

RENATA ZUBRZYCKA

Maria Curie-Skłodowska University in Lublin

<https://orcid.org/0000-0003-3816-0790>

ANNA WOJNARSKA

The State University of Applied Sciences in Tarnobrzeg

<https://orcid.org/0000000340968940>

ALLERGY AND ADHD IN CHILDREN – COMMON AREAS*

Introduction: The article presents a traditional review with elements of a systematic review concerning two common disorders affecting children's health and development: allergic diseases and ADHD. The frequency of allergic diseases is estimated at approximately 25%, while ADHD affects around 10-15% of children. The influence of allergies on the genesis of ADHD may be both direct (resulting from the clinical picture of nosological entity) and indirect, related to the results of treatment.

Research Aim: The aim of the study is to analyze allergic diseases and ADHD in children in connection with their co-occurrence, mutual relations, as well as causes and effects in the field of education.

Evidence-based Facts: The direction of the relationship has not yet been clearly established; therefore, the hypothesis of bidirectional association between allergy and ADHD has emerged. The reviewed literature indicates a frequent common etiology, mainly neurobiological, similarities in behavioral and emotional symptoms, which may be modified by psychosocial factors.

Summary: Despite discrepancies among the findings of various studies, the high frequency of co-occurrence of allergic diseases and ADHD should be acknowledged. This should serve as an important indication for physicians, psychologists, educators, and parents, highlighting the need for interdisciplinary diagnosis.

Keywords: allergy, ADHD, etiology, diagnosis, children, psycho-educational practice

* Suggested citation: Zubrzycka, R., & Wojnarska, A. (2026). Allergy and ADHD in Children – Common Areas. *Lubelski Rocznik Pedagogiczny*, 45(3), 181–200. <http://dx.doi.org/10.17951/lrp.2026.45.3.181-200>

INTRODUCTION

Over the past two decades, an increasing number of studies have reported the coexistence of developmental disorders and somatic diseases in children. Particular attention has been devoted to investigating the associations between allergic diseases of various forms, such as bronchial asthma (BA), allergic rhinitis (AR), atopic dermatitis (AD), food allergies (FA), mixed allergic conditions, and attention deficit hyperactivity disorder (ADHD). The occurrence of abovementioned nosological conditions continues to rise. Exploration of potential relationships between allergic conditions and mental health outcomes is one of the current directions in interdisciplinary research concerning children with allergic diseases (Xu et al., 2025). An analysis of bibliometric data (PubMed) demonstrates that, over the past decade, the number of publications addressing this issue has increased almost fourfold, from 155 to 565 indexed articles.

Allergy is defined as

an excessive response of the immune system to allergens that do not affect healthy individuals but are recognized as ‘dangerous’ in susceptible individuals, thereby stimulating immune cells such as lymphocytes, mast cells, and eosinophils to initiate a protective response of the organism. The most common allergens include tree and grass pollen, mold spores, food allergens, cat and dog dander, hymenoptera insects’ venom, and house dust mites. (Gupta et al., 2018; Kleine-Tebbe et al., 2016, as cited in Rosada et al., 2021 p. 3)

Atopy, in turn, refers to an acquired or inherited tendency (characteristic) to increased – relative to the general population – production of immunoglobulin E (IgE) which constitutes a fundamental mechanism underlying allergic reactions (Pawliczak, 2013). In Poland, the prevalence of atopy is estimated at approximately 40%, although not all individuals exhibit clinically significant symptoms (Kowal, 2013).

Allergic rhinitis (AR) is defined as “a (chronic) inflammatory process, usually IgE-dependent, induced by environmental allergens. It is characterized by the presence of inflammatory cells in the mucosa and submucosa. [...]” (Emeryk & Bartkowiak-Emeryk, 2011, p. 12). Treatment strategies include: patient and caregiver education, allergen elimination and avoidance of irritants, pharmacotherapy, and allergen immunotherapy administered either sublingually or subcutaneously (Samoliński et al., 2013, as cited in Emeryk et al., 2024).

Bronchial asthma (BA) is described as “an inflammatory disease of the airways leading to bronchial hyperresponsiveness and variable airway obstruction, manifested by recurrent episodes of dyspnea, cough, wheezing, and chest tightness that resolve spontaneously or with treatment” (Emeryk et al., 2010, p. 37).

The treatment of asthma is directed twofold:



- 1) to achieve and maintain symptom control, enabling patients to participate in normal daily activities (including physical exercise);
- 2) to minimize the risk of exacerbations, treatment-related adverse effects, and irreversible airway obstruction. These objectives are pursued through stepwise pharmacotherapy (preferred path and an alternative one), patient education, and, in selected cases vaccination and rehabilitation (GINA, 2024; Pawliczak et al., 2023, as cited in Emeryk et al., 2024).

Atopic dermatitis (AD) is a “chronic, recurrent inflammatory skin disease, usually beginning in early childhood, characterized by severe pruritus, typical localization, and characteristic morphology of lesions, frequently coexisting with other atopic diseases” (Silny, 2012, as cited in Millan & Mijas, 2017, p. 114).

Epidemiological studies conducted in Poland as part of the ECAP (Epidemiology of Allergic Diseases in Poland) project, involving children aged 6-7 years (N = 4,510) and adolescents aged 14-15 years (N = 4,721), demonstrated the presence of allergic rhinitis in 24% of children and 30% of adolescents, while bronchial asthma was identified in 18.8% of children and 16.1% of adolescents (Samoliński et al., 2014). Numerous studies have further confirmed that varying factors such as agricultural rural environments, traffic-related air pollution, tobacco smoke exposure, climate change, pet ownership, and occupational exposures are associated with elevated IgE levels and an increased risk of allergic diseases (Hao et al., 2025).

