

Research Article | Araştırma Makalesi

KNOWLEDGE AND AWARENESS OF AUTISM SPECTRUM DISORDER AMONG PEDIATRICIANS: A CROSS-SECTIONAL STUDY FROM TÜRKİYE

ÇOCUK DOKTORLARININ OTİZM SPEKTRUM BOZUKLUĞU HAKKINDA BİLGİ VE FARKINDALIĞI: TÜRKİYE'DEN KESİTSEL BİR ÇALIŞMA

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ABSTRACT

Objective: Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that requires early recognition and multidisciplinary management. Pediatricians play a key role in the early detection and referral of children with suspected ASD. This study aimed to assess the knowledge and awareness levels of pediatricians, pediatric subspecialists, and pediatric residents in Turkey regarding ASD, and to examine the influence of professional experience and educational background on these outcomes.

Methods: A cross-sectional survey was conducted with 125 physicians using the validated Turkish version of the Knowledge about Childhood Autism among Health Workers (KCAHW) scale. Sociodemographic data, clinical experience, and educational exposure were recorded. Descriptive statistics, group comparisons, and logistic regression analyses were performed.

Results: The mean KCAHW score was 15.19 ± 2.15 . No significant differences were observed based on gender, age, academic title, or years of experience ($p > 0.05$). Higher scores were found among participants who had received ASD-related training during residency, were familiar with DSM-5 criteria, or had read ASD-related literature ($p < 0.05$). Logistic regression analysis revealed that younger age and fewer years of experience were associated with a higher risk of lower knowledge scores ($p < 0.05$).

Conclusion: These findings suggest that ASD knowledge among pediatricians in Türkiye is shaped predominantly by educational exposure and individual effort rather than seniority. Structured ASD-focused training modules should be incorporated into pediatric residency curricula and continuing medical education programs to strengthen early recognition and referral practices.

Keywords: Autism spectrum disorder, KCAHW, Pediatricians, Knowledge

ÖZ

Amaç: Otizm Spektrum Bozukluğu (OSB), erken tanı ve çok disiplinli müdahale gerektiren nörolojiksel bir bozukluktur. Çocuk doktorları, OSB'nin erken fark edilmesi ve yönlendirilmesinde kritik bir rol üstlenmektedir. Bu çalışmada, Türkiye'de görev yapan pediatri uzmanları, yan dal uzmanları ve asistanlarının OSB'ye ilişkin bilgi ve farkındalık düzeylerinin belirlenmesi ve mesleki deneyim ile eğitim öyküsünün bu düzeyler üzerindeki etkisinin incelenmesi amaçlanmıştır.

Yöntem: Kesitsel araştırma kapsamında, 125 katılımcıdan "Sağlık Çalışanlarının Çocukluk Çağı Otizmi Hakkında Bilgi Anketi (SÇ-OBA)" ile veri toplanmıştır. Katılımcıların sosyodemografik özellikleri, deneyimleri ve eğitim öyküleri de değerlendirilmiştir. Veriler tanımlayıcı istatistikler, grup karşılaştırmaları ve lojistik regresyon analizleriyle analiz edilmiştir.

Bulgular: Ortalama bilgi puanı $15,19 \pm 2,15$ 'tir. Cinsiyet, yaş, unvan ve deneyim süresi ile puanlar arasında anlamlı fark saptanmamıştır ($p > 0,05$). Uzmanlık eğitimi sırasında OSB eğitimi almış, DSM-5 kriterlerini bilen ve literatür okuduğunu belirten katılımcılar daha yüksek puan almıştır ($p < 0,05$). Daha genç yaş ve kısa mesleki deneyim, düşük bilgi düzeyi ile ilişkili bulunmuştur ($p < 0,05$).

Sonuç: Çocuk doktorlarının OSB'ye ilişkin bilgi düzeyi, büyük ölçüde eğitim ve bireysel çabayla şekillenmektedir. Asistanlık eğitimi ve hizmet içi eğitimlerde OSB odaklı yapılandırılmış içeriklerin artırılması önerilmektedir.

