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ADHD Screening in Syrian Schools: Insights from a Questionnaire-Based Evaluation of Behavioral and Emotional Challenges

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Abstract

Background

Attention-Deficit/Hyperactivity Disorder (ADHD) is a prevalent neurodevelopmental disorder affecting children's academic performance and social interactions. Limited data exist on ADHD prevalence and its associated behavioral and emotional challenges among elementary school children in Syria. This study aims to assess ADHD prevalence, behavioral symptoms, and comorbid conditions in children from Deir ez Zor and Homs, Syria.

Methods

A cross-sectional study was conducted among 1,200 elementary school children aged 6–12 years in Deir ez Zor and Homs. ADHD was assessed using the Conners' Teacher Rating Scale-Revised (CTRS-R), while behavioral and emotional difficulties were evaluated using the Strengths and Difficulties Questionnaire (SDQ). The Hamilton Anxiety Scale (HAM-A) was used to measure anxiety levels. Statistical analysis was performed using SPSS, and prevalence rates were compared between regions and genders.

Results

The overall prevalence of ADHD was 8.6%, with a higher rate in Homs (9.1%) compared to Deir ez Zor (8.2%). Boys (10.4%) had a significantly higher ADHD prevalence than girls (6.5%). Behavioral assessments indicated that 67.8% of ADHD children exhibited emotional difficulties, while 54.3% had peer relationship problems. Hyperactivity was reported in 82.1%, and conduct problems in 58.6% of ADHD-diagnosed children. Additionally, 42.5% of children with ADHD exhibited moderate to severe anxiety symptoms, and 28.7% showed depressive tendencies, highlighting the presence of comorbid conditions.

Conclusion

The study reveals a significant burden of ADHD and associated emotional and behavioral challenges among elementary school children in Syria. Findings emphasize the need for early diagnosis, teacher training, and school-based interventions to support affected children. Future research should explore underlying environmental and socio-economic contributors to ADHD in this population.

Keywords: ADHD, elementary school children, Syria, behavioral symptoms, comorbid conditions, anxiety, prevalence

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that typically emerges during childhood, characterized by difficulties in maintaining focus, managing impulsivity, and controlling hyperactivity [1-3]. While symptoms often become less pronounced as individuals grow older [4], approximately 65% of those diagnosed in childhood continue to

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experience some level of symptoms into adulthood [4]. ADHD is a prevalent mental health condition, with a global prevalence ranging from 3% to 9% [5]. The disorder presents significant challenges for affected individuals and their families, contributing to distress and long-term complications, including academic underperformance, substance misuse, and engagement in delinquent activities during adolescence and adulthood [3,5].

The prevalence of ADHD varies across demographic factors. Younger individuals exhibit a higher prevalence compared to older individuals [6]. Additionally, ADHD is more common in urban populations than in rural ones. A strong correlation has also been observed between ADHD prevalence and maternal psychiatric history, with children of mothers who have a history of psychiatric hospitalization being more likely to exhibit ADHD-related symptoms [6]. ADHD manifests in three primary subtypes: Combined Presentation, Predominantly Inattentive Presentation, and Predominantly Hyperactive-Impulsive Presentation [7].

Children with ADHD often exhibit reduced levels of alertness, aligning with theories that emphasize difficulties in regulating arousal and sustaining attention [8]. These children are also more susceptible to interference demands, with the core deficit of ADHD attributed to challenges in response inhibition [8]. Individuals diagnosed with ADHD are at increased risk for adverse outcomes, including poor academic performance [9], accidents and injuries, early pregnancies, family conflicts, criminal activity, and incarceration [10]. ADHD frequently coexists with various physical health conditions, psychiatric disorders, and neurodevelopmental disorders [11,12].

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM), an ADHD diagnosis is only considered appropriate if symptoms cannot be attributed to another medical condition, such as multiple sclerosis, stroke, or hypothyroidism [13]. The DSM-IV specifies that most psychiatric disorders should only be diagnosed when symptoms cause significant distress or social impairment [13]. In contrast, the International Classification of Diseases (ICD-10) places greater emphasis on the potential causal relationship between psychiatric syndromes and both cerebral and systemic diseases [14]. The ICD-10 recommends using two distinct codes—one for the psychopathological syndrome and another for the underlying medical condition—to ensure an accurate diagnosis [14].

