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Physical Activity as an Adjunctive Intervention for Adults with ADHD: A Narrative Review

Aleksandra Zybert, ORCID https://orcid.org/0009-0004-5247-9161
E-mail: azybert@gumed.edu.pl
Medical University of Gdańsk, Marii Skłodowskiej-Curie 3a, 80-210 Gdańsk, Poland

Igor Nowiński, ORCID https://orcid.org/0009-0002-3480-2557
E-mail: igornowinski80@gmail.com
University Clinical Centre in Gdańsk, Medical University of Gdańsk, Dębinki 7, 80-952 Gdańsk, Poland

Dawid Ocicki, ORCID https://orcid.org/0009-0009-8638-7907
E-mail: dawid.ocicki@gumed.edu.pl
University Clinical Centre in Gdańsk, Medical University of Gdańsk, Dębinki 7, 80-952 Gdańsk, Poland

Michał Bojarski, ORCID https://orcid.org/0009-0001-5236-1655
E-mail: michal.bojarski@gumed.edu.pl
University Clinical Centre in Gdańsk, Medical University of Gdańsk, Dębinki 7, 80-952 Gdańsk, Poland

Michał Kwiatkowski, ORCID https://orcid.org/0009-0001-8305-1633
E-mail: michal.kwiatkowski@gumed.edu.pl
Medical University of Gdańsk, Marii Skłodowskiej-Curie 3a, 80-210 Gdańsk, Poland

Michał Musielak, ORCID https://orcid.org/0009-0002-0070-1694
E-mail: mich.musielak@onet.pl
Medical University of Gdańsk, Marii Skłodowskiej-Curie 3a, 80-210 Gdańsk, Poland

Iga Kobryń, ORCID https://orcid.org/0009-0000-8777-5076
E-mail: iga.kobryn@gumed.edu.pl
Medical University of Gdańsk, Marii Skłodowskiej-Curie 3a, 80-210 Gdańsk, Poland

Pola Kobryń, ORCID https://orcid.org/0009-0001-6477-7092
E-mail: pola.kobryn@gumed.edu.pl
Medical University of Gdańsk, Marii Skłodowskiej-Curie 3a, 80-210 Gdańsk, Poland

Aleksandra Borowska, ORCID https://orcid.org/0009-0001-4757-4859
E-mail: aleksandra.borowska@gumed.edu.pl
Medical University of Gdańsk, Marii Skłodowskiej-Curie 3a, 80-210 Gdańsk, Poland

Jakub Grabowski, ORCID https://orcid.org/0009-0002-8024-7160
E-mail: j.grabowski@gumed.edu.pl
Medical University of Gdańsk, Marii Skłodowskiej-Curie 3a, 80-210 Gdańsk, Poland

Corresponding author
Aleksandra Zybert, E-mail: azybert@gumed.edu.pl

Abstract

Background: Attention-deficit/hyperactivity disorder (ADHD) often persists into adulthood and is associated with executive dysfunction, emotional dysregulation, and reduced quality of life. As pharmacological treatment may not be sufficient for all patients, adjunctive non-pharmacological strategies are needed.
Aim: This narrative review summarises evidence on the effects of physical activity on ADHD symptoms and cognition in adults.
Material and Methods: PubMed and Scopus were searched, with manual reference screening. English-language studies published up to May 2026 were included, prioritising randomised trials, experimental studies, systematic reviews, and meta-analyses on physical activity in adults with ADHD.
Results: Physical activity may improve selected outcomes in adults with ADHD, especially inhibitory control, the most consistently supported cognitive domain. Benefits have also been reported for attention, symptom severity, sleep, and quality of life, although findings remain heterogeneous. Adult-specific evidence remains limited compared with paediatric and mixed-age ADHD literature. Acute and longer-term interventions appear promising, but the evidence is limited by small samples, diverse protocols, and variable outcome measures.
Conclusions: Physical activity is a biologically plausible and promising adjunctive strategy for adult ADHD, but it should not replace established pharmacological or psychosocial treatments. Further high-quality trials are needed to define optimal exercise protocols, long-term clinical relevance, and its role in multimodal ADHD care.
Keywords: Attention Deficit Disorder with Hyperactivity; Adult; Exercise; Exercise Therapy; Executive Function; Inhibitory Control

1. Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental condition that frequently persists into adulthood. Although traditionally associated with the paediatric population, current estimates suggest a prevalence of approximately 2.6–6.8% among adults. The aetiology of ADHD is multifactorial, involving both genetic and environmental influences, including prenatal factors [1,2].