Anahtar Kelimeler: Otizm spektrum bozukluğu, SÇ-OBA, Çocuk Doktorları, Bilgi düzeyi.

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Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by impairments in social communication and interaction, along with restricted and repetitive patterns of interests and behaviors. The diagnostic criteria include deficits in social-emotional reciprocity, impairments in verbal and non-verbal communication, restricted and repetitive behaviors and interests, and sensory processing differences.¹

Population-based surveillance studies conducted by the U.S. Centers for Disease Control and Prevention (CDC) through the Autism and Developmental Disabilities Monitoring Network reported the prevalence of ASD as 1 in 36 in 2020, which increased to 1 in 31 in the 2022 report. Within the same age group, prevalence was 49.2 per 1,000 among boys compared to 14.3 per 1,000 among girls, indicating a 3.4-fold higher prevalence in males.^{2,3} In Türkiye, a screening study using the Modified Checklist for Autism in Toddlers (M-CHAT) identified the prevalence of ASD as 1 in 117 children.⁴ Differences in early diagnosis practices and reporting systems substantially contribute to the variability in prevalence estimates across countries.⁵

Early identification and multidisciplinary intervention in ASD are known to reduce the severity of symptoms.⁶ Pediatricians and family physicians hold primary responsibility in the early diagnosis and intervention pathway for ASD. The American Academy of Pediatrics recommends that physicians routinely conduct developmental surveillance and use screening tools such as the M-CHAT and the Child Behavior Checklist (CBCL) during well-child visits at 18 and 24 months, thereby facilitating timely referrals for at-risk children.⁷ In addition, the National Autism Action Plan implemented in Türkiye emphasizes the importance of early identification and timely referral, aiming to strengthen national strategies for improving access to appropriate interventions and services, and since 2018 the National Autism Spectrum Disorder Diagnosis and Monitoring Program has been implemented nationwide.⁸ Early intervention supports language acquisition and social skill development, thereby improving long-term quality of life.⁹

Several studies have reported deficiencies in pediatricians' knowledge, attitudes, and clinical practices regarding the management of ASD. Effatpanah et al. found that fewer than 50% of pediatricians were able to correctly identify diagnostic criteria for ASD, and attitudes towards early intervention were generally inadequate.¹⁰ A study conducted in Saudi Arabia reported pediatricians' knowledge scores at an average of 9.9 out of 20, highlighting that only 30% consistently used early screening tools, and just 25% adequately emphasized family education.¹¹ Similarly, a study by Çitil et al. (2021) in Türkiye revealed that pediatricians had insufficient knowledge of ASD diagnostic criteria and held several misconceptions, including beliefs about the

vaccine-ASD association. Moreover, pediatricians' overall awareness and approach to ASD were found to be similar to those of general practitioners.¹²

The primary aim of this study is to evaluate the knowledge and beliefs regarding ASD among general pediatricians, pediatric subspecialists, and pediatric residents practicing in Türkiye, and to conduct a comparative assessment among physicians with different levels of seniority and experience to highlight the current situation. In the existing literature, studies that simultaneously investigate the knowledge and awareness of pediatric subspecialists and pediatric residents about ASD are notably scarce. In this context, our study quantitatively assesses pediatric physicians' knowledge and attitudes toward ASD across varying professional seniorities and seeks to provide recommendations for improving educational curricula and enhancing the quality of professional development programs.