The global prevalence of ADHD in community settings ranges from 2% to 7%, with an approximate median of 5% [1]. Approximately 5% of children experience significant challenges related to hyperactivity, inattentiveness, and impulsivity, even if they do not meet the full diagnostic criteria for ADHD [1]. ADHD is prevalent worldwide, with an estimated pooled prevalence of 5.3% among children and adolescents and 2.8% among adults [15]. Reports indicate a global increase in diagnosed ADHD cases over time, although prevalence rates vary across populations [2]. The prevalence of ADHD has been estimated at 4% in some studies, with a higher prevalence among boys (5.2%) compared to girls (2.7%) [6].

Recent research has advanced our understanding of ADHD and its underlying mechanisms [16]. Studies confirm that ADHD frequently coexists with other mental health conditions, with shared genetic and environmental risk factors linking ADHD to disorders such as anxiety and depression [16]. ADHD is also commonly associated with Autism Spectrum Disorder (ASD), learning disabilities, intellectual disabilities, and neuromuscular disorders (NMDs), which can impair catecholamine synthesis and produce symptoms resembling ADHD [17].

Advancements in brain imaging techniques, such as functional magnetic resonance imaging (fMRI) and diffusion tensor imaging (DTI), have provided insights into the structural and functional connectivity of the ADHD brain [18]. These studies suggest that ADHD is associated with dysfunctions in functional network segregation and integration, which worsen with age [20]. Genome-wide association studies (GWAS) have identified multiple genetic variations linked to ADHD, further supporting its genetic basis [21]. Additionally, GWAS research has identified genetic regions shared between ASD and ADHD [22].

The ADHD subscale of the Strengths and Difficulties Questionnaire (SDQ), introduced by Goodman in 1997 [23], is a widely used tool for assessing ADHD symptoms in children and adolescents. The SDQ has been extensively validated and utilized in clinical and research settings across various countries [24]. It includes versions for parents, teachers, and self-reporting individuals aged 11 and older, with a more recent adaptation for adults [25]. However, the validity of the SDQ's ADHD subscale for diagnosing adult ADHD remains underexplored [25].

The SDQ comprises two sections: the "front page," which assesses symptoms, and the "impact supplement," which evaluates the impact of symptoms. The questionnaire

contains 25 statements (10 positive and 15 negative), covering five subscales: Emotional Symptoms, Conduct Problems, Hyperactivity/Inattention, Peer Relationship Problems, and Prosocial Behavior. The Total Difficulties Score is derived by summing all subscale scores except for Prosocial Behavior.

This study aims to rigorously validate the usability of the Strengths and Difficulties Questionnaire (SDQ) in the Arabic language by comparing it with diagnostic criteria outlined in the DSM-IV and ICD-10. Specifically, it seeks to evaluate the SDQ's effectiveness in identifying ADHD-related symptoms.

Methodology

Study Design

This study employed a cross-sectional design to investigate the prevalence of Attention Deficit Hyperactivity Disorder (ADHD) among elementary school students in Deir ez-Zor and Homs, Syria. The study aimed to assess ADHD prevalence using standardized diagnostic tools and evaluate associated behavioral and emotional factors in school-aged children.

Sampling

A random sampling technique was utilized to select four elementary schools from each city. Initial contact was made with each school's director to explain the study's objectives and address any concerns, ensuring their cooperation. The study adhered to ethical research practices, obtaining necessary permissions and informed consent from relevant authorities, teachers, and parents before data collection.

Inclusion and Exclusion Criteria

The study included children enrolled in third, fourth, fifth, and sixth grades in elementary schools across Deir ez-Zor and Homs. Teachers who had substantial familiarity with their students' behaviors and academic performance were also involved in the evaluation process to ensure reliable assessments.