Adults with ADHD commonly present with persistent inattention, while hyperactivity may manifest as internal restlessness, impulsivity, and difficulties in emotional and behavioural

regulation. Core neurocognitive features include impairments in inhibitory control, working memory, and cognitive flexibility, and the disorder remains frequently underdiagnosed and insufficiently treated despite updated diagnostic criteria in the DSM-5-TR [3–5].

Pharmacological therapy remains an important component of ADHD management across the lifespan. Stimulant medications such as methylphenidate and amphetamine derivatives effectively reduce core symptoms, but their efficacy is not universal, and treatment may be limited by adverse effects, including insomnia, reduced appetite, and cardiovascular concerns [6–9]. In addition, adults with ADHD often present with co-occurring psychiatric conditions, including anxiety and depression, which can complicate treatment and adversely affect clinical outcomes [10].

Because of these limitations, interest in adjunctive non-pharmacological interventions continues to grow. Physical activity has emerged as a potentially useful adjunctive strategy because it is accessible, associated with broad health benefits, and may support cognitive functioning, including executive processes impaired in ADHD [11–16]. These potential effects are biologically plausible, but clinical evidence in adults with ADHD remains comparatively limited.

Evidence on physical activity in ADHD has expanded, but most studies have focused on children and adolescents. A systematic review and meta-analysis of paediatric populations demonstrated beneficial effects of exercise on attention, executive functioning, and hyperactivity/impulsivity [17]. However, relatively few investigations have examined adults with ADHD, and these findings cannot be directly extrapolated to adult populations. As adult ADHD is increasingly recognised as a persistent disorder with important functional consequences, there is a need to better define the role of physical activity in this population [3,18–20]. Unlike previous reviews focusing predominantly on paediatric or mixed-age ADHD populations, this review specifically emphasises adult ADHD, where clinical presentation, comorbidity burden, treatment needs, adherence barriers, and multimodal management considerations may differ substantially. This adult-focused perspective is clinically relevant because exercise interventions in adults with ADHD must account not only for symptom reduction, but also for functional impairment, psychiatric comorbidities, treatment adherence, and long-term implementation in everyday life. Therefore, synthesising adult-specific evidence may help clarify whether physical activity can be meaningfully integrated into multimodal ADHD management rather than extrapolated from paediatric findings.

This narrative review aims to synthesise current evidence on the effects of physical activity on ADHD symptoms and cognitive functioning in adults, evaluate the potential clinical relevance of exercise-based interventions, and identify key limitations and directions for future research.

2. Methods

This study was conducted as a structured narrative review of current evidence on the effects of physical activity in adults with ADHD. The literature search was designed to support a structured narrative synthesis and was not intended to constitute an exhaustive systematic review.

A literature search was performed using PubMed and Scopus to identify relevant studies published up to May 2026, with the final search conducted on May 20, 2026. Search terms included combinations of the following keywords: “ADHD”, “adult ADHD”, “attention-deficit/hyperactivity disorder”, “physical activity”, “exercise”, “aerobic exercise”, “resistance training”, “executive function”, “inhibitory control”, “cognition”, “sleep”, and “quality of life”. Additional relevant publications were identified through manual screening of reference lists of included articles and supplementary targeted searches in PubMed and Scopus.

The initial screening of titles and abstracts was performed independently by two authors. Potentially relevant full-text articles were then assessed for eligibility, and any discrepancies were resolved through discussion with a third author. The final selection of studies was based on relevance to the review aim, adult ADHD population, type of physical activity intervention, and reported cognitive or clinical outcomes.

No lower publication date limit was applied. However, the review predominantly included studies published from 2015 onwards, reflecting the most recent developments in the field, while earlier publications were included selectively to provide relevant neurobiological background.

