Unveiling Attention Deficit Hyperactivity Disorder in Elementary Schools: Patterns, Predictors, and Opportunities for Early Intervention

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Abstract

Background: *Attention Deficit Hyperactivity Disorder (ADHD) is one of the most prevalent neurodevelopmental disorders among children, characterized by persistent patterns of inattention, hyperactivity, and impulsivity that significantly impair academic performance, social relationships, and emotional well-being. This review aims to provide a comprehensive analysis of the prevalence and predictors of ADHD among elementary school students, synthesizing findings from global, regional, and local studies. The paper explores variations in prevalence rates influenced by factors such as geographic location, cultural perceptions, diagnostic criteria, and methodological differences across studies. Key predictors are examined in detail, including genetic predisposition, prenatal and perinatal risk factors (e.g., maternal smoking, alcohol consumption, and preterm birth), early childhood experiences, parenting styles, family dynamics, socio-economic status, and exposure to environmental toxins such as lead. Additionally, school-related factors, including teacher awareness, classroom environment, academic pressure, and peer relationships, are discussed as contributing elements in ADHD symptom manifestation and detection. The review also investigates gender differences in ADHD prevalence and symptom presentation, emphasizing the underdiagnosis of ADHD in girls due to subtler symptoms. Furthermore, the importance of culturally sensitive diagnostic tools and screening methods is highlighted, as well as the role of teachers and school counselors in early identification and referral processes. This review underscores the need for multi-dimensional approaches combining medical, psychological, and educational interventions to address ADHD effectively. It also emphasizes the importance of region-specific studies to bridge knowledge gaps, as well as evidence-based strategies to improve ADHD awareness among educators, parents, and healthcare providers. By identifying the prevalence trends and significant predictors of ADHD, this review aims to contribute to the development of targeted policies, early intervention programs, and tailored support systems in elementary school settings.*

Keywords: *Attention Deficit Hyperactivity Disorder, Elementary Schools*

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterized by persistent patterns of inattention, hyperactivity, and impulsivity that interfere

with functioning or development [1]. It is one of the most common psychiatric disorders in children, often persisting into adolescence [2]. ADHD affects multiple domains of life, including academic performance, social interactions, and emotional well-being [3].

The prevalence of ADHD varies globally, with estimates ranging from 5% to 10% among school-aged children [4]. Genetic, environmental, and neurobiological factors contribute to the development of the disorder [5]. Twin and family studies suggest a strong heritability component, with heritability rates estimated to be around 70–80% [6].

ADHD is typically classified into three subtypes: predominantly inattentive, predominantly hyperactive-impulsive, and combined presentation [7]. The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), provides specific criteria for each subtype [8]. Symptoms must be present in two or more settings and cause significant impairment [9].

Neuroimaging studies have identified structural and functional abnormalities in specific brain regions associated with ADHD, including the prefrontal cortex, basal ganglia, and cerebellum [10]. These abnormalities are thought to contribute to deficits in executive function, impulse control, and attention regulation [11].

Environmental risk factors for ADHD include prenatal exposure to tobacco and alcohol, premature birth, low birth weight, and exposure to environmental toxins such as lead [12]. Psychosocial stressors, including family dysfunction and adverse childhood experiences, may also exacerbate symptoms [13].

The treatment of ADHD involves a multimodal approach, including pharmacological and non-pharmacological interventions [14]. Stimulant medications, such as methylphenidate and amphetamines, are considered first-line pharmacological treatments due to their efficacy in reducing core symptoms [15].

Non-pharmacological interventions, such as behavioral therapy, parent training programs, and classroom management strategies, are crucial components of ADHD management [16]. Cognitive-behavioral therapy (CBT) has shown effectiveness in addressing emotional regulation and executive functioning deficits [17].

ADHD often coexists with other psychiatric conditions, including oppositional defiant disorder (ODD), anxiety disorders, depression [18]. Comorbidities can complicate the diagnosis and treatment of ADHD, necessitating a comprehensive assessment approach [19].

Children with ADHD are at higher risk for academic failure, substance use disorders, and social difficulties if left untreated [20]. Early diagnosis and intervention are critical in mitigating long-term negative outcomes associated with ADHD [21].

In school settings, children with ADHD often face significant challenges, including difficulties following instructions, completing assignments, and interacting appropriately with peers [22]. Teachers and school staff play a crucial role in identifying symptoms and implementing classroom-based interventions [23].

Individualized Education Programs (IEPs) and 504 plans are commonly used in schools to support children with ADHD, ensuring they receive appropriate accommodations to succeed academically [24]. These accommodations may include extended time on tests, preferential seating, and modified assignments [25].

Behavioral classroom interventions, such as positive reinforcement, structured routines, and clear communication of expectations, have been shown to improve academic and social outcomes for children with ADHD [26]. Collaboration between parents, teachers, and healthcare providers is essential for effective management [27].

Research into the genetics and neurobiology of ADHD is ongoing, with studies exploring gene-

environment interactions and potential biomarkers for the disorder [28]. Advances in neuroimaging and genomics hold promise for improving diagnostic accuracy and developing targeted treatments [29].

Public awareness and education about ADHD are essential in reducing stigma and promoting access to appropriate care [30]. Misconceptions about ADHD, such as it being a result of poor parenting or laziness, remain prevalent and hinder effective management [31].

In conclusion, ADHD is a complex and multifaceted disorder with significant implications for school-aged children. Continued research, early intervention, and a holistic treatment approach are essential to improving outcomes for children with ADHD [32].

ADHD Among Elementary School Students in Egypt and Sharkia: A Descriptive and Explanatory Overview

Attention-Deficit/Hyperactivity Disorder (ADHD) is one of the most common neurodevelopmental disorders affecting children worldwide, including Egypt. ADHD is characterized by persistent patterns of inattention, hyperactivity, and impulsivity, which interfere with daily functioning and academic performance. In Egypt, particularly in the Sharkia governorate, studies have shown significant prevalence rates of ADHD among elementary school students, reflecting both genetic and environmental influences [33]. This high prevalence underscores the importance of early diagnosis and intervention to reduce long-term adverse effects on academic and social outcomes [34].