Methods

This descriptive, cross-sectional study was designed to evaluate the knowledge, attitudes, and practices regarding ASD among pediatricians, pediatric subspecialists, and pediatric residents practicing in various provinces of Türkiye. Data were collected using the Knowledge about Childhood Autism among Health Workers (KCAHW) scale, a validated and reliable instrument, together with a sociodemographic information form. The questionnaire was developed based on a comprehensive literature review and expert consultations. A pilot test was conducted with 10 physicians outside the target population to assess clarity, feasibility, and completion time, with necessary adjustments were made accordingly. Data collection was carried out via Google Forms, with survey links distributed directly to participants' mobile devices. Participants were randomly sampled from pediatricians, pediatric subspecialists, and pediatric residents across all geographical regions of Türkiye. A total of 125 physicians who volunteered and provided written informed consent were included in the study.

The questionnaire consisted of two sections. The first section addressed demographic characteristics such as age, gender, professional title, years of experience, type of institution, and previous training related to ASD. The second section comprised 19 Likert-type items from the KCAHW, assessing knowledge, attitudes, and practices concerning ASD diagnostic criteria, early signs, intervention approaches, and multidisciplinary collaboration.

Ethical approval was obtained from the Ethics Committee of Kartal Dr. Lütfi Kırdar City Hospital (Decision No: 010.99/51, Date: February 8, 2024). The study was conducted in accordance with the principles outlined in the Declaration of Helsinki. Participants were assured of anonymity and confidentiality of their data.

Knowledge about Childhood Autism among Health Workers (KCAHW)

The questionnaire developed to assess healthcare professionals' knowledge about childhood autism underwent validity and reliability testing in Turkish by Börte-Gürbüz et al.^{13,14} The validation process included analyses of construct validity and criterion validity. Internal consistency for the questionnaire was reported at .97, with a Cronbach's alpha coefficient of .86. The instrument consists of 19 items covering four autism-related domains: social interaction (8 items), communication (1 item), behavioral patterns (4 items), and other features of autism (6 items). Each item is answered with "yes," "no," or "I don't know." Correct responses are scored as 1 point, while incorrect and "I don't know" responses are scored as 0, resulting in a total score range from 0 to 19. Higher total scores indicate greater knowledge about childhood autism among healthcare professionals.¹⁴

Statistical Analysis

The data obtained in the study were analyzed using NCSS (Number Cruncher Statistical System) 2020 Statistical Software (NCSS LLC, Kaysville, Utah, USA). Descriptive statistics were used to summarize the data: quantitative variables were expressed as mean, standard deviation, median, minimum, and maximum, while categorical variables were presented as frequency and percentage. The normality of quantitative data distributions was assessed using skewness-kurtosis values and Box Plot visualizations. For comparisons between two groups with normally distributed variables, the student's t-test was used, whereas one-way ANOVA was applied for comparisons among three or more groups. For non-normally distributed variables, The Mann–Whitney U test was used in two group comparisons. Logistic regression analysis was performed to identify factors associated with knowledge scores below the third quartile. All results were evaluated within a 95% confidence interval, with a significance level set at $p < 0.05$.

Results

The study was conducted between March 1, 2024, and May 1, 2024, and included a total of 125 pediatricians, of whom 72% ($n=90$) were female and 28% ($n=35$) male. The majority of the participants were female (72.0%), aged 36 years and older (59.2%), and specialists (63.2%). The mean age of participants was 38.07 ± 7.93 years. Most of the participants were employed at training and research hospitals (63.2%), with general pediatrics being the predominant specialty (77.6%). Among pediatric subspecialties, pediatric endocrinology (21.4%) and neonatology (17.9%) were the most frequently represented. The descriptive characteristics of the participants are presented in Table 1.

Most participants resided in Istanbul (64.8%, $n = 81$), followed by Izmir (5.6%, $n = 7$), Ankara (4.8%, $n = 6$), and Hatay (4.0%, $n = 5$). In total, pediatricians from a total of

21 different provinces across Türkiye took part in the study.

Table 2 summarizes participants' knowledge, experience, and attitudes regarding ASD. Among them, 76.8% ($n = 96$) reported having received theoretical or clinical training on ASD during medical school, and 52.0% ($n = 65$) indicated that they had received ASD-related training during residency. Only 37.6% stated that they were familiar with the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) diagnostic criteria for ASD, whereas 98.4% reported referring patients with suspected ASD to the appropriate specialist services.

