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Methylphenidate in the treatment of psychiatric disorders in adults: therapeutic potential and risk of misuse - a narrative review

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Summary

Background: *Attention-deficit/hyperactivity disorder (ADHD) is a chronic neurodevelopmental condition persisting into adulthood in up to 60% of affected individuals. Adult ADHD is associated with significant functional impairment, psychiatric comorbidities, emotional dysregulation, and reduced quality of life. Psychostimulants, particularly methylphenidate, remain first-line pharmacological therapy, with decades of data supporting their safety and efficacy. Given the evolving understanding of ADHD across the lifespan, this review synthesizes current evidence on the pharmacological properties, therapeutic potential, and clinical monitoring strategies for methylphenidate and related stimulants in adults.*

Methods: *A narrative, concept-driven synthesis was conducted, integrating contemporary clinical knowledge, pharmacological principles, guideline-level recommendations and outcome-focused treatment principles to adult ADHD.*

Results: *Methylphenidate inhibits dopamine and norepinephrine transporters, increasing catecholamine availability in frontostriatal circuits responsible for attention and executive control. Its pharmacokinetic profile differs between immediate-release and extended-release formulations, allowing individualized treatment. In adults, methylphenidate is indicated for ADHD and occasionally used off-label in treatment of resistant depression or excessive daytime sleepiness. Treatment usually starts with low doses (10-20 mg/day), which are titrated according to response and tolerability. Contraindications include uncontrolled hypertension, tachyarrhythmias, glaucoma, active psychosis and severe anxiety. Benefits include reduced inattentiveness, improved executive functioning and better occupational and psychosocial outcomes. Careful monitoring - covering cardiovascular parameters, adverse effects, potential misuse- supports safe long-term use. Across studies, psychostimulants demonstrate high efficacy and good tolerability, contributing to meaningful improvements in quality of life.*

Conclusions: *Methylphenidate remains a cornerstone of adult ADHD management, offering predictable pharmacological effects and flexible dosing when paired with structured clinical monitoring.*

Keywords: *Methylphenidate, Mental Disorders, Adult, Substance-Related Disorders, Drug Misuse*

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INTRODUCTION

Methylphenidate (MPH) is a central nervous system (CNS) stimulant and one of the cornerstone pharmacological treatments for attention-deficit/hyperactivity disorder (ADHD) in adults. (Jaeschke et al., 2021) At therapeutic doses it acts primarily as a norepinephrine-dopamine reuptake inhibitor (NDRI), blocking the dopamine (DAT) and norepinephrine transporters (NET) and increasing extracellular catecholamine levels in frontostriatal circuits implicated in ADHD pathophysiology. (Jaeschke et al., 2021)

Oral immediate-release (IR) formulations are rapidly absorbed and typically reach peak plasma concentrations within one to three hours, while modified and extended-release (ER) preparations provide a longer duration of action and smoother concentration-time profiles. (Palmini, 2024) These pharmacokinetic differences

List of abbreviations:

ADHD	attention-deficit/hyperactivity disorder
AI	artificial intelligence
APA	American Psychiatric Association
CNS	central nervous system
DAT	dopamine transporter
ER	extended-release
GPT-5	Generative Pre-trained Transformer 5
IR	immediate-release
MPH	methylphenidate
NDRI	norepinephrine-dopamine reuptake inhibitor
NET	norepinephrine transporter

permit individualised treatment plans, with ER products often preferred in adults with demanding occupational and social schedules because they simplify once-daily dosing and may support adherence. (Palmini, 2024)

ADHD is now recognised as a lifespan neurodevelopmental condition rather than a purely paediatric disorder. (Faraone et al., 2024; Giupponi et al., 2018) Longitudinal and epidemiological data indicate that a substantial proportion of patients continue to experience clinically relevant symptoms into adulthood, with estimated prevalence of about 2-5% in population-based samples and a progressive decrease with age. (Faraone et al., 2024) In adults, ADHD is most often characterised by inattention, executive dysfunction, emotional dysregulation and difficulties maintaining daily structure, rather than overt hyperactivity. (Faraone et al., 2024) Comorbidity with autism spectrum conditions, including Asperger syndrome, is not uncommon and can complicate adult diagnostic assessment and treatment planning. (Roy et al., 2015) These symptoms are linked to impairment in education, work, interpersonal relationships and overall health-related quality of life. (Ostinelli et al., 2025)

Randomised controlled trials and observational studies consistently show that stimulant medications, including MPH, reduce core symptoms of inattention and hyperactivity-impulsivity in adults with ADHD compared with placebo. (Jaeschke et al., 2021) Large network meta-analyses suggest that MPH is among the most efficacious pharmacological options across age groups, although effect sizes and tolerability differ between preparations and patient subgroups. (Olagunju & Ghoddusi, 2024; Cortese et al., 2018) Beyond symptom scores, treatment with MPH is associated with improvements in global functioning and quality of life, but these effects are more heterogeneous and generally smaller than those observed for core symptom outcomes. (Cortese et al., 2018) Consequently, benefits must be weighed against potential adverse effects, patient preferences and comorbid conditions, particularly cardiovascular or psychiatric disorders. (Bieś et al., 2023)

