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Awareness of medical students about autism spectrum disorders

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Abstract

Background. The level of awareness of future doctors is an important factor that can further affect the quality of life of children with autism spectrum disorders. The problem has both scientific significance due to the lack of such studies in domestic science, and practical significance for identifying problem areas in the system of pediatric education.

Aim. To identify the level of awareness of pediatric faculties' students about autism spectrum disorders, methods for their diagnosis and treatment, technologies for non-medical intervention.

Material and methods. A questionnaire, aimed at identifying the awareness of medical students about autism, methods of its diagnosis, patient routing and self-assessment of knowledge, was developed. The questionnaire included 29 questions, which could be conditionally divided into blocks: questions on knowledge about autism, action scenarios and routing, self-assessment of awareness of autism spectrum disorders, assessment of environmental components for children with such disorders, passport. Data collection was carried out using Google forms. The survey involved 408 students of pediatric faculties of 7 Russian medical universities of Kazan, Yaroslavl, Nizhny Novgorod, Krasnoyarsk, Irkutsk, Izhevsk, Kirov. The survey was conducted in December 2020. The type of research can be defined as a questionnaire survey, which was carried out in two stages (field and analytical) from December 2020 to March 2021. The survey was conducted among 1–4th year (144 people), 5th year (116 people) and 6th year students (125 people). The selection of subgroups was due to the specifics of the educational process: until the second semester of the 4th year, pediatric students do not study disciplines related to the problem of autism spectrum disorders, 5th year students study neurology and psychiatry, 6th year students additionally have experience in outpatient practice. The obtained data were processed using the SPSS package.

Results. Officially accepted in Russia at the time of the survey, the medical interpretation of autism spectrum disorders as a group of complex disintegrative disorders of mental development was indicated by only a third (32.8%) of the medical students surveyed. Another part of the respondents (28.7%) considered autism to be a genetic disorder in the development of the nervous system due to the lack of inhibition of certain genes. The high proportion of students (21.1%) who define autism as mental retardation associated with socio-pedagogical neglect, causes concern. Senior students were more likely to give more relevant answers about the factors of autism spectrum disorders ($\chi^2=22.318$ at $p=0.034$). Only 14.2% of students were able to indicate the age of the child for screening the risk of such disorders, 19.1% correctly named the scale used for screening. 71.3% of students did not know about non-medical interventions for autism spectrum disorders, more than 90% did not have information about institutions that families with a child with autism can apply for professional help.

Conclusion. Insufficient awareness of students of pediatric faculties on the problems of autism spectrum disorders, issues of screening, interventions and routing of children with autism was revealed.

Keywords: autism-type disorders (ASD), mental development disorders, ASD factors, ASD screening, medical student awareness.

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Background

Autism spectrum disorders (ASD) are a group of neurodevelopmental disorders occurring in early childhood that are characterized by persistent deficits in social communication and interaction and restricted, repetitive patterns of behavior, interests, or activities. Recently, the prevalence of autism has been increasing worldwide. The World Health Organization estimates that 1 in 100 children is diagnosed with ASD [1].

In 2020, a monitoring initiative by the Ministry of Education of Russia found that the total number of children with ASD in the country was 32,899, a 42% increase from 23,093 people in 2019 [2].

The reasons for the increase in prevalence of ASD are not definitively known. However, experts suggest that this increase is partly due to improvements in diagnostic tools and the expansion of diagnostic criteria. As an independent factor, the increase in awareness of the general population about children with autism due to movie productions (“Rain Man,” “The Good Doctor,” “The Bridge,” “Anton’s Right Here,” and others), actions in support of people with autism (international initiative “Light Up the Blue”), and activities of parental communities, including in mass media, are also mentioned. Moreover, the mediatization of autism has resulted in increased awareness among parents and teachers regarding the atypical behavior of children, leading to earlier contact with specialists [3].

Research indicates that early intervention is crucial for the effectiveness of ASD treatment. Therefore, diagnosing ASD as early as possible is critical. It has been found that autism can be diagnosed as early as 2 years of age, with early signs appearing after 18 months [5, 6].

Research surveys and monitoring conducted in different countries show that pediatricians who are usually the first point of contact may fail to respond to parents’ concerns and may not use appropriate screening procedures or referrals to other specialists [7, 8]. Lack of awareness of ASD among pediatricians can lead to delays in diagnosis and intervention and ineffective interactions with parents and allied professionals [9].