Developmental disorders, currently classified as neurodevelopmental disorders, emerge during childhood and/or adolescence and are associated with disturbances in developmental processes. The diagnosis of these disorders depends on the severity, frequency, and duration of symptoms (Bialecka-Pikul, 2007). According to ICD-11 (WHO, 2024), neurodevelopmental disorders include autism spectrum disorder (ASD), learning disorders, speech and language disorders, disorders of intellectual development, developmental coordination disorder, and Attention Deficit Hyperactivity Disorder (ADHD).

ADHD is a chronic mental health disorder with distinct behavioral symptoms (Kołakowski et al., 2007). It is defined by other terms (e.g., psychomotor hyperactivity disorder), but the terminology and diagnostic criteria have been standardized since the publication of the DSM-III in 1960 (DSM-IV, currently DSM-5) and in ICD-10 (currently ICD-11; see Januszewska & Januszewski, 2016). The core symptoms of ADHD are grouped into three criteria domains regarding inattention, hyperactivity, and impulsivity in thinking and emotions. The severity and configuration of these symptoms may vary (Gorzkowska & Samochowiec, 2012). Several modifications were introduced in DSM-5, including raising the age by which symptoms must first be present from 7 to 12 years (Szewczuk-Bogusławska & Flisiak-Antonijczuk, 2013).

The incidence of ADHD in the general population is estimated at approximately 10-15%, with 0.5-10% (average 3.7%) among children (Chorążka et al., 2015).



75% of children diagnosed with ADHD present at least one comorbid disorder, including adjustment disorder. A precise clinical diagnosis yields lower rates, while a tentative screening diagnosis significantly increases them.

It should be emphasized that the search for links between ADHD and allergic diseases has a relatively long tradition. In 1954 and 1958, Frederic Speer published two papers on a new clinical entity, which he termed allergic tension-fatigue syndrome (SATFS). It was characterized by physical symptoms such as constitutional allergic condition, excessive sweating, paleness, subfrontal edema, headaches, excessive tearing, salivation, and urinary urgency; and behavioral symptoms such as tension, restlessness, hyperactivity, hyperkinesia, aggressive irritability, excessive anxiety, fatigue, and various types of pain. Speer pioneered a psychosomatic approach to allergic diseases. ADHD was first mentioned in the DSM-III in 1960, leading to the hypothesis that SATFS might be a form of allergy. In 1989, Marshall highlighted biochemical brain mechanisms, explaining the relationship between the above disorders, based on an imbalance in cholinergic-adrenergic activity, which is crucial for the functioning of the nervous system. This position has been criticized, but in recent years, clinical studies have revealed connections between histamine and serotonin, explaining, among other things, the mechanism of inflammation (Blasco-Fontecilla, 2023). Further research into the origins of both problems focused on finding biomarkers of allergy, which included immunoglobulin E (IgE). Attention was drawn to the fact that the histaminergic system is a complex one involved in physiological functions such as energy and endocrine homeostasis, digestion, the sleep-wake cycle, cognition, attention, and immunoregulation between them. Excessive histamine causes symptoms of toxicity, leading to the destruction of inflamed organs (Blasco-Fontecilla, 2023; Zawilski, 2022).

Classifications of the causes of psychomotor hyperactivity disorder primarily emphasize the heredity of this disorder, which is among the highest in psychiatry (approximately 70%), as well as problems with nerve impulse transmission caused by neurotransmitter imbalances (Kołakowski et al., 2007). The first medical studies in this field suggested a clearly organic basis for this phenomenon. Further exploration of the causes of the problem focused on biochemical and neuropsychological studies (Gaidamowicz et al., 2018). A common genetic basis for allergies and ADHD is suggested by a polymorphism of the dopamine D5 receptor gene (DRD5), which is associated with ADHD and also participates in the immunological regulation of the differentiation process of Th17 cells, responsible for the development of asthma (August, 1996, as cited in Miayzaki et al., 2017).



RESEARCH PROBLEM AND AIM

The aim of this study is to analyze two health and developmental disorders characterized by high epidemiological rates: allergy and ADHD, in the context of their co-occurrence, interrelationships, and causes and consequences in the field of education for children and adolescents. In the diagnostic process, both medical diagnosis, based on international catalogues, and psychopedagogical diagnosis are important – allowing to identify the impact of ADHD and allergies on the psychosocial functioning of children and adolescents. To achieve this goal, the following research questions were formulated:

1. What is the frequency of co-occurrence of allergic diseases and ADHD?
2. What are the etiological factors of allergic diseases and ADHD?
3. What are the symptoms of the co-occurrence of these developmental disorders?

METHODOLOGY

The contemporary landscape of scientific information management reflects a wide variety of research approaches, including quantitative, qualitative, and mixed methods. Researchers also employ diverse data collection techniques, such as surveys, psychological tests, and clinical diagnostic tools, particularly when studies include medical variables. In addition, a range of statistical procedures is used to analyze the resulting data.

Meta-analysis is a statistical method that involves the synthetic and systematic analysis of multiple scientific studies on the same topic. Its goal is to find general conclusions and unify research results, which can often be contradictory or ambiguous (<https://pogotowiestatystyczne.pl/slowniki/metaanaliza/>). In turn, “a characteristic of the systematic review method is that the entire process of obtaining, evaluating, and synthesizing the literature should be thoroughly documented and conducted according to strictly defined standards” (Tranfield et al., 2003, as cited in Orłowska et al., 2017, p. 235). This is intended to minimize review bias and provide the reader with insight into the procedure adopted by the authors.

In this study, we decided to use a traditional review model, enriched with elements of a systematic review (Orłowska et al., 2017), to present the global scientific achievements regarding the comorbidity of allergies and ADHD in the context of the interrelationships between the variables studied and to clarify the nature of these associations. The criteria for group selection (age, gender, cultural background) and their size form additional variables that modify the picture of the ADHD-allergy relationship. The practical implications of their use and the limited representation of this topic in the Polish literature provide the rationale for this analysis.