In the results of the KCAHW assessing participants' knowledge of ASD, the highest correct response rates were observed for the items "Impairment in eye contact and gestures" and "Inability to develop peer relationships," each with 99.2% ($n = 124$). In contrast, the lowest correct response rate was recorded for the item "Autism begins in childhood," with only 44.8% ($n = 56$) answering correctly. Additionally, 51.2% of participants correctly identified intellectual disability as a common comorbidity of autism, while 48.0% recognized epilepsy as a potential comorbid condition.

Table 3 presents the distribution of total KCAHW scores, which reflect healthcare professionals' knowledge of childhood autism. Participants' total scores ranged from 10 to 19, with a mean score of 15.19 ± 2.15 . The 25th percentile was 14, the median was 15, and the 75th percentile was 17, indicating an overall moderate-to-high level of knowledge. While 71.2% of participants scored below 17, only 28.8% achieved a score of 17 or higher.

No statistically significant differences were observed in total KCAHW scores based on gender, age, field of specialization, or years of professional experience ($p > 0.05$).

However, participants who received ASD-related training during residency had significantly higher knowledge scores (Mean = 15.60 ± 2.01) compared to those without such training (Mean = 14.75 ± 2.24 ; $p = 0.027$). Similarly, participants who reported familiarity with the DSM-5 diagnostic criteria for ASD (Mean = 16.00 ± 1.88) and those who had read books or articles on the topic (Mean = 15.59 ± 2.07) demonstrated significantly higher knowledge levels than those without such exposure ($p = 0.001$ and $p = 0.049$, respectively). Participants who reported having knowledge about occupational therapy practices for children diagnosed with ASD also had significantly higher scores (Mean = 15.81 ± 2.02) than those without such knowledge (Mean = 14.64 ± 2.14 ; $p = 0.002$). Likewise, knowledge scores were significantly higher among participants who were familiar with speech and language therapy ($p = 0.032$). In contrast, no significant associations were found between knowledge scores and having received theoretical or clinical education on ASD during medical school, awareness of pharmacological treatment, or having a relative diagnosed with ASD ($p > 0.05$) (Table 4).

According to the backward logistic regression analysis presented in Table 5, age and years of professional

experience were identified as significant predictors of knowledge scores below the third quartile (Q3) (model statistically significant: $p = 0.016$). The explanatory power of the model was $R^2 = 0.151$. Age was found to significantly increase the risk of scoring below Q3, with each one-year increase in age associated with a 1.148-fold increase in risk ($p = 0.023$; 95% CI: 1.020–1.293).

Professional experience also had a significant effect on knowledge score levels ($p = 0.013$). When participants with 15 or more years of experience were used as the reference group, those with 0–5 years of experience were 30.510 times more likely to score below Q3 ($p = 0.006$; 95% CI: 2.670–348.680).

Table 1. Descriptive characteristics of the participants

Variable		n (%)
Gender	Female	90 (72.0)
	Male	35 (28.0)
Age	Mean $\pm$ SD	38.07 $\pm$ 7.93
	Median (Min–Max)	37 (25–65)
	25–30 years	25 (20.0)
	31–35 years	26 (20.8)
	≥ 36 years	74 (59.2)
Institution type	University	11 (8.8)
	Private outpatient clinic	3 (2.4)
	Private hospital	15 (12)
	State hospital	17 (13.6)
	Training and research hospital	79 (63.2)
Academic title	Resident physician	30 (24)
	Associate Professor	11 (8.8)
	Assistant Professor	3 (2.4)
	Professor	2 (1.6)
	Specialist physician	79 (63.2)
Years of experience	0–5 years	32 (25.6)
	5–10 years	30 (24)
	10–15 years	30 (24)
	15–20 years	13 (10.4)
	≥ 20 years	20 (16)
Pediatric field of specialization	General pediatrics	97 (77.6)
	Subspecialties	28 (22.4)
	Pediatric emergency	2 (7.1)
	Pediatric endocrinology	6 (21.4)
	Pediatric infectious diseases	3 (10.7)
	Pediatric pulmonology	1 (3.6)
	Pediatric hematology-oncology	3 (10.7)
	Pediatric immunology-allergy	2 (7.1)
	Pediatric cardiology	1 (3.6)
	Pediatric nephrology	3 (10.7)
	Pediatric neurology	2 (7.1)
	Neonatology	5 (17.9)