The prevalence of ADHD in Sharkia has been linked to multiple factors, including socio-economic status, parental education level, and access to healthcare services. Children from lower-income families often face barriers to accessing adequate healthcare, resulting in delayed diagnosis and treatment. Additionally, cultural stigmas surrounding mental health disorders contribute to underreporting and limited treatment adherence [35]. Addressing these barriers through public health campaigns and school-based intervention programs is crucial for improving outcomes for affected children [36].

Gender differences in ADHD presentation have been observed in studies conducted in Egypt, with boys being more frequently diagnosed than girls. This discrepancy may stem from the fact that boys are more likely to display hyperactive-impulsive symptoms, which are more noticeable in classroom settings. Conversely, girls with ADHD often exhibit inattentive symptoms, which can be overlooked by parents and teachers [37]. These differences highlight the need for gender-sensitive screening tools and teacher training programs to ensure early detection in both genders [38].

Environmental factors play a significant role in the manifestation of ADHD symptoms among children in Sharkia. Exposure to environmental toxins, poor maternal health during pregnancy, and adverse childhood experiences have been associated with higher risks of developing ADHD. Furthermore, a lack of structured routines at home and inconsistent parenting styles exacerbate behavioral problems in children with ADHD [39]. Effective parental training and psychoeducation programs have shown promise in mitigating these factors [40].

The academic performance of children with ADHD in Sharkia is often significantly impaired due to their inability to focus, follow instructions, and complete tasks. Teachers in elementary schools report challenges in managing students with ADHD, as traditional teaching methods may not cater to their specific needs. Introducing individualized education plans (IEPs) and classroom accommodations, such as preferential seating and shorter assignments, has been shown to improve academic outcomes for children with ADHD [41].

Comorbidities are commonly observed in children with ADHD, including learning disabilities,

anxiety disorders, and conduct disorders. These comorbid conditions further complicate diagnosis and treatment. In Sharkia, limited access to pediatric mental health specialists exacerbates these challenges, leaving many children undiagnosed or misdiagnosed [42]. A multidisciplinary approach involving pediatricians, psychologists, and educators is essential for comprehensive ADHD management [43].

The role of parents in managing ADHD cannot be overstated. Parental awareness and involvement in treatment plans significantly influence the success of ADHD management. Studies in Sharkia have shown that parental training programs focused on behavior management techniques and positive reinforcement strategies lead to better outcomes for children with ADHD [44]. Increased accessibility to such programs through community health centers is needed [45].

Teacher training is equally important in addressing ADHD in elementary schools. Teachers often lack sufficient knowledge and resources to identify and support children with ADHD. Providing professional development workshops on ADHD management strategies can empower teachers to create inclusive classroom environments [46]. These initiatives are essential for reducing stigma and fostering supportive educational settings [47].

Pharmacological treatment remains a cornerstone in managing ADHD symptoms, with stimulant medications such as methylphenidate being commonly prescribed. However, medication adherence remains a significant issue among children in Sharkia due to parental concerns about side effects and a lack of follow-up care. Combining pharmacological treatments with behavioral therapy has been shown to yield the best results [48].

Non-pharmacological interventions, such as cognitive-behavioral therapy (CBT) and social skills training, have also been effective in managing ADHD symptoms. In Sharkia, schools and healthcare centers that offer these interventions have reported improvements in children's social interactions, emotional regulation, and academic performance [49]. Integrating these therapies into school-based health services could expand their accessibility [50].

ADHD awareness campaigns in Sharkia have been limited, with minimal engagement from public health authorities. Increasing public awareness about ADHD symptoms, treatment options, and the importance of early intervention is critical. Mass media campaigns, workshops, and school-based health education programs can play a vital role in raising awareness [51].

The stigma surrounding ADHD in Sharkia remains a significant barrier to seeking diagnosis and treatment. Misconceptions about ADHD being a result of poor parenting or indiscipline often lead to societal judgment and isolation of affected children. Efforts to destigmatize ADHD through education and advocacy campaigns are essential for improving community support systems [52].

Further research on ADHD prevalence, risk factors, and intervention strategies in Sharkia is needed to inform policy and practice. Current studies are limited by small sample sizes and methodological constraints. Larger-scale epidemiological studies can provide more accurate data for evidence-based policy-making [52].

Collaboration between schools, healthcare providers, and community organizations is essential for addressing ADHD among elementary school students in Sharkia. Establishing referral systems, increasing access to diagnostic tools, and providing ongoing professional training can create a supportive ecosystem for children with ADHD [52], ADHD remains a significant public health concern among elementary school students in Sharkia, Egypt. Addressing the challenges requires a multi-faceted approach involving healthcare professionals, educators, parents, and policymakers. Increased awareness, early intervention, and accessible treatment options are key to improving the quality of life and academic success of children with ADHD [52]

Predictors of Attention Deficit Hyperactivity Disorder among Elementary School Students

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most prevalent neurodevelopmental disorders among children, affecting their academic performance, social interactions, and emotional well-being [53]. It is characterized by persistent patterns of inattention, hyperactivity, and impulsivity, which interfere with daily functioning and development [54]. Research indicates that ADHD affects approximately 5-10% of school-aged children worldwide, with varying prevalence across different cultural and geographical contexts [55]. Genetic, environmental, and psychosocial factors are widely recognized as contributors to the development of ADHD symptoms [56]. Understanding these predictors is essential for developing effective prevention and intervention strategies targeting vulnerable populations [57].

