

## ADHD & ADULTHOOD - ABOUT THE EPIDEMIOLOGY, SYMPTOMS AND TREATMENT OF ATTENTION DEFICIT HYPERACTIVITY DISORDER IN ADULTS

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### ABSTRACT

**Aims:** The main goal of the authors of the work was to dispel the myth that Attention Deficit Hyperactivity Disorder is a childhood disease. It was emphasized that failure to recognize ADHD in adults, especially in young women, leads to serious consequences.

**Methods:** This narrative review was conducted following established standards for non-systematic literature synthesis in biomedical research. Studies published between 2018 and 2025 were identified through PubMed/MEDLINE, Scopus and Web of Science searches using combinations of keywords and MeSH terms related to adult ADHD. Article selection was conducted based on predefined criteria and decisions were made collectively by the research team.

**Results:** Studies indicate that more than half of pediatric ADHD patients continue to struggle with the disorder into adulthood. This new awareness is leading to greater interest in ADHD in the adult population, especially given the underdiagnosis of people over the age of 18, including young women. The etiology of ADHD is multifaceted, with particular emphasis on the role of heredity and dopamine dysregulation.

**Conclusions:** Failure to accurately diagnose ADHD in adults leads to problems in many areas of life (social, professional, emotional) and a lack of understanding for people with this disorder. In young women, undiagnosed ADHD increases the risk of low self-esteem, hopelessness and sexual abuse. In addition,

people with ADHD are particularly vulnerable to disorders related to the abuse of psychoactive substances.

It is necessary to increase the knowledge of the medical and non-medical community about ADHD in adults. The serious effects of ADHD can be prevented by incorporating appropriate treatment, mainly pharmacological, in the form of stimulants, which are highly effective. However, it is important to remember the possible side effects of these drugs, such as an increase in cardiovascular risk and the rare occurrence of psychosis, which requires constant monitoring of patients.

**Keywords:** ADULT ADHD DIAGNOSIS, ATTENTION-DEFICIT/HYPERACTIVITY DISORDER, MENTAL HEALTH, METHYLPHENIDATE SAFETY

## INTRODUCTION

ADHD (attention deficit hyperactivity disorder) occurs in adults with a frequency of 4-5% [1]. According to the DSM-5, this syndrome can be diagnosed "if the patient meets at least 5 symptoms; by marking "often" or "very often" on the "ADHD Symptom Checklist" sheet for the characteristics of inattention or hyperactivity-impulsivity, or both." In addition, the symptoms must first appear before the age of 12 and impair the functioning of the individual in at least two situations. The duration of the experienced symptoms must last at least 6 months [2]. The symptoms experienced by the patient cannot result from another condition or the action of other factors. Children, unlike adults, require meeting 6 symptoms to make an ADHD diagnosis [3].

Depending on the dominance of symptoms from a given group of features, individual presentations of ADHD are distinguished: inattentive type (31%), then hyperactive-impulsive type (7%) and mixed type (62%) [2, 3]. The change from subtypes (DSM-4) to ADHD presentations (DSM-5) highlights the individual change in the patient's clinical picture during the course of the disease [4].

There are many questionnaires used by psychiatric specialists to diagnose ADHD in adults: the Adult ADHD Clinical Diagnostic Scale, Conner's Adult ADHD Diagnostic Interview for DSM-4, and the Adult ADHD Diagnostic Interview (DIVA-5). Thanks to the cooperation of the World Health Organization (WHO) and scientists from New York University Medical School and Harvard Medical School, the Adult ADHD Self-Report Scale (ASRS) was also developed as a tool useful for making a diagnosis [5]. The research center enabling minimally invasive, objective ADHD diagnosis in the future also includes work on miRNA [6].