Inclusion criteria comprised studies involving adults with ADHD that evaluated the effects of physical activity or structured exercise interventions on ADHD symptoms, executive functioning, cognitive performance, sleep, quality of life, feasibility, or related clinical

outcomes. Priority was given to randomised controlled trials, experimental studies, systematic reviews, and meta-analyses. Only articles published in English were included.

Exclusion criteria included studies focusing exclusively on paediatric populations, animal studies, case reports, editorials, commentaries, conference abstracts without full-text availability, and publications without adult ADHD-specific data or without direct relevance to physical activity interventions.

Selected paediatric, mixed-age, or general-population studies were included only when adult-specific evidence was unavailable and only to provide neurobiological background or contextual support; these studies were not treated as primary evidence for clinical efficacy in adults with ADHD.

Titles, abstracts, and full texts of potentially relevant publications were screened for relevance to the aim of the review. Publications included in the final reference list was selected based on their relevance to adult ADHD, physical activity, neurobiological mechanisms, and clinical outcomes. These publications included primary intervention studies, systematic reviews, meta-analyses, and selected mechanistic studies relevant to understanding the clinical and neurobiological effects of physical activity in ADHD.

Due to the narrative design of the review, no formal risk-of-bias assessment or meta-analysis was undertaken. The findings should therefore be interpreted as a qualitative synthesis of the available evidence.

3. Neurobiological mechanisms of ADHD and the effects of physical activity

ADHD is associated with alterations in catecholaminergic neurotransmission, particularly dopamine and norepinephrine pathways within frontostriatal and prefrontal networks [7,21]. These systems support attention regulation, inhibitory control, motivation, working memory, and behavioural regulation, which are commonly impaired in ADHD [4,22–24].

Exercise could plausibly influence these domains through several neurobiological pathways. Acute exercise has been associated with modulation of dopamine and norepinephrine signalling, which may partly overlap with mechanisms targeted by stimulant medications and contribute to short-term improvements in attention and inhibitory control [12,25]. However,

much of this mechanistic evidence comes from non-ADHD populations, and direct evidence in adults with ADHD remains limited.

Regular physical activity may also support neuroplastic adaptations, including increased brain-derived neurotrophic factor (BDNF), which is relevant to synaptic plasticity, learning, and neuronal survival [11,26]. Exercise has been linked to improved prefrontal and executive functioning, with inhibitory control currently the most consistently supported cognitive outcome in ADHD exercise research [13,19].

Exercise may also contribute to sleep regulation and emotional functioning, both frequently disrupted in ADHD. Regular exercise has been associated with better sleep quality, circadian regulation, reduced stress-related symptoms, and improved emotional functioning [12,27].

Overall, physical activity may influence neurobiological processes relevant to ADHD, but these mechanisms mainly support biological plausibility rather than direct clinical efficacy. Some mechanistic findings derive from paediatric, mixed-age, or non-ADHD populations and should therefore be extrapolated to adults with ADHD with caution.

4. Effects of physical activity on ADHD symptoms and cognitive functioning in adults

The effects of physical activity in adults with ADHD have been investigated in both acute and longer-term intervention studies, with outcomes assessed across multiple cognitive and clinical domains. Current evidence suggests that exercise may influence executive functioning, attention, sleep, symptom severity, and quality of life; however, findings remain heterogeneous due to differences in study design, exercise protocols, and outcome measures. Among the investigated domains, inhibitory control currently appears to represent the most consistently supported cognitive outcome.

4.1 Acute exercise and short-term cognitive effects

Acute bouts of physical activity may confer measurable short-term cognitive benefits in adults with ADHD, particularly in inhibitory control. A recent systematic review and meta-analysis including eight randomised controlled trials (14 comparisons; 373 adults with ADHD) found that a single session of exercise was associated with small-to-moderate improvements in inhibitory control compared with non-exercise control conditions (standardised mean difference [SMD] = −0.65, 95% confidence interval [CI]: −1.10 to −0.20). These effects were

observed across various protocols, most commonly involving approximately 30 minutes of moderate-to-vigorous aerobic exercise performed immediately before cognitive testing [19].