Contemporary clinical practice guidelines emphasise multimodal management of adult ADHD, combining psychoeducation, psychosocial and occupational interventions with pharmacotherapy tailored to individual needs. (Faraone et al., 2024; Cole et al., 2016) In Polish recommendations, long-acting MPH formulations are listed among first-line pharmacological options for adults, alongside atomoxetine and selected non-stimulant agents; treatment choice is guided by comorbidities, adverse-effect profiles and patient preference. (Gondek et al., 2025) Regulatory frameworks shape prescribing patterns: in Poland only selected modified-release MPH products are licensed for adults, which channels patients towards long-acting preparations, whereas in the United States and several other countries both MPH- and amphetamine-based stimulants are widely used despite limited guideline documents specifically focused on adult ADHD. (Ostinelli et al., 2025)

When considering MPH in adults, it is essential to distinguish between medically supervised use, non-medical misuse and stimulant use disorder. Misuse refers to taking a prescribed or diverted medication in a manner inconsistent with medical recommendations (e.g. higher doses, non-oral routes or use without a prescription), whereas addiction is characterised by compulsive use despite harm, craving and persistent neurobiological changes consistent with a stimulant use disorder. (Chamakalayil et al., 2021) Population surveys indicate that a minority of adults report non-medical use of prescription stimulants, often motivated by perceived cognitive enhancement, increased productivity or weight loss rather than treatment of ADHD symptoms. (Han et al., 2025) Nonmedical use of other prescription psychoactive medicines has also been documented in European adolescent samples, suggesting that patterns of diversion/misuse can start early and later extend to stimulants. (Kuzman & Posavec, 2016) Similar risk-taking substance-use patterns in early adulthood have been described for so-called ‚legal highs'. (Morris, 2016)

From a neurobiological perspective, the addictive potential of MPH is linked to its effects on dopaminergic signalling within mesocorticolimbic reward pathways. (Volkow et al., 2016) By blocking DAT and, at higher or more rapid doses, markedly increasing extracellular dopamine in regions such as the nucleus accumbens, MPH can produce reinforcing subjective effects that under some conditions favour the transition from controlled to compulsive use. (Koob & Volkow, 2016; Uhl et al., 2019) Repeated exposure to stimulants induces neuroadaptations in reward, stress and executive-control circuits, including dysregulation of glutamatergic transmission and altered synaptic plasticity, which may contribute to persistence of use despite negative consequences. (Hayes et al., 2020)

Clinical and epidemiological data suggest that the risk of developing a stimulant use disorder in adults treated with MPH for ADHD is generally low when the drug is prescribed at therapeutic doses, taken orally and monitored appropriately. (Jaeschke et al., 2021) However, individuals with a history of substance use disorder, high impulsivity or access to non-oral routes of administration appear to be at increased risk of misuse and addiction, underscoring the need for careful assessment and monitoring in these subgroups. (Agency for Healthcare Research and Quality, 2025; Chiappini et al., 2024;

Jakuszkowiak-Wojten et al., 2015) Long-term MPH treatment in adults is associated with a well-described profile of common adverse effects, including decreased appetite, weight loss, insomnia, headache, dry mouth, gastrointestinal discomfort and subjective nervousness. (Jaeschke et al., 2021; Bieś et al., 2023) Small average increases in heart rate and blood pressure are typical, with rare reports of serious cardiovascular events or emergent psychotic or manic symptoms, particularly in vulnerable individuals. (Bieś et al., 2023)

Ethical, legal and methodological challenges complicate research on MPH misuse and long-term safety, especially when high-risk populations or supratherapeutic dosing are considered. These issues are discussed in more detail later in this review, with an emphasis on their implications for clinical decision-making and guideline development.

SUBJECTS AND METHODS

Subjects

This manuscript is a narrative review of previously published literature. No new data were collected, no human participants were recruited, and ethics committee approval and informed consent were not applicable.

Methods

A narrative literature review was conducted between March 2024 and November 2025 to evaluate current evidence on the therapeutic use, safety profile and misuse of methylphenidate and other psychostimulants in adults with ADHD. Four major academic databases - PubMed, ScienceDirect, ResearchGate and Google Scholar - were searched using a combination of Medical Subject Headings (MeSH) and free-text terms. The following Boolean strategy was applied: ((ADHD OR „Attention-Deficit/ Hyperactivity Disorder") AND (Adults OR „Adult population") AND (Methylphenidate OR Psychostimulants OR „Stimulant medications") AND („Treatment guidelines" OR „Safety profile" OR Misuse OR Addiction OR „Long-term effects")).

The search was limited to peer-reviewed articles published in English between 2015 and 2025 to reflect recent developments in diagnostic standards, pharmacotherapy and addiction neuroscience. Eligible publications included randomized controlled trials, cohort and case-control studies, meta-analyses, systematic and narrative reviews, guideline papers and key articles describing neurobiological mechanisms of stimulant action or addiction. Conference abstracts, duplicate records, non-peer-reviewed material and papers focusing exclusively on paediatric populations without relevance to adult ADHD were excluded.

Statistical analyses

Because this is a narrative review, no de novo statistical analyses were performed. Evidence was synthesized qualitatively, with emphasis on study design, population characteristics, and consistency of findings across outcomes.