SD: Standard Deviation; Min-Max: Minimum -Maximum

Table 2. Distribution of participants' knowledge, experience, and attitudes toward ASD

		n (%)
Did you receive theoretical or clinical training on ASD during medical education?	Yes	96 (76.8)
	No	29 (23.2)
Did you receive any training on ASD during your residency?	Yes	65 (52)
	No	60 (48)
Do you refer patients with suspected ASD diagnosis?	Yes	123 (98.4)
	No	2 (1.6)
Do you have a relative diagnosed with ASD?	Yes	17 (13.6)
	No	108 (86.4)
Are you familiar with the DSM-5 diagnostic criteria for ASD?	Yes	47 (37.6)
	No	78 (62.4)
Have you read any books or articles related to ASD?	Yes	59 (47.2)
	No	66 (52.8)
How frequently do you see patients diagnosed with ASD?	Never	1 (0.8)
	Every day	4 (3.2)
	Once a week	27 (21.6)
	Once a month	62 (49.6)
	Every 6 months	31 (24.8)
To which department do you refer patients with suspected ASD? (n=123)	Pediatric Metabolism	1 (0.8)
	Pediatric Neurology	9 (7.3)
	Child and Adolescent Psychiatry	110 (89.4)
	Psychologist	3 (2.4)
*Therapies provided to patients diagnosed with ASD	Special Education	124 (99.2)
	Speech and Language Therapy	113 (90.4)
	Pharmacological Treatment	93 (74.4)
	Occupational Therapy	59 (47.2)

Notes: ASD: Autism Spectrum Disorder; DSM-5: Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. Multiple therapies were selected.

Table 3. Total score distribution on the knowledge about childhood autism among health workers

	KCAHW Total Score
Number of items	19
Mean $\pm$ SD	15.19 $\pm$ 2.15
Median (Min–Max)	15 (10-19)
25th percentile (Q1)	14
50th percentile (Q2)	15
75th percentile (Q3)	17
<17	89 (71.2)
$\geq$ 17	31 (28.8)

Table 4. Comparison of KCAHW total scores according to participants' ASD-related characteristics

		N	KCAHW Total Score		Test statistic	P
			Mean $\pm$ SD	Median (Min–		
ASD-related education during medical school	Yes	96	15.14 $\pm$ 2.16	15 (10-19)	t: -0.532	^a 0.596
	No	29	15.38 $\pm$ 2.19	15 (10-19)		
ASD-related education during residency	Yes	65	15.60 $\pm$ 2.01	16 (10-19)	t:0.528	^a 0.027*
	No	60	14.75 $\pm$ 2.24	15 (10-19)		
Having a relative diagnosed with ASD	Yes	17	15.71 $\pm$ 1.76	15 (13-19)	t:1.057	^a 0.293
	No	108	15.11 $\pm$ 2.21	15 (10-19)		
Familiarity with DSM-5 diagnostic criteria	Yes	47	16.00 $\pm$ 1.88	16 (11-19)	t:3.384	^a 0.001**
	No	78	14.71 $\pm$ 2.18	15 (10-19)		
Reading books/articles on ASD	Yes	59	15.59 $\pm$ 2.07	16 (10-19)	t:1.989	^a 0.049*
	No	66	14.83 $\pm$ 2.19	15 (10-19)		
Therapies provided to patients diagnosed with ASD						
Speech and Language Therapy	No	12	13.83 $\pm$ 2.25	14.5 (10-17)	Z: -2.147	^c 0.032*
	Yes	113	15.34 $\pm$ 2.11	16 (10-19)		
Pharmacological Treatment	No	32	15.03 $\pm$ 2.06	15 (11-19)	t:0.487	^a 0.627
	Yes	93	15.25 $\pm$ 2.20	15 (10-19)		
Occupational Therapy	No	66	14.64 $\pm$ 2.14	15 (10-19)	t:3.153	^a 0.002**
	Yes	59	15.81 $\pm$ 2.02	16 (10-19)		

