implementation strategies, and integration into psychiatric care.

Methods: A narrative literature review was conducted using PubMed, Embase, and other relevant databases, focusing on studies published up to 2025. Keywords such as "aerobic exercise," "depression," "anxiety," "psychiatric disorders," and "neurobiological mechanisms" were used to identify studies assessing clinical outcomes, neurobiological effects, and adherence factors.

Results: Aerobic exercise significantly reduces depression and anxiety symptoms across diverse populations, with moderate-to-large effect sizes in randomized controlled trials. Mechanistically, it enhances neurotransmitter balance, increases brain-derived neurotrophic factor (BDNF), regulates the hypothalamic-pituitary-adrenal (HPA) axis, and improves cognitive function. Optimal outcomes are observed with moderate-intensity exercise (60–80% HRmax), performed three times per week for at least 8–12 weeks. Supervised and group-based interventions improve adherence, particularly in psychiatric populations.

Conclusions: Aerobic exercise represents a viable, low-cost, and effective adjunct to traditional psychiatric treatments. However, methodological limitations, lack of long-term data, and adherence challenges remain. Future research should focus on standardized protocols, personalized exercise prescriptions, and large-scale, multi-center trials to maximize clinical integration and optimize patient outcomes.

Keywords: aerobic exercise; depression; anxiety; mood disorders; neurobiological mechanisms; psychiatric rehabilitation

Introduction

Mood disorders, particularly major depressive disorder (MDD) and generalized anxiety disorder (GAD), are among the most prevalent psychiatric conditions globally and are leading contributors to years lived with disability. [1] Despite the availability of effective pharmacological and psychotherapeutic interventions, a significant proportion of patients experience only partial remission, residual symptoms, or adverse effects from treatment, which compromises long-term outcomes. [2] These limitations highlight the urgent need for safe, accessible, evidence-based adjunctive therapies. [3]

Aerobic exercise has emerged as a promising non-pharmacological strategy to augment conventional treatments for mood disorders. Increasing empirical evidence supports the efficacy of moderate-intensity aerobic exercise in reducing depressive and anxiety symptoms across various clinical populations. [4, 5] In addition to symptom alleviation, exercise interventions have improved psychological domains such as self-esteem, cognitive function, and quality of life. [6]

From a mechanistic perspective, aerobic exercise is believed to modulate neurobiological processes implicated in mood regulation, including enhanced neurogenesis, increased expression of brain-derived neurotrophic factor (BDNF), reduced systemic inflammation, and normalization of hypothalamic-pituitary-adrenal (HPA) axis activity. [7] These physiological and neurocognitive adaptations offer a compelling rationale for integrating aerobic exercise into treatment paradigms for mood disorders.

This narrative review critically synthesizes the recent literature on aerobic exercise as an adjunctive treatment for depression and anxiety. Specifically, it addresses its clinical effectiveness, proposed mechanisms of action, optimal exercise parameters (e.g., frequency, intensity, and duration), and comparative value relative to other adjunctive interventions. By consolidating current findings, this review seeks to guide clinical application and inform future research directions in the integrative management of mood disorders.

Aerobic Exercise and Depression

Major depressive disorder (MDD) is a chronic psychiatric condition characterized by low mood, anhedonia, cognitive dysfunction, and somatic complaints. It affects over 280 million individuals worldwide and contributes significantly to global disability. [8] Despite the widespread use of pharmacotherapy and psychotherapy, up to 30–40% of patients do not achieve complete remission and experience residual symptoms or side effects. [9] These limitations have increased interest in adjunctive treatments, including structured aerobic exercise. [10]

A growing number of randomized controlled trials (RCTs) support aerobic exercise as an effective adjunct to standard care. In a single-blind RCT by Cheung and Lee (2018), 34 patients with MDD (HAM-D ≥14) were randomized to either 12 weeks of supervised aerobic exercise plus treatment-as-usual (TAU) or TAU alone. The intervention group showed a significant reduction in HAM-D scores from 18.5 to 9.8, compared to a more modest reduction from 19.5 to 14.5 in the control group. Sleep quality, assessed via the Pittsburgh Sleep Quality Index, also improved significantly (12.0 to 9.0) in the exercise group only. [11]

In another RCT, Siqueira et al. (2016) studied 57 adults with MDD who were randomized to 4 weeks of sertraline plus aerobic exercise (n=29) or sertraline alone (n=28). Depression severity was measured using the HAM-D, and the exercise group required significantly lower sertraline doses while demonstrating improvements in VO_2 max and oxygen pulse.[12] This suggests aerobic exercise can reduce medication burden while improving mood and cardiopulmonary fitness.