Two reviewers independently screened titles, abstracts and full texts for eligibility; disagreements were resolved by consensus. Studies meeting inclusion criteria were evaluated for methodological quality and clinical relevance with attention to diagnostic criteria, intervention characteristics (dosage, formulation, duration), outcomes, adverse effects, misuse or addiction signals and neurobiological findings. Data were extracted and synthesised thematically rather than quantitatively, consistent with the aims of a narrative review. Information was organised into sections covering therapeutic mechanisms, clinical efficacy, guideline recommendations, patterns of misuse and addiction, patient-clinician barriers and ethical or methodological challenges in long-term stimulant research.

Additionally, an artificial intelligence-supported language model (ChatGPT, GPT-5.1; OpenAI) was used during the preparation of this narrative review. The tool was applied to improve language quality by refining grammar, wording, and style to enhance clarity and readability, and to assist with the technical handling of references (e.g., organizing, formatting, and sorting citations in accordance with APA style) using sources previously identified via PubMed and other databases. All AI-assisted edits were critically evaluated by the authors, checked against the original publications, and revised as needed. The model was not used to conduct the literature search, extract data, or interpret findings.

RESULTS

Therapeutic potential of methylphenidate and other psychostimulants for adult ADHD

Methylphenidate remains a core component of pharmacological treatment for adults with ADHD and is consistently recommended as a first-line option in international and national guidelines. (Jaeschke et al., 2021; Gondek et al., 2025; Silczuk et al., 2025) Randomised controlled trials and meta-analyses in adult populations show that MPH leads to a clinically meaningful reduction in core ADHD symptoms, with moderate effect sizes compared with placebo and clear superiority over no pharmacological treatment. (Cortese et al., 2018) Benefits extend beyond symptom scores and include improvements in occupational performance, driving behaviour and aspects of emotional regulation, although effect sizes for these broader outcomes are smaller and more variable. (Ostinelli et al., 2025)

Network meta-analyses pooling data across stimulant and non-stimulant agents confirm that MPH is among the most effective medications for adult ADHD, while some amphetamine formulations may show slightly larger effect sizes in specific comparisons. (Cortese et al., 2018) In clinical practice MPH is often preferred because its efficacy is well documented, dose titration strategies are familiar to clinicians and there is extensive experience with its use across a broad range of adult patients. (Jaeschke et al., 2021) Both immediate-release (IR) and extended-release (ER) formulations are available. IR preparations provide rapid onset and shorter duration of action, which may be useful for flexible daytime coverage or as an adjunct in partial responders, whereas ER preparations support once-daily dosing and more stable symptom control with fewer fluctuations in concentration and mood. (Bieś et al., 2023) Adult ADHD guidelines therefore recommend individualised titration, starting with low doses and adjusting according to efficacy and tolerability, with explicit consideration of daily routines, comorbidities and patient preference. (Silczuk et al., 2025)

The most frequently reported adverse effects of MPH in adults include decreased appetite, dry mouth, insomnia, palpitations and mild increases in heart rate or blood pressure. (Jaeschke et al., 2021) For most patients these reactions are transient or manageable through dose adjustment, scheduling of doses or switching between IR and ER formulations. (Jaeschke et al., 2021) Nevertheless, cardiovascular safety remains a key consideration, particularly in adults with pre-existing hypertension, structural heart disease or other risk factors. Cohort and registry studies suggest that in generally healthy adults MPH is not associated with a substantial increase in serious cardiovascular events, although small mean elevations in blood pressure and heart rate are typical and warrant regular monitoring. (Man et al., 2020) Some analyses indicate that transient increases in seizure risk or arrhythmias may occur early in treatment, highlighting the need for careful baseline assessment and documentation of neurological and cardiac history before initiation. (Kooij et al., 2019) Rare idiosyncratic reactions have also been reported, including ecchymosis temporally associated with methylphenidate exposure. (Sahan & Boylu, 2021)

Psychiatric adverse events are also relevant in adult populations. Anxiety, irritability and mood lability may emerge or worsen, particularly at higher doses, and rare cases of psychotic symptoms or manic switches have been described. (Jaeschke et al., 2021) Adults with comorbid mood or personality disorders, and those with substance use disorders, require especially close monitoring, clear communication about warning signs and a low threshold for dose reduction or discontinuation if severe psychiatric symptoms occur. (Ostinelli et al., 2025) Current European and national guidelines emphasise that MPH therapy in adults should be embedded within a broader multimodal plan combining psychoeducation, psychosocial interventions and management of comorbidities. (Silczuk et al., 2025; Cole et al., 2016) Emerging adjunctive modalities such as neurostimulation have been discussed as investigational options in ADHD, although they remain outside routine stimulant prescribing pathways. (Zaman, 2016; Wong & Zaman, 2019) The presence of cardiovascular risk factors, psychiatric comorbidity or a history of substance misuse does not automatically preclude MPH use but requires an individualised risk-benefit assessment, shared decision-making and a structured monitoring strategy. (Gondek et al., 2025)

Overall, when prescribed and monitored in line with contemporary guidelines, MPH offers substantial therapeutic benefit for many adults with ADHD, with a safety profile that is acceptable but not trivial. Clinicians should therefore adopt a proactive approach to baseline assessment, dose titration and follow-up, with routine review of functional outcomes, adverse effects and potential signals of misuse.