Experimental and neurophysiological studies provide additional support for these short-term effects. In a functional MRI study of adults with ADHD, 30 minutes of acute aerobic exercise performed on a cycle ergometer was associated with increased activation in parietal, temporal, and occipital regions during a Go/No-Go task, suggesting enhanced recruitment of neural networks involved in response inhibition, even when behavioural changes in task accuracy were relatively small [28]. In a more recent trial in drug-naive adults with ADHD, both moderate- and high-intensity cycling acutely increased short-interval cortical inhibition and modulated cortical excitability. These neurophysiological changes were positively correlated with improvements in inhibitory control performance on a stop-signal task [29].

Taken together, acute aerobic exercise may transiently improve inhibitory control in adults with ADHD. However, available studies are relatively small and heterogeneous, and outcomes are usually measured immediately after exercise. Therefore, these short-term effects should not be interpreted as evidence of sustained clinical benefit or long-term improvement in everyday functioning.

4.2 Longer-term exercise interventions and clinical outcomes

Structured exercise programmes may be more clinically relevant than single sessions because they may influence ADHD symptoms, sleep, quality of life, and everyday functioning over a longer period. In Yang et al., chronic exercise interventions lasting 8–24 weeks showed a larger pooled effect for inhibitory control than acute exercise (SMD = −1.77, 95% CI −2.84 to −0.69), although this estimate was based on few heterogeneous trials [19].

Most longer-term adult ADHD interventions have used multicomponent programmes combining aerobic, resistance, and flexibility training. In a randomised pilot trial, a 12-week physiotherapist-led programme in 14 adults with ADHD included three 50-minute sessions per week and aimed to achieve at least 150 minutes of moderate-intensity activity weekly. Approximately 80% of participants who initiated the programme completed it according to protocol [30].

Although underpowered for efficacy, outcomes favoured exercise across self-rated ADHD symptoms, clinician-rated global severity, sleep, quality of life, and cognitive tasks [30]. The

START trial similarly supports exercise as an add-on intervention and suggests benefits for symptom control, sleep, and health-related quality of life (HRQoL) [18]. These findings align with Yang et al., where multicomponent interventions were associated with improvements in inhibitory control and symptom burden [19].

Structured multicomponent exercise therefore appears feasible and clinically promising, but chronic interventions are difficult to interpret mechanistically. Improvements may partly reflect non-specific factors such as behavioural structure, therapist contact, goal-directed routines, and adherence support rather than exercise physiology alone. Current findings should therefore be viewed as evidence of feasibility and potential benefit, not definitive proof of durable efficacy.

4.3 Exercise modalities and comparative interpretation

Across studies involving adults with ADHD, aerobic exercise is the most frequently investigated modality and currently appears to be the best-supported approach. Acute interventions have typically involved cycling or treadmill-based exercise performed at moderate-to-vigorous intensity, whereas longer-term programmes often include aerobic intervals such as brisk walking, running, or cycling conducted several times per week [19,28,29,31]. Aerobic exercise has been most consistently associated with improvements in inhibitory control, particularly in acute intervention studies, and therefore currently provides the most consistent cognitive signal within the existing evidence base.

Exercise intensity may also influence cognitive outcomes. Recent network meta-analytic evidence in ADHD populations, including adults, suggests that higher-intensity exercise protocols may be associated with greater improvements in executive function outcomes compared with moderate-intensity exercise and control conditions [32]. However, these findings are derived from mixed-age populations and heterogeneous exercise protocols, and optimal intensity thresholds for adults with ADHD remain insufficiently defined.

Multicomponent exercise programmes combining aerobic, resistance, and flexibility training may have greater practical relevance in clinical settings because they more closely resemble real-world exercise prescriptions. In the studies included in Yang et al., these interventions were associated with improvements in inhibitory control and overall symptom burden in adults with ADHD [19]. Similarly, the pilot study by Svedell et al. suggested that multicomponent programmes may positively influence symptoms, sleep, quality of life, and cognitive

performance while also demonstrating acceptable feasibility and adherence [30]. However, because these interventions combine multiple therapeutic elements, including structured routines, behavioural support, and therapist contact, it remains difficult to determine the independent contribution of exercise itself.

