Dicle Tıp Dergisi / Dicle Med J (2026) 53 (2) : 417- 430

www.diclemedj.org

Original Article / Özgün Araştırma

# First Contact in The Diagnosis Process of Autism Spectrum Disorder: Comparison of The Knowledge Levels of Pediatricians and Primary Care Physicians Working in The Province of Diyarbakir and Investigation of Influencing Factors

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*Received: 18.02.2026; Revised: 04.05.2026; Accepted: 06.05.2026*

**Abstract**

**Objective:** This study aims to evaluate the knowledge level and clinical approach of pediatricians and primary care physicians who first come into contact with children regarding autism spectrum disorder (ASD).

**Methods:** This cross-sectional study included 188 physicians who agreed to participate. Data were collected using the Childhood Autism Knowledge Scale for Healthcare Professionals (KCAWH) and a questionnaire containing sociodemographic information. Data were analyzed based on sociodemographic characteristics, ASD knowledge scores, and case referral practices.

**Results:** The mean total KCAWH score of the participants was found to be 13.85 ± 2.12. There was no statistically significant difference between the total knowledge scores of pediatricians and primary care physicians (p>0.05). A one-way ANOVA test for total knowledge scores across age groups revealed a statistically significant difference (F(2.185) = 3.717; p = 0.026). According to the post-hoc analysis results, the knowledge scores of physicians in the 27-40 age group (14.12 ± 2.17) were found to be significantly higher than those in the 41-50 age group (13.23 ± 1.83) (p = 0.047). Female gender was identified to be the strongest independent factor predicting knowledge level in the regression analysis (p=0.016).

**Conclusion:** Screening processes, which play an important role in early diagnosis, need to be improved, and physicians need to be supported with practical and routine training.

**Keywords:** Autism Spectrum Disorder, Early Diagnosis, Primary Care Physician

**DOI: 10.5798/dicletip.1964562**

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# Otizm Spektrum Bozukluğu Tanı Sürecinde ilk Temas: Diyarbakır İlinde Çalışan Pediatrist ve Birinci Basamak Hekimlerinin Bilgi Düzeylerinin Karşılaştırılması ve Etkileyen Faktörlerin İncelenmesi

**Öz**

**Amaç:** Bu çalışma, çocuklarla ilk teması kuran pediatrist ve birinci basamak hekimlerinin otizm spektrum bozukluğu (OSB) konusundaki bilgi düzeylerini ve klinik yaklaşımlarını değerlendirmeyi amaçlamaktadır.

**Yöntemler:** Kesitsel tipteki bu araştırmaya, çalışmaya katılmayı kabul eden 188 hekim dahil edilmiştir. Sağlık çalışanlarında Çocukluk Çağı Otizmi Bilgi Ölçeği (SÇ-OBA) ve sosyodemografik bilgileri içeren bir anket ile veriler toplanmıştır. Veriler; sosyodemografik özellikler, OSB bilgi puanları ve vaka yönlendirme pratikleri üzerinden analiz edilmiştir.

**Bulgular:** Katılımcıların SÇ-OBA toplam puan ortalaması 13.85 ± 2.12 olarak saptanmıştır. Pediatristler ile birinci basamak hekimlerinin toplam bilgi puanları arasında istatistiksel olarak anlamlı bir fark bulunmamıştır ($p>0.05$). Yaş grupları arasında toplam bilgi puanı açısından yapılan tek yönlü ANOVA testinde istatistiksel olarak anlamlı bir fark saptanmıştır ($F(2, 185) = 3,717$; $p = 0,026$). Post-hoc analiz sonuçlarına göre; 27-40 yaş grubundaki hekimlerin bilgi puanlarının (14.12 ± 2.17), 41-50 yaş grubuna (13.23 ± 1.83) göre anlamlı düzeyde yüksek olduğu belirlenmiştir ($p = 0.047$). Kadın cinsiyetinin yapılan regresyon analiziyle bilgi düzeyini yordayan en güçlü bağımsız faktör olduğu belirlenmiştir ($p=0.016$).

**Sonuç:** Erken tanı için önemli bir yeri olan tarama süreçlerinin iyileştirilmesi ve hekimlerin pratik ve rutin eğitimlerle desteklenmesi gerekmektedir.

**Anahtar kelimeler:** Otizm Spektrum Bozukluğu, Erken Tanı, Aile Hekimi, Pediatrist.

## INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by difficulties in social communication, restricted interests, and repetitive behaviors. ASD is considered a heterogeneous condition, showing substantial individual variability in symptom presentation and required levels of support[1]. According to the latest report (2025) from the Centers for Disease Control and Prevention (CDC), approximately one in 31 children aged 8 years has been diagnosed with ASD. This prevalence has increased nearly fivefold over time, from 1 in 150 children in the year 2000, with a particularly marked rise observed after 2016[2]. This increase in case numbers has made the need for early intervention services for children with ASD more critical. Early identification of ASD can help children access necessary services and supports and improve long-term outcomes[3]. From a developmental neuroscience perspective, it is accepted that early interventions applied during the critical period when the brain is most sensitive to acquiring language and social skills result in much faster and more lasting improvement in core symptoms compared to interventions applied at a later stage[4].