Brush et al. (2020) conducted an 8-week trial with 66 adults diagnosed with MDD, comparing moderate-intensity aerobic exercise (n=35) to light stretching (n=31). Those in the aerobic group significantly reduced depressive symptoms (Hedge's g = 0.66). Moreover, individuals with higher baseline depression severity and greater reward responsiveness were more likely to respond favorably to the exercise intervention.[4]

In inpatient populations, aerobic exercise has been particularly impactful. Legrand and Neff (2016) conducted a 10-day RCT in 35 hospitalized MDD patients beginning pharmacotherapy. Participants randomized to aerobic exercise (n=14) demonstrated a large effect size (Cohen's d = –1.06) in depression reduction (BDI-II scores) compared to stretching and no-intervention groups.[13] When compared directly to psychotherapy, aerobic exercise has shown comparable efficacy. Carneiro et al. (2015) conducted a 4-month RCT with 26 women, finding that supervised aerobic exercise combined with antidepressants significantly reduced BDI-II scores and improved anxiety and stress, achieving effects similar to psychotherapeutic interventions.[14] Similarly, Imboden et al. (2020) found that aerobic exercise produced comparable short-term improvements in depression symptoms and outperformed stretching in enhancing working memory in a 6-week inpatient RCT.[15]

Several studies have confirmed the effectiveness of aerobic exercise in specific subpopulations. For instance, Moraes et al. (2019) found that both aerobic (n=9) and strength training (n=9) produced significant reductions in HAM-D and BDI scores in older adults (mean age ~68) compared to controls (n=9), with a 50% symptom reduction threshold met. [16] Xu and Lin (2019) demonstrated that 12 weeks of aerobic training significantly reduced depression in adolescents with subthreshold depressive symptoms.[17] Likewise, Imboden et al. (2021) conducted an umbrella review. They found that aerobic and resistance exercise yield moderate improvements in depressive symptoms in older adults, comparable to other effective treatments.[18] In adolescents, aerobic group exercise has improved depressive symptoms in clinical settings, with structured protocols now being evaluated in multicenter RCTs.[19] Among HIV-positive adults, a 12-week supervised aerobic training program significantly reduced self-reported depressive symptoms and was recommended for further clinical implementation.[20] Similarly, a recent randomized trial demonstrated that moderate-intensity aquatic aerobic exercise reduced postpartum depression and anxiety symptoms, with significantly lower EPDS scores in the intervention group compared to controls.[21]

These findings collectively support the integration of aerobic exercise into comprehensive treatment plans for depression. The consistency of outcomes across diverse populations, combined with measurable physiological and psychological benefits, positions aerobic exercise as a low-cost, safe, and effective adjunctive therapy for major depressive disorder.

Aerobic Exercise and Anxiety

Anxiety disorders, including generalized anxiety disorder (GAD), panic disorder, social anxiety disorder, and obsessive-compulsive disorder (OCD), are among the most prevalent psychiatric conditions globally, with an estimated 1-year prevalence of 18% in adults.[22] These disorders often follow a chronic course, impairing occupational functioning, social relationships, and overall quality of life.[23] While selective serotonin reuptake inhibitors (SSRIs) and cognitive behavioral therapy (CBT) are effective for many, treatment resistance, side effects, and accessibility barriers persist. In this context, aerobic exercise has emerged as a viable and increasingly evidence-based adjunctive intervention for anxiety management, showing promise in reducing symptom severity across a wide range of populations.[24, 25] Several randomized controlled trials (RCTs) and meta-analyses have explored the efficacy of aerobic exercise in anxiety management.

A meta-analysis by Rebar et al. (2015), which included 40 RCTs, found a moderate effect of exercise in reducing anxiety symptoms in adults, particularly among clinical populations (Rebar et al., 2015).[26] In contrast, Herring et al. (2014) conducted a focused meta-analysis on exercise training and anxiety in adults with chronic illness, reporting significant reductions in anxiety symptoms (effect size = –0.29) and more substantial effects with higher-intensity exercise. [25] Furthermore, LeBouthillier and Asmundson (2015) examined the acute effects of aerobic and resistance exercise in individuals with high anxiety sensitivity, finding both modalities reduced anxiety. Still, aerobic exercise significantly improved general psychological distress.[27]