Resistance training has been less frequently examined as a standalone intervention and currently has a more limited evidence base. Nevertheless, it is commonly incorporated into multicomponent programmes and may contribute to broader functional benefits [19,30]. At present, available evidence remains insufficient to determine whether resistance-based interventions exert distinct cognitive or clinical effects independent of aerobic exercise.

Mind-body modalities, including yoga, Tai Chi, and Pilates, have also been explored in a small number of studies. Yang et al. reported large effect sizes for inhibitory control following chronic Pilates and Tai Chi interventions, although these findings were limited by small sample sizes, wide confidence intervals, and methodological uncertainty [19]. A feasibility study of a 7-week Tai Chi programme involving young adults, including individuals with ADHD, reported reductions in self-reported inattention and improvements in executive function task performance [33]. However, because this study involved a mixed population and an exploratory design, these findings should be interpreted cautiously and viewed primarily as hypothesis-generating rather than definitive evidence of efficacy.

Overall, heterogeneity of exercise protocols and outcome measures limits direct comparison across modalities. Current evidence does not allow a definitive ranking of exercise types in adults with ADHD. Aerobic exercise and structured multicomponent programmes currently appear best supported, whereas resistance-based and mind-body interventions remain promising but are based on smaller and less certain evidence. Apparent differences between modalities may partly reflect sample size, heterogeneity, and study design rather than true efficacy differences.

4.4 Overall interpretation of the evidence

Physical activity may benefit some cognitive and clinical outcomes in adults with ADHD, but the strength of evidence varies across domains and intervention types. The most consistent findings concern inhibitory control, which appears to be particularly responsive to both acute and longer-term exercise interventions [19]. In contrast, evidence regarding broader executive

domains, such as working memory and cognitive flexibility, remains less consistent and is supported by fewer studies with greater methodological variability [19,32].

Acute studies mainly show short-term cognitive modulation [28,29], whereas longer-term interventions may be more clinically relevant for symptoms, sleep, quality of life, and functioning [18,19,30]. However, both lines of evidence remain limited by small samples, short follow-up, heterogeneous protocols, and variable outcome measures.

Thus, physical activity should be viewed as a promising adjunct, not a standalone treatment. Aerobic and multicomponent exercise currently show the most consistent evidence, but direct comparisons across modalities and intensities remain insufficient [19,32,33].

Future trials should use larger adult ADHD samples, longer follow-up, standardised protocols, and functional outcomes to clarify the long-term clinical role of exercise.

Key adult studies discussed in this section are summarised in Table 1.

Table 1. Summary of key studies investigating physical activity interventions in adults with ADHD

Author (year)	Study design	Type of exercise	Sample	Duration / protocol	Main findings and interpretation
Yang et al. (2025) [19]	Systematic review and meta-analysis	Acute and chronic physical activity interventions (mixed modalities)	373 adults with ADHD	Single-session and 8–24-week chronic programmes	Improved inhibitory control, especially in chronic programmes; evidence remained heterogeneous.
Mehren et al. (2019) [28]	fMRI experimental study	Acute aerobic exercise, cycling	23 adults with ADHD	Single 30-minute session	Increased activation in response-inhibition regions after acute exercise; behavioural effects were small.
Wang et al. (2024) [29]	Experimental neurophysiological study	Acute aerobic cycling at different intensities	24 drug-naive adults with ADHD	Single-session intervention	Moderate- and high-intensity cycling improved cortical inhibition and inhibitory control.
Svedell et al. (2023) [30]	Randomised pilot trial	Multicomponent: aerobic, resistance, flexibility	14 adults with ADHD	12-week programme, 3 sessions/week	Feasible programme with favourable trends in symptoms, sleep, quality of life, and cognition.
Svedell et al. (2025) [18]	Randomised controlled trial (START)	Structured exercise added to treatment as usual	63 adults with ADHD (43 START; 20 TAU)	12-week intervention	Exercise add-on improved ADHD symptoms, global severity, insomnia, and HRQoL; durability remains uncertain.