After formulating the research questions, we selected the following databases (available, among others, through university sources): PubMed, EBSCO, and Google Scholar. The following keywords (free-text terms) were used as search filters: ADHD, allergy, ADHD and allergy, etiology, neurodevelopmental disorders. Peer-reviewed and indexed sources in Polish and English were considered. These included systematic review articles and meta-analyses of empirical studies on children and adolescents conducted within the last ten years. Traditional or narrative review articles, used in the introduction and discussion of the results, were also analyzed.

We excluded the articles that were theoretical reviews, typically essay-style, and those that were older than the specified timeframe. We also excluded studies whose topics did not fit within the research questions. As a result of this exploration, eight articles were identified, meeting the inclusion criteria assessed by both authors. The obtained results are presented in a table later in the article, accompanied by a critical commentary.

EVIDENCE-BASED FACTS

Co-occurrence of ADHD and Allergic Diseases – Area of Diagnosis

The results of empirical studies presented in Table 1 below indicate the co-occurrence of allergic diseases and ADHD.

Table 1
Co-occurrence of allergic diseases and attention deficit hyperactivity disorder (ADHD) – summary of research results conducted using systematic review and meta-analysis procedures

Research authors	Methods	Inclusion criteria	Number of initially analyzed records and number of included publications (number of people)	Main conclusions from the research
------------------	---------	--------------------	---	------------------------------------

Chua et al. (2021)	Systematic review of research.	Review of articles for epidemiological links. Examination of the relationship between: a) allergy and neurodevelopmental disorders: allergy and ADHD, allergy and ASD; b) factors influencing the studied variables	Initially, there were 1,459 records on the association between allergy and neurodevelopmental disorders, and 17,915 records on common factors influencing the variables studied. Ultimately, 15 and 88 studies, respectively, were included in the review. Study group sizes ranged from 770 to 354,916 (US).	There is a strong and significant association between the occurrence of allergies and neurodevelopmental disorders. Longitudinal studies confirm that allergy diagnosed early in life is a strong predictor of ADHD and ASD later in life. Children with asthma are twice as likely to develop ADHD as children without asthma. For atopic dermatitis, allergic rhinitis, and asthma, correlations with ADHD are significant at $p < 0.05$ to $p < 0.001$. There is no direct evidence linking factors such as maternal depression and anxiety, maternal allergy status, diet, exposure to environmental pollution, microbiome dysbiosis, and sleep disorders with either allergy or neurodevelopmental disorders.
Wei al. (2025)	Systematic review of studies and meta-analysis.	Observational studies published in full-text articles (peer-reviewed) regarding AR, ADHD and ASD variables.	Baseline: 852 records, 18 selected (five cross-sectional, six case-control, seven cohort). Eleven studies analyzed ADHD as a dependent variable, AR as an independent variable, and seven studies analyzed ADD in reverse roles.	Individuals with allergic rhinitis have a 1.83-fold higher risk of developing ADHD than individuals without AR; at the same time, the AR risk ratio increases in patients with diagnosed ADHD, confirming the bidirectional nature of the association. The presence of AR also poses a risk of developing ASD. Women with AR are more likely to have comorbid allergies and ADHD than men. Children ≤ 8 years of age have a higher risk of developing ADHD than children > 8 years of age.



Wang et al. (2024)	Systematic review of studies and meta-analysis (PRISMA).	Databases: MEDLINE, EMBASE, Cochrane Library, PubMed. Cross-sectional and controlled trials; children and adolescents <18 years of age; formal diagnosis of ADHD and AR.	Initial: 1,183 records; 12 selected; N = 530,360. Two studies concerned the prevalence of ADHD in groups with and without AR, 10 – the prevalence of AR in groups with and without ADHD.	There is a significant correlation between AR and ADHD, which increases with the application of strict methodological rigor. Women with ADHD are more susceptible to AR than men. There is a significantly higher risk of AR comorbidity in children with ADHD aged 9-15 years. The association is stronger in Asian populations. Treatment for AR reduces the severity of ADHD, and ADHD therapy may reduce the severity of AR, but this bidirectionality has not been clearly confirmed.
Wang et al. (2025)	Systematic review of studies and meta-analysis (PRISMA, MOOSE).	Databases: PubMed, Embase, Cochrane Library, Web of Science, PsychInfo, LILACS. Observational studies (retro- and prospective cohort, cross-sectional, and case-control) with a formal diagnosis of ADHD and AD.	Baseline: 1,452 records; 49 selected (18 cohort, 10 case-control, 21 cross-sectional). Populations: Europe, Asia, North America.	Individuals with atopic dermatitis have a 1.34-fold higher risk of developing ADHD than individuals without AD; the prevalence of AD increases in individuals with ADHD, confirming a bidirectional relationship. Individuals with a family history of allergy have a higher risk of ADHD. More severe AD with sleep disturbances and co-occurring atopic disorders is associated with an increased risk of developing ADHD.

So et al. (2025)	Systematic review of studies and meta-analysis.	Retrospective observational and longitudinal (peer-reviewed) studies on the relationship between health disorders (allergies, asthma, glucocorticoids, eczema, head injuries, infections, malnutrition, sleep disorders) and ADHD in children 0-17 years of age. Diagnosis of health disorders at least 6 months before the diagnosis of ADHD.	Initial: 208 records; 57 selected (1978-2021); N = 253,423 children (Asia, Australia, Europe, Americas).	Risk factors for ADHD (dichotomous and continuous measurement) include head injuries, infections, and sleep disorders; and in the case of dichotomous measurement only, allergies. BA and AD were not significantly associated with ADHD.
Penchev et al. (2025)	Systematic review of studies and meta-analysis.	Databases: PubMed, Scopus, Cochrane Central. Observational studies and randomized clinical trials of children with and without BA; at least one indication of attention and memory deficits measured with a validated instrument.	Initial: 1,786 records; seven selected; N = 104,975 (10,200 with BA); mean age nine years.	Children with BA have an increased risk of attention deficits compared to healthy children. Children with BA do not differ from children without BA in terms of memory function.