The domestic literature demonstrates the limited knowledge of physicians regarding ASD [10]. Therefore, improving the training of medical students in modern concepts of ASD is of considerable interest. This can be achieved by studying the formation of their knowledge and attitudes.

Studies conducted by international researchers indicate that medical students may lack sufficient knowledge about ASD to work in primary care [11–13]. In addition, students studying in pedagogical

specialties demonstrate the highest level of awareness [14]. Thus, medical schools are developing new educational programs that involve the parents of children with ASD and educators for medical students.

This project would be relevant for Russia as the country has established a system of specialized care for children with ASD, including scientifically based methods of correction for the disorder, an inclusive school model, and clinical guidelines for medical care [15, 16]. Training medical students to work with children with ASD and their parents is necessary and possible within modern interdisciplinary approaches.

Aim

The objective of this study was to determine the level of awareness of medical students about ASD, methods of its diagnosis and treatment, and non-medical interventions.

Materials and methods

Questionnaire survey was conducted in two stages (field and analytical) from December 2020 to March 2021 in seven Russian medical universities in Kazan, Yaroslavl, Nizhny Novgorod, Krasnoyarsk, Irkutsk, Izhevsk, and Kirov. The questionnaire consisted of 29 questions divided into blocks, such as questions on knowledge on autism, scenarios of actions and routing, self-assessment of awareness of ASD, assessment of the components of the environment for children with ASD, and passport cards. Google Forms was used for data collection. The questionnaire’s content was validated by five experts, all of whom were professors of psychiatry and neurology. Criterion validity was achieved through a pilot survey of 50 fifth-year students from the pediatrics faculty.

The survey included 408 participants selected by purposive sampling. The participants were students studying pediatrics, mostly seniors. Of the respondents, 87% were 1st–4th year students (144), 5th year students (116), or 6th year students (125). The division of subgroups was based on the specifics of the educational process. Pediatric students do not take ASD courses until the second semester of the fourth year, fifth-year students study neurology and psychiatry, and sixth-year students gain experience in outpatient practice. Therefore, the grouping was associated with identifying the role of the pediatric education program in raising awareness of ASD and solving related issues.

This study was conducted on a selective group. The gender distribution was 17.2% boys and 81.1% girls. Some questions were similar to those asked in a questionnaire survey of physicians (n = 400)

from 35 subjects in the Russian Federation [10]. From the results of the questionnaire survey, the physicians were specialists in pediatrics (53%), neurology (14.7%), and psychiatry (24.2%). 8.2% of physicians did not indicate their profile. 62.9% of the respondents had regular clinical experience working with children with ASD, while 21% did not but were engaged in the study of this field.

SPSS was employed for data processing. Frequency analysis and χ^2 were employed to test the hypothesis that there is no relationship between the variables (independence criterion).

Results and discussion

The results showed that 47.1% of medical students believed that the number of children with ASD increased in the settlement years. 36.3% found it difficult to answer, while 15% indicated that the number did not change. Only 1.7% stated that the number decreased. A correlation with the students' course was also found ($\chi^2 = 22.591$ at $p < 0.001$). From the survey results, 32.6% of 1st–4th year students reported an increase in numbers, while 54.3% of 5th year students and 58.4% of 6th year students reported the same. Moreover, 18.8% of 1st–4th year students, 12.1% of 5th year students, and 11.2% of 6th year students reported that the situation with ASD remained stable.

The answers of respondents who expressed their opinion about the dynamics of the number of children with ASD were compared with the assessments of a subsample of physicians. It was observed that a higher proportion of physicians (87.2%) reported an increase in the number of children compared with students (73.8%). Only 12.5% of physicians and 23.5% of students reported no change in the number of children with ASD. A decrease in the number of children with ASD was reported by only one physician (0.4%) and seven students (2.7%). Statistical analysis revealed a significant difference between the two groups ($\chi^2 = 17.180$, $p < 0.001$) [6].

During the survey, students were asked to define ASD. Only 32.8% of the respondents correctly identified ASD as a group of complex developmental disorders, as defined by “Clinical Recommendations (Treatment Protocol). Autism Spectrum Disorders: Diagnosis, Treatment, Monitoring” (2015), which was in effect at the time of the survey [17]. Of the participants, 28.7% selected the option “genetic disorders of nervous system development due to the lack of inhibition of certain genes.”