Author (year)	Study design	Type of exercise	Sample	Duration / protocol	Main findings and interpretation
LaCount et al. (2022) [31]	Experimental study	Acute aerobic exercise	College students with ADHD	Single-session intervention	Post-exercise improvements in cognitive and psychological functioning; student sample limits generalisability.
Converse et al. (2020) [33]	Feasibility study	Tai Chi, mind-body intervention	Young adults, including individuals with ADHD	7-week programme	Reduced self-reported inattention and improved executive-task performance; exploratory findings.
Chen et al. (2025) [32]	Systematic review and network meta-analysis	Intensity-specific exercise interventions across ADHD populations	Patients with ADHD across age groups	Multiple protocols across included studies	Higher-intensity exercise ranked more favourably for executive function, but adult-specific applicability is limited.

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; fMRI, functional magnetic resonance imaging; HRQoL, health-related quality of life; TAU, treatment as usual. Data were summarised by the authors based on the cited studies. Some included evidence derives from mixed-age or student-based samples and should therefore be interpreted with caution.

5. Clinical implications of physical activity in adult ADHD

Current clinical approaches to adult ADHD emphasise multimodal treatment strategies, typically combining pharmacotherapy with psychoeducation and psychosocial interventions. However, medication alone may not fully address functional impairment, comorbid conditions, and HRQoL [1,7,9,10]. Within this framework, physical activity may represent a non-pharmacological adjunct that could address ADHD-related difficulties while also supporting broader health domains such as sleep and general physical health [27,34].

5.1 Physical activity as an adjunct to standard care

Physical activity may be a feasible and safe adjunct to standard ADHD treatment, not a replacement for pharmacotherapy or psychosocial interventions. In the START randomised controlled trial, adults with ADHD receiving usual psychiatric care who participated in a 12-week structured exercise programme demonstrated significantly greater improvements in self-reported ADHD symptoms, global functioning, sleep quality, and HRQoL compared with treatment as usual, with no serious adverse events reported [18]. A preceding randomised pilot trial by the same group demonstrated that a similar 12-week mixed exercise programme was well tolerated and acceptable, with approximately 80% of participants completing the

intervention according to protocol despite common difficulties with time management in this population [30]. Although underpowered for definitive efficacy outcomes, the pilot study reported consistent trends towards reductions in ADHD symptoms, improved sleep, and enhanced cognitive performance in the exercise group [30].

These findings are broadly consistent with the still limited adult-ADHD exercise literature, including recent evidence synthesis and experimental studies suggesting beneficial effects on inhibitory control and selected clinical outcomes, although methodological variability limits the certainty of these conclusions [18,19,29–33]. Physical activity may be particularly relevant for adults with ADHD who experience sleep disturbances, low mood, a sedentary lifestyle, or reduced overall functioning, as these domains are often insufficiently addressed by pharmacological treatment alone [14,15,27,34].

5.2 Practical exercise considerations

Optimal training parameters for adults with ADHD are not yet established, so practical recommendations should rely on general public health guidance and limited ADHD-specific evidence. The World Health Organization recommends that adults engage in at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic physical activity per week, combined with muscle-strengthening activities on at least two days per week [34]. Exercise protocols used in adult ADHD studies are broadly consistent with these general recommendations, with most chronic interventions involving three supervised sessions per week lasting 40–60 minutes [18,30].

ADHD-specific evidence suggests that moderate-to-vigorous aerobic exercise and structured multicomponent programmes combining aerobic and resistance training may be the most promising approaches for improving inhibitory control and selected clinical outcomes in adults with ADHD [18,19,30,32]. Acute exercise studies have typically employed cycling at 50–70% of age-predicted maximal heart rate for 20–30 minutes, whereas longer-term programmes often incorporate interval-based or continuous aerobic training combined with resistance and flexibility components over 8–12 weeks [28–30]. Mind-body approaches such as Tai Chi and Pilates may also offer benefits, particularly for individuals who prefer lower-impact or socially engaging activities, although evidence for these modalities in adults with ADHD remains preliminary and based on small samples [19,33].

At present, precise dose-response relationships, optimal intensity thresholds, and the comparative effectiveness of different exercise modalities remain insufficiently defined. Therefore, current exercise recommendations for adults with ADHD should be interpreted as pragmatic clinical considerations rather than formal ADHD-specific exercise guidelines.

