

Original Research Article

Sick kids, smart teachers: a cross-sectional study on teachers' knowledge of pediatric neurological diseases in Saudi Arabia

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ABSTRACT

Background: Recent medical advancements have decreased absenteeism in children with chronic illnesses, emphasizing the importance of inclusive education. Epilepsy remains a common neurological disorder worldwide, yet many teachers lack the training to manage it and other neurodevelopmental disorders such as attention deficit-hyperactivity disorder (ADHD) and Autism spectrum disorder (ASD). ADHD is prevalent among school-aged children, with studies in Riyadh and Madina showing limited teacher awareness. Similarly, increasing ASD diagnoses underscore the need for enhanced educator preparedness. This study assesses the knowledge of teachers in Riyadh regarding the management of common pediatric neurodevelopmental conditions in school environments.

Methods: A cross-sectional analytical design was used. A self-administered questionnaire was distributed to 369 teachers across various schools. It comprised two sections: demographic data and assessment of knowledge regarding epilepsy, ASD, and ADHD. Questions covered disease definitions, symptoms, educational impact, school strategies, and management practices.

Results: Among the 369 teachers, gender distribution was nearly equal. Most worked in private schools (56.9%). While 77.5% correctly identified epilepsy and 86.7% recognized its symptoms, only 54.2% felt confident managing it. Knowledge of ASD and ADHD was moderate (65% and 70.7%, respectively). The average knowledge score was 12.66/19, with 57.7% scoring above average. Male teachers showed slightly better overall knowledge, though teaching experience and school type were not significant predictors.

Conclusions: Teachers in Saudi Arabia demonstrate basic knowledge of epilepsy, ADHD, and ASD, but notable knowledge gaps remain, especially in daily management. Targeted training is crucial to enable effective educational support for children with chronic neurodevelopmental disorders.

Keywords: Chronic illnesses, Neurological disorders, Epilepsy, Teacher knowledge, Teacher training, Educational support, Neurodevelopmental diseases, School management strategies

INTRODUCTION

Recent advancements in the field of medicine have played a crucial role in reducing absenteeism rates among children with chronic illnesses compared to previous periods.¹ The school years represent a critical period for children, as they undergo significant stages of social,

psychological, and physical development that impact their overall well-being and future prospects as adults. Epilepsy, one of the most prevalent neurological disorders worldwide, affects approximately 50 million individuals globally.² In Saudi Arabia, reported prevalence rate of epilepsy is 6.5 per 1000 population.³ Numerous international studies have highlighted lack of knowledge, inadequate training and misconceptions

among teachers regarding epilepsy and its management.⁴⁻⁶

ADHD is another neurodevelopmental disorder characterized by impaired functioning observed in multiple settings, particularly in home and school environments. It is primarily associated with symptoms of impulsivity, inattention, or hyperactivity.^{7,8} ADHD is recognized as one of the most prevalent disorders in childhood, affecting a significant number of children.⁹ Research indicates that the prevalence of ADHD ranges from 2% to 18% among school-age children. In a study conducted in Riyadh, teachers exhibited an overall percentage score of correct responses that was concerning, measuring only 17.2%.¹⁰ This finding suggests a poor level of knowledge among teachers regarding ADHD.¹¹ Similarly, another study conducted in Madina revealed suboptimal knowledge among elementary school teachers regarding ADHD, with an overall knowledge score of only 38%.¹²

Furthermore, the prevalence of ASD is increasing globally, with current estimates indicating that it affects approximately 1 in 100 individuals.^{13,14} This rise in prevalence has led to a corresponding increase in the number of children and young students with ASD enrolled in pre-schools, primary schools, high schools, and universities.^{15,16} Having knowledge about ASD is crucial for teachers to create an appropriate social and educational environment that meets the needs of students with ASD. A 2020 review developed a conceptual framework of teachers' knowledge based on 11 studies, revealing that early childhood teachers often lack the necessary knowledge to identify students with ASD. The authors emphasized the significance of early childhood teachers possessing knowledge of ASD to effectively recognize early signs and symptoms.¹⁷

To date, limited research is available regarding teachers' knowledge and skills in managing urgent situations that may arise in children with chronic diseases. Therefore, the purpose of this cross-sectional study is to evaluate the level of knowledge among teachers in Riyadh, Saudi Arabia.