Among clinical populations, Abrantes et al. (2017) conducted a 12-week RCT in 56 OCD patients who had not fully responded to treatment. Participants were randomized to aerobic exercise (n = 28) or health education (n = 28). At post-treatment, 30.4% of the aerobic group were considered treatment responders (≥35% reduction in symptoms), compared to only 7.7% in the control group, suggesting a clinically meaningful benefit from exercise augmentation. [28]Similarly, in a study of fibromyalgia patients (n = 321), Kelley et al. (2022) reported significant anxiety reductions following aerobic exercise training, with a pooled mean change of –0.77 points on anxiety scales (95% CI: –1.25 to –0.77), confirming benefits in populations with somatic comorbidity.[29]

Comparative studies on exercise modalities indicate nuanced differences. LeBouthillier and Asmundson (2015) showed in a single-session RCT (n = 41) that 30 minutes of aerobic exercise reduced anxiety sensitivity with moderate effect sizes while not impacting intolerance of uncertainty or distress tolerance.[27] Martinsen et al. (1989), in an 8-week RCT with 79 inpatients diagnosed with anxiety disorders (71% with panic disorder and agoraphobia), found no statistically significant difference between aerobic and non-aerobic training in reducing anxiety, although aerobic capacity improved only in the aerobic group. [30]This suggests that psychological mechanisms like distraction and mastery may mediate the anxiolytic effects of physical activity more than physiological adaptations alone.

When combined with established therapies, aerobic exercise may amplify treatment effects. Jayakody et al. (2013) reviewed eight RCTs and found that exercise combined with antidepressants or CBT improved outcomes in panic disorder and social anxiety more than either alone.[22] For instance, patients with panic disorder receiving paroxetine plus aerobic exercise experienced more significant improvements on the Clinical Global Impression scale than those on paroxetine alone.[31] Aylett et al. (2018), in a meta-analysis of 15 RCTs with 675 patients, concluded that high-intensity aerobic exercise had a greater effect on reducing anxiety symptoms than low-intensity regimens (effect size = –0.41, 95% CI: –0.70 to –0.12).[32]

Taken together, these findings support the inclusion of aerobic exercise as a feasible, scalable, and effective adjunctive treatment for anxiety disorders. Meta-analyses and systematic reviews show small-to-moderate effect sizes for aerobic exercise in reducing anxiety symptoms, particularly when interventions are sustained for at least 4–12 weeks and combined with traditional treatments.[22, 23, 32] Moreover, high-intensity aerobic regimens yield more potent anxiolytic effects than low-intensity activity, with a standardized mean difference of –0.41 reported in controlled trials. [32] These outcomes reinforce the integration of structured exercise into comprehensive anxiety treatment plans.