van der Schans et al. (2017)	Systematic review of studies and meta-analysis (PRISMA).	Databases: Medline, Embase, PsycInfo. Observational studies (cross-sectional quantitative and longitudinal qualitative) on the comorbidity of BA, AD and/or AR, and ADHD; age 0-17 years; control group.	Baseline: 961 records; 28 studies in quantitative synthesis, nine in qualitative synthesis; N = 80-226,550.	A significantly higher risk of ADHD co-occurrence in children with atopic diseases, as well as the reverse relationship, has been confirmed. Individuals with atopic diseases have a 30% to 50% increased risk of developing ADHD later in life.
Miyazaki et al. (2017)	Systematic review of studies and meta-analysis (PRISMA).	Databases: MEDLINE, EMBASE, Cochrane, CINAHL. Population-based case-control studies of children <18 years of age; formal diagnosis of ADHD.	Initial: 250 records; five selected; N = 61,811 (Germany, Korea, Great Britain, Taiwan, Thailand).	Children with ADHD have an 80% higher risk of developing asthma than children without ADHD. There is a possible genetic link between ADHD and asthma (low-quality evidence). There is no association between food allergy and ADHD.

Note. Author's own study. BA – bronchial asthma; AR – allergic rhinitis; AD – atopic dermatitis; ASD – autism spectrum disorder; ADHD – attention deficit hyperactivity disorder.

Summarizing the analysed studies, it can be stated that:

- The research methodology was based on meta-analysis, longitudinal, cross-sectional, retrospective, and prospective studies, observational studies, and case-control studies.
- The study locations were China, Taiwan, Sweden, USA, South America, and Australia; relatively few studies in Europe.
- The study group sizes ranged from several hundred to several hundred thousand individuals.
- The studies examined the unidirectional allergy-ADHD and ADHD-allergy relationships, as well as, less frequently, the bidirectional relationship.
- The criterion for the existence of an allergic disease was confirmed by a medical diagnosis.
- The most frequently analyzed allergic diseases included: asthma, allergic rhinitis, and atopic dermatitis.

- The ADHD criterion was met by various diagnostic methods with varying degrees of measurement sensitivity.
- The relationships were verified using correlation coefficients, regression, and frequency levels (%).
- The strength of the relationships was found to be higher in Asian populations.
- Additional etiological factors (cited below) were detected, increasing comorbidity rates.
- All meta-analyses were conducted collaboratively.

Studies of the comorbidity of ADHD and allergic diseases, as illustrated in Table 1 above, were conducted in two directions. The frequency of ADHD in children and adolescents with allergies or allergies in the group diagnosed with ADHD was analyzed.

Analysis of the results revealed that the risk of developing ADHD symptoms in children with diagnosed allergies is several times higher than in control groups, with allergic rhinitis being the strongest predictor. Women with allergic rhinitis are more likely to have comorbid ADHD than men (Wei et al., 2025). Shyu et al. (2012) emphasize the importance of age and gender in the studied children, finding that the highest risk of developing the disease appears between six and eleven years of age and most often affects boys.

This association was stronger in large cohort studies in Asian populations (Wang et al., 2024). The more allergy risk factors present, the higher the likelihood of developing ADHD. The coexistence of allergic rhinitis and ADHD may act as mutual risk factors (Wang et al., 2024; Wei et al., 2025). In the case of AD, BA, and FA, iron deficiency anemia plays a role in the genesis of ADHD and other neurodevelopmental disorders (Wang et al., 2018). Significant bilateral associations are found between AD, AR, BA, and ADHD symptoms (Xin Yi et al., 2024). Age is also a variable differentiating the relationship. The highest risk of developing ADHD was observed in children with allergies aged eight years and under (Wei et al., 2025). The concomitant occurrence of ARs and eczema is more strongly correlated with the occurrence of ADHD than asthma (Wang et al., 2018). Treatment of AR significantly reduces the severity of ADHD (Wang et al., 2024).

Children with ADHD are significantly more likely to have BA, AR, and AD than children without ADHD (Miayzaki et al., 2017). Adolescents with ADHD and BA were significantly more likely to experience unipolar or bipolar depression (Chen et al., 2014). Children diagnosed with ADHD also exhibited symptoms of AD in as many as 45% of cases (Budzińska-Kostańska, 2015).

Despite abundant statistical evidence for a significant relationship between allergy and ADHD, many researchers consider it controversial. Nevertheless, numerous similarities in etiological mechanisms and symptoms may be important in the treatment of both disorders. The lack of consistency between the results of



studies on the comorbidity of allergic diseases may stem from the selection of too small study groups or imprecise measurement methods.

Co-occurrence of ADHD and Allergic Diseases – The Area of Etiology

The Neurobiological Basis of ADHD and Allergies

Research on the anatomy and function of the brain in neurodevelopmental disorders has allowed for the precise identification of cortical structures and regions responsible for the development of symptoms of hyperactivity and/or attention deficits. Neuroimaging studies have revealed distinct differences in the brain structure of individuals with ADHD, expressed in dopamine receptor density, differences in white matter, and the rate of maturation of cortical regions. These differences concern the prefrontal region, striatum, posterior parietal cortex, temporal cortex in the left hemisphere, and certain regions of the magnum (Borkowska, 2008, p. 44).

An imbalance between neurotransmitters such as norepinephrine and dopamine has been demonstrated, which affects the reception and transmission of information and is associated with disruptions in the secretion of serotonin, which is responsible for mood regulation (Goodman, 2010). Deficiencies in this neurotransmitter are associated with impulsivity, inappropriate, and aggressive behavior (Barkley, 2020). It is worth emphasizing the presence of similar neurobiological mechanisms in genesis and course of allergic diseases. It should be recognized that allergy and ADHD may share a common mechanism and represent connections between the nervous system and the immune system through the action of histamine and serotonin.