Neurobiological mechanisms of misuse and addiction

The discussion of MPH in adults must also address the neurobiology of misuse and stimulant use disorder. Medically supervised, oral, therapeutic use differs qualitatively

from non-medical misuse and addiction, yet these states lie along a continuum of exposure and risk. (Chiappini et al., 2024; Simon et al., 2015) Misuse typically involves higher-than-prescribed doses, non-oral routes (e.g. intranasal use of crushed tablets) or use without a prescription, often in the context of cognitive enhancement, performance pressure or weight control. (Chiappini et al., 2024) Addiction, conceptualised as stimulant use disorder, is characterised by compulsive use, craving, impaired control and continued use despite harm, accompanied by identifiable neuroadaptations in reward-related circuits. (Simon et al., 2015)

At the neurobiological level MPH exerts both therapeutic and reinforcing effects primarily by blocking dopamine and norepinephrine transporters, leading to increased extracellular catecholamine levels in fronto-striatal and mesolimbic pathways. (Cassidy et al., 2015) Neuroimaging studies demonstrate that MPH-induced dopamine elevations in the ventral striatum, including the nucleus accumbens, are closely linked with subjective experiences of reward and "high", particularly at supra-therapeutic doses and with rapid routes of administration. (Volkow et al., 2016) The rate at which MPH reaches the brain is a crucial determinant of abuse liability: ER oral formulations, which generate slower and more sustained dopamine increases, are associated with lower reinforcing potential than IR preparations or non-oral routes. (Koob & Volkow, 2016)

Repeated exposure to high doses of psychostimulants produces neuroadaptations that shift behaviour from voluntary, goal-directed use towards habitual and eventually compulsive patterns. (Simon et al., 2015; Woodhead & Robbins, 2017) These changes include altered dopamine receptor availability, dysregulated glutamatergic transmission in cortico-striatal loops and plasticity within stress-related and habit-formation circuits. (Wilens & Kaminski, 2019) Over time, the salience of drug-related cues increases while sensitivity to natural rewards diminishes, contributing to craving, relapse and difficulty discontinuing use despite negative consequences. (Simon et al., 2015; Wilens & Kaminski, 2019) Neurobiological insights from broader addiction research therefore help explain why a subset of individuals exposed to MPH or other stimulants develop persistent, maladaptive patterns of use. (Uhl et al., 2019; Hayes et al., 2020)

Epidemiological data from the past decade indicate that non-medical use of prescription stimulants, including MPH, is most prevalent among young adults, university students and people working in high-pressure environments. (Krinzinger et al., 2019; Morris, 2016) University counseling samples suggest that ADHD symptoms and related psychosocial stressors may be under-recognized in student populations, which can intersect with risk-taking and substance-use vulnerability. (Rapinesi et al., 2018) Among individuals with ADHD, misuse may arise before diagnosis as attempted self-medication, or later as self-directed adjustments of prescribed doses, as well as through diversion of legitimately obtained medication to peers. (Chiappini et al., 2024) Comorbid substance use disorders, mood and anxiety disorders and a history of trauma have been identified as important risk factors that increase vulnerability to misuse and progression to stimulant use disorder. (Krinzinger et al., 2019)

From a clinical standpoint, differentiating between appropriate use, problematic use and addiction can be challenging, especially in adults who report subjective benefit from higher-than-recommended doses or irregular intake patterns. (Cassidy et al., 2015) A structured assessment should therefore include detailed questioning about dosing, routes of administration, episodes of binge use, attempts to cut down and withdrawal-like symptoms such as fatigue, hypersomnia, anhedonia and dysphoria following abrupt discontinuation. (Cassidy et al., 2015; Jonovska et al., 2021) Early recognition of emerging misuse allows for timely interventions, including transition to ER formulations, supervised dispensing, intensified psychosocial support or a switch to non-stimulant pharmacotherapy when the risk-benefit balance becomes unfavourable. (Koob & Volkow, 2016)

Ethical, legal and methodological challenges in studying methylphenidate misuse and addiction

Research on MPH misuse and addiction in adults is constrained by ethical, regulatory and methodological challenges that limit the available evidence base. (Bieś et al., 2023) Because MPH is a controlled substance with recognised abuse potential, clinical trials that mimic real-world misuse patterns (e.g. high doses, rapid titration or non-oral routes) are difficult to justify ethically and require intensive safety monitoring and specialised facilities. (Bieś et al., 2023; Silczuk et al., 2025) As a result, much of the evidence regarding misuse and addiction derives from observational studies, naturalistic follow-up and pharmacovigilance data rather than randomized trials. (Silczuk et al., 2025)

Observational designs introduce several sources of bias. Adults who receive long-term MPH treatment may differ systematically from those who do not, for example in baseline ADHD severity, comorbidities or socio-economic status, complicating causal inference regarding both benefits and harms. (Silczuk et al., 2025)

Confounding by indication, selection bias and differential loss to follow-up can lead to under- or over-estimation of risks such as cardiovascular events, psychiatric complications or the emergence of substance use disorders. (Elliott et al., 2020) Large registry-based studies and insurance databases partially mitigate these issues through sample size and statistical adjustment, but detailed information on misuse patterns, off-label dosing or diversion is often lacking. (Elliott et al., 2020)