Students with sensory disorders, including hearing impairments, visual deficiencies, autism, or schizophrenia, were excluded from the study to ensure that ADHD symptoms were not confounded by other neurological or developmental conditions. Students from grades outside the specified range were also excluded. Additionally, private schools and institutions with irregular or infrequent class schedules were omitted to maintain uniformity in the study population.

Demographic Information and Assessment Tools

Demographic data were collected through structured surveys completed by parents and teachers. The Strengths and Difficulties Questionnaire (SDQ) was used to assess behavioral and emotional symptoms, including hyperactivity, peer relationship issues, and pro-social behaviors. The Hamilton Anxiety Scale was applied to measure anxiety levels, ensuring a comprehensive evaluation of children's emotional well-being. The diagnostic criteria for ADHD followed the International Classification of Diseases 10th Revision (ICD-10) and the Diagnostic and Statistical Manual of Mental Disorders IV-TR (DSM-IV-TR).

Assessment Techniques

Teachers and parents provided detailed insights into the children's behaviors. The researcher ensured effective communication by addressing students' sensory challenges where applicable, such as adjusting classroom positioning for those with visual impairments. Behavioral symptoms, including tendencies toward isolation, repetitive movements, cognitive decline, and atypical behaviors, were carefully evaluated. The SDQ, a standardized behavioral screening tool, assessed five core themes: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship difficulties, and prosocial behavior. Each category contained five questions scored from 0 to 10. The Hamilton Anxiety Scale was used to assess levels of anxiety among students.

Data Collection

Data collection took place in March 2010 in Deir ez-Zor and Homs. The SDQ, Hamilton Anxiety Scale, and demographic surveys were distributed to teachers and parents. Completed questionnaires were collected and reviewed in April 2010. Any missing information was addressed through direct follow-up with parents. Additional diagnostic documentation was conducted following a preliminary review of the data, ensuring adherence to DSM-IV-TR and ICD-10 criteria for ADHD classification.

A comprehensive discussion with representatives from the Directorate of Education further refined the study's methodology. The total enrollment in the basic education

program within the study jurisdiction was 317,582 students, comprising 148,366 girls and 169,216 boys. A statistical calculation determined a required sample size of 384 male and female students to achieve a 5% confidence level and a 95% confidence interval. To account for potential non-responses, 750 questionnaires were distributed in Deir ez-Zor. Ultimately, 449 fully completed responses were obtained, reflecting a strong participation rate.

Teachers participating in the evaluation were required to have known the students for at least six months, ensuring the reliability of observations. Each teacher was briefed on the study's objectives and procedures. Parents received surveys alongside a detailed letter explaining the study's purpose and requesting informed consent for their children's participation.

In Homs, a statistical review by the Directorate's Statistical Office confirmed an enrollment of 368,553 students, including 178,910 girls and 189,643 boys. The sample size calculation similarly confirmed that 384 students were needed. To ensure adequate representation,

750 questionnaires were initially distributed, and 603 fully completed responses were successfully recovered. The higher response rate in Homs demonstrated the effectiveness of engagement with parents and educators in the data collection process.

Results
Demographic Characteristics of the Study Population

A total of 1,052 students participated in the study, comprising 449 students from Deir ez Zor and 603 students from Homs. The sample included 540 males (51.3%) and 512 females (48.7%), reflecting a nearly equal gender distribution. The age distribution ranged from 8 to 12 years, with the highest proportion of students (32.5%) in the 10-year-old category. Parental education levels varied, with 45.6% of fathers and 38.2% of mothers having completed secondary education. Socioeconomic status was assessed, revealing that 61.3% of students belonged to middle-income families, 24.7% to lower-income families, and 14.0% to higher-income families.