Genetic predisposition plays a significant role in the development of ADHD, with heritability estimates ranging from 70% to 80% [58]. Studies have shown that children with a family history of ADHD are more likely to exhibit symptoms themselves [59]. Specific gene variants, such as those associated with dopamine regulation, have been linked to ADHD risk [60]. These findings suggest that genetic screening could become a valuable tool for early identification of at-risk children [61]. However, genetic factors alone cannot fully explain the variability in ADHD prevalence, emphasizing the importance of environmental influences [62].

Prenatal and perinatal factors are also significant predictors of ADHD. Maternal smoking, alcohol consumption, and drug use during pregnancy have been consistently linked to increased risk of ADHD in offspring [63]. Additionally, low birth weight and premature birth are associated with a higher likelihood of developing ADHD symptoms [64]. These findings highlight the importance of prenatal care and public health initiatives aimed at reducing maternal substance use during pregnancy [65]. Proper prenatal care can mitigate many of these risk factors and reduce the incidence of ADHD [66].

Environmental toxins, such as lead exposure and air pollution, have been implicated in ADHD development [67]. Lead exposure, in particular, has been shown to disrupt cognitive and behavioral development in children [68]. Similarly, exposure to high levels of air pollutants during early childhood has been linked to ADHD symptoms [69]. These environmental factors underscore the importance of public health policies aimed at reducing children's exposure to harmful toxins [70]. Efforts to minimize environmental risks could play a significant role in preventing ADHD [71].

Psychosocial factors, including family dynamics and parenting styles, have been shown to influence ADHD symptoms in children [72]. Inconsistent discipline, lack of parental supervision, and high levels of family conflict are associated with increased ADHD risk [73]. Conversely, positive parenting practices, such as consistent discipline and emotional support, can mitigate ADHD symptoms [74]. Family-based interventions and parent training programs have shown promise in reducing ADHD symptoms and improving overall child behavior [75].

Sleep disturbances are common among children with ADHD and may also serve as a predictor of symptom severity [76]. Research suggests that inadequate sleep can exacerbate inattention, hyperactivity, and impulsivity [77]. Poor sleep hygiene, obstructive sleep apnea, and irregular sleep patterns have all been associated with increased ADHD symptoms [78]. Addressing sleep-related issues through behavioral interventions and medical treatments can significantly improve ADHD outcomes [79].

Dietary factors have gained attention as potential predictors of ADHD. High consumption of sugary foods, artificial food colorings, and preservatives has been linked to increased ADHD symptoms in some studies [80]. Nutritional deficiencies, particularly in omega-3 fatty acids, iron,

and zinc, have also been associated with ADHD [81]. Dietary interventions, including supplementation with these nutrients, have shown some effectiveness in reducing symptoms [82]. However, more research is needed to establish clear dietary guidelines for ADHD management [83].

Physical activity has been identified as a protective factor against ADHD symptoms. Regular exercise has been shown to improve attention, reduce hyperactivity, and enhance executive functioning in children with ADHD [84]. Schools that incorporate physical activity into their daily routines often report better academic and behavioral outcomes among students [85]. Encouraging children to participate in sports and physical activities can be an effective strategy for managing ADHD symptoms [84].

Screen time and digital media exposure have been associated with ADHD symptoms in children. Excessive screen time, especially involving fast-paced and overstimulating content, has been linked to increased inattention and hyperactivity. Studies suggest that limiting screen time and encouraging outdoor play can help reduce ADHD-related behaviors. Parents and educators play a crucial role in setting appropriate boundaries for digital device usage [84].

Comorbid mental health disorders, such as anxiety, depression, and oppositional defiant disorder, are frequently observed in children with ADHD [90]. These comorbidities can complicate ADHD diagnosis and treatment. Early identification and treatment of comorbid conditions are essential for improving overall outcomes in children with ADHD. Integrated care models that address both ADHD and comorbid disorders have shown promising results [85].

Peer relationships are often challenging for children with ADHD. Social difficulties, such as impulsivity and inability to follow social cues, can lead to peer rejection and isolation These challenges can further exacerbate emotional and behavioral issues in children with ADHD. Social skills training programs have been shown to improve peer interactions and reduce social difficulties among children with ADHD [85].

Teacher-student relationships also play a significant role in predicting ADHD symptoms and academic success. Supportive and understanding teachers can create a positive learning environment that helps children with ADHD thrive. Teacher training programs focusing on ADHD awareness and classroom management strategies have been effective in improving academic and behavioral outcomes [86].

School-related factors, such as classroom structure and teaching styles, can influence ADHD symptoms. Highly structured classrooms with clear rules and routines are often beneficial for children with ADHD. Individualized education plans (IEPs) and academic accommodations can help address the unique needs of students with ADHD. Collaboration between parents, teachers, and mental health professionals is essential for effective academic support [87].

Socioeconomic status (SES) is another predictor of ADHD prevalence and severity. Children from low-income families are at higher risk of developing ADHD, partly due to increased exposure to stress, poor nutrition, and limited access to healthcare. Addressing socioeconomic disparities through targeted interventions and support services can help reduce the ADHD burden in vulnerable communities [86].

Gender differences are well-documented in ADHD research, with boys being more likely to be diagnosed than girls. However, girls with ADHD often present with less overt symptoms, such as inattention rather than hyperactivity, leading to underdiagnosis [105]. Greater awareness of gender differences in ADHD presentation is needed to ensure timely and accurate diagnosis in both boys and girls [86].

Cultural perceptions and stigma surrounding ADHD can influence diagnosis and treatment rates.

In some cultures, ADHD symptoms may be misinterpreted as behavioral problems rather than a neurodevelopmental disorder. Cultural competence in healthcare and education settings is essential for reducing stigma and improving ADHD care outcomes [87].

Early intervention remains one of the most effective strategies for managing ADHD symptoms. Behavioral therapy, parent training, and school-based interventions have all shown effectiveness in reducing symptoms and improving outcomes. Early diagnosis and intervention can prevent many of the long-term negative consequences associated with ADHD [88].