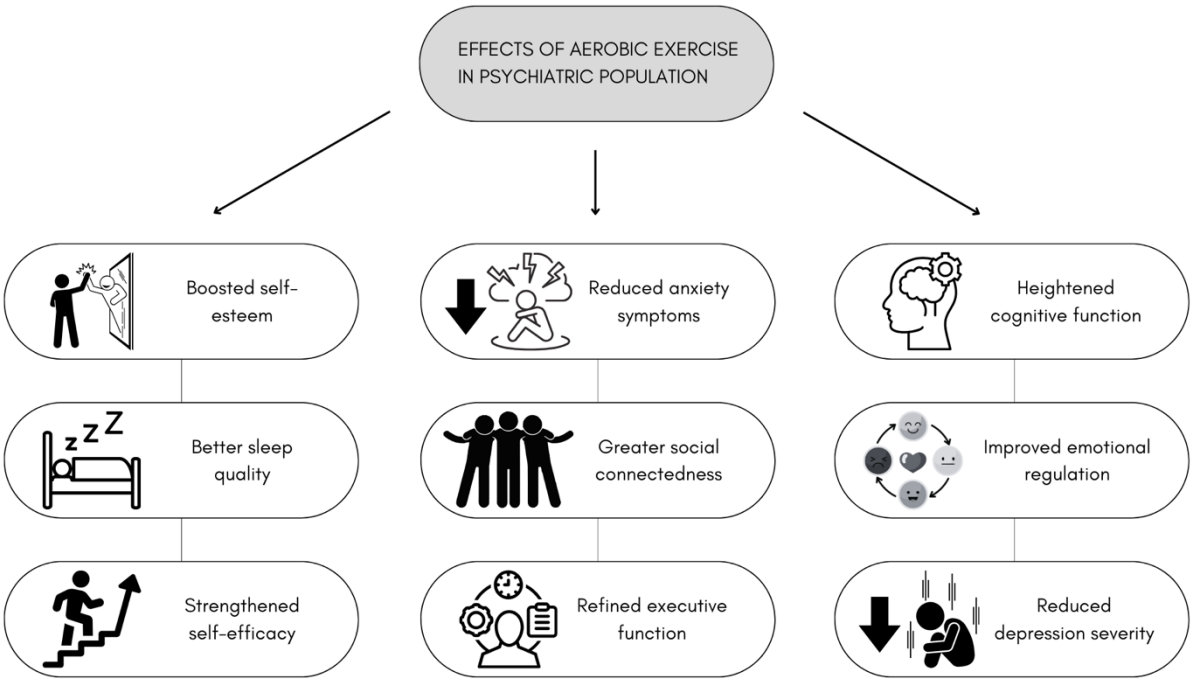

Figure 1. Overview of aerobic exercise's psychological and cognitive benefits in psychiatric populations, including improvements in self-esteem, executive function, emotional regulation, and social connectedness.

Neurobiological and Psychological Mechanisms

Aerobic exercise exerts antidepressant and anxiolytic effects through a range of neurobiological and psychological pathways. One central mechanism involves the modulation of key neurotransmitters and neurotrophic factors. Aerobic training has been shown to elevate brain-derived neurotrophic factor (BDNF) levels, which supports neurogenesis and synaptic plasticity-critical processes in mood regulation. He et al. (2024) highlighted that aerobic exercise modulates the release of dopamine, serotonin, and BDNF, positively influencing mood and cognition in individuals with mental disorders. [7] Additionally, aerobic activity increases circulating endocannabinoids, such as anandamide (AEA) and 2-arachidonoylglycerol (2-AG), which activate CB1 receptors and interact with the dopaminergic reward system to elevate mood and reduce stress reactivity.[33]

Another crucial biological pathway is the regulation of the hypothalamic-pituitary-adrenal (HPA) axis and reducing systemic inflammation. Aerobic exercise decreases cortisol levels and promotes negative feedback regulation of the HPA axis, which is often dysregulated in mood and anxiety disorders.

This feedback effect leads to more adaptive responses to stress and lowers the production of proinflammatory cytokines, contributing to both physiological and psychological recovery from depressive symptoms.[7, 33]

Psychologically, aerobic exercise contributes to cognitive and emotional benefits that enhance mental health outcomes. Improvements in self-esteem, executive function, sleep quality, and overall cognitive performance have been consistently reported. In a randomized controlled trial involving 56 college students, Liu (2014) found that 8 weeks of aerobic training led to significantly enhanced activation in brain regions associated with executive processing-including the contralateral frontal gyrus, left parietal lobules, and supplementary motor cortex-as measured by fMRI during n-back tasks.[34] Similarly, in a study of 17 children with ADHD, 8 weeks of rope-skipping aerobic training improved executive function and reduced response time in flanker tasks ($p < 0.05$), accompanied by increased spontaneous brain activity in the prefrontal cortex.[35]

Functional brain imaging further supports these observations. Shen et al. (2024) conducted an fMRI study in 78 adults with subthreshold depression. They found that after an 8-week aerobic exercise intervention, abnormalities in the anterior cingulate cortex-a region implicated in emotional regulation-were significantly reduced. The improvement in depression severity (as measured by PHQ-9) was correlated with increased regional homogeneity (ReHo) and restored neural synchronization in emotion-related brain networks.[36] In multiple sclerosis patients, a 12-week treadmill walking program also resulted in reductions in depressive symptoms and increased functional connectivity within the default mode network (DMN), supporting the notion that aerobic exercise may restore network-level brain function associated with self-referential and affective processing.[37]