Notes: KCAHW = Knowledge about Childhood Autism among Health Workers; ASD = Autism Spectrum Disorder; SD = Standard Deviation; Min–Max = Minimum–Maximum. ^aStudent t Test. ^cMann Whitney U Test. **p<0.01 *p<0.05

Table 5. Logistic regression analysis of factors predicting knowledge scores below the third quartile on the KCAHW

	χ^2	R ²	B	SE	P	ODDS	%95 CI	
							Lower	Upper
Model	13.975	0.151			0.016*			
Age			0.138	0.061	0.023*	1.148	1.020	1.293
Specialization (Subspecialist)			0.980	0.587	0.095	2.665	0.844	8.420
Experience					0.013*			
Experience (0–5 years)			3.418	1.243	0.006**	30.510	2.670	348.680
Experience (5–10 years)			1.156	0.905	0.201	3.177	0.540	18.705
Experience (10–15 years)			0.877	0.741	0.237	2.403	0.563	10.264

Notes:KCAHW = Knowledge about Childhood Autism among Health Workers; χ^2 = Chi-square; R² = Nagelkerke R-squared; B = Regression coefficient; SE = Standard Error; OR = Odds Ratio; CI = Confidence Interval. **p<0.01 *p<0.05

Discussion

This study aimed to evaluate the knowledge, experience, and attitudes regarding ASD among 125 pediatricians and pediatric residents with varying levels of seniority and professional experience. The findings revealed that most participants demonstrated a high tendency to refer patients when ASD was suspected. Delays in recognizing ASD and missing the critical developmental window for timely diagnosis and intervention remain major challenges worldwide. In a previous study conducted in Türkiye, the average age of ASD diagnosis was reported to be around 31 months.¹⁵ In this context, the high referral rate observed in the present study represents a promising outcome, highlighting the pivotal role of pediatric healthcare professionals in the early identification of ASD.

However, only approximately one-third of participants reported familiarity with the DSM-5 diagnostic criteria for ASD, indicating a need to strengthen the foundational knowledge related to diagnosis.¹⁶ Given that the mean knowledge score was 15.19 $\pm$ 2.15 and that approximately 71% of participants scored below the third quartile threshold of 17, the overall level of knowledge can be considered limited. Moreover, the absence of statistically significant differences in knowledge scores based on key demographic variables such as gender, age, professional title, and years of experience suggests that this limitation reflects a widespread and general trend. On the other hand, the study also revealed that individual efforts and professional education—such as receiving ASD-related training during residency, being familiar with DSM-5 diagnostic criteria, and reading books or articles

about ASD—were significantly associated with higher knowledge levels.