METHODS

Study design and setting

This study is a cross-sectional analytical study conducted in ten National Guard schools in Riyadh, Saudi Arabia, covering all educational levels (elementary, middle, and high) and including both male and female teachers. The study was conducted during the academic year from January 2024 July 2024.

Selection criteria

The inclusion criteria comprised all qualified credentialed teachers working at the selected schools. Teachers who

were undertrained or lacked formal teaching credentials were excluded from the study.

Sample size and sampling technique

According to the general authority for statistics, there are approximately 490,555 teachers in Saudi Arabia. Using the Raosoft sample size calculator, with a confidence level of 95% and a margin of error of 5%, the required sample size was calculated to be 384 participants. A random sampling technique was used to select 369 teachers from the target schools.

Procedure

Data were collected through a self-administered questionnaire written in the participants' native language to ensure clarity and avoid statistical bias due to misinterpretation. The questionnaire consisted of two sections:

Demographic information

Including age, gender, teaching level, and type of school.

Knowledge assessment

Targeting awareness of three common pediatric neurodevelopmental disorders-ASD, epilepsy, and ADHD.

Each disorder was evaluated across five dimensions: definition, symptoms, short- and long-term effects on education, ideal school approaches, and disease management. Responses were scored as follows: 0-2: Unsatisfactory knowledge, 3-4: Average knowledge, 5-6: Adequate knowledge.

Each participant received a score reflecting their knowledge of each disorder.

Ethical approval

All participants received an informed consent form and were assured that participation was voluntary. Confidentiality was maintained throughout, with access to data limited to the research team. Ethical approval was obtained from the relevant institutional review board (IRB) prior to initiating the study.

Statistical analysis

Data entry was performed using Microsoft excel, and analysis was conducted using SPSS version 22.0. Categorical variables (e.g., gender, school type) were reported as frequencies and percentages, while continuous variables (e.g., age) were described using means and standard deviations (SD).

Chi-square tests were used for comparisons of categorical variables, and t-tests were used for continuous variables. A $p < 0.05$ was considered statistically significant.

Statistical data analysis

Data entry was performed using Microsoft excel, and analysis was conducted using SPSS version 22.0. Categorical variables (e. g., gender, school type) were reported as frequencies and percentages, while continuous variables (e. g., age) were described using means and standard deviations (SD). Chi-square tests were used for comparisons of categorical variables, and t tests were used for continuous variables. A $p < 0.05$ was considered statistically significant.

Descriptive analysis with the mean and standard deviation was applied to continuous variables, and frequencies and percentages were used for categorically measured variables. The Kolmogorov-Smirnov statistical test of normality was used to assess the normality assumption for metric variables, along with histograms. Multiple response dichotomy analysis was applied to variables measured with more than one answer. Teachers' knowledge of each of the measured children's diseases was assessed by awarding one point for each correctly answered knowledge question, and zero for incorrect answers. A total chronic disease knowledge score for each disease was calculated by summing the teachers' answers to the marked knowledge questions, yielding a score ranging from 0 to 6 for each disease. The overall knowledge of teachers regarding school children's diseases was computed by summing their knowledge scores for the three diseases. Multivariable binary logistic regression analysis (MBLR) was applied to assess the predictors of the teachers' odds of having low children's disease knowledge when regressed against their sociodemographic and other measured work-related factors. The associations between predictor variables and the analyzed outcome in multivariable logistic regression analysis were expressed as odds ratios with their associated 95% CI. SPSS IBM statistical computing program version 28 was used for statistical data analysis, and alpha significance value considered at 0.050 level.