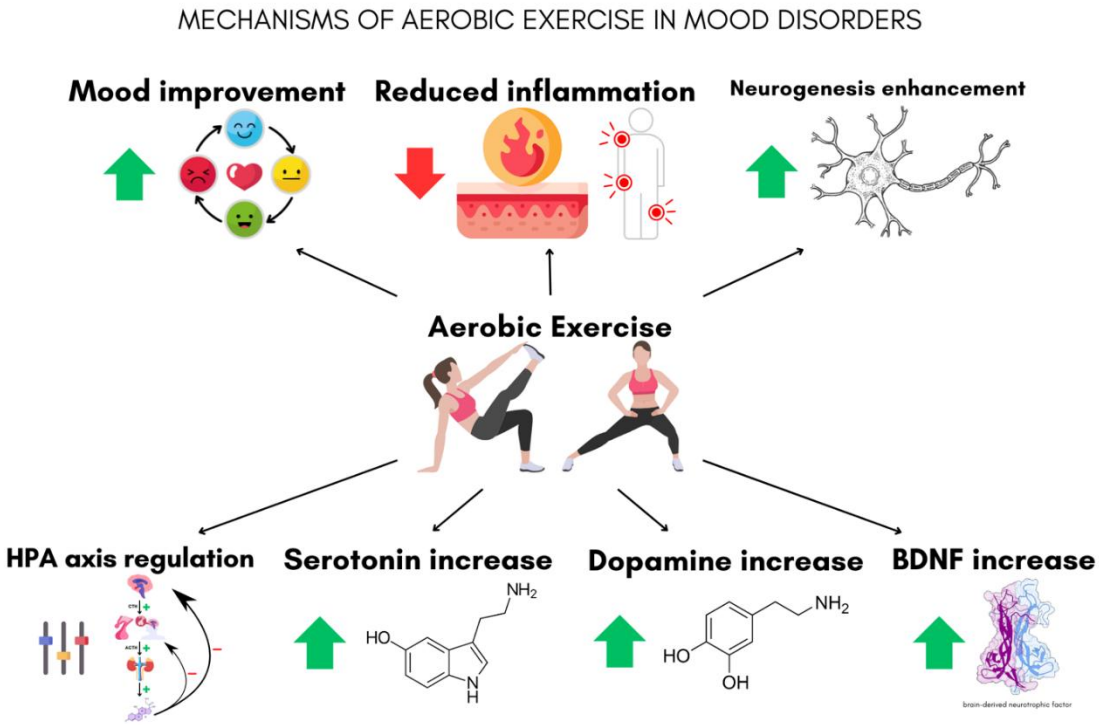

Figure 2. Mechanisms through which aerobic exercise impacts mood disorders. Improvements occur via neurotransmitter (e.g., serotonin, dopamine, BDNF) modulation, HPA axis regulation, inflammation reduction, and neurogenesis enhancement.

These findings underscore that aerobic exercise improves mood and anxiety symptoms and induces measurable biological changes in neurotransmitter systems, stress regulation, brain connectivity, and cognitive performance. These adaptations provide a compelling neurobiological foundation for integrating exercise into treating mood disorders.

Optimal Exercise Parameters

Determining the most effective structure of aerobic exercise programs is critical for maximizing their therapeutic value in mood disorder treatment. Evidence from randomized controlled trials suggests that moderate-intensity aerobic exercise performed three times per week for at least 8–12 weeks yields significant reductions in depression and anxiety symptoms. A systematic review by Stanton and Reaburn (2014) concluded that programs structured around 30-minute sessions, three times weekly at 60–80% of maximum heart rate, over a minimum of 9 weeks, are most commonly associated with clinical improvements in depression.[38] Similarly, Yu et al. (2022) conducted a 12-week RCT comparing 150 minutes/week of moderate walking versus 75 minutes/week of vigorous walking in 30 adults aged 50+, and found both intensities equally effective in reducing depression (Beck Depression Inventory scores dropped significantly in both groups, $p < 0.001$), anxiety, and improving cardiorespiratory fitness.[39]

Supervision appears to influence both adherence and outcomes. A meta-analysis on exercise interventions in lung cancer patients reported a median adherence rate of 80% in supervised programs, with consistent improvements in depression, anxiety, and quality of life compared to usual care.[40] Similarly, in a 12-week RCT of 56 patients with OCD, participants in the supervised aerobic exercise condition showed more significant improvements in fitness and higher treatment response (30.4% vs. 7.7%) compared to those in an education-only control, despite both groups improving on symptom severity.[28] These findings suggest that supervision not only promotes adherence but may be critical for therapeutic impact, particularly in psychiatric populations where motivational deficits are common.

Regarding delivery format, both individual and group-based programs have demonstrated efficacy. A randomized controlled trial by Haakstad et al. (2016) in 105 pregnant women showed that those who attended supervised group aerobic exercise twice per week for 12 weeks had significantly better self-rated health and lower anxiety levels compared to controls ($p < 0.01$), especially among women with ≥80% session adherence.[41] Additionally, participants reported fewer pregnancy-related physical complaints, reinforcing the psychological and somatic benefits of group training.