Histamine is a crucial mediator for the development of allergy symptoms. Once it reaches the subcutaneous tissue, it causes discomfort and pain, and in chronic inflammation, it leads to damage to organ microstructures (Zawilski, 2022). Histamine receptors have a comprehensive effect on the nervous system: H1: frontal cortex, thalamus, nucleus coeruleus, raphe nuclei, stellate cells; H2: frontal cortex, hippocampus, amygdala, basal ganglia; H3: the entire nervous system; H4: hematopoietic stem cells. A deficiency of the enzyme DAO (diamine oxidase), which breaks down histamine, leads to its accumulation and can trigger significant symptoms of ADHD and associated disorders (Blasco-Fontecilla, 2023, p. 9).

Serotonin affects the immune system and modulates inflammatory and allergic diseases. Patients with ADHD have higher levels of allergic and inflammatory markers such as IgE, histamine, CBC parameters, and serotonin (5-HT) than healthy controls (Wang et al., 2018). The immunopathological hypothesis that ADHD may be an inflammatory and immunological disease is undoubtedly one of the important concepts explaining the potential relationship between allergy and ADHD (Instanes et al., 2017; Zou & Wang et al., 2017, as cited in Xu et al., 2022).

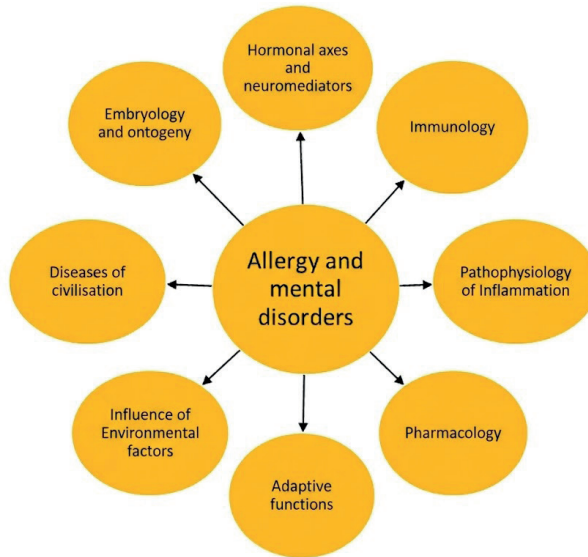
The etiology of ADHD is recognized as multidimensional. The simultaneous occurrence of multiple risk factors increases the likelihood of developing the di-



sorder. In recent years, researchers in countries such as China, Taiwan, the United States, and Sweden have sought to identify a common underlying basis for ADHD and allergic diseases.

Figure 1

Additional etiological factors



Note. Source: Zawilski, 2022, p. 81.

Figure 1 above illustrates the complexity of common etiological factors of allergies and mental disorders, including ADHD. In addition to the neurobiological and biochemical basis, the analysis of the etiology of ADHD and allergic diseases also highlights the importance of additional factors that act as mediators in the development of the analyzed disorders, including psychosocial and lifestyle factors. Chua et al. (2021) demonstrated that maternal mental health (depression and anxiety), maternal diabetes during pregnancy, maternal allergic conditions, and environmental factors such as diet, exposure to environmental pollutants, gut microbiota (i.e., the balance of microorganisms in the gut), and sleep disorders may play a role. In children with AR, these factors may lead to functional deficits in specific brain areas involved in the pathophysiology of ADHD (Bush, 2005, as cited in: Wei et al., 2025).

Common Symptoms of ADHD and Allergic Diseases

The impact of ADHD can play a crucial role in a student's academic functioning, family relationships, and social interactions. Studies of individuals with ADHD have

shown a strong tendency to develop behavioral disorders, primarily oppositional defiant disorder, as well as mental disorders such as mood disorders, anxiety, depression, and bipolar disorder (Chen et al., 2014). Allergy, regardless of comorbid ADHD, is also associated with psychosocial problems, which may manifest as chronic fatigue and attention deficits. According to Tibosch et al. (2011), academic functioning is hampered by behavioral disorders, particularly internalizing disorders such as anxiety, withdrawal, and excessive control; students are less likely to exhibit aggression, acting out, and lack of control. Students with allergies also have been found to have reduced cognitive function (Papapostolou et al., 2021), impaired learning, especially in mathematics (Urschitz et al., 2003), poorer exam results (Sanchez et al., 2018), and absenteeism (Schneider, 2020). Analyses indicate the occurrence of common behavioral and cognitive symptoms in children with allergic diseases and ADHD, such as tic disorders, compulsive behavior, and anxiety (Chen et al., 2013, 2014).

According to the current guidelines of the Global Initiative for Asthma (GINA, 2020), stressful situations can worsen asthma symptoms in both children and adults. The guidelines also indicate that stress may contribute to poor adherence to asthma treatment. Consequently, GINA recommends considering psychological interventions as part of the therapeutic approach for people with asthma.

SUMMARY

A review of articles, primarily meta-analyses/systematic reviews, provided answers to the research questions. The frequency of comorbid allergic diseases and ADHD was several times higher than in healthy individuals (without allergies). The percentages in the dual-diagnosis groups were also several times higher than in the comparison groups. ADHD symptoms were most common in children with asthma and/or allergic rhinitis. Discrepancies between the results of various studies are related to their methodological basis (methods used, sample size, recruitment method, medical classification of the disease).

In the etiology of allergies and ADHD, similar factors related to the immune and endocrine systems have been identified. Histamine is particularly important, as it moderates the functioning of the nervous system through a network of numerous connections, thus generating symptoms similar to ADHD. Although the search for causes focused on biochemical factors, additional psychosocial and ecological variables were also considered. More in-depth analyses would likely allow for the identification of the type of relationship between the factors. Given the emerging criticism of unidirectional cause-and-effect analyses, greater research interest in exploring bidirectional relationships is to be expected.