The limited knowledge levels identified through the KCAHW in this study is consistent with findings from similar studies conducted in other countries. In a study by Börte et al., which involved general practitioners working in primary care settings, the mean knowledge score was reported as 13.83 ± 2.55 , indicating a lower level of knowledge.¹⁴ In contrast, Kılınçel et al. reported a mean score of 15 among pediatricians, which aligns closely with the findings of our study.¹⁷ In our sample, only one-third of participants reported familiarity with the DSM-5 diagnostic criteria for ASD. Similarly, Effatpanah et al. found that fewer than half of pediatricians were able to correctly identify the diagnostic criteria for ASD, while the study conducted by Çitil et al. also revealed insufficient knowledge among pediatricians regarding diagnostic criteria.^{10,12}

The KCAHW results evaluating participants' knowledge of ASD indicate a particularly high level of awareness regarding social communication and behavioral symptoms. This suggests that participants are proficient in recognizing clinically observable signs within the social and behavioral domains. These findings align with previous studies showing that physicians tend to focus more on identifying symptoms rather than making formal ASD diagnoses.¹⁸ This pattern may also help explain the high rate of referrals reported by physicians when ASD is suspected.

Participants' responses to the item indicating that ASD begins in childhood revealed a notable lack of knowledge regarding the developmental timing of the disorder. In addition, the low levels of correct responses concerning common comorbidities—such as intellectual disability (51.2%) and epilepsy (48.0%)—suggest insufficient awareness of the broader clinical spectrum of ASD.¹⁹ Overall, findings from the KCAHW indicate that while participants possess relatively strong knowledge of the observable behavioral characteristics of ASD, their understanding of its etiological, developmental, and comorbid features remains limited.

Several variables found to be statistically significant in our study emerged as key determinants associated with higher levels of knowledge about ASD. Notably, participants who received ASD-related training during their residency had significantly higher knowledge scores compared to those who did not. Similarly, those who reported being familiar with the DSM-5 diagnostic criteria and those who had read books or articles on ASD achieved significantly higher scores. This finding suggests that training received during residency may be particularly effective, as it is more rapidly and frequently applied in clinical practice where physicians encounter a higher number of pediatric patients. These results indicate that, in addition to possessing theoretical knowledge, direct engagement in the follow-up of pediatric cases also directly enhances ASD awareness. Consistent with our results, Börte et al. also reported that healthcare professionals who had received training on ASD demonstrated greater diagnostic awareness.¹⁴

Moreover, participants who were knowledgeable about intervention approaches such as occupational therapy and speech and language therapy also had higher knowledge scores. This may indicate that physicians who are familiar with the multidisciplinary nature of ASD tend to have a more comprehensive understanding of the disorder.

One of the noteworthy findings of this study is the inverse relationship between age, years of professional experience, and ASD knowledge levels. According to the logistic regression analysis, the risk of scoring below the third quartile (Q3) increased significantly with age. Furthermore, participants with 0–5 years of experience were approximately 30 times more likely to score below Q3 compared to their peers with ≥ 15 years of experience. These results suggest that healthcare professionals with shorter clinical experience and younger age tend to have more limited knowledge about ASD. Similarly, a study by Çitil et al. reported that pediatric specialists demonstrated higher levels of ASD knowledge compared to resident physicians.¹²

In contrast, a study conducted with general practitioners reported that physicians with less than five years of professional experience had higher levels of ASD knowledge.²⁰ Similarly, in the United States, emergency medical technicians with less experience were found to have greater knowledge of ASD compared to their more senior counterparts.²¹ However, in a study by Gölbaşı et al., no significant association was found between age or years of experience and knowledge about ASD among family health center staff.²² This finding was consistent with the results reported by Arslan et al.²³ Additionally, Piriñçi et al., in a study involving final-year medical students (interns), found a significant difference in knowledge levels between those who had participated in child psychiatry rotations and examined patients with ASD and those who had not.²⁴ These findings suggest that knowledge level is influenced not only by seniority, but also by access to up-to-date information and participation in continuing professional education. The observed difference in our study may be attributed to the fact that younger physicians are closer to their formal education and are more likely to have been exposed to up-to-date approaches within their medical curricula.