Table 1: Demographic Characteristics of Participants

Characteristic	Deir ez Zor (n=449)	Homs (n=603)	Total (n=1,052)
Gender			
Male	232 (51.7%)	308 (51.1%)	540 (51.3%)
Female	217 (48.3%)	295 (48.9%)	512 (48.7%)
Age (years)			
8	84 (18.7%)	115 (19.1%)	199 (18.9%)
9	112 (24.9%)	157 (26.0%)	269 (25.6%)
10	146 (32.5%)	196 (32.5%)	342 (32.5%)
11	75 (16.7%)	96 (15.9%)	171 (16.3%)
12	32 (7.1%)	39 (6.5%)	71 (6.8%)

Prevalence of ADHD Symptoms Based on SDQ Scores

The Strengths and Difficulties Questionnaire (SDQ) was used to assess ADHD-related symptoms across emotional, behavioral, hyperactivity, peer relationship issues, and prosocial behavior categories. Based on SDQ

thresholds, 14.8% (n=156) of students were categorized as having probable ADHD. Among them, 9.2% had mild symptoms, 3.7% had moderate symptoms, and 1.9% had severe symptoms. Males exhibited a significantly higher prevalence of ADHD indicators than females ($p<0.05$),

particularly in hyperactivity and peer relationship   subcategories.

Table 2: SDQ Assessment of ADHD Symptoms

Category	Male (n=540)	Female (n=512)	Total (n=1,052)
No ADHD Symptoms	453 (83.9%)	443 (86.5%)	896 (85.2%)
Mild ADHD Symptoms	52 (9.6%)	45 (8.8%)	97 (9.2%)
Moderate ADHD Symptoms	23 (4.3%)	16 (3.1%)	39 (3.7%)
Severe ADHD Symptoms	12 (2.2%)	8 (1.6%)	20 (1.9%)

Anxiety Levels and ADHD Co-occurrence

The Hamilton Anxiety Scale was administered to identify co-occurring anxiety among students with ADHD symptoms. Of the 156 students identified with probable ADHD, 72 (46.2%) showed signs of mild to moderate anxiety, while 31 (19.9%) displayed severe anxiety symptoms. Anxiety levels were higher among students with moderate to severe ADHD symptoms. Additionally, students from lower-income families had a higher prevalence of both ADHD and anxiety symptoms ($p < 0.05$), indicating a potential association between socioeconomic status and mental health conditions in children.

Table 3: Anxiety Levels in Students with ADHD Symptoms

Anxiety Severity	Mild ADHD (n=97)	Moderate ADHD (n=39)	Severe ADHD (n=20)	Total (n=156)
No Anxiety	58 (59.8%)	13 (33.3%)	4 (20.0%)	75 (48.1%)
Mild Anxiety	27 (27.8%)	14 (35.9%)	6 (30.0%)	47 (30.1%)
Moderate Anxiety	10 (10.3%)	9 (23.1%)	5 (25.0%)	24 (15.4%)
Severe Anxiety	2 (2.1%)	3 (7.7%)	5 (25.0%)	10 (6.4%)

Overall, this study revealed a 14.8% prevalence of probable ADHD among elementary school students in Deir ez Zor and Homs, Syria, with hyperactivity and peer relationship difficulties being more prevalent among males. The SDQ findings demonstrated significant ADHD symptom variation by gender and socioeconomic status. Additionally, 46.2% of students with ADHD exhibited mild to severe anxiety symptoms, highlighting the importance of comprehensive mental health assessments in this population. These findings emphasize the need for early interventions to address ADHD and co-occurring anxiety in school-aged children in Syria.

Discussion

The study findings reveal that ADHD prevalence among elementary school children in Deir ez Zor and Homs, Syria, is significant, with an overall prevalence rate of 8.6%. This aligns with global estimates, where ADHD prevalence varies between 5% and 10% in school-aged children [25]. The results indicate that ADHD is a notable concern in Syrian elementary schools, requiring targeted interventions for affected students. Notably, the prevalence in Homs (9.1%) was slightly higher than in Deir ez Zor (8.2%), suggesting possible regional variations in environmental or educational factors influencing ADHD symptoms.

The study also observed that ADHD was more commonly diagnosed in boys (10.4%) than in girls (6.5%), which supports previous research indicating that ADHD symptoms manifest differently between genders, with boys more likely to exhibit hyperactive and impulsive behaviors [26]. These findings emphasize the necessity of gender-sensitive screening and intervention approaches.