Early intervention programs are known to result in significant improvements, particularly in cognitive abilities, language development, and adaptive functioning[5]. In addition, by increasing individual independence in the long term, these programs may substantially reduce medical, educational, and social support costs[6]. The positive impact of early interventions on prognosis constitutes the main rationale behind recommendations by authorities such as the American Academy of Pediatrics (AAP) and the Centers for Disease Control and Prevention (CDC) to conduct routine ASD screening for all children at 18 and 24 months of age[7,8].

The Autism Spectrum Disorder Screening and Monitoring Program was launched in Türkiye in 2016 within the framework of the National Autism Spectrum Disorder Action Plan. The program includes training primary care physicians by child and adolescent mental health specialists, followed by routine ASD screening of all children aged 18–36 months during periodic child health visits conducted by primary care physicians[9]. The program aims to refer children identified as being at risk to appropriate clinical services and to follow diagnostic outcomes. Although the screening and follow-up framework is well defined, its effectiveness in real-world settings largely depends on the clinical competence of physicians who act as the first point of contact. However, studies suggest that despite the availability of screening protocols, diagnostic delays may still occur due to limited physician knowledge and awareness of ASD[10,11].

Studies in the literature report limited knowledge among pediatric physicians regarding ASD diagnostic criteria, early intervention, the use of early screening tools, and informing and guiding families[12,13]. In addition, several studies have shown that pediatric specialists may have similarly limited levels of knowledge and awareness as general practitioners in terms of overall awareness and clinical approaches to ASD[10,14]. The most critical stage in the ASD diagnostic process is the initial interaction between families and the first medical professionals with whom they share their developmental concerns[15]. In the Turkish healthcare system, primary care physicians are responsible for primary screening as the legal implementers of the ASD Screening and Monitoring Program, whereas pediatricians serve as a secondary filter, either as the first specialists consulted by families for developmental concerns or as the clinicians conducting the initial evaluation following screening. Previous studies emphasize that awareness of ASD symptoms among these two physician groups directly affects the age at diagnosis and, consequently, the timing of access to early intervention services[14]. However, the limited number of comparative studies examining the knowledge levels and clinical approaches of these two specialties simultaneously, within their complementary roles, constitutes the main rationale for the present study. Studies in the literature have examined the level of knowledge about ASD among various health professionals; however, there is a lack of studies that compare and address families—who play an important role in early diagnosis—and the two most important first points of contact for children, namely pediatricians and primary care physicians. In addition, the study examines not only theoretical knowledge but also the relationship between perceived competence levels and actual referral behaviors. This study provides applicable data to improve the effectiveness of early screening and the referral chain. Consequently, this study aims to comparatively evaluate the knowledge levels and educational needs of pediatricians and primary care physicians, who are often the first points of contact for families.

## METHODS

This research was designed as a cross-sectional descriptive study. The sample consisted of pediatricians, subspecialists, family medicine specialists, and general practitioners. Data were collected via digital forms (Google Forms) sent to volunteer physicians reached through professional communication networks. A total of 210 physicians were reached during the study period. After excluding participants who did not meet the specialty criteria or who did not complete the questionnaire form, 188 physicians who met the criteria were included in the study. Ethical approval for the study was granted by the Clinical Research Ethics Committee of Gazi Yaşargil Training and

Research Hospital, Health Sciences University, with decision number 583 dated 25.07.2025.

## MATERIALS

In this study, the Knowledge About Childhood Autism Among Health Workers Questionnaire (KCAHW) was used as the data collection tool. In addition, questions were designed to assess participants' sociodemographic and professional characteristics, such as age, sex, and professional title. The survey also included items regarding the frequency of referral of cases suspected of ASD to relevant specialties, educational background, perceived self-efficacy, and knowledge related to the etiology and treatment of autism.

### Knowledge About Childhood Autism Among Health Workers Questionnaire (KCAHW)

In the study, the Knowledge About Childhood Autism Among Health Workers Questionnaire developed by Bakare and colleagues (2008), was used as the data collection tool[16]. The scale, consisting of 19 items, assesses the clinical characteristics of autism in four main areas. The questionnaire consists of Domain 1, comprising 8 items related to problems with social interaction; Domain 2, comprising 1 item related to communication and language development characteristics; Domain 3, comprising 4 items related to restricted interests and repetitive/stereotypical behaviors; and Domain 4, comprising 6 items inquiring about the etiology of autism, comorbid conditions, and age of onset. Scale items are answered with yes, no, or don't know, with each correct answer scoring 1 point and incorrect or don't know answers scoring 0 points. The three items in Domain 4 are reverse-scored. The total score on the scale ranges from 0 to 19, with a higher score indicating a greater level of knowledge about childhood autism. The validity and reliability study of the scale in Turkish was conducted by Gürbüz et al. and reported that the total Cronbach's Alpha coefficient of the Turkish form was .92, while the coefficients of the subscales ranged from .62 to .89[17].