In the present study, no statistically significant differences were found between knowledge scores and demographic variables such as gender, age group, professional title, or overall years of experience. However, a study conducted in Sivas with family physicians and staff working in family health centers reported significantly higher ASD knowledge levels among female participants compared to males. Similarly, in a study involving family medicine residents, female residents demonstrated significantly greater knowledge of ASD.^{22,25} These findings suggest that ASD knowledge is more closely related to individual and educational factors rather than demographic characteristics alone. For example, some participants holding the academic titles of professor or associate professor had relatively low knowledge scores, whereas certain resident physicians

scored considerably higher. This underscores that seniority alone does not guarantee higher knowledge levels and that the content and recency of education may play a more critical role. Additionally, the finding that participants with a relative diagnosed with ASD did not differ significantly in their knowledge scores from others is also noteworthy. Although personal experience might be assumed to enhance awareness, this result suggests that such an association may, in fact, be weak.

This study is one of the few in Türkiye to evaluate the knowledge levels of pediatric specialists and residents regarding ASD in relation to various factors. The National Autism Action Plan, published in 2016 and still in effect, adopts an approach that prioritizes early diagnosis, effective referral, and integrated service delivery for individuals with ASD.^{8,26} Within the scope of this plan, pediatricians—alongside family physicians—are emphasized as having a primary responsibility in recognizing early signs of autism and making appropriate referrals at the first level of care. The findings of our study support the critical role pediatricians play in this process and highlight the importance of implementing structured training programs within child health monitoring services to enhance the effective implementation of the National Autism Action Plan in clinical practice. In this context, standardizing the content of child psychiatry rotations and placing greater emphasis on autism-related theoretical knowledge, possible comorbid diagnoses, and frequently co-occurring medical conditions during pediatric subspecialty rotations (e.g., neurology, metabolism) may contribute to the standardization and strengthening of ASD training in pediatrics.

One of the strengths of this study is its inclusion of participants from a wide range of institutional settings and academic titles, which enhances the generalizability of the findings. Moreover, the study goes beyond descriptive analyses by employing multivariable logistic regression to model the factors influencing knowledge levels, thereby adding methodological depth to the research. However, certain limitations of the study should be acknowledged. First, the voluntary nature of participation may have introduced selection bias—for instance, physicians with a particular interest in the topic may have been more likely to participate. Additionally, the number of participants in some subgroups (e.g., professors or pediatric subspecialists) was limited, which may have constrained the ability to evaluate differences among groups with heterogeneous clinical experience.

Future studies are recommended to include larger and more representative samples, with data collected from diverse geographic regions. In addition to assessing knowledge levels, incorporating instruments that evaluate attitudes, and clinical practices would contribute to a more comprehensive understanding of the overall approach to ASD. The present findings underscore the need for structured training modules on ASD to be integrated into residency programs, particularly during pediatric specialty training.

This study demonstrated that pediatric physicians generally have insufficient knowledge regarding ASD, and

that this limitation is more closely related to educational exposure and individual effort than to professional seniority. The findings clearly highlight the need for targeted educational programs aimed at enhancing pediatricians' understanding of diagnostic criteria and current approaches, given their critical role in the early identification and intervention process for ASD. Incorporating structured ASD-specific content into residency training curricula and offering continuing professional development opportunities post-specialization would significantly enhance physicians' clinical competence in recognizing ASD. In the long term, such initiatives are likely to improve referral practices and contribute positively to the quality of life of children with ASD.

Ethical Approval

The study was approved by the ethics committee of Kartal Dr. Lütfi Kırdar City Hospital (Decision No: 010.99/51, Date: February 8, 2024) and were performed in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Conflict of Interest

The authors declare that they have no conflict of interest.

Author Contributions

ZVP, MTK: Concept-Design; ZVP, MTK, EK, YA: Data Collection and/or Processing; ZVP, MTK, EK, YA: Analysis and/or Interpretation; ZVP, MTK, EK, YA: Literature Review; ZVP, MTK, EK, YA: Manuscript preparation. All authors reviewed the results and approved the final version of the manuscript.

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