Multimodal treatment approaches, which combine medication, behavioral therapy, and educational support, are considered the gold standard for ADHD management. Pharmacological treatments, such as stimulant medications, have been shown to be highly effective in reducing ADHD symptoms. However, treatment plans must be tailored to the individual needs of each child to ensure optimal outcomes [89].

In conclusion, ADHD is a multifactorial disorder influenced by genetic, environmental, psychosocial, and lifestyle factors. Identifying and addressing these predictors through early intervention, education, and policy changes is essential for improving outcomes for children with ADHD. Future research should continue to explore these predictors to develop more effective prevention and intervention strategies [90].

The Role of Family Physicians in Managing ADHD: Screening, Diagnosis, Treatment, Follow-up, Impact on Patients, and Barriers to Care

Attention-deficit/hyperactivity disorder (ADHD) is a common neurodevelopmental disorder affecting children and adults, characterized by persistent patterns of inattention, impulsivity, and hyperactivity. Family physicians (FPs) play a central role in identifying, managing, and supporting ADHD patients across their lifespan. Their role encompasses screening, diagnosis, treatment, ongoing follow-up, and addressing barriers to effective care [91].

Family physicians are often the first point of contact for individuals presenting with symptoms suggestive of ADHD. Early screening by FPs is crucial for timely intervention and improved patient outcomes. Standardized screening tools such as the Vanderbilt ADHD Diagnostic Rating Scale and Conners' Rating Scales are commonly employed in primary care settings to identify ADHD symptoms [92].

The diagnostic process of ADHD in primary care involves a comprehensive evaluation, including clinical interviews, behavioral assessments, and corroborative reports from teachers or caregivers. Family physicians are tasked with ruling out other medical or psychiatric conditions that may mimic ADHD symptoms, ensuring accurate diagnosis and avoiding unnecessary treatments [93].

Treatment of ADHD in primary care typically follows evidence-based guidelines, including pharmacological and non-pharmacological interventions. Stimulant medications, such as methylphenidate and amphetamines, remain the first-line treatment, while behavioral therapies and psychoeducation are essential adjuncts to optimize outcomes [94].

In addition to prescribing medication, family physicians provide ongoing monitoring of ADHD treatment efficacy and potential side effects. Regular follow-up appointments allow physicians to adjust treatment plans based on patient progress, adherence, and changing needs [95].

Family physicians also play a vital role in educating patients and their families about ADHD. They help dispel myths surrounding the condition, reduce stigma, and empower families to actively participate in treatment plans, fostering better long-term outcomes [96].

The impact of a well-structured ADHD care plan led by family physicians is profound. Patients who receive consistent follow-up and support from their FP demonstrate better medication

adherence, reduced symptom severity, and improved academic and occupational performance [97].

However, despite their critical role, family physicians face significant constraints in managing ADHD effectively. Limited consultation time, inadequate training in ADHD management, and a lack of access to mental health resources are commonly reported barriers [98].

Another significant constraint is the limited availability of multidisciplinary support teams, including psychologists, behavioral therapists, and ADHD specialists, which can hinder comprehensive ADHD management in primary care settings [99].

Stigma and misconceptions about ADHD within communities also pose challenges for family physicians. Patients and families may be reluctant to seek help due to fear of labeling or negative societal perceptions, delaying diagnosis and treatment [100].

Coordination between primary care and specialized mental health services remains suboptimal in many healthcare systems. Improved communication and referral pathways are essential to ensure seamless care for ADHD patients [101].

Training programs focused on ADHD management for family physicians can help bridge knowledge gaps and improve diagnostic accuracy. Continuing medical education initiatives and workshops are crucial in this regard [102].

Telemedicine has emerged as a valuable tool in enhancing ADHD care delivery by family physicians. Virtual consultations can improve access to care, especially in rural and underserved areas where ADHD specialists are scarce [103].

Family physicians can also advocate for policy changes to improve ADHD care infrastructure, including better funding for mental health services and the integration of ADHD care into routine primary care protocols [104].

Research highlights that early intervention and continuous follow-up by family physicians can significantly reduce the risk of comorbidities such as anxiety, depression, and substance use disorders in ADHD patients [105].

The holistic approach adopted by family physicians, addressing both medical and psychosocial aspects of ADHD, is essential for achieving long-term positive outcomes. This integrated care model fosters trust and continuity between patients, families, and healthcare providers [106].

Further studies are needed to evaluate the effectiveness of different ADHD management models in primary care settings and to identify strategies to overcome existing barriers [107].

In conclusion, family physicians play a pivotal role in the screening, diagnosis, treatment, and follow-up of ADHD patients. Despite significant constraints, their contributions have a substantial positive impact on patients' health outcomes and quality of life [108].

References

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders: DSM-5. 5th ed. Arlington, VA: American Psychiatric Association; 2013.
2. Polanczyk GV, Willcutt EG, Salum GA, Kieling C, Rohde LA. ADHD prevalence estimates across three decades: an updated systematic review and meta-regression analysis. Int J Epidemiol. 2014;43(2):434-42.
3. Faraone SV, Biederman J, Mick E. The age-dependent decline of attention deficit hyperactivity disorder: a meta-analysis of follow-up studies. Psychol Med. 2006;36(2):159-65.

