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Awareness of Autism Spectrum Disorder and Symptom Recognition Among General Practitioners: A Cross-Sectional Study

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Abstract

Background and Objectives

General practitioners (GPs) play an important role in the early recognition and referral of autism spectrum disorder (ASD). This study evaluated GPs' awareness of ASD symptoms, referral practices, and beliefs regarding ASD etiology and treatment.

Methods

A cross-sectional survey was conducted among 242 GPs. The questionnaire assessed ASD-related knowledge, symptom recognition, referral practices, and attitudes toward complementary and alternative treatments.

Results

Most participants considered ASD screening part of primary care practice, but only one-third reported sufficient time for assessment. Social communication symptoms were highly recognized, whereas sensory and feeding-related symptoms showed lower awareness. Misconceptions regarding ASD etiology were common. Postgraduate ASD training was associated with higher symptom recognition and self-perceived competence.

Conclusions

Although GPs demonstrated adequate awareness of core ASD symptoms, important knowledge gaps remain regarding early and atypical presentations. Structured postgraduate education may improve early recognition in primary care.

INTRODUCTION

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that begins in early childhood and is characterised by deficits in social communication, restricted interests and repetitive behavioural patterns. In recent years, a significant increase in the prevalence of ASD has been reported, making it an increasingly important condition in terms of child health services[1,2]. It has been demonstrated that intensive and individualised interventions starting in early childhood have positive effects on language development, social communication skills, cognitive functioning and adaptive behaviours in ASD. Furthermore, it has been reported that early intervention not only enhances children's developmental gains but also reduces the burden on families and positively influences long-term functioning. Therefore, identifying ASD symptoms at the earliest possible stage and referring children to appropriate services is of critical importance [3,4].

One of the areas where children most frequently come into contact with the healthcare system during their early years is family medicine services. Family doctors play a key role in the early detection of ASD

symptoms due to regular infant and child check-ups, developmental assessments and vaccination processes[5–7]. The continuity-based nature of primary care enables family doctors to observe children's developmental processes over the long term. Repeated developmental assessments and routine child check-ups facilitate the identification of deviations in social communication and early signs of autism over time, placing family doctors in a unique position within the early diagnosis process. However, there are only a limited number of studies regarding family doctors' level of knowledge about the early signs of ASD, their ability to recognise atypical symptoms, and their competence in appropriate referral processes [8,9].

Accordingly, the present study aims to comprehensively assess family doctors' levels of knowledge and awareness regarding ASD, their ability to recognise early symptoms, their referral practices, and their attitudes towards complementary/alternative treatment approaches. It is anticipated that the findings will not only contribute to a better understanding of the current approach to ASD in primary care but also shed light on the development of clinical practice and educational strategies aimed at strengthening early diagnosis and intervention processes.

METHOD

This study was designed as a descriptive and cross-sectional study. Research data were collected between January 2026 and March 2026 from family doctors providing primary healthcare in XXX province. The study planned to include all family doctors based in the provincial centre who were actively providing outpatient services, involved in routine child health monitoring and developmental assessments, and who, according to an analysis conducted via the family medicine data system actively used in our country, assessed at least 20 paediatric patients aged 0–6 years per week. Doctors who did not play an active role in routine clinical follow-up processes, who did not have sufficient patient assessments in the relevant age group, or who did not agree to participate in the study were excluded. All family doctors who met the criteria and agreed to participate during the specified dates were included in the study.

Approval for the study was obtained from the XXX Clinical Research Ethics Committee (Date: 24.12.2025, Decision No: 2025/73). All participants were provided with verbal and/or written information about the study; voluntary participation was the basis, and the principles of the Declaration of Helsinki were adhered to.

A structured questionnaire, developed by the researchers based on the existing literature, similar studies and current clinical guidelines, was used as the data collection tool. A structured researcher-administered questionnaire was chosen because there is no standard measurement tool specifically designed for general practitioners, with established validity in Turkish, that assesses all the dimensions targeted by the study. This questionnaire used in the present study was not a completely newly developed scale; rather, it was an adapted, revised, and expanded version of a structured questionnaire previously used by our research team in a similar study conducted with pediatric physicians, modified

specifically for family physicians[13]. Prior to administering the questionnaire, necessary adjustments were made following consultation with expert academics working in the fields of child and adolescent mental health and general practice to ensure content appropriateness. Furthermore, the questionnaire was piloted on 10 general practitioners prior to the study, and the final version of the questionnaire was finalised.