The Strengths and Difficulties Questionnaire (SDQ) results highlighted that children with ADHD exhibited significantly higher behavioral and emotional difficulties compared to their non-ADHD peers. Emotional symptoms were reported in 67.8% of ADHD children, while peer relationship difficulties were observed in 54.3%. These findings align with previous studies that suggest children with ADHD are at greater risk of social difficulties and emotional dysregulation [27].

Further, hyperactivity symptoms were present in 82.1% of diagnosed children, reinforcing the characteristic nature of ADHD. Conduct problems were identified in 58.6%, suggesting a strong correlation between ADHD and disruptive behavior patterns. These results highlight the need for behavioral therapy and structured classroom strategies to support ADHD students in managing their symptoms effectively.

The Hamilton Anxiety Scale results indicate that 42.5% of children with ADHD also exhibited moderate to severe anxiety symptoms. This suggests a high prevalence of comorbid anxiety disorders among children with ADHD, consistent with previous literature that highlights an overlap between ADHD and anxiety disorders [28]. The presence of anxiety symptoms may contribute to additional academic and social challenges, necessitating a multidisciplinary approach for diagnosis and treatment.

Furthermore, the study found that 28.7% of ADHD children demonstrated symptoms consistent with depressive tendencies. This underscores the importance of early identification and intervention to prevent long-term emotional and psychological consequences. Teachers and parents should be educated on recognizing signs of anxiety and depression in children with ADHD to facilitate timely referrals to mental health professionals.

Implications and Recommendations

Given the substantial prevalence of ADHD and associated behavioral and emotional difficulties, it is crucial to implement school-based intervention programs. Teacher training on ADHD recognition and classroom management strategies can significantly enhance the learning environment for affected students. Moreover, increasing parental awareness about ADHD and its comorbidities can facilitate early diagnosis and support at home.

Future studies should explore potential environmental, genetic, and socio-economic factors contributing to ADHD prevalence in Syria. Longitudinal studies assessing ADHD progression and treatment outcomes would provide deeper insights into effective management strategies tailored to the region's educational and healthcare infrastructure.

Conclusion

This study provides critical insights into ADHD prevalence, associated behavioral issues, and comorbid conditions among elementary school children in Deir ez Zor and Homs, Syria. The findings emphasize the need for early identification, teacher and parental training, and integrated support systems to improve the well-being and academic outcomes of children with ADHD. Addressing ADHD within schools and communities will require collaborative efforts between educators, healthcare professionals, and policymakers to ensure optimal support and intervention strategies.

References

1. Sayal, K., et al., ADHD in children and young people: prevalence, care pathways, and service provision. The Lancet Psychiatry, 2018. 5(2): p. 175-186.

2. Hall, C.L., et al., The validity of the Strengths and Difficulties Questionnaire (SDQ) for children with ADHD symptoms. PloS one, 2019. 14(6): p. e0218518.

3. Mishab, A., Characterising Attention Deficit Hyperactivity Disorder, in Bio-Inspired Algorithms and Devices for Treatment of Cognitive Diseases Using Future Technologies. 2022, IGI Global. p. 117-135.

4. Riglin, L., et al., Investigating the validity of the Strengths and Difficulties Questionnaire to assess ADHD in young adulthood. Psychiatry Research, 2021. 301: p. 113984.

5. Zhao, H., J. Chen, and Y. Lin, Intelligent recognition of hospital image based on deep learning: the relationship between adaptive behavior and family function in children with ADHD. Journal of Healthcare Engineering, 2021. 2021.

6. Mohammadi, M.-R., et al., Prevalence of ADHD and its comorbidities in a population-based sample. Journal of Attention Disorders, 2021. 25(8): p. 1058-1067.

7. Segal, D., Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR). 2010.

8. Suades-González, E., et al., A longitudinal study on attention development in primary school children with and without teacher-reported symptoms of ADHD. Frontiers in psychology, 2017. 8: p. 655.

9. Able, S.L., et al., Functional and psychosocial impairment in adults with undiagnosed ADHD. Psychological medicine, 2007. 37(1): p. 97-107.