High-risk groups are frequently under-represented in clinical research. Adults with active substance use disorders, severe cardiovascular disease or unstable psychiatric comorbidities are commonly excluded from trials and many observational cohorts, even though these populations raise the most pressing clinical questions regarding MPH safety and misuse. (Krinzinger et al., 2019; Perera & Courtenay, 2017) Consequently, clinicians must extrapolate from limited data and integrate clinical experience, patient preferences and ethical considerations when making decisions in complex cases. (Krinzinger et al., 2019) Brief self-assessed quality-of-life measures have been proposed as low-burden screening signals for problematic drug and alcohol use, which may be useful when evaluating vulnerability to stimulant misuse. (Fedyk, 2017)

Informed-consent procedures also present challenges. Adults with ADHD and co-occurring psychiatric or substance use disorders may experience fluctuating motivation, cognitive difficulties and ambivalence about treatment, which can affect their understanding of study aims, risks and potential benefits. (Baggio et al., 2025) Researchers must ensure that participation is genuinely voluntary, that benefits are not overstated and that appropriate safeguards are in place to prevent exploitation or coercion, especially in correctional or forensic settings where stimulant treatment and misuse are both relevant. (Grimley & Bartels, 2024) Practical barriers, such as mistrust of institutions or fear of legal consequences among people who misuse stimulants, further complicate recruitment and retention. (Baggio et al., 2025; Grimley & Bartels, 2024)

Legal and regulatory frameworks influence which types of studies are feasible. Differences between countries in MPH scheduling, prescribing regulations and monitoring requirements can either facilitate or hinder research collaboration and may result in uneven data availability across regions. (National Institute for Health and Care Excellence, 2019) While stricter control measures can reduce diversion and non-medical use, overly restrictive policies may also limit legitimate access to treatment and impede ethically sound research. (National Institute for Health and Care Excellence, 2019) Future studies should therefore address not only clinical and neurobiological questions but also systematically examine how regulatory strategies and service=delivery models affect real-world patterns of MPH use, misuse and associated outcomes in adults.

DISCUSSION

Overall, the evidence supports a dual imperative: maintaining access to effective stimulant treatment for adults with ADHD while strengthening safeguards that minimize diversion and prevent harm. (Baggio et al., 2025) Prospective studies and pragmatic trials that incorporate real-world monitoring frameworks and patient-centered outcomes are needed to refine clinical pathways and clarify risk-benefit profiles across adult psychiatric subpopulations. (Grimley & Bartels, 2024)

Methodologically, the field faces recurring challenges: ethical constraints limit experimental study of misuse, while underreporting and heterogeneity in definitions complicate interpretation across cohorts. (Wilens & Kaminski, 2019) Many studies rely on self-report, toxicology databases, or administrative prescribing data, each of which can introduce misclassification and confounding by indication. (Krinzinger et al., 2019) Future work would benefit from standardized operational definitions of misuse, transparent ascertainment methods, and designs that more clearly separate therapeutic exposure from nonmedical consumption. (Elliott et al., 2020)

Misuse, diversion, and addiction remain central safety considerations. Mechanistic and clinical work converges on dopaminergic reward circuitry and dose-route effects as key determinants of abuse potential, especially when preparations are manipulated for nonoral administration or taken at supratherapeutic doses. (Koob & Volkow, 2016) Observational data indicate that nonmedical use can cluster in specific settings and risk groups, supporting structured screening for substance use vulnerability and reinforcement of safe-use behaviors as part of routine prescribing. (Uhl et al., 2019; Fedyk, 2017) Evidence also suggests that comorbid substance use disorders and certain psychosocial contexts may modify risk, underscoring the need for integrated care pathways. (Hayes et al., 2020)

Beyond ADHD, the literature on methylphenidate in adult psychiatric disorders is more heterogeneous. Reviews describe potential symptomatic benefits in selected contexts, but these applications are typically supported by smaller and methodologically more variable studies than the adult ADHD evidence base. (Gondek et al., 2025) In

mood and psychotic disorders, clinical decision-making must weigh potential benefits against the risk of symptom exacerbation, and careful patient selection and monitoring are emphasized across synthesis articles. (Chamakalayil et al., 2021; Ashcroft et al., 2015) Clinical guidance and risk-benefit discussions are particularly important when stimulants are considered in complex psychiatric presentations. (Han et al., 2025)

This narrative review suggests that methylphenidate remains a cornerstone pharmacotherapy for adults with ADHD, with consistent evidence for improvements in core symptoms and clinically relevant functioning when appropriately prescribed and monitored. (Cortese et al., 2018) In adult practice, treatment choices frequently intersect with psychiatric comorbidity, highlighting the need to tailor dosing, follow-up intensity, and outcome monitoring to the individual clinical profile. (Bieś et al., 2023) Given links between adult ADHD, comorbid mood disorders, and suicidality, careful monitoring of affective symptoms and self-harm risk remains important in routine care. (Giupponi et al., 2018)

CONCLUSIONS

The therapeutic use of methylphenidate and other psychostimulants in adults with ADHD is supported by extensive evidence showing that these agents reduce core symptoms, improve daily functioning and enhance aspects of cognitive performance. Their dopaminergic and noradrenergic mechanisms of action underpin their continued status as first-line pharmacological options for adult ADHD, with generally favourable short-term safety and efficacy profiles. At the same time, important uncertainties remain regarding long-term cardiovascular and psychiatric safety, trajectories of misuse and addiction, and broader functional outcomes in real-world populations.