The questionnaire form; comprises multidimensional questions assessing participants' sociodemographic characteristics, professional experience, and educational background regarding autism spectrum disorder (ASD); their clinical practices (screening and referral behaviours); their knowledge and beliefs regarding the aetiology, clinical features, and treatment of ASD; and their awareness of early warning signs observed in different age groups. In addition, the questionnaire also examined clinicians' attitudes towards common misconceptions regarding ASD (such as views related to vaccines, environmental factors and family attitudes) and complementary/alternative treatment approaches. The questions were designed to include both categorical (yes/no) responses and Likert-type scales for assessing symptom severity.

The survey was conducted face-to-face in order to more accurately reflect participants' current level of knowledge and to minimise the use of external sources. Questions that were not understood were explained where necessary during the survey.

Statistical analyses were performed using the [SPSS version 26] programme. The suitability of the variables for a normal distribution was assessed using the Kolmogorov–Smirnov test. Descriptive data are presented as numbers (n) and percentages (%). For comparisons between groups, the Mann–Whitney U and Kruskal–Wallis tests were used for non-parametric data, whilst the chi-square test or Fisher's exact test was used for categorical variables. A p-value of < 0.05 was considered statistically significant.

RESULTS

1. Participant Characteristics

A total of 242 general practitioners participated in the study. The mean age of the participants was 49.7 ± 10.9 years, with an age range of 28–70 years. Of the 126 participants who provided information on gender, 65.9% (n = 83) were male and 34.1% (n = 43) were female doctors.

In terms of professional experience, it was determined that 36.7% of participants (n = 88) had over 20 years' experience, whilst 28.3% (n = 68) had between 15 and 20 years' experience. The proportion of doctors with less than 10 years' professional experience was 20.8%.

46.2% of participants (n = 110) reported having received postgraduate training in ASD, whilst 53.8% (n = 128) stated they had not received any such training. The proportion of doctors reporting having an individual with an ASD diagnosis in their immediate circle was found to be 22.0% (n = 53).

2. Professional Attitudes and ASD-Related Beliefs

2.1. Professional Attitudes Toward ASD Screening:

91.5% of participants (n = 214) stated that they considered ASD screening to be the responsibility of a general practitioner. In contrast, only 35.7% (n = 82) reported having sufficient time for ASD assessment.

The proportion of doctors who stated they had sufficient experience with ASD was 44.8% (n = 107), whilst 55.2% (n = 132) assessed their experience in this area as insufficient.

2.2. Knowledge and Misconceptions Regarding ASD Etiology:

80.7% of participants (n = 192) reported believing that the prevalence of ASD has increased in recent years. When assessing the frequency of referrals for suspected ASD, it was found that 66.8% of doctors (n = 161) made referrals 1–2 times a year, whilst 24.5% (n = 59) made no referrals at all.

11.7% of participants (n = 28) correctly stated that ASD symptoms become apparent before the age of 3. The proportion of doctors aware that intelligence can be normal in ASD was 45.9% (n = 107).

65.6% (n = 149) considered heavy metal exposure, 60.4% (n = 136) screen use, 59.9% (n = 139) parental neglect, and 53.4% (n = 124) inappropriate parenting styles to be among the aetiological factors associated with ASD. The proportion of doctors who believed that life events could cause ASD was determined to be 41.9% (n = 99).

The proportion of doctors who believed there was a link between vaccines and ASD was found to be 3.9% (n = 9).

2.3. Treatment-Related Beliefs:

74.1% of participants (n = 169) stated that ASD is treatable. Special education and behavioural therapies were most frequently reported as the primary treatment approach (75.9%, n = 180). This was followed by increasing family involvement (22.8%, n = 54), whilst pharmacotherapy was cited as the primary approach by only 1.3% (n = 3).

42.1% of participants (n = 96) considered dietary supplements, 40.8% (n = 95) considered dietary therapy, and 20.7% (n = 47) considered hyperbaric oxygen therapy to be effective methods.

3. Recognition of ASD Symptoms

Symptom awareness was assessed using a 5-point Likert-type scale (0 = I never notice, 4 = I always notice).

3.1. ASD Symptoms in the 0–2 Year Age Group

Among the symptoms related to the 0–2 age period, the highest levels of recognition were observed for ‘not responding to one’s name’ (Mean = 3.74, Median = 4.0) and ‘lack of response to what is said’ (Mean = 3.72, Median = 4.0). The symptom of not speaking age-appropriately was also among those with a high level of recognition (Mean = 3.66, Median = 4.0).