## AIM

The aim of the authors of this paper was to draw the attention of the readers to a new version of the disease entity ADHD. It is a disease that also affects adults, and if unrecognized and untreated, it significantly impairs everyday functioning. The work was created so that the diagnosis of ADHD would not be identified only with patients with the profile of a school-age boy, but rather broadened to include people, especially women over the age of 18 [7]. In recent years, medicine has been taking a broader look at this topic because it deserves attention, as confirmed by the content below.

## METHODS

This narrative review was conducted in accordance with established standards for non-systematic literature synthesis in biomedical research. The authors searched for relevant publications using the PubMed/MEDLINE, Scopus, and Web of Science databases. The search covered the time frame from January 2021 to March 2025. The following keywords and MeSH terms were used in various combinations: "adult ADHD", "attention-deficit/hyperactivity disorder", "methylphenidate", "sex differences in ADHD", "late-onset ADHD", "adult diagnosis", and "treatment".

The inclusion criteria were:

1. peer-reviewed original studies, meta-analyses, systematic and narrative reviews related to ADHD in adults;
2. publications in English;
3. studies addressing epidemiology, pathophysiology, diagnosis, gender differences, comorbidities, or treatment strategies in adult ADHD.

Exclusion criteria were:

1. articles focused exclusively on pediatric ADHD;
2. case reports or single-patient observations unless discussed in broader context;

3. non-English publications.

The selection process was not systematic. However, the authors prioritized recent high-quality studies from high-impact journals. References were evaluated based on scientific relevance, methodological rigor, and their contribution to the synthesis of current knowledge. Studies were grouped according to thematic relevance to the main sections: epidemiology, gender-related aspects, symptomatology, comorbidities, and treatment. Clinical guidelines and expert consensus papers were also included where applicable.

RESULTS AND DISCUSSION

EPIDEMIOLOGY, ETIOLOGY AND RISK FACTORS

Although ADHD has long been perceived as a predominantly pediatric condition, recent epidemiological studies reveal its persistence into adulthood. In Poland, national-level data are limited, but a large epidemiological survey estimated the prevalence of adult ADHD symptoms at approximately 2.2 %, with a slightly higher rate in men (2.5 %) compared to women (1.9 %) [8]. Among children, estimates vary significantly. According to World Population Review from 2017, only about 0.3 % of Polish children are diagnosed with ADHD, one of the lowest rates globally. In contrast, international studies report average childhood ADHD prevalence of 4.6 % in Europe and up to 9.8 % in the United States. Adult prevalence is estimated at 2.8 % in Europe and up to 4.4 % in North America [9, 10]. These data are summarized in Table 1, which also highlights the role of underdiagnosis, limited awareness, and cultural differences in recognition and reporting practices.

ADHD diagnosis affects up to 6% of the world's population [11]. The data collected so far allow us to conclude that up to 60% of ADHD cases diagnosed in childhood persist into adulthood. Moreover, specialists notice an increasing trend of visits by adults with suspected ADHD diagnosis, without a previous psychiatric history in this direction, necessary for diagnosis according to DSM-V. The etiology of the described disease entity remains ambiguous. It seems to have a multifactorial basis: genetic, molecular, environmental. There are premises to think about significant epigenetic changes occurring already at the stage of fetal life, which may determine the occurrence of disease symptoms in the future. The heritability of ADHD, according to genetic studies, may oscillate around 70% [5]. It is suspected that mutations of the dopamine D4 and D5 receptor genes are involved [12]. Studies also suggest the influence of dopaminergic system dysregulation (dopamine deficiency) as one of many factors influencing the occurrence of ADHD. The similarity of the structure of the dopamine molecule and thyroid hormones is also significant due to the common element - tyrosine. Studies suggest the presentation of symptoms similar to ADHD symptoms in the course of hypothyroidism [5]. An interesting observation determining the time of the onset of ADHD symptoms is the presence of the patients' own resources and those of their loved ones. A protective, masking effect on the symptoms of the disease is exerted by patients with speech, communication and reading skills, while on the part of the family, the following factors delay the onset of symptoms: the parents' high salary and the mother's qualifications. This is the result of a strong network of support and assistance, which loses its power with the achievement of adulthood and independence [13]. Environmental factors include, among others: extremely low birth weight, premature birth, smoking by the father and mother [4, 14].