The common symptomatology of allergies and ADHD includes emotional and behavioral disorders such as restlessness, chronic fatigue, difficulty concentrating,



impulsivity, sleep disorders, anxiety, depression, and bipolar disorder. Identifying the common threads between allergies and ADHD in children has practical implications for treatment and psycho-educational therapy. This knowledge allows for the use of medications that can help alleviate disruptive behaviors by alleviating symptoms. Prevention is crucial not only for disseminating information regarding the causes and effects of these links, but also (following the example of countries where meta-analyses were conducted) creating interdisciplinary research teams and intensifying exploration of the biopsychosocial aspects of allergic diseases and neurodevelopmental disorders, including ADHD.

CONCLUSIONS

Recommendations for Psychopedagogical Practice – Diagnosis and Intervention

Diagnosis of developmental disorders should be multi-stage and interdisciplinary, encompassing a medical assessment of the child's general health, neurological and psychiatric examinations. Furthermore, a clinical psychological assessment should be conducted, with attention paid to the manifestations of emotional, social, and intellectual disorders (Emeryk et al., 2018). It appears that knowledge about the specific psychosocial effects of allergies is insufficiently disseminated among medical and educational staff, as well as parents of children with allergies. Increasing their awareness of the risk of specific cognitive and/or emotional-social disruptions in children with allergies may improve the effectiveness of treatment and education processes.

The legal basis for assistance provided to students with allergic diseases is regulated by the EAACI guidelines: the management of the allergic child at school (Muraro et al., 2010) – practically not widespread in Poland, as well as a number of ministerial documents: Announcement of the Minister of Health of November 3, 2022, regarding recommendations for the care of students with anaphylaxis, bronchial asthma, allergic rhinitis, atopic dermatitis and urticaria at school; Art. 21, section 3 of the Act of April 12, 2019, on health care for students and the Regulation of the Minister of National Education of August 9, 2017, on the principles of organizing and providing psychological and pedagogical assistance in public kindergartens, schools and other institutions (Journal of Laws of 2023, item 1798). Strengthening teachers' education in the field of implementation of the above formal and legal solutions seems to be a significant challenge for practice and it is worth including the conclusions from global research on the common areas of allergies and ADHD presented in the article in the content of training programs.

It is also important to increase parents' knowledge of practical ways to cope with the burden of multiple consequences of the disease in children, as the mental state of caregivers may impact the effectiveness of allergy treatment and therapy



for problems co-occurring with the disease or resulting from it. This proposal is supported by the Shared Decision Making (SDM) perspective, currently promoted in theory and clinical practice, which emphasizes the need to consider a broad, non-medical context in rehabilitation (Elwyn et al., 2012). The increasing epidemiological indicators of allergies and ADHD, as well as the results of meta-analyses and systematic reviews undoubtedly justify the strengthening of Polish explorations in the discussed area and the popularization and use of the accumulated knowledge in educational practice.

REFERENCES

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. <https://doi.org/10.1176/appi.books.9780890425596>
- Barkley, R. A. (2020). *ADHD. Podjąć wyzwanie. Kompletny przewodnik dla rodziców*. Wydawnictwo Uniwersytetu Jagiellońskiego.
- Białecka-Pikul, M. (2007). O potrzebie nowego spojrzenia na zaburzenia rozwoju. *Sztuka Leczenia*, 14(2), 13–24.
- Blasco-Fontecilla, H. (2023). Is histamine and not acetylcholine the missing link between ADHD and allergies? Speer allergic tension fatigue syndrome revisited. *Journal of Clinical Medicine*, 12(16), Article 5350. <https://doi.org/10.3390/jcm12165350>
- Borkowska, A. R. (2008). *Procesy uwagi i hamowania reakcji u dzieci z ADHD z perspektywy neuropsychologii klinicznej*. Wydawnictwo Uniwersytetu Marii Curie-Skłodowskiej w Lublinie.
- Budzińska-Kostańska, A. (2015). *Alergia pokarmowa, kontaktowa i powietrzнопochodna u dzieci z zespołem nadpobudliwości psychoruchowej z deficytem uwagi* [Rozprawa doktorska, Uniwersytet Medyczny w Poznaniu].
- Chen, M. H., Su, T. P., Chen, Y. S., Hsu, J. W., Huang, K. L., Chang, W. H., & Bai, Y. M. (2013). Attention-deficit/hyperactivity disorder, tic disorder, and allergy: Is there a link? A nationwide population-based study. *Journal of Child Psychology and Psychiatry*, 54(5), 545–551. <https://doi.org/10.1111/jcpp.12018>
- Chen, M. H., Su, T. P., Chen, Y. S., Hsu, J. W., Huang, K. L., Chang, W. H., & Bai, Y. M. (2014). Higher risk of mood disorders among adolescents with ADHD and asthma: A nationwide prospective study. *Journal of Affective Disorders*, 156, 232–235. <https://doi.org/10.1016/j.jad.2013.10.053>
- Chen, K., Zheng, X., Li, Z., Xiang, H., Chen, B., & Zhang, H. (2019). Risk factors analysis of attention-deficit/hyperactivity disorder and allergic rhinitis in children: A cross-sectional study. *Italian Journal of Pediatrics*, 45(1), 99. <https://doi.org/10.1186/s13052-019-0703-1>
- Chorążka, K., Miłkowska, P., Łoza, B., & Polikowska, M. (2015). Rozpowszechnienie zespołu nadpobudliwości psychoruchowej we współczesnym świecie. *Neuropsychiatria i Neuropsychologia*, 7(1), 25–30.