RESULTS

Three hundred and sixty-nine school children teachers residing in Saudi Arabia had enrolled themselves into the study and completed and returned the study questionnaire. The table 1 displays the resulted descriptive analysis for the school teachers' sociodemographic characteristics and their work-related factors. Nearly half of the sample 50.4% were male teachers and the remainder 49.6% of them were female school children's teachers. The age groups for those teachers were as follows: 15.4% of them were aged between 20-30 years, but most of them 37.4% were aged between 31-40 years and another 36.6% of the teachers were aged 41-50 years and the remainder of them were

aged >50 years however. The teachers were asked to indicate their teaching experience years and 21.7% of them had teaching experience between 1-5 years, and 15.2% of them had experience between 6-10 years but the majority of the teachers had ≥ 11 years of teaching children (Figure 1). The resulted findings also showed that 43.1% of the teachers worked at governmental public schools and most of them 56.9% worked at Private sector schools. Asked to indicate the levels of their students they teach and 3.8% of them were involved in kindergarten level teaching, another 33.3% of the teachers worked with elementary level students and 25.5% with intermediate level students but most of them 37.4% were also involved in teaching secondary level students.

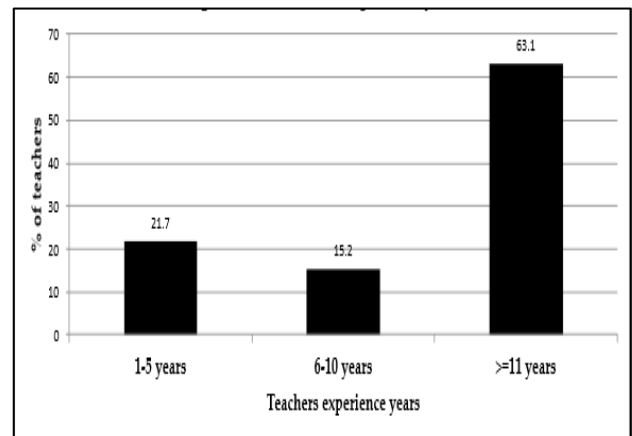


Figure 1: The teachers experience years.

Table 2 displays the resulted descriptive analysis for the school teacher's knowledge of 2 known children's chronic diseases.

Teachers' knowledge of Epilepsy among children

The findings revealed a considerable gap in the correct understanding of epilepsy among teachers. A majority of the participants, 77.5%, correctly identified epilepsy as a neurological disorder, while 22.5% still held incorrect views. In terms of recognizing the signs and symptoms, a robust 86.7% were knowledgeable, but 13.3% were not. When considering epilepsy's impact on school performance, only 70.2% had correct perceptions, and 29.8% underestimated its effects. Regarding long-term side effects, a larger portion, 61.8%, had accurate information, while 38.2% were not informed. In emergency management during a seizure, 54.7% knew the initial steps, yet 45.3% were unsure. Dealing with epileptic children daily was understood by 54.2%, but 45.8% lacked confidence in this area. Lastly, the best treatments for epilepsy were correctly identified by only 80.2%, with 19.8% having gaps in their knowledge.

Teachers' knowledge of ASD among children

For autism, only 65% of teachers could correctly define the disorder, and 35% had misconceptions. The signs and

symptoms accurately identified by 78.3%, but 21.7% still unclear. Regarding impact on academic performance, 68% responded correctly, while 32% did not recognize the challenges faced by autistic students. Knowledge about the long-term side effects was correctly understood by 65.9% of teachers, with 34.1% still misinformed. Proper daily management of autistic children was known to 79.4% and 20.6% lacked adequate strategies. Best-known treatments for autism were recognized by 79.9% and 20.1%, needed better information.

Teachers' knowledge of ADHD among children

The understanding of ADHD was also varied, with 70.7% correctly defining the condition, while 29.3% held incorrect beliefs. Recognition of signs and symptoms was high among 84%, though 16% did not identify these correctly. Impressively, 88.6% understood how ADHD affects school performance accurately, but 11.4% did not. Misconceptions about long-term side effects were common, with 62.3% holding incorrect views, and only 37.7% being informed. Strategies for handling children with ADHD were known to 55.3% of teachers, whereas 44.7% felt unprepared. Knowledge of the best treatments for ADHD was correctly understood by 70.2% and 29.8% were not aware of effective interventions.