Table 1. ADHD Prevalence by Region with Diagnostic Gaps and Data Source Types

Region/ Country	ADHD Prevalence in Children (%)	ADHD Prevalence in Adults (%)	Likely Underdiagnosis Factor	Primary Data Source Type
Poland	0.3	2.2	High	Population survey
Europe (avg)	4.6	2.8	Moderate	Meta- analysis
United States	9.8	4.4	Low	Insurance records, CDC data

Canada	7.1	3.8	Low	Health system databases
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ADHD IN WOMEN

It is worth emphasizing that the ratio of ADHD occurrence by gender has changed from 3:1 (boys:girls) at school age to 1:1 (men:women) in adulthood [11]. Studies undoubtedly show a lower detection rate of ADHD syndrome in girls and their underdiagnosis, which translates into their later poorer functioning with the disease [3]. The clinical picture of ADHD itself differs depending on gender: in women, the inattentive type is more common, while in men, the hyperactive and impulsive type. The presence of more pronounced symptoms that affect the environment is the reason for the higher detection rate of ADHD in boys at school age, than the picture of poorer concentration and mood disorders that dominates in girls. Lowered self-esteem and more frequent risky intimate relationships are common in women diagnosed with ADHD. Female patients are more likely to become victims of sexual harassment, have unplanned pregnancies and become mothers, from whom society expects, to a greater extent than from men, resourcefulness in fulfilling household and parenting duties. According to research, women with ADHD before receiving a diagnosis often experienced a sense of hopelessness, inadequacy and lack of faith in their own abilities, while fruitlessly searching for the reason for the destructive emotions they experienced.

Retrospectively analyzing social relations, most patients experienced: lack of understanding from their family, inability to establish closer relationships with peers and unsatisfactory male-female relationships. All this translates into a sense of helplessness and lack of understanding and the presence of fear in everyday life. Aggressive and impulsive behaviors presented by young men are often the reason for their referral for assessment by a teacher or psychologist, resulting in an increase in their recognition. An additional factor delaying the correct diagnosis is the more frequent co-occurrence of other mental illnesses in women: eating disorders, affective disorders, anxiety. During the studies, all adult women were united by the fact that they felt a great sense of relief after receiving the ADHD diagnosis. An objectively determined cause of life failures by a specialist allows one to get rid of the burden of the eternal sense of guilt and self-criticism, leaving room for self-acceptance [11]. The data collected so far confirm a higher degree of overall impairment in the functioning of women with ADHD compared to the opposite sex [1]. Women affected by ADHD coped worse in the social and emotional sphere, while men coped worse in the mental sphere, which manifested itself in more difficult acquisition of new knowledge [1].

The clinical differences between adult men and women with ADHD are summarized in the table below to highlight gender-specific symptom profiles, diagnostic challenges, and psychosocial consequences.

Table 2. Comparison of ADHD manifestations in adult men and women

Clinical Feature	Men	Women
ADHD Type	Hyperactive-impulsive type (predominant)	Inattentive type (predominant)
Observable Symptoms in Childhood	Aggressiveness, impulsivity, disciplinary problems	Poor concentration, anxiety, low mood
Main Complaints in Adulthood	Difficulties in acquiring knowledge	Low self-esteem, depressive symptoms
Psychiatric Comorbidities	More common: conduct disorders, substance use	More common: affective, anxiety, and eating disorders
Risk of Sexual Abuse	Low	Increased
Self-Esteem and Emotional Consequences	More externalized symptoms, aggression	Feelings of guilt, inadequacy, hopelessness

Social Behavior	Impatience, interrupting conversations	Social withdrawal, relationship difficulties
Factors Delaying Diagnosis	Overt behavioral symptoms attract attention	Symptom masking, comorbidities, gender stereotypes