5.3 Barriers to adherence and implementation

Adults with ADHD may face barriers to initiating and maintaining physical activity because inattention, disorganisation, impulsivity, and executive dysfunction can impair planning, time management, routine formation, and adherence [3,10]. Boredom and reduced persistence may further limit engagement in repetitive exercise.

Comorbid anxiety, depression, sleep disturbances, and obesity may also reduce motivation, energy, and perceived self-efficacy [10,27]. Thus, individuals who could benefit from exercise may also find regular participation difficult.

Adherence may improve when programmes are structured, varied, supervised, and tailored to symptoms, fitness level, comorbidities, and preferences. Reminders, group-based activity, and integration into daily routines may support sustainability [34]. These strategies should be viewed as adherence supports rather than evidence-based ADHD-specific implementation guidelines.

6. Limitations of this review and future directions

This review was conducted as a structured narrative review rather than a systematic review. Accordingly, no preregistered protocol or formal risk-of-bias assessment was undertaken, and the findings should be interpreted as a qualitative synthesis of the available literature rather than a formal certainty assessment of the evidence base.

The literature search was limited primarily to PubMed and Scopus, which may have resulted in the omission of relevant studies indexed elsewhere. In addition, only English-language publications were included, introducing the possibility of language bias. The heterogeneity of the available literature, including variability in study design, exercise protocols, outcome measures, and participant characteristics, further limited direct comparison across studies. Some mechanistic and cognitive conclusions were also partially extrapolated from paediatric,

mixed-age, or non-ADHD populations because of the limited number of adult-specific investigations currently available [17,19].

The strength of evidence also differs across outcomes, with inhibitory control being more consistently supported than broader clinical endpoints such as emotional regulation, everyday functioning, or long-term quality of life.

Future research should prioritise larger, adequately powered randomised controlled trials in adults with ADHD. Studies should use standardised exercise protocols, longer follow-up, objective cognitive and functional outcomes, and direct comparisons between modalities, intensities, and programme structures [19,32].

Future studies should also examine adherence, sustainability of benefits, and interactions between exercise, pharmacotherapy, and psychosocial interventions. More personalised approaches may improve feasibility and clinical applicability.

7. Conclusions

Physical activity appears to be a promising adjunctive strategy for adults with ADHD, with the most consistent evidence supporting improvements in inhibitory control. Additional potential benefits may include improvements in ADHD symptoms, sleep quality, emotional regulation, quality of life, and selected aspects of everyday functioning, although these outcomes remain preliminary and less consistently supported than inhibitory control.

Physical activity should not replace established pharmacological or psychosocial treatments. However, given its biological plausibility, accessibility, low cost, and broad physical and mental health benefits, it may represent a clinically useful complementary component of adult ADHD management, especially for individuals with a sedentary lifestyle, sleep disturbances, mood symptoms, or reduced overall functioning.

Despite these encouraging findings, the current evidence base remains preliminary and heterogeneous, with limitations including small sample sizes, methodological variability, and a scarcity of long-term randomised controlled trials in adult populations. Consequently, current data do not yet support definitive ADHD-specific exercise recommendations.

Further high-quality randomised controlled trials with longer follow-up periods, standardised protocols, objective functional outcomes, and direct comparisons between exercise modalities and intensities are needed to better define the long-term clinical role of physical activity in adults with ADHD.

Disclosure

Authors' Contribution:

Conceptualization: Aleksandra Zybert, Michał Kwiatkowski, Iga Kobryń, Pola Kobryń

Methodology: Aleksandra Zybert, Michał Musielak, Aleksandra Borowska

Validation: Michał Bojarski, Iga Kobryń, Aleksandra Borowska, Jakub Grabowski, Dawid Ocicki

Investigation: Michał Bojarski, Iga Kobryń, Jakub Grabowski

Resources: Michał Bojarski, Michał Kwiatkowski, Dawid Ocicki

Data curation: Igor Nowiński, Michał Musielak, Jakub Grabowski

Writing–original draft preparation: Aleksandra Zybert, Igor Nowiński, Aleksandra Borowska

Writing–review and editing: Michał Kwiatkowski, Michał Musielak, Pola Kobryń

Supervision: Aleksandra Zybert, Pola Kobryń, Dawid Ocicki

Project administration: Aleksandra Zybert

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