The Table 3 displays the schoolchildren's teachers overall yielded knowledge scores on the assessed diseases and their total knowledge on those three diseases. The findings showed that the school teachers' overall knowledge on children's chronic disease was measured with 12.66/19 points highlighting an overall high knowledge of those teachers about psychologic diseases like autism, epilepsy and ADHD disease combined. However, by considering the teachers knowledge level it was found that 57.7% of the teachers had scored high knowledge (greater than average=12 points) and the remainder of the teachers had low psychologic disease knowledge nevertheless. Also, the teacher's overall autism disease knowledge score was measured worth 4.35/7 points and their mean Epilepsy disease knowledge score was measured with 4.76/6 points and their ADHD knowledge score was measured with 3.54/6 points.

To gain deeper insights into factors that may account for varying levels of knowledge among teachers on children's psychological and developmental diseases, a

multivariable logistic binary regression analysis was performed on their dichotomized overall knowledge scores. The findings from Table 4 indicate that the sex significantly affects the knowledge levels, with male teachers showing lower odds of having poor knowledge compared to female teachers. The odds ratio is 0.522, with a confidence interval ranging from 0.325 to 0.839, and a significant $p=0.007$. This suggests that male teachers are generally more informed about children's psychological and developmental diseases than their female counterparts. Teaching experience, measured in years, does not significantly influence the teachers' knowledge levels, as indicated by an odds ratio of 0.851 with a confidence interval from 0.635 to 1.140 and a $p=0.279$. The sector of employment also does not show a significant impact on the knowledge levels. Teachers in the private sector have an odds ratio of 0.805 (95% CI: 0.470-1.378), with a $p=0.428$. Similarly, level of students that teachers educate does not significantly affect their knowledge levels about children's diseases, with an odds ratio of 0.924 (95% CI: 0.733-1.166) and a $p=0.506$.

Table 1: Descriptive analysis of the school teachers' sociodemographic characteristics and working and professional factors.

Variables	N	Percentage (%)
Sex		
Male	186	50.4
Female	183	49.6
Age group (in years)		
20-30	57	15.4
31-40	138	37.4
41-50	135	36.6
>50	39	10.6
Teaching experience (in years)		
1-5	80	21.7
6-10	56	15.2
≥11	233	63.1
Working sector		
Governmental	159	43.1
Private	210	56.9
Teaching levels		
Kindergarten	14	3.8
Elementary	123	33.3
Intermediate	94	25.5
Secondary	138	37.4

Table 2: Descriptive analysis for teacher's knowledge of school children's psychological and developmental diseases.

Variables	Incorrect answer, N (%)	Correct answer, N (%)
Knowledge of epilepsy		
What is epilepsy	83 (22.5)	286 (77.5)
What are the signs and symptoms of epilepsy	49 (13.3)	320 (86.7)
How would epilepsy affect the students school performance?	110 (29.8)	259 (70.2)
What is/are the long term side effects of epilepsy on children?	141 (38.2)	228 (61.8)
what is the first step to do during seziures attack?	202 (54.7)	167 (45.3)

Continued.

Variables	Incorrect answer, N (%)	Correct answer, N (%)
How to deal with epileptic children?	169 (45.8)	200 (54.2)
What are the best known treatments for epilepsy?	73 (19.8)	296 (80.2)
Knowledge of autism		
What is autism?	129 (35)	240 (65)
What are the signs and symptoms of autism?	80 (21.7)	289 (78.3)
How would autism affect the students school performance?	118 (32)	251 (68)
What is/are the long term side effects of autism on children?	126 (34.1)	243 (65.9)
How to deal with autistic children?	76 (20.6)	293 (79.4)
What are the best known treatments for autism?	74 (30.1)	295 (79.9)
Knowledge of ADHD		
What is ADHD?	108 (29.3)	261 (70.7)
What are the signs and symptoms of ADHD?	59 (16)	310 (84)
How would ADHD affect the students school performance?	327 (88.6)	42 (11.4)
What is/are the long term side effects of ADHD on children?	139 (37.7)	230 (62.3)
How to deal with children with ADHD?	165 (44.7)	204 (55.3)
What are the best known treatments for ADHD?	110 (29.8)	259 (70.2)

Table 3: The descriptive analysis for the teachers' overall knowledge of autism, epilepsy and hyperactivity, (Maximum possible score=6).