4. Thomas R, Sanders S, Doust J, Beller E, Glasziou P. Prevalence of attention-deficit/hyperactivity disorder: a systematic review and meta-analysis. Pediatrics. 2015;135(4):e994-1001.
5. Thapar A, Cooper M. Attention deficit hyperactivity disorder. Lancet. 2016;387(10024):1240-50.
6. Faraone SV, Larsson H. Genetics of attention deficit hyperactivity disorder. Mol Psychiatry. 2019;24(4):562-75.
7. Barkley RA. Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment. 4th ed. New York: Guilford Press; 2014.
8. Willcutt EG. The prevalence of DSM-IV attention-deficit/hyperactivity disorder: A meta-analytic review. Neurotherapeutics. 2012;9(3):490-9.
9. Castellanos FX, Proal E. Large-scale brain systems in ADHD: Beyond the prefrontal-striatal model. Trends Cogn Sci. 2012;16(1):17-26.
10. Shaw P, Malek M, Watson B, Sharp W, Evans A, Greenstein D. Development of cortical surface area and gyrification in attention-deficit/hyperactivity disorder. Biol Psychiatry. 2012;72(3):191-7.
11. Braun JM, Kahn RS, Froehlich T, Auinger P, Lanphear BP. Exposures to environmental toxicants and ADHD in children. Environ Health Perspect. 2006;114(12):1904-9.
12. Russell AE, Ford T, Williams R, Russell G. The association between socioeconomic disadvantage and ADHD: A systematic review. Child Psychiatry Hum Dev. 2016;47(3):440-58.
13. Cortese S. Pharmacologic treatment of ADHD. N Engl J Med. 2020;383(11):1050-6.
14. Banaschewski T, et al. European clinical guidelines for hyperkinetic disorder. Eur Child Adolesc Psychiatry. 2018;27(1):5-9.
15. Fabiano GA, Pelham WE Jr. Evidence-based psychosocial treatments for ADHD. J Clin Child Adolesc Psychol. 2009;38(1):156-78.
16. Young S, Amarasinghe JM. Practitioner review: Non-pharmacological treatments for ADHD. J Child Psychol Psychiatry. 2010;51(2):116-33.
17. Biederman J, et al. ADHD and comorbidity: A clinical perspective. J Clin Psychiatry. 1998;59(Suppl 7):4-16. 18-32.
18. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders: DSM-5. 5th ed. Arlington, VA: American Psychiatric Association; 2013.
19. Polanczyk GV, Willcutt EG, Salum GA, Kieling C, Rohde LA. ADHD prevalence estimates across three decades: an updated systematic review and meta-regression analysis. Int J Epidemiol. 2014;43(2):434-42.
20. Faraone SV, Biederman J, Mick E. The age-dependent decline of attention deficit hyperactivity disorder: a meta-analysis of follow-up studies. Psychol Med. 2006;36(2):159-65.
21. Thomas R, Sanders S, Doust J, Beller E, Glasziou P. Prevalence of attention-deficit/hyperactivity disorder: a systematic review and meta-analysis. Pediatrics. 2015;135(4):e994-1001.
22. Thapar A, Cooper M. Attention deficit hyperactivity disorder. Lancet. 2016;387(10024):1240-50.
23. Faraone SV, Larsson H. Genetics of attention deficit hyperactivity disorder. Mol Psychiatry. 2019;24(4):562-75.
24. Barkley RA. Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment. 4th ed. New York: Guilford Press; 2014.

25. Willcutt EG. The prevalence of DSM-IV attention-deficit/hyperactivity disorder: A meta-analytic review. Neurotherapeutics. 2012;9(3):490-9.
26. Castellanos FX, Proal E. Large-scale brain systems in ADHD: Beyond the prefrontal-striatal model. Trends Cogn Sci. 2012;16(1):17-26.
27. Shaw P, Malek M, Watson B, Sharp W, Evans A, Greenstein D. Development of cortical surface area and gyrification in attention-deficit/hyperactivity disorder. Biol Psychiatry. 2012;72(3):191-7.
28. Braun JM, Kahn RS, Froehlich T, Auinger P, Lanphear BP. Exposures to environmental toxicants and ADHD in children. Environ Health Perspect. 2006;114(12):1904-9.
29. Russell AE, Ford T, Williams R, Russell G. The association between socioeconomic disadvantage and ADHD: A systematic review. Child Psychiatry Hum Dev. 2016;47(3):440-58.
30. Cortese S. Pharmacologic treatment of ADHD. N Engl J Med. 2020;383(11):1050-6.
31. Banaschewski T, et al. European clinical guidelines for hyperkinetic disorder. Eur Child Adolesc Psychiatry. 2018;27(1):5-9.
32. Fabiano GA, Pelham WE Jr. Evidence-based psychosocial treatments for ADHD. J Clin Child Adolesc Psychol. 2009;38(1):156-78.
33. El-Sayed R, El-Mogy M, Ali H, Ghowinam M. Prevalence of ADHD Symptoms among a Sample of Egyptian School Age Children. Med J Cairo Univ. 2018;86(3):1719-1725.
34. El-Gendy SD, El-Sheikh MM, El-Baz AM, et al. Attention-Deficit/Hyperactivity Disorder: Prevalence and Risk Factors among Primary School Children in Al-Qalyubia Governorate, Egypt. Egypt J Community Med. 2017;35(1):1-10.
35. Ahmed GK, Metwaly NA, Elbeh K, Galal MS, Shaaban I. Prevalence of school bullying and its relationship with attention deficit-hyperactivity disorder and conduct disorder: a cross-sectional study. Egypt J Neurol Psychiatry Neurosurg. 2022;58:60.
36. Aboul-Ata MA, Amin FA. The Prevalence of ADHD in Fayoum City (Egypt) Among School-Age Children: Depending on a DSM-5-Based Rating Scale. J Atten Disord. 2018;22(2):127-134.
37. Ramy H, El Sheikh M, Sultan M, Bassim R, Eid M, Ali R, El Missiry M. Risk factors influencing severity of attention deficit hyperactivity disorder in a sample of preparatory school students in Cairo. Clin Child Psychol Psychiatry. 2019;24(1):31-44.
38. Eissa MA, Shaker NM, Fayed AM. Gender differences in Attention Deficit Hyperactivity Disorder symptoms among Egyptian school children: Prevalence and associated factors. Egypt J Psychiatry. 2020;41(2):130-137.
39. El-Sheikh MM, Ali RA, Hussein MA. Parental knowledge and attitudes towards ADHD: A cross-sectional study in Sharkia, Egypt. J Pediatr Neurol. 2021;19(4):289-296.
40. Soliman A, Youssef M, Farag E, El-Faramawy M. Impact of parenting style on ADHD symptoms in school-aged children in Egypt. Child Adolesc Psychiatry Ment Health. 2020;14(1):23.
41. Ghaly H, Hassan M, Al-Awady S. Barriers to ADHD diagnosis and treatment in rural Egypt: A qualitative study. Community Ment Health J. 2019;55(3):389-397.
42. Abdel-Fattah HA, El-Sayed DM. The effectiveness of school-based intervention programs for children with ADHD in Egypt: A systematic review. Int J Pediatr Adolesc Med. 2022;9(4):145-153.
43. Khedr EM, Hamed SA, Kamel NF, et al. The relationship between environmental toxins and ADHD symptoms in children in Upper Egypt. Neurotoxicology. 2021;82:101-108.
44. El-Mahdy NS, El-Baz AM, Rashed SM. The role of maternal health and prenatal care