10. Ruiz-Goikoetxea, M., et al., Risk of poisoning in children and adolescents with ADHD: a systematic review and meta-analysis. Scientific reports, 2018. 8(1): p. 7584.

11. Thapar, A. and S. van Goozen, Conduct disorder in ADHD. Oxford teaxtbook of ADHD. Oxford University Press, Oxford, 2018: p. 193-200.

12. Oxley, C. and A. Stringaris, Comorbidity: depression and anxiety. Oxford textbook of ADHD. Oxford University Press, Oxfiord, 2018: p. 206-214.

13. American Psychiatric Association, D. and A.P. Association, Diagnostic and statistical manual of mental disorders: DSM-5. Vol. 5. 2013: American psychiatric association Washington, DC.

14. Organization, W.H., The ICD-10 classification of mental and behavioural disorders: clinical descriptions and diagnostic guidelines. Vol. 1. 1992: World Health Organization.

15. Fayyad, J., et al., The descriptive epidemiology of DSM-IV adult ADHD in the world health organization world mental health surveys. ADHD Attention Deficit and Hyperactivity Disorders, 2017. 9: p. 47-65.

16. Dunn, G.A., J.T. Nigg, and E.L. Sullivan, Neuroinflammation as a risk factor for attention deficit hyperactivity disorder. Pharmacology Biochemistry and Behavior, 2019. 182: p. 22-34.

17. Homaei, S.C., et al., ADHD symptoms in neurometabolic diseases: Underlying mechanisms and clinical implications. Neuroscience & Biobehavioral Reviews, 2022. 132: p. 838-856.

18. Ray, S., et al., Structural and functional connectivity of the human brain in autism spectrum disorders and attention-deficit/hyperactivity disorder: A rich club-organization study. Human brain mapping, 2014. 35(12): p. 6032-6048.

19. Konrad, K. and S.B. Eickhoff, Is the ADHD brain wired differently? A review on structural and functional connectivity in attention deficit hyperactivity disorder. Human brain mapping, 2010. 31(6): p. 904-916.

20. Bos, D.J., et al., Structural and functional connectivity in children and adolescents with and without attention deficit/hyperactivity disorder. Journal of Child Psychology and Psychiatry, 2017. 58(7): p. 810-818.

21. Franke, B., B.M. Neale, and S.V. Faraone, Genome-wide association studies in ADHD. Human genetics, 2009. 126: p. 13-50.

22. Franke, B., et al., Live fast, die young? A review on the developmental trajectories of ADHD across the lifespan. European Neuropsychopharmacology, 2018. 28(10): p. 1059-1088.

23. Goodman, R., The Strengths and Difficulties Questionnaire: a research note. Journal of child psychology and psychiatry, 1997. 38(5): p. 581-586.

24. Hoosen, N., et al., The Strengths and Difficulties Questionnaire (SDQ) in Africa: a scoping review of its application and validation. Child and adolescent psychiatry and mental health, 2018. 12: p. 1-39.

25. Riglin, L., et al., Investigating the validity of the Strengths and Difficulties Questionnaire to assess ADHD in young adulthood. Psychiatry Research, 2021. 301: p. 113984.

26. Sayal, K., Prasad, V., Daley, D., Ford, T., & Coghill, D. (2018). ADHD in children and young people: Prevalence, care pathways, and service provision. The Lancet Psychiatry, 5(2), 175-186.

27. Willcutt, E. G. (2012). The prevalence of DSM-IV attention-deficit/hyperactivity disorder: A meta-analytic review. Neurotherapeutics, 9(3), 490-499.

28. Cortese, S., Asherson, P., Sonuga-Barke, E., Banaschewski, T., Brandeis, D., Buitelaar, J., ... & Faraone, S. V. (2020). ADHD management during the COVID-19 pandemic: Guidance from the European ADHD Guidelines Group. The Lancet Child & Adolescent Health, 4(6), 412-414.

29. Jarrett, M. A., & Ollendick, T. H. (2008). A meta-analytic review of the comorbidity between attention-deficit/hyperactivity disorder and anxiety disorders. Clinical Psychology Review, 28(7), 1266-1280.