Variables	Mean (SD)	Maximum possible score
Overall knowledge of children's psychologic diseases	12.66 (3.40)	0-19 points
Overall knowledge level, N (%)		
High>12 points	213	57.7
Low<12 points	156	42.3
Autism knowledge score	4.35 (1.45)	0-7 points
Epilepsy knowledge score	4.76 (1.63)	0-6 points
Hyperactivity ADDH knowledge score	3.54 (1.42)	0-6 points

Table 4: Multivariable logistic binary regression analysis of teachers' odds of having low knowledge on children's psychological and developmental diseases/illness.

Parameters	Multivariable adjusted odds ratio	95% CI for OR		
		Lower	Upper	P value
Sex: male versus female	0.522	0.325	0.839	0.007
Teaching experience years	0.851	0.635	1.140	0.279
Working sector=private	0.805	0.470	1.378	0.428
Teaching level (Students stages)	0.924	0.733	1.166	0.506
Constant	0.014			0.249

*Dependent outcome variable: Poor Knowledge of children's chronic disease (No/Yes).

DISCUSSION

Prevalent neurodevelopmental disorders like epilepsy, ASD, and ADHD, significantly impact children's functioning across home and school settings.¹⁸ Recent medical advancements have reduced absenteeism among children with chronic illnesses.¹⁹ Previous studies reveal significant gaps in teachers' knowledge about managing epilepsy, ADHD, and ASD globally, including Saudi Arabia.²⁰ Despite some understanding of symptoms and acute management, teachers often lack comprehensive knowledge on long-term implications and everyday management in educational settings, emphasizing the

need for enhanced training and resources to support affected students effectively. This study assesses Saudi Arabian teachers' knowledge of ADHD, epilepsy, and autism, highlighting the need for the educational interventions and policy updates to better support affected students in schools.

The study reveals a nuanced landscape of understanding among teachers. For epilepsy, a significant majority (77.5%) correctly identified the condition as a neurological disorder, aligning with previous studies which shows that teachers had comparable knowledge. However, Iannone et al shows that 16.8% of teachers

consider epilepsy a psychiatric disorder which shows that there is poor knowledge about epilepsy among teacher.²¹ However, our study highlights persistent gaps in emergency management knowledge and the impact of epilepsy on academic performance, with only 54.7% and 70.2% of teachers, respectively, showing adequate understanding. However, Almarwani et al shows that only 11.4% thought that they had sufficient training in first-aid management of seizures.²² This discrepancy underscores the need for targeted educational programs focusing on the comprehensive implications of epilepsy, which could mirror the successful models implemented in European or African schools. Similarly, Makhado et al shows that epilepsy education programs can effectively enhance epilepsy-related knowledge, understanding, values, attitudes, and skills among primary school learners.²³

For autism, although a majority of teachers could define the disorder and identify symptoms, gaps in managing its educational impact and long-term side effects remain, similar to findings from studies in the various regions of world. Similarly, Taresh et al reported various global studies which highlight a significant gap in preschool teachers' knowledge about ASD, especially in recognizing early signs, posing major barriers to effective intervention.²⁴ This indicates a global trend where initial teacher training on autism appears sufficient at a surface level but lacks depth in practical, day-to-day educational strategies and long-term management. Similarly, Marí et al shows that teachers often understand autism's basics but face difficulties applying effective management strategies in classroom settings.²⁵

ADHD knowledge among teachers showed better comprehension of the disorder's impact on school performance than other conditions, aligning with results from a Iranian study where over 65% of educators felt confident in identifying ADHD's effects on learning (Hosseinnia et al).²⁶ However, similar to global trends, teachers still struggle with effective long-term management strategies, emphasizing an ongoing need for professional development (Ghamrawi et al).²⁷

Moreover, the multivariable logistic regression analysis provides critical insights into demographic and professional variables affecting knowledge levels. Interestingly, male teachers displayed more comprehensive knowledge than female teachers, a finding that contrasts with studies which shows opposite results. However, Alhossein et al shows that female teachers were more knowledgeable about neurodevelopmental disorders like ASD and EBP than male teachers.²⁸ This could reflect cultural or systemic differences in professional development opportunities in Saudi Arabia.