Despite demonstrated efficacy, implementation barriers remain. Common obstacles include low motivation, lack of time, fear of injury, and stigma around exercising in public or clinical spaces. Hoffman et al. (2010) found that in a 10-week aerobic exercise trial in people with traumatic brain injury and mild depression, participants who exercised ≥90 minutes per week had significantly lower depression scores ($p = .033$). Still, adherence was variable due to fatigue and perceived burden.[42] This highlights the importance of tailoring programs to individual capacities and contexts and incorporating behavioral strategies such as goal-setting, feedback, and social support to enhance adherence.

The optimal aerobic exercise prescription for mood disorders consists of moderate-intensity training (60–80% HRmax), three weekly sessions for at least 8–12 weeks. Supervision and flexible, patient-centered delivery (individual or group) can enhance adherence and outcomes. Addressing motivational and logistical barriers is essential to realize exercise's therapeutic potential in mental health care fully.

Clinical Integration and Recommendations

Integrating aerobic exercise into psychiatric care settings is increasingly recognized as feasible and therapeutically beneficial. Evidence from randomized controlled trials and implementation studies confirms that exercise can be safely and effectively incorporated into clinical environments. For example, in a feasibility trial within inpatient stroke rehabilitation, Biasin et al. (2014) found that 31 of 78 patients (40%) enrolled in a structured aerobic program, with a 77% attendance rate and no adverse events, demonstrating that individualized, supervised sessions are practical in medically complex populations.[43] Similarly, Schmitt et al. (2019) reported that aerobic exercise is an easy-to-implement adjunct in patients with schizophrenia and major depression and is now included in European treatment guidelines for MDD and PTSD at evidence level 1a and for schizophrenia at level B.[44]

A multidisciplinary approach significantly enhances the success of clinical integration. Effective programs typically involve collaboration between psychiatrists, physiotherapists, occupational therapists, and exercise specialists. Shimada et al. (2019) demonstrated this in a 12-week RCT involving patients with schizophrenia, where combining individual and group aerobic sessions improved cognition, motivation, and interpersonal functioning.[45] These findings support integrating mental health and physical rehabilitation teams to optimize patient engagement and outcomes.

Special populations require particular consideration to ensure exercise programs are inclusive and safe. In the study by Bueno-Antequera et al. (2019), only 11 of 21 inmates with psychiatric disorders completed a 12-week aerobic-strength intervention. Yet, those who adhered experienced considerable improvements in functional capacity: 6-minute walk test performance increased by +21.2%, and waist circumference was reduced by 3.5%.[46] However, cardiac comorbidities and scheduling issues were primary barriers to participation. Similar challenges have been reported in patients with schizophrenia, where adherence rates may be compromised due to cognitive deficits or motivational impairments, but tailored support can mitigate these issues.[47]

Regarding policy, major psychiatric organizations increasingly recommend aerobic exercise as part of standard care. The European Psychiatric Association has issued a position statement calling for routine physical activity promotion in psychiatric care, with suggested program parameters of at least 12 weeks, 20–40 minutes per session, and moderate intensity (50–60% HRmax).[44] This guideline aligns with current evidence suggesting that structured, supervised programs-especially when embedded within psychological or nutritional interventions-are most effective for improving mental and physical health outcomes in patients with mood disorders.

Patient Perspectives and Adherence Factors

Adherence to aerobic exercise among individuals with psychiatric conditions is deeply influenced by their beliefs, psychological state, and structural barriers. Patients with mood and anxiety disorders generally recognize the mental health benefits of physical activity but struggle to maintain long-term engagement. In a qualitative study by Zeibig et al. (2021), 38 outpatients with heterogeneous psychiatric diagnoses (including major depressive disorder, anxiety, ADHD, and insomnia) participated in a 12-week group-based aerobic exercise program. The intervention showed strong acceptability, with an adherence rate of 71%, and resulted in significant improvements in depression ($d = 0.68$, $p = .015$), anxiety ($d = 0.87$, $p = .002$), and sleep quality ($d = 0.88$, $p = .001$). Participants reported that a sense of group belonging and consistent coaching were critical motivational factors.[48] Psychological barriers such as anhedonia, fatigue, low self-worth, and social stigma are prevalent in psychiatric populations and negatively affect adherence.