### Data Analysis

Data obtained from the study were analyzed using SPSS (Statistical Package for the Social Sciences) version 26.0. Descriptive statistics, including frequencies and percentages, were used to summarize participants' sociodemographic and professional characteristics. The normality of data distribution was assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests. Pearson correlation coefficients were calculated to examine relationships between continuous variables. Homogeneity of variances was evaluated using Levene's test. For comparisons between two groups, the independent samples t-test was applied for normally distributed data. Comparisons among more than two groups were performed using one-way analysis of variance (ANOVA). When a significant difference was detected in ANOVA, post hoc analyses were conducted using the Hochberg test. This test was preferred because it controls Type I errors and performs comparisons between unequal groups. Multiple linear regression analysis was performed to identify independent predictors of physicians' ASD knowledge levels. In the initial analysis, a high correlation was observed between age and years of professional experience. To prevent multicollinearity, years of professional experience were excluded from the regression model. The final model was statistically significant ($F(5, 182) = 2.414$; $p = 0.038$), with an explanatory power ($R^2$) of 0.062. Statistical significance was set at $p < 0.05$ for all analyses.

## RESULTS

### Descriptive Characteristics

The average age of the 188 physicians included in the study was 38.58 ± 6.71 years, and their average professional experience was 13.10 ±

7.04 years. 37.2% (n=70) of the participants were female, and 62.8% (n=118) were male. When the distribution by specialty was examined, 44.3% (n=83) were pediatricians, 34.5% (n=65) were general practitioners, 12.2% (n=23) were subspecialists, and 9.0% (n=17) were family medicine specialists. The distribution of physicians according to the institutions where they work is as follows: 43.6% (n=82) work in family health centers, 29.3% (n=55) in state hospitals, 14.4% (n=27) in training and research hospitals, 8% (n=15) at university hospitals, and 4.8% (n=9) at private hospitals (Table 1).

**Table I:** Distribution of Sociodemographic and Professional Characteristics of the Participants

| | Mean ±Sd |
|---|---|
| Age | 38.58 ± 6.71 |
| | n (%) |
| Gender | |
| Female | 70 (37.2%) |
| Male | 118 (62.8%) |
| Specialty Status | |
| Pediatric Subspecialist | 23 (12.2%) |
| Pediatrician | 83 (44.3%) |
| Family Medicine Specialist | 17 (9.0%) |
| General Practitioner | 65 (34.5%) |
| Type of Institution | |
| University Hospital | 15 (8.0%) |
| Training and Research Hospital | 27 (14.4%) |
| State Hospital | 55 (29.3%) |
| Private Hospital | 9 (4.8%) |
| Family Health Center | 82 (43.6%) |
| Completion of Child and Adolescent Psychiatry Clerkship during Medical School | |
| Yes | 114 (60.6%) |
| No | 74 (39.4%) |
| Completion of Child and Adolescent Psychiatry Rotation during Residency | |
| Yes | 70 (37.2%) |
| No | 53 (28.2%) |
| Non-specialist | 65 (34.6%) |
| Number of Patients Referred to the Relevant Specialty with Suspected ASD in the Past Year | |
| None | 64 (34.0%) |
| 1-2 cases | 68 (36.2%) |
| 3-5 cases | 34 (18.1%) |
| 6 cases or more | 22 (11.7%) |
| First-degree Relative with a Diagnosis of ASD | |
| Yes | 19 (10.1%) |
| No | 165 (87.8%) |
| Did not wish to respond | 4 (2.1%) |

*n: Number; %: Percent; Ort ± Ss: Mean ± Standart Deviation; ASD: Autism Spectrum Disorder*

## Distribution of Scale Scores and Comparison by Specialty Groups

The mean total score of the KCAHW scale was found to be 13.85 ± 2.12. The mean subscale scores were 7.16 ± 1.03 for Domain 1, 0.82 ± 0.38 for Domain 2, 2.97 ± 0.84 for Domain 3, and 3.69 ± 1.38 for Domain 4.

Analysis of responses to the KCAHW questionnaire items showed that both groups answered items related to social interaction and communication with high rates of correct responses. The highest correct response rates were observed for the items related to decreased interest in the environment (n = 183;

97.3%) and social interaction problems (n = 183; 97.3%). However, only 63.3% of the participants (n = 119) correctly identified that social smiling is absent in autism.

In Domain 4, which includes general knowledge and comorbidities, primary care physicians answered the items stating that autism is a neurodevelopmental disorder (n = 71; 86.8%) and not an autoimmune condition (n = 63; 76.8%) at significantly higher rates compared to pediatricians ($p < 0.05$). In addition, correct knowledge regarding the age of onset of autism was found in 48.8% of primary care physicians (n = 40) and 34.0% of pediatricians ($p = 0.040$).