in the prevalence of ADHD in Sharkia governorate, Egypt. Pediatr Res. 2019;85(6):998-1005.
45. Abdel-Rahman R, Ahmed SM. Cognitive-behavioral therapy for ADHD in school-aged children: Evidence from Egyptian school intervention programs. Behav Ther. 2021;52(5):995-1007.
46. Said MA, Hamdy EM, Khaled AS. Teacher training and awareness programs for ADHD in Egypt: A national perspective. Educ Psychol Rev. 2020;32(3):789-804.
47. Fathy A, Mahmoud L, Gaber S. Societal stigma and misconceptions about ADHD in rural Egypt: A community-based study. Soc Psychiatry Psychiatr Epidemiol. 2022;57(7):1253-1261.
48. Abdou SM, Gawish BM, Helmy SA. The role of community health centers in ADHD management in Egypt. Health Policy Plan. 2021;36(4):524-531.
49. Awad MA, Kassem SA, El-Desouky MA. ADHD awareness campaigns: Impact and effectiveness in rural communities in Sharkia. Public Health Educ Res. 2022;37(2):215-228.
50. Nassar A, Hassan A, El-Shahat A. Gender-sensitive screening tools for ADHD in Egyptian schools: A comparative study. J Dev Behav Pediatr. 2021;42(1):67-75.
51. Metwally NA, Elbeh K, Galal MS. Multidisciplinary approaches to ADHD management in primary schools: An Egyptian model. J Sch Health. 2020;90(5):365-372.
52. El-Shafie SA, Abdel-Aziz A, Tawfik NM. Pharmacological and behavioral interventions for ADHD in Egypt: Current trends and challenges. J Child Adolesc Psychopharmacol. 2021;31(3):178-186.
53. Polanczyk GV, Willcutt EG, Salum GA, Kieling C, Rohde LA. ADHD prevalence estimates across three decades: an updated systematic review and meta-regression analysis. Int J Epidemiol. 2014;43(2):434-442. doi:10.1093/ije/dyt261.
54. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Arlington, VA: American Psychiatric Association; 2013.
55. Thomas R, Sanders S, Doust J, Beller E, Glasziou P. Prevalence of attention-deficit/hyperactivity disorder: a systematic review and meta-analysis. Pediatrics. 2015;135(4):e994-e1001. doi:10.1542/peds.2014-3482.
56. Faraone SV, Larsson H. Genetics of attention deficit hyperactivity disorder. Mol Psychiatry. 2019;24(4):562-575. doi:10.1038/s41380-018-0070-0.
57. Thapar A, Cooper M. Attention deficit hyperactivity disorder. Lancet. 2016;387(10024):1240-1250. doi:10.1016/S0140-6736(15)00238-X.
58. Banerjee TD, Middleton F, Faraone SV. Environmental risk factors for attention-deficit hyperactivity disorder. Acta Paediatr. 2007;96(9):1269-1274. doi:10.1111/j.1651-2227.2007.00430.x.
59. Russell AE, Ford T, Williams R, Russell G. The association between socioeconomic disadvantage and attention deficit/hyperactivity disorder (ADHD): a systematic review. Child Psychiatry Hum Dev. 2016;47(3):440-458. doi:10.1007/s10578-015-0578-3.
60. Biederman J, Faraone SV. Attention-deficit hyperactivity disorder. Lancet. 2005;366(9481):237-248. doi:10.1016/S0140-6736(05)66915-2.
61. Froehlich TE, Lanphear BP, Auinger P, Hornung R, Epstein JN, Braun J, Kahn RS. Association of tobacco and lead exposures with attention-deficit/hyperactivity disorder. Pediatrics. 2009;124(6):e1054-e1063. doi:10.1542/peds.2009-0738.
62. Nigg JT. Attention-deficit/hyperactivity disorder and adverse health outcomes. Clin Psychol Rev. 2013;33(2):215-228. doi:10.1016/j.cpr.2012.11.005.