- Elwyn, G., Frosch, D., Thomson, R., Joseph-Williams, N., Lloyd, A., Kinnersley, P., Cording, E., Tomson, D., Dodd, C., Rollnick, S., Edwards, A., & Barry, M. (2012). Shared decision making: A model for clinical practice. *Journal of General Internal Medicine*, 27(10), 1361–1367. <https://doi.org/10.1007/s11606-012-2077-6>
- Emeryk, A., Bartkowiak-Emeryk, M., & Kurzawa, R. (2010). Symptomatologia i klasyfikacja astmy. In A. Emeryk, A. Bręborowicz, & G. Lis (Eds.), *Astma i choroby obturacyjne oskrzeli u dzieci* (pp. 37–48). Elsevier Urban & Partner.
- Emeryk, A., & Bartkowiak-Emeryk, M. (2011). Definicja i podział alergicznego nieżytu nosa. In A. Emeryk (Ed.), *Alergiczny nieżyt nosa u dzieci* (pp. 11–16). Termedia.
- Emeryk, A., Wojnarska, A., & Zubrzycka, R. (2018). Interdyscyplinarność w diagnozie i terapii dzieci z chorobami alergicznymi układu oddechowego. *Pielęgniarstwo i Zdrowie Publiczne*, 8(4), 305–312. <https://doi.org/10.17219/pzp/90353>
- Emeryk, A., Chról, M., & Emeryk-Maksymiuk, J. (2024). Diagnozowanie i leczenie alergicznego nieżytu nosa i astmy w POZ. *Alergoprofil*, 20(2), 8–16. <https://doi.org/10.24292/01.AP.202140624>
- Gaidamowicz, R., Deksnytė, A., Palinauskaitė, K., Aranauskas, R., Kasiulevičius, V., & Šapoka, V. (2018). ADHD – plaga XXI wieku? *Psychiatria Polska*, 52(2), 287–307. <https://doi.org/10.12740/PP/67111>
- Global Initiative for Asthma. (2024). *Global strategy for asthma management and prevention*. <https://www.ginasthma.org>
- Goodman, D. W. (2010). Czarna księga ADHD. *Psychiatria po Dyplomie*, 4(3), 12–32.
- Gorzowska, I., & Samochowiec, J. (2012). Historia zaburzenia hiperkinetycznego (ADHD) na świecie i przed ICD-10 i DSM-IV-TR. *Psychiatria*, 9(3), 91–99.
- Hao, Y., Yang, Y., Zhao, H., Chen, Y., Zuo, T., Zhang, Y., You, H., Cui, L., & Song, X. (2025). Multi-omics in allergic rhinitis: Mechanism dissection and precision medicine. *Clinical Reviews in Allergy & Immunology*, 68(1), Article 19. <https://doi.org/10.1007/s12016-025-09028-3>
- Januszewska, E., & Januszewski, A. (2016). Nadpobudliwość psychoruchowa — kryteria diagnostyczne, przebieg i trudności na różnych etapach rozwoju. *Rocznik Filozoficzny Ignatianum*, 22(2), 28–51.
- Kołąkowski, A., Wolańczyk, T., Pisula, A., Skotnicka, M., & Bryńska, A. (2007). *ADHD – zespół nadpobudliwości psychoruchowej*. Gdańskie Wydawnictwo Psychologiczne.
- Kowal, K. (2013). Epidemiologia chorób alergicznych. In R. Pawliczak (Ed.), *Alergologia. Kompendium* (pp. 61–67). Termedia.
- Mazur, Z., & Orłowska, A. (2018). Jak zaplanować i przeprowadzić systematyczny przegląd literatury. *Polskie Forum Psychologiczne*, 23(2), 235–251. <https://doi.org/10.14656/PFP20180202>
- Millan, M., & Mijas, J. (2017). Atopowe zapalenie skóry – patomechanizm, diagnostyka, postępowanie lecznicze, profilaktyka. *Nowa Pediatria*, 21(4), 114–122. <https://doi.org/10.25121/NP.2017.21.4.114>

- Miyazaki, C., Koyama, M., Ota, E., Swa, T., Mlunde, L. B., Amiya, R. M., Tachibana, Y., Yamamoto, H., & Mori, R. (2017). Allergic diseases in children with attention-deficit/hyperactivity disorder: A systematic review and meta-analysis. *BMC Psychiatry*, 17(1), Article 120. <https://doi.org/10.1186/s12888-017-1281-7>
- Muraro, A., Clark, A., Beyer, K., Borrego, M., Borres, M., Lødrup Carlsen, K. C., & Zanchetti, M. (2010). The management of the allergic child at school. *Allergy*, 65(6), 681–689. <https://doi.org/10.1111/j.1398-9995.2010.02343.x>
- Obwieszczenie Ministra Zdrowia z dnia 3 listopada 2022 r. w sprawie zaleceń postępowania dotyczących opieki nad uczniami z anafilaksją, astmą oskrzelową, alergicznym nieżytem nosa, atopowym zapaleniem skóry i pokrzywką w szkole (M.P. 2022 poz. 1083).
- Orłowska, A., Mazur, Z., & Łaguna, M. (2017). Systematyczny przegląd literatury: Na czym polega i czym różni się od innych przeglądów. *Ogrody Nauk i Sztuk*, 7, 350–363. <https://doi.org/10.15503/onis2017.350.363>
- Papapostolou, G., Kiotseridis, H., Romberg, K., Dahl, Å., Bjermer, L., Lindgren, M., Aronsson, D., Tunsäter, A., & Tufvesson, E. (2021). Cognitive dysfunction and quality of life during pollen season in children with seasonal allergic rhinitis. *Pediatric Allergy and Immunology*, 32(1), 67–76. <https://doi.org/10.1111/josh.12877>
- Pawliczak R. (2013). Patofizjologia chorób IgE -zależnych. In R. Pawliczak (Ed), *Alergologia. Kompendium* (pp. 41-60). Termedia
- Pogotowie Statystyczne. (b.d.). *Metaanaliza*. Słownik pojęć. Retrieved 12 January 2026 from <https://pogotowiestatystyczne.pl/slowniki/metaanaliza/>
- Rosada, T., Napiórkowska-Baran, K., Al-Ska, E., Baranowska, K., & Bartuzi, Z. (2021). Alergia jako maska pierwotnych niedoborów odporności. *Alergia Astma Immunologia – Przegląd Kliniczny*, 26(1), 2–9.
- Rozporządzenie Ministra Edukacji Narodowej z dnia 9 sierpnia 2017 r. w sprawie zasad organizacji i udzielania pomocy psychologiczno-pedagogicznej w publicznych przedszkolach, szkołach i placówkach (Dz.U. 2023 poz. 1798).
- Samoliński, B., Raciborski, F., Lipiec, A., Tomaszewska, A., Krzych-Fałta, E., Samel-Kowalik, P., Walkiewicz, A., Lusawa, A., Borowicz, J., Komorowski, J., Samolińska-Zawisza, U., Sybilski, A. J., Piekarska, B., & Nowicka, A. (2014). Epidemiologia chorób alergicznych w Polsce (ECAP). *Alergologia Polska – Polish Journal of Allergology*, 1, 10–18. <https://doi.org/10.1016/j.alergo.2014.03.008>
- Schneider, T. (2020). Asthma and academic performance among children and youth in North America: A systematic review. *Journal of School Health*, 90(4), 319–342. <https://doi.org/10.1111/josh.12877>
- Shyu, C. S., Lin, H. K., Lin, C. H., & Fu, L. S. (2012). Prevalence of attention-deficit/hyperactivity disorder in patients with pediatric allergic disorders: A nationwide, population-based study. *Journal of Microbiology, Immunology and Infection*, 45(3), 237–242. <https://doi.org/10.1016/j.jmii.2011.11.008>
- Szewczuk-Bogusławska, M., & Flisiak-Antonijczuk, H. (2013). Czy zmiana kryteriów ułatwi rozpoznanie ADHD u dorosłych? *Psychiatria Polska*, 47(2), 293–302.