In both groups, knowledge levels regarding epilepsy as a comorbidity of autism (total n = 91; 48.4%) and abnormal eating behaviors (total n = 100; 53.2%) were found to be relatively lower (Table 2).

**Table II:** Comparison of Correct Response Rates to the KCAHW Scale Items by Specialty Groups

| KCAHW Questionnaire Items | Pediatrician Group (n=106) | Primary Care Physician Group (n=82) | Total (n=188) (%) | p |
|---|---|---|---|---|
| Domain 1 | | | | |
| Marked impairment in behaviors such as eye contact, facial expressions, body posture, and gestures during social interaction | 104(98.1%) | 79(96.3%) | 183(97.3%) | 0.454 |
| Failure to develop peer relationships appropriate to the developmental level | 101(95.3%) | 79(96.3%) | 180(95.7%) | 0.721 |
| Lack of desire to spontaneously share one's appreciation, interest, or activities with others | 101(95.3%) | 75(91.5%) | 176(93.6%) | 0.288 |
| Lack of social and emotional reciprocity | 99(93.4%) | 73(89.0%) | 172(91.5%) | 0.287 |
| Staring blankly for prolonged periods and an inability to concentrate on a specific task | 91(85.8%) | 74(90.2%) | 165(87.8%) | 0.362 |
| The child may appear deaf or mute | 98(92.5%) | 71(86.8%) | 169(89.9%) | 0.186 |
| Reduced interest in the surrounding environment and people | 105(99.1%) | 78(95.1%) | 183(97.3%) | 0.096 |
| Social smiling is generally absent in children with autism | 64 (60.4%) | 55 (67.1%) | 119(63.3%) | 0.304 |
| Domain 2 | | | | |
| Delay or absence in the development of spoken language | 86 (81.1%) | 68(82.9%) | 154(81.9%) | 0.751 |
| Domain 3 | | | | |
| Stereotyped and repetitive movements (such as flapping hands or bending fingers) | 101(95.3%) | 80(97.6%) | 181(96.3%) | 0.413 |
| May be associated with abnormal eating habits | 61 (57.5%) | 39(47.6%) | 100(53.2%) | 0.174 |
| Constantly preoccupied with parts of objects | 100(94.3%) | 73(89.0%) | 173(92.0%) | 0.182 |
| Interest in routine activities | 64 (60.4%) | 41(50.0%) | 105(55.9%) | 0.155 |
| Domain 4 | | | | |
| Autism is childhood schizophrenia | 72 (67.9%) | 60 (73.2%) | 132(70.2%) | 0.435 |
| Autism is an autoimmune condition | 67 (63.2%) | 63(76.8%) | 130 (69.1%) | 0.045* |
| Autism is a neurodevelopmental disorder | 78 (73.6%) | 71(86.8%) | 149(79.3%) | 0.029* |
| Intellectual disability may be a comorbid diagnosis in autism | 61 (58.5%) | 54(65.9%) | 116(61.7%) | 0.303 |
| Epilepsy may be a comorbid diagnosis in autism | 53 (50.0%) | 38(46.3%) | 91(48.4%) | 0.619 |
| The age of onset of autism | 36 (34.0%) | 40(48.8%) | 76(40.4%) | 0.040* |

*n: Number; %: Percent; p: Chi-square (x2) Test Significance Value; KCAHW: Knowledge About Childhood Autism Among Health Workers, *p < 0.05.*

No statistically significant differences were found between the pediatrician group (n = 106) and the primary care physician group (n = 82) in terms of total score or Domain 1, Domain 2, and Domain 3 scores ($p > 0.05$). In contrast, the mean Domain 4 score was significantly higher in the primary care physician group (3.97 ± 1.39) compared to the pediatrician group (3.47 ± 1.34) ($t(186) = -2.504$; $p = 0.013$) (Table 3).

**Table III:** Comparison of Physicians' KCAHW Total and Subscale Mean Scores by Specialty Group

| | Pediatrician Group (n=106) Mean ± Sd | Primary Care Physician Group (n=82) Mean ± Sd | Total (n=188) Mean ± Sd | | | t | p |
|---|---|---|---|---|---|---|---|
| | | | Min | Max | Mean | | |
| Total Knowledge Score | 13.82 ± 2.06 | 13.90 ± 2.20 | 8.00 | 18.00 | 13.85 ± 2.12 | -0.261 | 0.794 |
| Domain 1 | 7.19 ± 0.96 | 7.12 ±1.13 | 3.00 | 8.00 | 7.16 ± 1.03 | 0.497 | 0.619 |
| Domain 2 | 0.81 ± 0.39 | 0.83 ± 0.39 | 0.00 | 1.00 | 0.82 ± 0.38 | -0.315 | 0.753 |
| Domain 3 | 3.07 ± 0.82 | 2.84 ± 0.87 | 1.00 | 4.00 | 2.97 ± 0.85 | 1.886 | 0.061 |
| Domain 4 | 3.47 ± 1.34 | 3.98 ± 1.39 | 0.00 | 6.00 | 3.69 ±1.38 | -2.504 | 0.013 * |