SYMPTOMS

ADHD is characterized by a triad of symptoms: inattention, hyperactivity, and impulsivity. All of this is the result of cognitive deficits, which are the main causative mechanism of this neurodevelopmental disorder. Previous studies allow us to conclude that the deficit of hyperactivity and impulsivity fades with age, while the deficit of attention is permanent. The disease also affects the area responsible for the executive function, which is so important in maintaining control over behavior and coordinating cognitive functions. Working memory, as an executive component, is commonly limited in ADHD patients in this disorder, which translates into difficulties in acquiring and organizing knowledge. The course of this syndrome in adults, due to obvious differences in everyday functioning, performing professional work, duties, and fulfilling specific social roles, is different than in children. The main symptoms mentioned by experts are: unsatisfactory results achieved in studies, failures at work, problems with creating relationships (partners, friends, family), recurring injuries, a greater tendency to addiction to alcohol and other psychoactive substances. In the context of work, ADHD manifests itself in disorganization, failure to complete started activities, making mistakes resulting from a lack of minimal caution. On the other hand, looking from the perspective of social relations, patients with ADHD are characterized by frequent interruptions during conversations resulting from impatience, and making inappropriate comments. A closer look at this list can lead to the conclusion that the presented symptoms and their consequences affect adults to a much more serious extent than children and adolescents. The unpleasant effects include: loss of job, deterioration of interpersonal relationships and loneliness, and finally damage to physical health. That is why it seems so important to draw attention to this disease entity from the perspective of the age group of adults. The comforting fact is that adults have greater skills in coping with difficulties encountered in everyday life (also resulting from the ADHD diagnosis) and learning through experience, which is absent in the youngest. The issue of the frequently observed tendency to risky behaviors in people suffering from ADHD, especially in the context of driving, remains worth attention. This results in more frequent road accidents, financial penalties and imprisonment [5]. A significant diagnostic problem in diagnosing ADHD is the frequent co-occurrence of other psychiatric disorders: disorders associated with the abuse of psychoactive substances (SUH), affective disorders, anxiety disorders and personality disorders such as antisocial and borderline personality. Previous studies indicate that up to 1 in 4 adults with SUH has ADHD co-occurring. The reason for this correlation is the similar triggering mechanisms of both diseases: imbalance of dopamine metabolism or weakened executive functions [15]. It should also be remembered that ADHD symptoms are often present in patients with autism spectrum disorders, which can affect up to 50% of patients [4]. A challenge for doctors is sometimes the similarity of ADHD symptoms to hypomania occurring in bipolar affective disorder (BD). The following factors speak in favor of BD: distraction, not inattention, overvalued thoughts, reduced need for sleep without accompanying fatigue, and lack of productive symptoms [16]. According to researchers, impulsivity, which is an element of the clinical picture of ADHD, may directly contribute to suicidal thoughts and attempts, as well as completed suicides [17]. The main risk factors include: the presence of psychiatric diseases (most often borderline personality disorder), suicides in relatives, inability to maintain relationships for at least 2 years, traumatic experiences in childhood - molestation or violence [12].

TREATMENT

ADHD therapy in adults is complex and includes both pharmacotherapy and psychoeducation and psychotherapy. According to the guidelines of the European Adult ADHD Network, the group of first-line drugs are stimulants, specifically methylphenidate [18]. Its main mechanism of action is the inhibition of dopamine reuptake [19]. It is characterized by rapid effectiveness, which translates into clinical improvement achieved shortly after starting therapy [20]. One of the most frequently reported side effects is loss of appetite, which leads to weight loss. The subsequent reduction in BMI would seem to reduce (in adults using the described drug) cardiovascular risk, however, the possible increase in blood pressure and heart rate determines the potential for an adverse effect of methylphenidate on the circulatory system. Cases of acute coronary syndrome with ST-segment elevation, ischemic stroke and increased cardiac troponins have been described as probable adverse effects in patients taking methylphenidate [18]. However, one of the conducted cohort studies indicates a small effect of methylphenidate on cardiovascular risk during the first six months of use. Furthermore, no difference was found in the occurrence of adverse cardiac events in patients with and without a history of cardiology. Currently, researchers tend to believe that the diagnosis of ADHD itself is a risk factor, regardless of the stimulant treatment used [21]. A serious