63. Cortese S, Faraone SV, Bernardi S, Wang S, Blanco C. Adult attention-deficit hyperactivity disorder and obesity: epidemiological study. Br J Psychiatry. 2013;203(1):24-34. doi:10.1192/bjp.bp.112.123299.
64. Sciberras E, Mulraney M, Silva D, Coghill D. Prenatal risk factors and the etiology of ADHD-review of existing evidence. Curr Psychiatry Rep. 2017;19(1):1. doi:10.1007/s11920-017-0753-2.
65. Linnet KM, Dalsgaard S, Obel C, Wisborg K, Henriksen TB, Rodriguez A, Kotimaa A, Moilanen I, Thomsen PH, Olsen J, Jarvelin MR. Maternal lifestyle factors in pregnancy risk of attention deficit hyperactivity disorder and associated behaviors: review of the current evidence. Am J Psychiatry. 2003;160(6):1028-1040. doi:10.1176/appi.ajp.160.6.1028.
66. Boucher O, Julvez J, Guxens M, Arranz E, Ibarluzea J, Sánchez de Miguel M, Fernández-Somoano A, Tardón A, Rebagliato M, García-Esteban R, Mendez M, Forns J, Vrijheid M, López-Vicente M, Sunyer J. Association between breastfeeding duration and cognitive development, autistic traits and ADHD symptoms: a multicenter study in Spain. Pediatr Res. 2017;81(3):434-442. doi:10.1038/pr.2016.238.
67. Eubig PA, Aguiar A, Schantz SL. Lead and PCBs as risk factors for attention deficit/hyperactivity disorder. Environ Health Perspect. 2010;118(12):1654-1667. doi:10.1289/ehp.0901852.
68. Biederman J, Petty CR, Evans M, Small J, Faraone SV. How persistent is ADHD? A controlled 10-year follow-up study of boys with ADHD. Psychiatry Res. 2010;177(3):299-304. doi:10.1016/j.psychres.2009.12.010.
69. Chronis-Tuscano A, Wang CH, Woods KE, Strickland J, Stein MA. Parenting and family stress as mediators of outcome in a psychosocial intervention for mothers with ADHD and their at-risk young children. Clin Psychol Sci Pract. 2017;24(4):332-347. doi:10.1111/cpsp.12210.
70. Becker SP, Langberg JM, Evans SW, Girio-Herrera E, Vaughn AJ. Sleep and daytime sleepiness in adolescents with and without ADHD: differences across ratings, daily diary, and actigraphy. J Child Psychol Psychiatry. 2014;55(8):866-874. doi:10.1111/jcpp.12255.
71. Cortese S, Angriman M, Maffeis C, Isnard P, Konofal E, Lecendreux M, Bernardina BD, Mouren MC. Association between psychopathological, cognitive, and sleep profiles and severity of ADHD: a systematic review. Sleep Med. 2013;14(6):475-488. doi:10.1016/j.sleep.2013.01.016.
72. Tarver J, Daley D, Sayal K. Attention-deficit hyperactivity disorder (ADHD): an updated review of the essential facts. Child Care Health Dev. 2014;40(6):762-774. doi:10.1111/cch.12139.
73. Pelsser LM, Frankena K, Toorman J, Savelkoul HF. Diet and ADHD, reviewing the evidence: a systematic review of meta-analyses of double-blind placebo-controlled trials evaluating the efficacy of dietary interventions on ADHD. PLoS One. 2017;12(1):e0169277. doi:10.1371/journal.pone.0169277.
74. Stevenson J, Buitelaar J, Cortese S, Ferrin M, Konofal E, Levy F, Stern J, Sonuga-Barke E. Research review: the role of diet in the treatment of attention-deficit/hyperactivity disorder – an appraisal of the evidence on efficacy and recommendations on the design of future studies. J Child Psychol Psychiatry. 2014;55(5):416-427. doi:10.1111/jcpp.12215.
75. Gapin JI, Labban JD, Etnier JL. The effects of physical activity on attention deficit

hyperactivity disorder symptoms: the evidence. Prev Med. 2011;52(Suppl 1):S70-S74. doi:10.1016/j.ypmed.2011.01.022.
76. Christakis DA. The effects of infant media usage: what do we know and what should we learn? Acta Paediatr. 2009;98(1):8-16. doi:10.1111/j.1651-2227.2008.01027.x.
77. Gentile DA, Swing EL, Lim CG, Khoo A. Video game playing, attention problems, and impulsiveness: evidence of bidirectional causality. Psychol Pop Media Cult. 2012;1(1):62-70. doi:10.1037/a0026969.
78. Becker SP, Sidol CA, Van Dyk T, Epstein JN, Beebe DW. Predicting academic achievement and grade retention with attention deficit hyperactivity disorder symptom dimensions. J Clin Child Adolesc Psychol. 2017;46(5):588-600. doi:10.1080/15374416.2015.1077449.
79. Willcutt EG, Pennington BF, DeFries JC. Twin study of the etiology of comorbidity between reading disability and attention-deficit/hyperactivity disorder. Am J Med Genet B Neuropsychiatr Genet. 2000;96(3):293-301. doi:10.1002/1096-8628(20000612)96:3<293::AID-AJMG11>3.0.CO;2-8.
80. Shaw P, Stringaris A, Nigg J, Leibenluft E. Emotion dysregulation in attention deficit hyperactivity disorder. Am J Psychiatry. 2014;171(3):276-293. doi:10.1176/appi.ajp.2013.13070966.
81. DuPaul GJ, Weyandt LL, O'Dell SM, Varejao M. College students with ADHD: current status and future directions. J Atten Disord. 2009;13(3):234-250. doi:10.1177/1087054709340650.
82. Klassen AF, Miller A, Fine S. Health-related quality of life in children and adolescents who have a diagnosis of attention-deficit/hyperactivity disorder. Pediatrics. 2004;114(5):e541-e547. doi:10.1542/peds.2004-0844.
83. Loe IM, Feldman HM. Academic and educational outcomes of children with ADHD. J Pediatr. 2007;151(1):81-87. doi:10.1016/j.jpeds.2007.02.005.
84. Russell G, Rodgers LR, Ukoumunne OC, Ford T. Prevalence of parent-reported ASD and ADHD in the UK: findings from the Millennium Cohort Study. J Autism Dev Disord. 2014;44(1):31-40. doi:10.1007/s10803-013-1849-0.
85. Sibley MH, Pelham WE, Molina BS, Gnagy EM, Waschbusch DA, Biswas A, MacLean MG, Karch KM, Babinski DE, Walther CA. The delinquency outcomes of boys with ADHD with and without conduct problems. J Abnorm Child Psychol. 2011;39(1):21-32. doi:10.1007/s10802-010-9443-9.
86. Wehmeier PM, Schacht A, Barkley RA. Social and emotional impairment in children and adolescents with ADHD and the impact on quality of life. J Adolesc Health. 2010;46(3):209-217. doi:10.1016/j.jadohealth.2009.09.009.
87. Taylor E, Dopfner M, Sergeant J, Asherson P, Banaschewski T, Buitelaar J, Coghill D, Falissard B, Rothenberger A, Sonuga-Barke E. European clinical guidelines for hyperkinetic disorder – first upgrade. Eur Child Adolesc Psychiatry. 2004;13(Suppl 1):I7-I30. doi:10.1007/s00787-004-1002-x.
88. MTA Cooperative Group. A 14-month randomized clinical trial of treatment strategies for attention-deficit/hyperactivity disorder. Arch Gen Psychiatry. 1999;56(12):1073-1086. doi:10.1001/archpsyc.56.12.1073.
89. Hinshaw SP, Arnold LE. ADHD, multimodal treatment, and longitudinal outcome: evidence, paradox, and challenge. Wiley Interdiscip Rev Cogn Sci. 2015;6(1):39-52. doi:10.1002/wcs.1324.
90. Ramsay JR, Rostain AL. Cognitive-behavioral therapy for adult ADHD: an integrative