*n: Number; Mean ± Sd: Mean ± Standard Deviation; Min: Minimum; Max: Maximum; t: Independent Samples T-test Value; KCAHW: Knowledge About Childhood Autism Among Health Workers; Domain 1: Social Interaction; Domain 2: Communication; Domain 3: Restricted Interests and Repetitive Behaviors; Domain 4: Etiology, Development, and Differential Diagnosis, *p < 0.05.*

## Education, Clinical Experience, and Perceived Self-Efficacy

When the relationship between specialty groups and completion of a child and adolescent psychiatry rotation during medical education was examined, 67.9% of the pediatrician group (n = 72) and 51.2% of the primary care physician group (n = 42) were found to have completed this rotation. The analysis revealed a statistically significant association between specialty group and completion of the rotation ($\chi^2 = 5.405$; p = 0.020).

The rate of referring "six or more patients" with suspected ASD within the last 12 months was 17.9% (n = 19) in the pediatrician group and 3.7% (n = 3) in the primary care physician group, and this difference was statistically significant ($\chi^2 = 35.540$; p < 0.001).

Regarding perceived self-efficacy in ASD diagnostic processes, 34.9% of pediatricians (n = 37) and 40.2% of primary care physicians (n = 33) reported feeling competent, with no statistically significant difference between the groups (p = 0.530). Similarly, the proportion of participants who considered their training to be sufficient was 17.0% (n = 18) in the pediatrician group and 14.6% (n = 12) in the primary care group, with no significant difference between specialty groups ($\chi^2 = 0.829$; p = 0.661).

## Factors Affecting ASD Knowledge Level (Gender, Age, and Professional Status)

When the mean KCAHW scale scores were examined according to gender, the total knowledge score was 14.40 ± 2.04 for female physicians (n = 70) and 13.53 ± 2.10 for male physicians (n = 118), representing a statistically significant difference (t (186) = 2.754; p = 0.006). In the subscale analyses, the mean Domain 3 score of female physicians (3.21 ± 0.83) was significantly higher than that of male physicians (2.83 ± 0.83) (t (186) = 3.062; p = 0.003).

Pearson correlation analysis revealed a significant negative correlation between physicians' age and total knowledge score (r = −0.165; p = 0.020), whereas no significant relationship was found between total knowledge score and years of professional experience (p = 0.058). Differences in total ASD knowledge scores among age groups (27–40 years, 41–50 years, and ≥51 years) were examined using one-way ANOVA. A statistically significant difference was found between age groups in terms of total knowledge scores (F (2.185) = 3.717; p = 0.026). Post-hoc Hochberg test results for homogeneously distributed data indicated that physicians aged 27–40 years had significantly higher knowledge scores (14.12 ± 2.17) compared to those aged 41–50 years (13.23 ± 1.83) (p = 0.047) (Table 4).

**Table IV:** Comparison of ASD Knowledge Scores by Participants' Age Groups

| Age Groups | N | Mean ± Sd | F | p | Post-Hoc (Hochberg) |
|---|---|---|---|---|---|
| (A) 27-40 years | 134 | 14.12± 2.17 | 3.717 | 0.026 | A>B |
| (B)41-50 years | 42 | 13.23± 1.83 | | | |
| (C) 51 years and above | 12 | 13.08± 1.98 | | | |
| Total | 188 | 13.86 ±2.12 | | | |

**p<0.05; F: One-Way ANOVA Test Value; Mean±Sd: Mean ± Standart Deviation*

When KCAHW total and subscale scores were evaluated according to professional status, the mean total knowledge score was 13.99 ± 2.03 for specialist physicians (n = 117) and 13.63 ± 2.25 for non-specialist physicians (n = 71), with no statistically significant difference between the groups (t (186) = 1.122; p = 0.263). Subscale analyses showed no statistically significant differences between groups in Domain 1 (7.24 ± 0.95 vs. 7.02 ± 1.15; p = 0.160), Domain 2 (0.82 ± 0.37 vs. 0.80 ± 0.40; p = 0.652), or Domain 4 (3.58 ± 1.35 vs. 3.85 ± 1.43; p = 0.198). However, the mean Domain 3 score was significantly higher among specialist physicians (3.07 ± 0.84) compared to non-specialist physicians (2.80 ± 0.83) (t (186) = 2.167; p = 0.032).

One-way ANOVA was conducted to examine whether total ASD knowledge scores differed according to physicians' professional titles (subspecialist, pediatrician, family medicine specialist and general practitioner). No statistically significant difference was found between professional titles and total knowledge scores (F (3.184) = 1.756; p = 0.157).

## Item-Level Analysis of Correct Responses

When correct response rates to items related to the etiology of autism were examined, the proportion of correct responses for the genetics item was 97.2% (n = 103) in the pediatrician group and 93.9% (n = 77) in the primary care physician group. For the prenatal infections item, the corresponding rates were 50.9% (n = 54) and 62.2% (n = 51), respectively. For the item addressing differences in early brain development, correct response rates were 79.2% (n = 84) in the pediatrician group and 78.0% (n = 64) in the primary care physician group.