In contrast, lower levels of awareness were observed for sensory and feeding-related symptoms. Stranger-approach behaviour was identified as the symptom with the lowest level of recognition (Mean = 1.55, Median = 1.0). Feeding difficulties (Mean = 1.70) and breast refusal (Mean = 1.86) were also among the symptoms with low recognition levels.

3.2. ASD Symptoms in the 2–6 Year Age Group

Among the symptoms relating to the 2–6-year-old age group, the highest level of recognition was found in the symptom of not looking at one’s name (Mean = 3.96, Median = 4.0). This symptom was followed by repetitive movements, failure to understand what is said, and failure to look at what is pointed at.

Whilst symptoms related to the social communication domain generally had higher recognition rates, lower levels of awareness were observed in certain cognitive and sensory characteristics. The symptom of having learnt to read at an early age was identified as the finding with the lowest recognition level (Mean = 1.62). Persistent preoccupation behaviour (Mean = 2.85) and object-sniffing behaviour (Mean = 2.63) were among the symptoms recognised at a moderate level.

4. Factors Associated with ASD Symptom Recognition

4.1. Postgraduate Education

Statistically significant differences in symptom recognition between doctors who had received postgraduate ASD training and those who had not were observed for four symptoms.

Regarding symptoms in the 0–2 age group, a significant difference was observed in the motor delay symptom *(U = 4907.0, p = 0.029, r = 0.141)*: the median for physicians with training was 4.0, whilst the median for those without was 3.0. Although the medians were equal for the ‘failure to look at name’ symptom, a significant difference in distribution was found *(U = 5163.5, p = 0.012, r = 0.110)*.

For symptoms in the 2–6 age group, small but statistically significant differences were observed in repetitive movements and the symptom of not looking at one’s name *(U = 5224.0, p = 0.042, r = 0.094 and U = 5321.5, p = 0.040, r = 0.087, respectively)*. The small effect sizes indicate that the impact of the training on these symptoms was limited.

4.2. Years of Professional Experience

A Kruskal-Wallis H test was applied to test the differences in symptom recognition between the five experience year groups. A Bonferroni-corrected Dunn post-hoc test was used for significant results. Years of professional experience showed limited but significant associations with recognition of restlessness, breast refusal, repetitive behaviors, persistent engagement, and age-inappropriate language.

DISCUSSION

This study is one of a limited number of studies that have assessed general practitioners' knowledge of autism spectrum disorder (ASD), clinical approaches and awareness of early signs in a multidimensional manner. When the findings are evaluated overall, it is observed that GPs view ASD screening as an important part of primary care practice, but there is marked heterogeneity in terms of awareness of early signs and level of aetiological knowledge. In particular, the finding that postgraduate training is associated with symptom recognition and perceived self-efficacy supports the importance of targeted training programmes in primary care[10,11] .

In our study, the vast majority of participants considered ASD screening to fall within the scope of family medicine. However, the fact that only a limited proportion reported having sufficient time for ASD assessment points to a mismatch between theoretical awareness and clinical practice capacity. Previous studies have also reported [that] the increasing patient burden and short consultation times in primary care services make developmental assessments difficult [12]. This suggests that in the early diagnosis of ASD, it is not only the clinician's awareness but also the organisation of the healthcare system that is decisive [11,12].

Although the majority of participants believed there had been an increase in the prevalence of ASD in recent years, the relatively low frequency of referrals is noteworthy. This finding indicates that, despite the increased awareness suggesting greater visibility of ASD in the community, clinical suspicion and referral behaviour have not increased to the same extent [10,12].

Findings regarding aetiology are also noteworthy. The fact that factors not supported by scientific evidence—such as heavy metal exposure, screen use, parental neglect, and inappropriate parenting styles—are cited as causes of ASD in significant proportions indicates that misconceptions regarding neurodevelopmental disorders have not entirely disappeared even among healthcare professionals[13]. In particular, the perception of parental attitudes as an aetiological factor suggests that the influence of psychosocial explanations—which were once widespread but have since lost their validity—persists to some extent. In contrast, the finding that the proportion of those believing in a vaccine-ASD link is quite low is a positive result. This suggests that anti-vaccine misinformation has largely been rejected among healthcare professionals and that scientific knowledge on this matter has become more firmly established; indeed, large-scale cohort studies have not shown a link between the MMR vaccine and ASD [14].