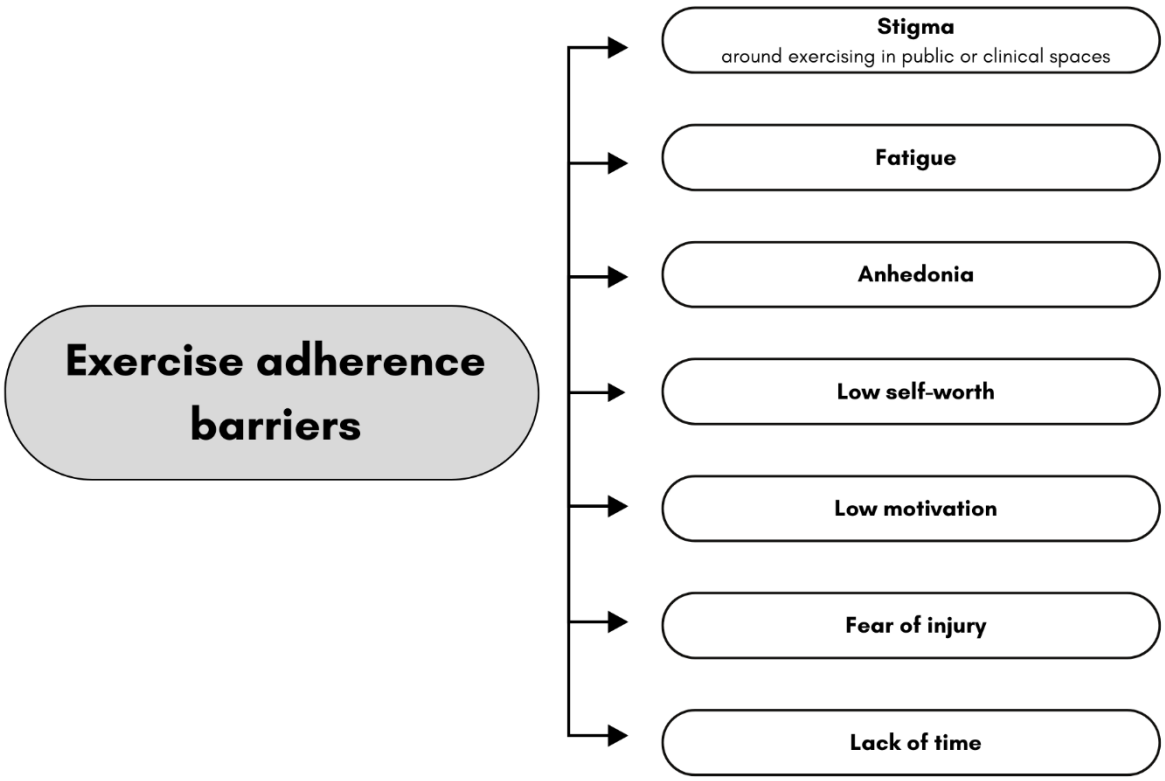

Figure 3. Common barriers reported by patients with mood disorders that hinder engagement in regular aerobic exercise include stigma, fatigue, anhedonia, and fear of injury.

In a feasibility study of 32 adolescents with persistent depression and high comorbidity (71% ADHD, 62% anxiety), Jarbin et al. (2021) found that while 66% of eligible participants enrolled, only 67% completed the entire 14-week program. However, those who adhered (attending 81% of sessions) reported significant reductions in depressive symptoms (QIDS-A17-C, $p < .001$) and improved well-being at 1-year follow-up.[49]

Structured interventions incorporating behavioral strategies are essential to enhance adherence. Programs integrating motivational interviewing, individualized goal-setting, and cognitive support have improved retention and mental health outcomes. For example, Oertel-Knöchel et al. (2014) conducted a 4-week combined cognitive and aerobic intervention in psychiatric inpatients (n = 51; MDD = 22, schizophrenia = 29), resulting in increased working memory, improved speed of processing, and reduced anxiety symptoms. Notably, patients with depression exhibited stronger emotional improvements, whereas cognitive gains were more pronounced in schizophrenia patients.[50]

Patient-reported outcomes reinforce these findings. In a narrative case analysis by Rundell and Rundell (2020), a teenager with seven psychiatric diagnoses (including depression, anxiety, and autism spectrum disorder) experienced life-changing improvements in mood, cognition, and social functioning after discontinuing medications and initiating a high-frequency aerobic cycling program. Though anecdotal, the report underscores the transformative potential of exercise when aligned with personal motivation and structured support.[51]

Individuals with psychiatric disorders face unique adherence challenges due to both internal symptoms and external barriers. Nonetheless, when supported through structured, group-based, and psychologically informed exercise programs, many patients demonstrate meaningful mood, cognition, and functioning improvements. Integrating such interventions into clinical care requires a patient-centered, flexible approach that prioritizes feasibility and psychological readiness.