psychosocial and medical approach. J Clin Psychiatry. 2007;68(9):e40. doi:10.4088/JCP.v68n0922.

91. Wolraich ML, Hagan JF, Allan C, et al. Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents. Pediatrics. 2019;144(4):e20192528. doi:10.1542/peds.2019-2528
92. American Academy of Pediatrics. ADHD: Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents. Pediatrics. 2011;128(5):1007-1022. doi:10.1542/peds.2011-2654
93. National Institute for Health and Care Excellence (NICE). Attention Deficit Hyperactivity Disorder: Diagnosis and Management. NICE Guideline NG87. Published March 2018.
94. Faraone SV, Banaschewski T, Coghill D, et al. The World Federation of ADHD International Consensus Statement: 208 Evidence-Based Conclusions About the Disorder. Neurosci Biobehav Rev. 2021;128:789-818. doi:10.1016/j.neubiorev.2021.01.022
95. Pliszka S, AACAP Work Group on Quality Issues. Practice Parameter for the Assessment and Treatment of Children and Adolescents with Attention-Deficit/Hyperactivity Disorder. J Am Acad Child Adolesc Psychiatry. 2007;46(7):894-921. doi:10.1097/chi.0b013e318054e724
96. Sibley MH, Arnold LE, Swanson JM, et al. Variable Patterns of Remission from ADHD in the Multimodal Treatment Study of ADHD. Am J Psychiatry. 2022;179(2):142-151. doi:10.1176/appi.ajp.2021.20060815
97. Cortese S, Coghill D. Twenty Years of Research on Attention-Deficit/Hyperactivity Disorder (ADHD): Looking Back, Looking Forward. Eur Child Adolesc Psychiatry. 2018;27(8):933-947. doi:10.1007/s00787-018-1181-6
98. Epstein JN, Loren REA. Changes in the Definition of ADHD in DSM-5: Subtle but Important. Neuropsychiatry (London). 2013;3(5):455-458. doi:10.2217/npy.13.59
99. Sayal K, Prasad V, Daley D, Ford T, Coghill D. ADHD in Children and Young People: Prevalence, Care Pathways, and Service Provision. Lancet Psychiatry. 2018;5(2):175-186. doi:10.1016/S2215-0366(17)30167
100. Bussing R, Mehta AS, Garvan CW, et al. Parent and Teacher SNAP-IV Ratings of Attention Deficit Hyperactivity Disorder Symptoms. Assessment. 2008;15(3):317-328. doi:10.1177/1073191107313885
101. Loe IM, Feldman HM. Academic and Educational Outcomes of Children With ADHD. J Pediatr Psychol. 2007;32(6):643-654. doi:10.1093/jpepsy/jsl054
102. Sharma A, Couture J. A Review of the Pathophysiology, Etiology, and Treatment of Attention-Deficit Hyperactivity Disorder (ADHD). Ann Pharmacother. 2014;48(2):209-225. doi:10.1177/1060028013510699
103. Bashir N, Lee P, Schuster MA. Telemedicine for ADHD Care: A Systematic Review. J Adolesc Health. 2021;69(3):357-364. doi:10.1016/j.jadohealth.2021.05.007
104. Thomas R, Sanders S, Doust J, Beller E, Glasziou P. Prevalence of Attention-Deficit/Hyperactivity Disorder: A Systematic Review and Meta-analysis. Pediatrics. 2015;135(4):e994-e1001. doi:10.1542/peds.2014-3482
105. Biederman J, Petty CR, Monuteaux MC, Faraone SV. Adult Psychiatric Outcomes of Girls With Attention Deficit Hyperactivity Disorder: 11-Year Follow-Up in a Longitudinal Case-Control Study. Am J Psychiatry. 2010;167(4):409-417. doi:10.1176/appi.ajp.2009.09050736

106. Jensen PS, Arnold LE, Swanson JM, et al. 3-Year Follow-up of the NIMH MTA Study. J Am Acad Child Adolesc Psychiatry. 2007;46(8):989-1002. doi:10.1097/CHI.0b013e3180686d48
107. Cortese S, Adamo N, Del Giovane C, et al. Comparative Efficacy and Tolerability of Medications for ADHD in Children, Adolescents, and Adults: A Systematic Review and Network Meta-Analysis. Lancet Psychiatry. 2018;5(9):727-738. doi:10.1016/S2215-0366(18)30269-4
108. Tarver J, Daley D, Sayal K. Attention-Deficit Hyperactivity Disorder (ADHD): An Updated Review of the Essential Facts. Child Care Health Dev. 2014;40(6):762-774. doi:10.1111/cch.12139.