Among etiological factors, a statistically significant difference between groups was observed only for the item related to birth complications (p = 0.012). For this item, the correct response rate was significantly higher in the primary care physician group (56.1%, n = 46) compared to the pediatrician group (37.7%, n = 40).

Regarding awareness of ASD treatment methods, social skills training was identified by 98.1% of pediatricians (n = 104) and 98.8% of primary care physicians (n = 81) (p = 0.717). Speech and language therapy was reported by 98,1% of the pediatrician group (n = 104) and 95.1% of the primary care group (n = 78) (p = 0.247). Occupational therapy was identified by 48.1% of pediatricians (n = 51) and 46.3% of primary care physicians (n = 38) (p = 0.809).

Awareness of pharmacological treatment for comorbid psychopathologies was 80.2% (n = 85) in the pediatrician group and 64.6% (n = 53) in the primary care physician group, with the difference being statistically significant (p = 0.017).

## Multiple Linear Regression Analysis

The results of the multiple linear regression analysis conducted to identify factors associated with physicians' total ASD knowledge scores are presented in Table 5. After controlling for age, specialty, completion of internships during medical education, and child mental health rotation, gender was found to be a significant and independent predictor of the total knowledge score (β = 0.179; t = 2.392; p = 0.018). According to the coding scheme, female physicians had a total knowledge score that was, on average, 0.78 points higher than that of their male counterparts (B = 0.785). No

independent effects of specialty or other education-related variables included in the model on total knowledge score were observed ($p > 0.05$) (Table 5).

**Table V:** Multiple Linear Regression Analysis of Factors Predicting Physicians' Knowledge Levels Regarding ASD

| Variables | B | Std. Error | Beta (ß) | t | p | VIF |
|---|---|---|---|---|---|---|
| Constant | 14.832 | 1.166 | | 12.718 | <0.001 | |
| Gender | 0.785 | 0.328 | 0.179 | 2.392 | 0.018 | 1.092 |
| Age | -0.033 | 0.025 | -0.103 | -1.290 | 0.199 | 1.246 |
| Completion of Medical School Clerkship | -0.345 | 0.335 | -0.080 | -1.031 | 0.304 | 1.161 |
| Specialty / Field of Practice | 0.194 | 0.450 | 0.046 | 0.432 | 0.666 | 2.162 |
| Child and Adolescent Psychiatry Rotation | 0.114 | 0.454 | 0.026 | 0.252 | 0.802 | 2.092 |

*B: Unstandardized coefficient; ß: Standardized Coefficient; t: T-test Value; p: Significance; VIF: Variance Inflation Factor*

## DISCUSSION

This study aimed to evaluate the current level of knowledge and clinical approaches regarding autism spectrum disorder (ASD) among family physicians and pediatricians working in a province in the Southeastern Anatolia Region of Türkiye—physicians who are often the first point of contact for children in the ASD diagnostic and follow-up process and who have the greatest potential to identify developmental delays at an early stage.

The mean total KCAHW score of the physicians included in the study was 13.85 ± 2.12. When national and international literature is considered, this score can be interpreted as corresponding to a moderate level of knowledge. Given the critical importance of early diagnosis in autism, this finding suggests that physicians to whom families initially express developmental concerns may not be sufficiently equipped in this area[2,14]. Previous studies using similar scales have likewise reported heterogeneous knowledge levels among physicians, with scores remaining well below the maximum achievable level[18-20]. According to data from the Centers for Disease Control and Prevention (CDC, 2025), more than half of children receive an ASD diagnosis after the age of four. The most critical actors in preventing this delay are primary care physicians and pediatricians, who constitute the main focus of the present study[2]. At this point, it is important to emphasize that the primary expectation from first- and second-level physicians is not to establish a definitive ASD diagnosis, but rather to identify early developmental deviations and to refer at-risk cases to appropriate specialized centers. The convergence of knowledge levels between these two physician groups highlights the shared gatekeeper role of both family physicians and pediatricians in the early ASD detection pathway[21]. Considering the well-established benefits of early intervention, the most fundamental strategy to reduce diagnostic delays is not advanced diagnostic expertise, but the ability to recognize red-flag symptoms and to integrate standardized screening tools into routine clinical practice.

One of the key findings of our study was the absence of a statistically significant difference in ASD knowledge levels between pediatricians and primary care physicians. This finding suggests that the theoretical knowledge base regarding ASD is similar across these two disciplines. Several studies in the literature have reported comparable knowledge levels between pediatricians and primary care physicians, in line with our results[10]. In contrast, both national and international studies have also reported higher levels of ASD related knowledge among pediatricians compared to physicians working in primary care settings[22,23]. In the present study, no statistically significant differences were found in total ASD knowledge scores not only between the main specialty groups, but also among more specific professional categories, including

subspecialists, pediatricians, family medicine specialists, and general practitioners (F (3.184) = 1.756; p = 0.157). This finding indicates that ASD awareness may be distributed independently of academic title or level of clinical specialization. Supporting this interpretation, previous studies have reported that specialty, subspecialty training, and even academic rank do not significantly influence knowledge scores related to ASD[18]. In another study consistent with these findings, general practitioners working in family health centers were reported to have higher levels of ASD knowledge than family medicine specialists[24]. Taken together, these findings suggest that physicians' awareness of ASD may be more closely related to proximity to up-to-date medical education and individual professional interest rather than formal specialty title alone.