- Tibosch, M. M., Verhaak, C. M., & Merkus, P. J. F. M. (2011). Psychological characteristics associated with the onset and course of asthma in children and adolescents: A systematic review of longitudinal effects. *Patient Education and Counseling*, 82(1), 11–19. <https://doi.org/10.1016/j.pec.2010.03.011>
- Ustawa z dnia 12 kwietnia 2019 r. o opiece zdrowotnej nad uczniami (Dz.U. 2019 poz. 1078).
- Urschitz, M. S., Guenther, A., Eggebrecht, E., Wolff, J., Urschitz-Duprat, P. M., Schlaud, M., & Poets, C. F. (2003). Snoring, intermittent hypoxia and academic performance in primary school children. *American Journal of Respiratory and Critical Care Medicine*, 168(4), 464–468. <https://doi.org/10.1164/rccm.200212-1397OC>
- Wang, L. J., Yu, Y. H., Fu, M., Yeh, W. T., Hsu, J., Yang, Y. H., Chen, W. J., Chiang, B. L., & Pan, W. H. (2018). Attention-deficit/hyperactivity disorder is associated with allergic symptoms and low levels of hemoglobin and serotonin. *Scientific Reports*, 8, Article 10229. <https://doi.org/10.1038/s41598-018-28702-5>
- Wang, Q., Wang, R., Li, M., Liang, J., Zhan, X., Lu, Y., Huang, G., & Gu, Q. (2024). The relationship between allergic rhinitis and attention-deficit/hyperactivity disorder: A systematic review and meta-analysis. *PeerJ*, 12, e18287. <https://doi.org/10.7717/peerj.18287>
- Wei, J., Li, Y., Wu, Q., Lei, B., & Gui, X. (2025). Bidirectional association between allergic rhinitis and attention-deficit/hyperactivity disorder: A systematic review and meta-analysis. *Journal of Affective Disorders*, 369, 499–507. <https://doi.org/10.1016/j.jad.2024.10.032>
- World Health Organization. (2024). *International statistical classification of diseases and related health problems* (11th ed.). World Health Organization.
- Xu, X., Li, S., Chen, Y., Deng, X., Li, J., Xiong, D., & Xie, H. (2025). Association between allergic diseases and mental health conditions: An umbrella review. *Journal of Allergy and Clinical Immunology*, 155(3), 701–713. <https://doi.org/10.1016/j.jaci.2024.10.030>
- Zawilski, Z. M. (2022). Alergia i zaburzenia emocjonalne w populacji pediatrycznej – analiza potencjalnych związków przyczynowo-skutkowych. *Przegląd Pediatryczny*, 51(1), 70–82. <https://doi.org/10.26625/10093>

ALERGIA I ADHD U DZIECI – OBSZARY WSPÓLNE

Wprowadzenie: Artykuł zawiera przegląd tradycyjny z elementami przeglądu systematycznego dotyczący dwóch częstych zaburzeń w stanie zdrowia i rozwoju: chorób alergicznych oraz ADHD u dzieci, których częstość występowania jest szacowana w przypadku alergii - 25%, w przypadku ADHD na około 10-15%. Oddziaływane alergii na genozę ADHD może być zarówno bezpośrednie (uwarunkowane obrazem klinicznym określonej jednostki nozologicznej), jak i pośrednie związane ze skutkami leczenia.

Cel badań: Celem pracy jest analiza alergii i ADHD u dzieci w kontekście ich współwystępowania, wzajemnych relacji, a także przyczyn i konsekwencji w obszarze edukacji.

Stan wiedzy: Kierunek zależności jest nadal nieustalony, dlatego pojawia się hipoteza o dwu-



kierunkowym powiązaniu ADHD i alergii. Dokonany przegląd wskazuje na częstą wspólną etiologię, głównie neurobiologiczną, zbieżność objawów behawioralnych i emocjonalnych modyfikowanych przez czynniki psychospołeczne.

Podsumowanie: Pomimo rozbieżności między wynikami różnych badań należy uznać wysoką częstotliwość współwystępowania chorób alergicznych i ADHD. Powinno to być istotną wskazówką dla lekarzy, psychologów i pedagogów oraz rodziców, co wskazuje na potrzebę interdyscyplinarnej diagnozy.

Słowa kluczowe: alergia, ADHD, etiologia, diagnoza, dzieci, praktyka psychopedagogiczna