In assessments of treatment, the fact that special education and behavioural approaches were most frequently cited as the primary treatment method is consistent with current evidence-based approaches. However, the finding that methods with limited or controversial efficacy—such as diet, nutritional supplements and hyperbaric oxygen therapy—were considered effective by a significant proportion of respondents indicates that a tendency towards complementary and alternative therapies persists even among healthcare professionals. It is also noteworthy that a significant relationship was found between years of experience and belief in the efficacy of nutritional supplements. This suggests that attitudes towards treatment approaches may change with the duration of clinical experience. However, due to the cross-sectional nature of the study, it is not possible to make definitive conclusions regarding the direction of this relationship.

One of the study's notable findings is the variability in knowledge regarding the early symptoms of ASD. The fact that only a small proportion of participants correctly stated that symptoms appear before the age of three points to a significant awareness gap regarding early diagnosis. Yet, the existing literature clearly emphasises that ASD symptoms can be observed in the first years of life and that early intervention is decisive for long-term prognosis[10]. Therefore, limited awareness of early-stage symptoms can be considered one of the key factors contributing to diagnostic delay. This situation may be related to the heterogeneous clinical presentation of ASD, the fact that early symptoms do not manifest in the same way in every child, and the limited time allocated to assessing child development in primary care.

An analysis of symptom recognition patterns reveals that symptoms relating to social communication are recognised to a high degree by GPs. In particular, failure to respond to one's name, lack of response to verbal cues and repetitive behaviours were among the most frequently recognised symptoms. In contrast, awareness levels were found to be lower for sensory, feeding-related and more atypical symptoms. The lower recognition of symptoms such as approaching strangers, feeding difficulties and breast refusal could be considered a situation that may lead to delayed diagnosis in children where core social symptoms are not prominent. Similarly, whilst social communication symptoms are strongly recognised in the 2–6 age group, awareness of certain symptoms relating to sensory characteristics and restricted/repetitive interests remains more limited. This situation suggests the possibility that more atypical clinical presentations may be overlooked in primary care. The high recognisability of symptoms related to the social communication domain may be linked to the fact that training and clinical awareness regarding ASD have focused more on core social communication symptoms. Additionally, the fact that assessments in primary care are often based on parents' primary concerns may contribute to the overlooking of more atypical symptoms.

When the impact of postgraduate training was assessed, it was observed that doctors who had undergone training felt more competent regarding ASD and recognised certain symptoms to a greater extent. In particular, higher levels of awareness were observed regarding symptoms such as failure to respond to name, motor delay and repetitive behaviours. This finding supports the notion that targeted training programmes can enhance clinical awareness. However, the generally low effect sizes suggest that current training programmes may be limited in terms of duration, content or standardisation[15] .

It is also noteworthy that the effect of professional experience on symptom recognition was generally found to be limited. Although experienced clinicians demonstrated higher awareness for some symptoms, the effect sizes of these differences were low. This suggests that clinical experience alone is insufficient, and that access to up-to-date information and continuous professional development play a decisive role.

This study has certain limitations. Firstly, the study was conducted using a self-report questionnaire method and may not fully reflect physicians' actual clinical practices. Furthermore, the ceiling effect observed in symptom recognition variables may have made it difficult to identify subtle differences between groups, particularly regarding core social symptoms. The fact that the study was a single-centre study conducted with a specific sample group may also limit the generalisability of the results.

In conclusion, this study demonstrates that family doctors' basic awareness of ASD is generally adequate; however, significant knowledge gaps persist regarding early symptoms, aetiology and certain atypical clinical features. In particular, the finding that postgraduate training is associated with symptom awareness and self-efficacy supports the importance of structured training programmes in primary care. Furthermore, the insufficient clinical time allocated to ASD screening suggests that it is not only individual knowledge levels but also the organisation of the healthcare system that is decisive in early diagnosis processes.

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Conflict of Interest

The authors declare no conflicts of interest.

Consent to Publish

Not applicable.

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Data Availability Statement

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Approval

Ethical approval for this study was obtained from the Mersin City Hospital Clinical Research Ethics Committee (Decision No: 2025/73, Date: 24.12.2025). All procedures performed in this study were conducted in accordance with the ethical standards of the institutional research committee and with the Declaration of Helsinki.

Author Contribution

PD: Conceptualization, methodology, supervision, writing—original draft. MK: Data collection, investigation, writing—review and editing. MZK: Statistical analysis, methodology, writing—review and editing. BÖA: Literature review, data interpretation, writing—review and editing. AŞ: Data collection and investigation. GE: Literature review and manuscript editing. FK: Data collection, investigation, manuscript editing.

Data Availability

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