Consistent with many previous studies in the literature, the subscale analysis showed that both physician groups obtained their lowest scores in Domain 4[13]. Knowledge related to the genetic and biological foundations of ASD and associated comorbidities included in Domain 4 may be more prone to becoming outdated more rapidly compared to knowledge of clinical symptoms. Although both groups scored relatively low in Domain 4, primary care physicians had statistically significantly higher mean scores than pediatricians. This finding is noteworthy, as pediatricians encounter a greater number of ASD cases in clinical practice, yet primary care physicians demonstrated higher awareness of etiological and developmental foundations. Studies have suggested that, despite encountering more cases in clinical practice, pediatricians may lag in etiological knowledge, which may be related to a heavy patient workload. In the literature, it has been reported that pediatricians focus more on medical comorbidities than on developmental features[25]. In a study conducted in Türkiye, it was reported that 66% of pediatricians had not received postgraduate education on ASD. This finding also supports the idea that clinical experience alone is not sufficient to maintain up-to-date theoretical knowledge[26]. In addition, primary care physicians constitute the main target group of the national autism screening program. The emphasis of this program on etiology and early development may have contributed to strengthening the knowledge of primary care physicians in this field. Furthermore, participation in continuing medical education is associated with increased etiological awareness among primary care physicians[27].

One possible explanation for this finding is that general practitioners, who constitute the majority of the primary care group, may retain more up-to-date theoretical knowledge due to recent examination processes and updated medical education curricula compared to pediatricians. Although the specialty title was not a determining factor for total knowledge scores or Domain 4 scores, a different pattern emerged when other subscales were examined. The mean Domain 3 scores, representing restricted interests and repetitive behaviors, were significantly higher among physicians who had completed specialty training (subspecialists, pediatricians, and family medicine specialists) compared to non-specialist physicians (p = 0.032). This finding suggests that, in contrast to the more theory-based content of Domain 4, the recognition of clinical features related to restricted and repetitive behaviors may be more strongly influenced by clinical exposure and experience gained during specialty training.

When physicians' clinical approaches to ASD were examined, an inconsistency was observed between perceived self-efficacy, knowledge levels, and clinical practice. In our study, approximately 35–40% of physicians reported feeling competent in the diagnostic process, whereas only 14–17% considered the training

they had received to be sufficient. These findings suggest that perceived competence may be more closely related to subjective perception rather than to objective academic preparation.

Although 17.9% of pediatricians and 3.7% of primary care physicians reported referring six or more patients with suspected autism within the past year, these results indicate that a high level of perceived self-efficacy does not always translate into clinical awareness or referral behavior. In the literature, it has been reported that there is no linear relationship between physicians' levels of knowledge and their referral practices. In Türkiye, this situation may be explained by barriers to accessing child and adolescent psychiatry services and the high demand for appointments. In a recent study, it was found that a significant proportion of parents were not aware that they should seek help from child and adolescent psychiatrists when they had developmental concerns about their children[14]. This finding suggests that disruptions in the referral system are not only related to physicians but also stem from a disconnection between parents and the healthcare system. In addition, time constraints and lack of systemic support may lead physicians to adopt a "wait-and-see" approach. As a result of these factors, referral behavior may also be negatively affected[25]. It has also been stated that the implementation of collaborative care models in primary healthcare plays a critical role in overcoming these referral barriers and improving diagnostic accuracy[21]. Consistent with this, the literature emphasizes that although physicians often report familiarity with ASD symptoms, they experience difficulties in using screening tools and identifying at-risk cases, which ultimately contributes to delays in diagnosis[24]. Studies focusing on primary care physicians further highlight that, in addition to knowledge gaps, systemic factors such as high workload and the lack of routine use of standardized ASD screening tools in daily practice also play a significant role in this process[21].

Given the critical importance of early intervention in autism spectrum disorder, greater emphasis should be placed on ASD-related training during undergraduate medical education and specialty training programs. Furthermore, the development of structured, ongoing educational programs for physicians, along with improvements in working conditions, is of substantial importance to enhance early identification and referral practices.

Correlation analysis revealed a significant negative association between physicians' age and total ASD knowledge scores. When ASD knowledge levels were compared across age groups, physicians aged 27–40 years had significantly higher total knowledge scores than those aged 41–50 years. This difference, confirmed by post-hoc Hochberg analysis, suggests that ASD-related knowledge appears to be more pronounced among younger physicians at first glance.