Neither teaching experience nor the type of educational institution (private vs. public) significantly influenced knowledge levels, which suggests that existing

continuous professional development (CPD) programs may not be adequately tailored to meet the specific needs of more experienced teachers or those in different types of schools. However, McDougal et al shows that teaching experience often enhances knowledge of neurodevelopmental disorders, but training, support, and educational context are crucial for effective understanding and intervention.²⁹ Similarly, Au et al shows that private teachers had a good understanding and a marginally positive perception of ASD, despite some anxiety about teaching students with ASD.³⁰ This discrepancy as highlighted in our study shows an area for potential policy enhancement, ensuring that CPD offerings are relevant and accessible to all educators regardless of their background.

CONCLUSION

Given the critical role teachers play in supporting students with psychological and developmental disorders, it is essential to address the knowledge gaps identified in this study through comprehensive, ongoing training and development. Education policymakers should integrate specific modules on psychological and developmental disorders into teacher education programs and encourage schools to collaborate with healthcare providers for regular workshops that keep teachers updated on the latest research and management strategies. There is also a need for specialized training programs focusing on disease recognition, practical management strategies, educational adaptations, and emotional support for students with these conditions. By addressing these gaps through structured professional development, educational institutions can better equip teachers to manage and support the diverse needs of their students, ultimately improving educational outcomes and student well-being.

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REFERENCES

1. Moonie S, Sterling DA, Figgs LW, Castro M. The relationship between school absence, academic performance, and asthma status. *J School Heal.* 2008;78(3):140-8.
2. Alamri S, Alghamdi A, Al Quait A. What Saudi teachers know about epilepsy: A cross-sectional study of Tabuk City. *Epilepsy Behavior.* 2018;89:169-72.
3. Al Rajeh S, Awada A, Bademosi O, Ogunniyi A. The prevalence of epilepsy and other seizure disorders in an Arab population: a community-based study. *Seizure.* 2001;10(6):410-4.
4. Prpic I, Korotaj Z, Vlašić-Cicvaric I, Paucic-Kirincic E, Valerjev A, Tomac V. Teachers' opinions about