Limitations and Future Directions

Despite the growing body of evidence supporting aerobic exercise as an adjunctive treatment for mood and anxiety disorders, several limitations constrain current research. Methodologically, studies often suffer from tiny sample sizes, lack of blinding, short follow-up durations, and heterogeneity in outcome measures. For example, in a meta-analysis of 35 randomized controlled trials (RCTs) comprising 1,356 patients with depression, heterogeneity was moderate to high, and only six studies met rigorous standards for allocation concealment, intention-to-treat analysis, and blinding.[52] Similarly, Bernard and Ninot (2012) noted that most studies on schizophrenia and exercise used inadequately selected control groups and self-selected participants, reducing internal validity.[53]

There is also a critical gap in understanding the long-term effects of aerobic exercise on psychiatric symptoms. While some trials have followed participants for 3–6 months post-intervention, only a handful provide data extending beyond one year. For instance, a Cochrane review cited a small residual benefit at 4–26 months after intervention (SMD = –0.33, 95% CI: –0.63 to –0.03) but emphasized that few studies included follow-up assessments, limiting confidence in sustained outcomes.[54] In addition, few trials assess biological markers of therapeutic change. Although animal models suggest exercise induces neurogenesis and modulates oxidative stress, human studies have produced mixed findings. Schmitt et al. (2014) found that while aerobic exercise reduced oxidative stress markers (TBARS), it had no significant effect on serum BDNF in depressed inpatients, highlighting the need for more robust biomarker studies.[55]

Future research must prioritize large-scale, multi-site RCTs using standardized exercise protocols and validated psychiatric outcome measures to address these gaps. A network meta-analysis of 82 RCTs with 5,379 older adults with depression found no significant differences in efficacy between aerobic, resistance, and mind-body exercise (Hedges' g = –0.27 to –0.51). Yet, this synthesis also highlighted high variability in intervention design and execution (Miller et al., 2021). There remains a need to define the minimal effective dose, optimal frequency, and duration of aerobic exercise specific to different psychiatric diagnoses and age groups.[56]

Another emerging direction is the development of personalized exercise prescriptions tailored to psychiatric subtypes, cognitive profiles, and motivation levels. Precision psychiatry approaches may leverage digital tools, genetic data, and behavioral patterns to guide individualized interventions. Chen et al. (2024), in a systematic review of 6 RCTs (n = 253), found that higher-intensity and longer-duration exercise (≥60 minutes/session, >8 weeks) had more potent effects on anxiety symptoms (SMD = –0.94, 95% CI: –1.40 to –0.47) in college students. These findings suggest that exercise dose-response relationships may vary by demographic and diagnostic factors, requiring further exploration in psychiatric populations.[57]

In summary, while current evidence affirms the antidepressant and anxiolytic benefits of aerobic exercise, the field must advance with rigorously designed, long-term studies, deeper biomarker analysis, and personalized treatment frameworks to fully integrate exercise into psychiatric care pathways.

Conclusion

This narrative review highlights the growing body of evidence supporting the use of aerobic exercise as an effective adjunctive treatment for mood disorders, including major depressive disorder and anxiety-related conditions. Across multiple randomized controlled trials, aerobic exercise has consistently demonstrated moderate reductions in depressive and anxiety symptoms, with effect sizes comparable to those achieved through pharmacotherapy or psychotherapy alone. The therapeutic impact has been observed across various clinical populations-including adolescents, older adults, individuals with chronic illness, and patients with treatment-resistant symptoms-underscoring the broad applicability of aerobic exercise as a complementary intervention.

Neurobiological research suggests that aerobic activity's benefits are underpinned by measurable changes in neurotransmitter systems, neurotrophic factors such as BDNF, and improvements in HPA axis regulation and brain function. Psychologically, exercise enhances cognitive function, sleep quality, self-efficacy, and social connectedness-all crucial for sustained mental health recovery. Adherence to exercise programs is improved by incorporating motivational strategies, supervision, and patient-centered delivery formats such as group sessions, which patients consistently report as supportive and therapeutic.

Given its efficacy, safety profile, and holistic benefits, aerobic exercise should be integrated into standard psychiatric care models. Mental health professionals, physiotherapists, and exercise specialists must collaborate to design personalized, feasible, and scalable programs that can be implemented across inpatient, outpatient, and community settings.

National and international psychiatric guidelines are beginning to reflect this paradigm shift, but further institutional support is needed to make structured physical activity a standard, evidence-based component of comprehensive treatment for mood disorders.

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Software: n/a
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Formal analysis: Damian Adasik
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