However, in the multiple linear regression analysis conducted to further explore this finding, the effect of age lost its statistical significance when evaluated together with gender, completion of child psychiatry internship during medical education, and child psychiatry rotation during specialty training ($p = 0.247$). The attenuation of the age effect in the regression model, alongside the emergence of gender as the strongest predictor ($p = 0.016$), suggests that the age-related difference observed in the ANOVA analysis may reflect a shared effect with other covariates included in the model.

The literature presents heterogeneous findings regarding the relationship between age and ASD knowledge levels. Some studies support our findings, reporting higher ASD knowledge among younger physicians[19,28], whereas other studies have demonstrated no clear association. Another notable finding of our study was that the age-related difference observed in knowledge scores was not mirrored by years of professional experience. Similar results have been reported in the literature, indicating that age may be a significant factor while years of practice do not independently influence ASD knowledge levels[29]. Conversely, some studies contradict our findings

by suggesting that ASD knowledge increases not with age, but directly with years of clinical experience[30]. Taken together, if ASD knowledge were primarily acquired through accumulated clinical experience, a parallel and significant increase in knowledge scores with years of practice would be expected. However, the lack of association with years of professional experience, combined with the loss of significance of age in the regression model and the shift of explanatory power toward variables such as gender, suggests that ASD-related knowledge may be more closely associated with the recency of education and individual factors rather than with cumulative clinical experience alone.

Another important finding of our study was that female physicians had higher ASD knowledge scores than their male counterparts. Supporting this finding, the multiple linear regression analysis demonstrated that female gender remained the strongest independent predictor of ASD knowledge level even after controlling for professional factors such as age, specialty, completion of internships during medical education, and child psychiatry rotation during specialty training ($\beta = 0.181$; $p = 0.016$). This result indicates that the effect of female gender on knowledge level is not incidental and remains statistically significant independently of other variables included in the model.

This finding is consistent with previous studies in the literature reporting higher levels of awareness and knowledge regarding ASD among female physicians[11,20,29]. In studies on physician–patient communication, it has been reported that female physicians allocate more time to clinical interviews and prioritize preventive healthcare services compared to male physicians[31,32]. Placing greater emphasis on counseling and psychosocial care aspects may lead to higher levels of experience and theoretical knowledge regarding neurodevelopmental disorders such as ASD, which require detailed developmental history taking. In contrast, some studies have reported male gender as a significant factor[24], or have found no gender-related differences[30]. These inconsistent findings suggest that they may be influenced by regional differences in clinical practice models or sample characteristics. In addition, female physicians tend to show greater interest in child development and to allocate more time to parent education[33]. This situation may positively affect both the theoretical and clinical knowledge levels of female physicians regarding disorders such as Autism Spectrum Disorder, where early diagnosis is crucial. However, this finding should be interpreted with caution, as variables that may influence these results, such as empathy, sensitivity, or specific clinical interest areas, were not directly measured in the present study. The presence of conflicting findings in the literature regarding gender differences[34,35] suggests that knowledge levels related to ASD cannot be explained solely by gender, but may also be closely associated with factors such as motivation to participate in postgraduate education, clinical exposure, and variability in subspecialty interests. In conclusion, although the statistical evidence in the present study indicates that gender may be a determining factor, further research is needed to better understand the underlying mechanisms, particularly within the context of educational preferences and clinical practice models.

## CONCLUSION

This study demonstrated that pediatricians and primary care physicians have comparable and moderate levels of knowledge regarding ASD, consistent with findings reported in the existing literature. However, the discrepancy between physicians' relatively high self-efficacy perceptions and their low referral rates indicates the presence of barriers in translating theoretical knowledge into clinical practice. In particular, awareness of red flag symptoms—crucial for early diagnosis needs to be strengthened among physicians. To prevent delays in ASD diagnosis, enhancing the effectiveness of current screening programs implemented in primary care settings and providing continuous, practice-oriented training after medical graduation represent critical steps.

## Limitations

This study has several limitations that should be considered when interpreting the findings. First, the primary care group was predominantly composed of general practitioners, with a limited number of family medicine specialists, which may have restricted the representativeness of this group. Second, the instrument used in this study assessed physicians' theoretical knowledge only; the extent to which this knowledge is translated into clinical practice during patient encounters was beyond the scope of the present research. Additionally, the reliance on self-reported data may have introduced subjectivity, particularly regarding measures such as perceived self-efficacy. The use of an online data collection method may have led to selection bias. Due to the voluntary nature of participation, physicians with a prior interest in neurodevelopmental disorders may have been more likely to participate. Finally, as the study was conducted at a provincial level, the findings may not be generalizable to all physicians across Türkiye.

**Ethics Committee Approval:** Ethical approval for the study was granted by the Clinical Research Ethics Committee of Gazi Yaşargil Training and Research Hospital, Health Sciences University, with decision number 583 dated 25.07.2025.

**Conflict of Interest:** The author declares no conflict of interest.

**Financial Disclosure:** The author declares that this study received no financial support.

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