Clinical research in this area is complicated by high dropout rates, challenges in maintaining long-term follow-up, the heterogeneity of ADHD presentations and the high prevalence of psychiatric comorbidities in adults. Ethical constraints on experimental designs, under-representation of high-risk groups and reliance on observational data further limit the strength of available evidence. Nonetheless, current data support the view that, when prescribed judiciously and monitored systematically, psychostimulants remain a highly effective and clinically indispensable component of adult ADHD treatment.

Future work should prioritize long-term, methodologically rigorous and ethically sound studies that include representative patient populations and systematically assess misuse and addiction outcomes. Such evidence is essential to refine risk-benefit assessments, inform regulatory and guideline decisions and optimize individualised, evidence-based care for adults living with ADHD.

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References

1. Agency for Healthcare Research and Quality. (2025). *Misuse of attention-deficit/hyperactivity disorder prescription stimulants in adults: Comparative effectiveness review* (Comparative Effectiveness Review No. 245). Agency for Healthcare Research and Quality.
2. Ashcroft, S., Verdolini, N., Zaman, R., & Agius, M. (2015). The comorbidity between bipolar disorder and ADHD in a young adult: a focus on impulsivity. *Psychiatria Danubina*, *27 Suppl 1*, S195-S197.
3. *Attention deficit hyperactivity disorder: diagnosis and management*. (2019). National Institute for Health and Care Excellence (NICE).
4. Baggio, S., da Cunha Gonçalves, L., Heller, P., Wolff, H., & Gétaz, L. (2025). Informed Consent in Vulnerable Populations: The Case of Detained Persons with Attention Deficit Hyperactivity Disorder. *Journal of empirical research on human research ethics : JERHRE*, *20*(3), 107-113. https://doi.org/10.1177/15562646251340474
5. Bieś, R., Fojcik, J., Warchala, A., Trędzbor, B., Krysta, K., Piekarska-Bugiel, K., & Krzystanek, M. (2023). The Risk of Methylphenidate Pharmacotherapy for Adults with ADHD. *Pharmaceuticals (Basel, Switzerland)*, *16*(9), 1292. https://doi.org/10.3390/ph16091292
6. Cassidy, T. A., McNaughton, E. C., Varughese, S., Russo, L., Zulueta, M., & Butler, S. F. (2015). Nonmedical use of prescription ADHD stimulant medications among adults in a substance abuse treatment population: early findings from the NAVIPPRO surveillance system. *Journal of attention disorders*, *19*(4), 275-283. https://doi.org/10.1177/1087054713493321
7. Chamakalayil, S., Strasser, J., Vogel, M., Brand, S., Walter, M., & Dürsteler, K. M. (2021). Methylphenidate for Attention-Deficit and Hyperactivity Disorder in Adult

Patients With Substance Use Disorders: Good Clinical Practice. *Frontiers in psychiatry*, *11*, 540837. https://doi.org/10.3389/fpsyt.2020.540837