but rare adverse effect of stimulant therapy is psychosis due to increased dopamine concentration in the CNS. Studies suggest a higher incidence of this side effect in the adult group, dependent on the dose. The presence of an episode of psychosis in the patient's medical history and family history is important, as it significantly increases this risk [19]. The second group of drugs are non-stimulating agents, represented by atomoxetine - a selective presynaptic noradrenaline reuptake inhibitor [20, 22]. Its clear advantage is the lack of addictive potential, which distinguishes it from the first group of drugs. However, numerous studies prove the greater effectiveness of drugs stimulating the nervous system in comparison with non-stimulating drugs [20]. The course of sleep also changes under the influence of the applied pharmacotherapy, causing its quality to improve or deteriorate depending on individual predispositions [18]. The most recognized form of psychotherapy in the treatment of ADHD remains Cognitive Behavioral Therapy (CBT) [23].

## SUMMARY

Analyzing the above content, one can ask oneself the question - can ADHD in adults become a separate disease entity? A 4-year study available in the American Journal of Psychiatry from 2015 provided a groundbreaking answer: scientists found that only 10% of adults with ADHD had it in childhood. This fact leads to the revolutionary conclusion that the causes of this disease entity are different, depending on the age group [5].

It seems important to emphasize three pieces of information:

1. ADHD is a disease that affects the entire population, not limited to the pediatric group.
2. Statistics confirm the occurrence of ADHD to an equal extent in both women and men in adulthood.
3. The group of women, regardless of age, remains the most underdiagnosed group, which translates into poorer functioning of patients with ADHD.

Knowledge of risk factors and clinical picture allows for the identification of patients who should undergo screening tests for ADHD and change their fate in the future.

## CONCLUSIONS

To better understand and diagnose ADHD in adults, further, in-depth research is needed in several key areas. First of all, it is necessary to thoroughly investigate the basis of ADHD in adults, which will allow for a better understanding of the mechanisms behind this disorder. In this context, further miRNA studies are necessary to find a measurable ADHD marker that could significantly facilitate diagnosis. Furthermore, we need to develop methods for detecting ADHD, focusing more on the female gender. This is crucial because ADHD symptoms in women may be different and are often underdiagnosed. It is also important to clarify whether ADHD in adults is a separate disease entity or a continuation of ADHD from childhood, which has implications for the diagnostic and therapeutic approach.

Finally, due to the widespread use of methylphenidate in the treatment of ADHD, more studies are needed to confirm its safety in terms of cardiovascular risk. This will ensure the safety of patients taking this drug.

## AUTHOR CONTRIBUTIONS

Conceptualization: Magdalena Cyrkler; methodology: Aleksandra Maria Śledziewska; formal analysis: Aleksandra Drabik; investigation: Kamil Czerwiak; resources: Maciej Karasiński; data curation: Magda Lipian;; writing - original draft: Magdalena Cyrkler, Aleksandra Śledziewska, Aleksandra Drabik, Kamil Czerwiak, Kamila Sieradocha, writing - review and editing: Maciej Karasiński, Magda Lipian, supervision: Magdalena Cyrkler; project administration: Kamila Sieradocha

## ARTIFICIAL INTELLIGENCE DISCLOSURE

Artificial intelligence tools (e.g., ChatGPT, OpenAI) were used to assist with language editing, structural refinement, and the formulation of selected textual segments (e.g., background synthesis, objectives, conclusions). All AI-assisted content was critically reviewed, fact-checked, and finalized by the authors.

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