- capabilities and behavior of children with epilepsy. *Epilepsy Behavior*. 2003;4(2):142-5.
5. Dantas FG, Cariri GA, Cariri GA, Ribeiro Filho AR. Knowledge and attitudes toward epilepsy among primary, secondary and tertiary level teachers. *Arquivos Neuro-Psiquiatria*. 2001;59:712-6.
6. Jones C, Atkinson P, Cross JH, Reilly C. Knowledge of and attitudes towards epilepsy among teachers: a systematic review. *Epilepsy Behavior*. 2018;87:59-68.
7. Greenhill LL, Pliszka S, Dulcan MK. Practice parameter for the use of stimulant medications in the treatment of children, adolescents, and adults. *J Am Academy Child Adolescent Psychiatr*. 2002;41(2):26S-49.
8. Perrin JM, Stein MT, Amler RW, Blondis TA, Feldman HM, Meyer BP, et al. Clinical practice guideline: treatment of the school-aged child with attention-deficit/hyperactivity disorder. *Pediatrics*. 2001;108(4):1033-44.
9. Kates N. Attention deficit disorder in adults. Management in primary care. *Canadian Family Physician*. 2005;51(1):53-9.
10. Alkahtani KD. Teachers' knowledge and misconceptions of attention deficit/hyperactivity disorder. *Psychology*. 2013;4(12):963.
11. Alanazi F, Al Turki Y. Knowledge and attitude of Attention-Deficit and Hyperactivity Disorder (ADHD) among male primary school teachers, in Riyadh City, Saudi Arabia. *J Family Med Prim Care*. 2021;10(3):1218.
12. Aljohani A. Elementary school teachers' knowledge of attention deficit/hyperactivity disorder. *J Fam Med Primary Care*. 2018;7(5):907.
13. Prevalence rate of autism-Autism Europe. Available at: <https://www.autismeurope.org/about-autism/prevalence-rate-of-autism/>. Accessed on 02 April 2025.
14. Lord C, Elsabbagh M, Baird G, Veenstra-Vanderweele J. Autism spectrum disorder. *Lancet*. 2018;392(10146):508-20.
15. Cappe É, Poirier N, Boujut É, Nader-Grosbois N, Dionne C, Boulard A. Autism spectrum disorder and evaluation of perceived stress parents and professionals: Study of the psychometric properties of a French adaptation of the Appraisal of Life Event Scale (ALES-vf). *L'encephale*. 2016;43(4):321-5.
16. Van Herwegen J, Ashworth M, Palikara O. Views of professionals about the educational needs of children with neurodevelopmental disorders. *Res Develop Disab*. 2019;91:103422.
17. Tareh S, Ahmad NA, Roslan S, Ma'rof AM, Zaid S. Pre-School Teachers' Knowledge, Belief, Identification Skills, and Self-Efficacy in Identifying Autism Spectrum Disorder (ASD): A Conceptual Framework to Identify Children with ASD. *Brain Sci*. 2020;10(3):165.
18. Scandurra V, Gialloreti EL, Barbanera F, Scordo MR, Pierini A, Canitano R. Neurodevelopmental Disorders and Adaptive Functions: A Study of Children with Autism Spectrum Disorders (ASD) and/or Attention Deficit and Hyperactivity Disorder (ADHD). *Front Psychiatry*. 2019;10:673.
19. John A, Friedmann Y, DelPozo-Banos M, Frizzati A, Ford T, Thapar A. Association of school absence and exclusion with recorded neurodevelopmental disorders, mental disorders, or self-harm: a nationwide, retrospective, electronic cohort study of children and young people in Wales, UK. *Lancet Psychiatr*. 2022;9:23-34.
20. Alkhotani AM. Teachers and Epilepsy in Saudi Arabia: Gaps in Knowledge and Potential Roles. *Int J Gen Med*. 2022;15:795-801.
21. Iannone LF, Roberti R, Arena G, Mammone S, Pulitano P, De Sarro G, et al. Assessing knowledge and attitudes toward epilepsy among schoolteachers and students: Implications for inclusion and safety in the educational system. *PLoS One*. 2021;16(4):e0249681.
22. Almarwani B, Alqelaiti E, Aljohani A, Abuanq L, Alhujaili R, Aljohani R. Knowledge and Attitude About Epilepsy Among School Teachers in Madinah, Saudi Arabia. *Cureus*. 2023;15(9):e44572.
23. Makhado TG, Sepeng NV, Makhado L. A systematic review of the effectiveness of epilepsy education programs on knowledge, attitudes, and skills among primary school learners. *Front Neurol*. 2024;15:1356920.
24. Tareh S, Ahmad NA, Roslan S, Ma'rof AM, Zaid S. Pre-School Teachers' Knowledge, Belief, Identification Skills, and Self-Efficacy in Identifying Autism Spectrum Disorder (ASD): A Conceptual Framework to Identify Children with ASD. *Brain Sci*. 2020;10(3):165.
25. Gómez-Marí I, Sanz-Cervera P, Tárraga-Mínguez R. 2021 Teachers' Knowledge Regarding Autism Spectrum Disorder (ASD): A Systematic Review. *Sustainability*. 2021;13(9):5097.
26. Hosseinnia M, Mazaheri MA, Heidari Z. Knowledge, attitude, and behavior of elementary teachers regarding attention deficit hyperactivity disorder. *J Educ Health Promot*. 2020;9:120.
27. Ghamrawi N, Shal T, Ghamrawi NAR. Cultivating teacher leadership: Evidence form a transformative professional development model. *School Leadership Management*. 2024;44(7):1-29.
28. Alhossein A. Teachers' Knowledge and Use of Evidenced-Based Practices for Students with Autism Spectrum Disorder in Saudi Arabia. *Front Psychol*. 2021;12:741409.
29. McDougal E, Riby DM, Hanley M. Teacher insights into the barriers and facilitators of learning in autism. *Res Autism Spectrum Disorders*. 2020;79:101674.
30. Au TC, Lau NS. Private music teachers' knowledge of and attitudes toward students with autism spectrum disorder. *J Autism Dev Disord*. 2021;51(12):4551-9.

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