8. Chiappini, S., Gramuglia, P. D., Mosca, A., Cavallotto, C., Miuli, A., Corkery, J. M., Guirguis, A., Schifano, F., & Martinotti, G. (2024). Methylphenidate abuse and misuse in patients affected with a psychiatric disorder and a substance use disorder: a systematic review. *Frontiers in psychiatry*, *15*, 1508732. https://doi.org/10.3389/fpsyt.2024.1508732
9. Cole, P., Weibel, S., Nicastro, R., Hasler, R., Dayer, A., Aubry, J. M., Prada, P., & Perroud, N. (2016). CBT/DBT skills training for adults with attention deficit hyperactivity disorder (ADHD). *Psychiatria Danubina*, *28*(Suppl-1), 103-107.
10. Cortese, S., Adamo, N., Del Giovane, C., Mohr-Jensen, C., Hayes, A. J., Carucci, S., Atkinson, L. Z., Tessari, L., Banaschewski, T., Coghill, D., Hollis, C., Simonoff, E., Zuddas, A., Barbui, C., Purgato, M., Steinhausen, H. C., Shokraneh, F., Xia, J., & Cipriani, A. (2018). Comparative efficacy and tolerability of medications for attention-deficit hyperactivity disorder in children, adolescents, and adults: a systematic review and network meta-analysis. *The lancet. Psychiatry*, *5*(9), 727-738. https://doi.org/10.1016/S2215-0366(18)30269-4
11. Elliott, J., Johnston, A., Husereau, D., Kelly, S. E., Eagles, C., Charach, A., Hsieh, S. C., Bai, Z., Hossain, A., Skidmore, B., Tsakonas, E., Chojecki, D., Mamdani, M., & Wells, G. A. (2020). Pharmacologic treatment of attention deficit hyperactivity disorder in adults: A systematic review and network meta-analysis. *PloS one*, *15*(10), e0240584. https://doi.org/10.1371/journal.pone.0240584
12. Faraone, S. V., Bellgrove, M. A., Brikell, I., Cortese, S., Hartman, C. A., Hollis, C., Newcorn, J. H., Philipsen, A., Polanczyk, G. V., Rubia, K., Sibley, M. H., & Buitelaar, J. K. (2024). Attention-deficit/hyperactivity disorder. *Nature reviews. Disease primers*, *10*(1), 11. https://doi.org/10.1038/s41572-024-00495-0
13. Fedyk O. (2017). The pursuit of pleasure - a self-assessed global quality of life as a potential screening method for problematic use of drugs and alcohol. *Psychiatria Danubina*, *29*(Suppl 3), 541-545.
14. Giupponi, G., Giordano, G., Maniscalco, I., Erbuto, D., Berardelli, I., Conca, A., Lester, D., Girardi, P., & Pompili, M. (2018). Suicide risk in attention-deficit/hyperactivity disorder. *Psychiatria Danubina*, *30*(1), 2-10. https://doi.org/10.24869/psyd.2018.2
15. Gondek T.M., Stramecki F., Cieśla M., Ziegart-Sadowska K., Foryciarz K., Główczyński P., Krupa A.J., Krysta K., Malec A.K., Rewekant A., Szczegielniak A., Szczubiał-Kamińska A., Taracha-Mocarska A., Tokarek A., Wojtkiewicz A., Todzia-Kornaś A. (2025). Assessment and management of adults with ADHD. Guidelines of the Specialty Training Section of the Polish Psychiatric Association and a coalition of organizations for people with ADHD -update, 2025. *Psychiatria Spersonalizowana / Personalized Psychiatry, 4(1),* 80-115. https://doi.org/10.5114/psychs.2025.154273
16. Grimley, A., & Bartels, L. (2024). The need for speed? Exploring the risks and benefits of pharmacological treatment for adult ADHD in prisons. *Psychiatry, psychology, and law : an interdisciplinary journal of the Australian and New Zealand Association of Psychiatry, Psychology and Law*, *31*(6), 1131-1151. https://doi.org/10.1080/13218719.2023.2260861
17. Han, B., Jones, C. M., Volkow, N. D., Rikard, S. M., Dowell, D., Einstein, E. B., Guy, G. P., Tomoyasu, N., Ko, J., Baldwin, G., Olsen, Y., & Compton, W. M. (2025). Prescription Stimulant Use, Misuse, and Use Disorder Among US Adults Aged 18 to 64 Years. *JAMA psychiatry*, *82*(6), 572-581. https://doi.org/10.1001/jamapsychiatry.2025.0054
18. Hayes, A., Herlinger, K., Paterson, L. M., & Lingford-Hughes, A. (2020). The neurobiology of substance use and addiction: evidence from neuroimaging and relevance to treatment. *BJPsych Advances*, *26*(6), 367-378. https://doi.org/10.1192/BJA.2020.68
19. Jaeschke, R. R., Sujkowska, E., & Sowa-Kućma, M. (2021). Methylphenidate for attention-deficit/hyperactivity disorder in adults: a narrative review. *Psychopharmacology, 238(10),* 2667-2691. https://doi.org/10.1007/s00213-021-05946-0
20. Jakuszkowiak-Wojten, K., Landowski, J., Wiglusz, M. S., & Cubała, W. J. (2015). Impulsivity in anxiety disorders. A critical review. *Psychiatria Danubina*, *27 Suppl 1*, S452-S455.
21. Jonovska, S., Sugnet, T., & Šendula-Jengić, V. (2021). High-Dose Methylphenidate Use Prior to Hospitalization Exacerbates the Withdrawal Syndrome in Inpatients Treated for Opioid and Sedative-Hypnotic Co-Dependence - Case Series and Review of the Literature. *Psychiatria Danubina*, *33*(Suppl 4), 1240-1242.
22. Koob, G. F., & Volkow, N. D. (2016). Neurobiology of addiction: a neurocircuitry analysis. *The lancet. Psychiatry*, *3*(8), 760-773. https://doi.org/10.1016/S2215-0366(16)00104-8
23. Kooij, J. J. S., Bijlenga, D., Salerno, L., Jaeschke, R., Bitter, I., Balázs, J., Thome, J., Dom, G., Kasper, S., Nunes Filipe, C., Stes, S., Mohr, P., Leppämäki, S., Casas, M., Bobes, J., Mccarthy, J. M., Richarte, V., Kjems Philipsen, A., Pehlivanidis, A., Niemela, A., … Asherson, P. (2019). Updated European Consensus Statement on diagnosis and treatment of adult ADHD. *European psychiatry : the journal of the Association of European Psychiatrists*, *56*, 14-34. https://doi.org/10.1016/j.eurpsy.2018.11.001
24. Krinzinger, H., Hall, C. L., Groom, M. J., Ansari, M. T., Banaschewski, T., Buitelaar, J. K., Carucci, S., Coghill, D., Danckaerts, M., Dittmann, R. W., Falissard, B., Garas, P., Inglis, S. K., Kovshoff, H., Kochhar, P., McCarthy, S., Nagy, P., Neubert, A., Roberts, S., Sayal, K., … ADDUCE Consortium (2019). Neurological and psychiatric adverse effects of long-term methylphenidate treatment in ADHD: A map of the current evidence. *Neuroscience and biobehavioral reviews*, *107*, 945-968. https://doi.org/10.1016/j.neubiorev.2019.09.023
25. Kuzman, M., & Posavec, M. (2016). Medical use, nonmedical use of prescription tranquilizers/sedatives and associated factors among Croatian adolescents. *Psychiatria Danubina, 28*(Suppl. 2), 39-45.
26. Man, K. K. C., Lau, W. C. Y., Coghill, D., Besag, F. M. C., Cross, J. H., Ip, P., & Wong, I. C. K. (2020). Association between methylphenidate treatment and risk of seizure: a population-based, self-controlled case-series study. *The Lancet. Child & adolescent health*, *4*(6), 435-443. https://doi.org/10.1016/S2352-4642(20)30100-0
27. Morris B. (2016). Understanding the prevalence of ‚legal high' misuse in early adulthood. *Psychiatria Danubina*, *28*(Suppl-1), 49-58.
28. Olagunju, A. E., & Ghoddusi, F. (2024). Attention-Deficit/Hyperactivity Disorder in Adults. *American family physician*, *110*(2), 157-166.

29. Ostinelli, E. G., Schulze, M., Zangani, C., Farhat, L. C., Tomlinson, A., Del Giovane, C., Chamberlain, S. R., Philipsen, A., Young, S., Cowen, P. J., Bilbow, A., Cipriani, A., & Cortese, S. (2025). Comparative efficacy and acceptability of pharmacological, psychological, and neurostimulatory interventions for ADHD in adults: a systematic review and component network meta-analysis. *The lancet. Psychiatry*, *12*(1), 32-43. https://doi.org/10.1016/S2215-0366(24)00360-2
30. Palmini A. (2024). Attention-deficit/hyperactivity disorder (ADHD) in adults: a multilayered approach to a serious disorder of inattention to the future. Transtorno de déficit de atenção/hiperatividade em adultos: uma abordagem multicamadas de um problema sério de desatenção ao futuro. *Arquivos de neuro-psiquiatria*, *82*(7), 1-12. https://doi.org/10.1055/s-0044-1791513
31. Perera, B., & Courtenay, K. (2017). ADHD and Challenging behaviour in People with Intellectual Disability: should we screen for ADHD?. *Psychiatria Danubina*, *29*(Suppl 3), 562-564.
32. Rapinesi, C., Kotzalidis, G. D., Del Casale, A., Ferrone, M., Vento, A., Callovini, G., Curto, M., Ferracuti, S., Sani, G., Pompili, M., Familiari, G., Girardi, P., & Angeletti, G. (2018). Depressive symptoms, temperament/character, and attention deficit/hyperactivity disorder traits in medical students seeking counseling. *Psychiatria Danubina*, *30*(3), 305-309. https://doi.org/10.24869/psyd.2018.305
33. Roy, M., Prox-Vagedes, V., Ohlmeier, M. D., & Dillo, W. (2015). Beyond childhood: psychiatric comorbidities and social background of adults with Asperger syndrome. *Psychiatria Danubina*, *27*(1), 50-59.
34. Şahan, E., & Boylu, M. E. (2021). Methylphenidate Induced Ecchymosis. *Psychiatria Danubina*, *33*(1), 65-66. https://doi.org/10.24869/psyd.2021.65
35. Silczuk, A., Lewandowska, A., Filip, M., Atroszko, P. A., Podolec, J., Gałecka, M., Madejek, R., & Czyżewski, Ł. (2025). Current insights into the safety and adverse effects of methylphenidate in children, adolescents, and adults - narrative review. *Pharmacological reports : PR*, *77*(5), 1247-1259. https://doi.org/10.1007/s43440-025-00763-0
36. Simon, N., Rolland, B., & Karila, L. (2015). Methylphenidate in Adults with Attention Deficit Hyperactivity Disorder and Substance Use Disorders. *Current pharmaceutical design*, *21*(23), 3359-3366. https://doi.org/10.2174/1381612821666150619093254
37. Uhl, G. R., Koob, G. F., & Cable, J. (2019). The neurobiology of addiction. *Annals of the New York Academy of Sciences*, *1451*(1), 5-28. https://doi.org/10.1111/nyas.13989
38. Volkow, N. D., Koob, G. F., & McLellan, A. T. (2016). Neurobiologic Advances from the Brain Disease Model of Addiction. *The New England journal of medicine*, *374*(4), 363-371. https://doi.org/10.1056/NEJMra1511480
39. Wilens, T. E., & Kaminski, T. A. (2019). Prescription Stimulants: From Cognitive Enhancement to Misuse. *Pediatric clinics of North America*, *66*(6), 1109-1120. https://doi.org/10.1016/j.pcl.2019.08.006
40. Wong, H. C., & Zaman, R. (2019). Neurostimulation in Treating ADHD. *Psychiatria Danubina*, *31*(Suppl 3), 265-275.
41. Woodhead, S., & Robbins, T. (2017). The relative contribution of goal-directed and habit systems to psychiatric disorders. *Psychiatria Danubina*, *29*(Suppl 3), 203-213.
42. Zaman R. (2016). Investigative and therapeutic uses of Transcranial magnetic stimulation (TMS) in Attention Deficit Hyperactivity Disorder (ADHD). *Psychiatria Danubina*, *28*(Suppl-1), 99-102.

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