In the context of diagnosis and inclusion policy, it is concerning that 21.1% of pediatric students associate autism with social and pedagogical neglect, defining it as a form of mental retardation

caused by these factors. 12% of respondents selected the variant defining ASD as a congenital disorder accompanied by mental retardation. According to the current literature, autism can be diagnosed in people with different levels of intelligence, including those who are intellectually gifted.

The options listed in the “Other” column are also noteworthy. Some students believe that autism is caused by vaccination (2 responses), whereas others believe it is an acquired disease caused by genetic predisposition (1 response). One response suggests that autism is simply a different way of thinking that is not accepted by society. The final response indicates a variant position among the respondents, which is referred to as neurodiversification [19].

The question on approaches to autism contained concepts of ASD inherent in two models of autism: biomedical and social, referring to the neurodiversity paradigm. Among medical students, 44.4% considered the approach that views autism as an atypical neurological development, similar to left-handedness, and in need of recognition and support rather than correction. 26% considered autism a health disorder requiring treatment, while 29.2% stated that both approaches were correct. The 2020 clinical guidelines, published after the start of the field phase of the study, define the condition as a heterogeneous group of neurodevelopmental disorders [20].

A comparison of the responses from physicians and future pediatricians regarding the factors of ASD concluded that students more frequently agreed with the proposed answer options regarding the factors that increase the prevalence of autism among children. For factors that are unproven by modern science, it was found that only 24% of physicians and 45.3% of students discussed the impact of ecology on the prevalence of ASD ($\chi^2 = 37.577$, $p < 0.001$). In addition, 28.2% of physicians and 40.2% of students pointed out the influence of changes in human microbiota and deterioration in the quality of food and water ($\chi^2 = 12.794$, $p < 0.001$).

Researchers studying the factors influencing the number of children with ASD discuss the trend of decreasing child mortality and its potential impact on increasing diversity. A survey found that 38.2% of students and 22.5% of physicians agreed with this influence ($\chi^2 = 23.616$, $p < 0.001$). In addition, modern research underscores issues and problems on factors not directly related to the increase in morbidity that may affect statistics [21]. During the questionnaire survey, 39% of students and 27.5% of physicians agreed that there was an improvement in the quality of diagnostic procedures used to detect

autism. In addition, 23.8% of students and 14.8% of physicians noted changes in the rules of medical statistics, while 40.7% and 27% reported increased accessibility of medical care, respectively.

It was shown that the risk of having a child with ASD increases as the parents age [18]. A survey of students found that 54.9% recognized this factor, whereas only 20.5% of physicians did ($\chi^2 = 101.595$, $p < 0.001$). In addition, certain medications taken during pregnancy have been linked to an increased risk of autism in children. Medical students (36%) selected this response option twice as frequently as physicians (17.8%) ($\chi^2 = 34.2579$, $p < 0.001$). Currently, a correlation between the practice of delivering babies via cesarean section and autism has been established. Medical students (19.8%) were significantly more likely than physicians (5.5%) to suggest that an increase in this practice could be a contributing factor to the rising prevalence of ASD ($\chi^2 = 39.049$, $p < 0.001$).

Medical students were more likely than physicians to indicate both proven and unproven factors of autism. Physicians were more cautious in their statements about the factors and more often chose the "Other" column when answering the question. Undergraduate students gave more relevant answers about ASD factors ($\chi^2 = 22.318$, $p = 0.034$). Specifically, 45.7% of 5th year students, 48.8% of 6th year students, and only 35.4% of 1st year students indicated that factors were underidentified.

However, students showed a lack of awareness as they chose the social factor "children's early exposure to gadgets and the virtual world" at approximately the same frequency (18.8%, 23.3%, and 20% for the 1st–4th, 5th, and 6th years, respectively). Only a few students chose "mother's coldness" or "psychotraumatic situation" as factors. Genetic factors were more frequently named by students in their 1st–3rd courses (36.8%) than by older students (22.4% and 17.6% for 5th and 6th courses, respectively).

According to the survey results, 53.9% of respondents reported having no experience in communicating with children with ASD, while 36.3% reported occasional experience. Only 8.2% of the respondents reported having such experience. Among those without experience, more than half (53.7%) rated the importance of forming ideas about the behavior of children with autism as maximum on a 10-point scale.

However, it can be stated that future pediatricians lack confidence in helping children with ASD, as concluded in Fig. 1. When answering the question, "How confident will you feel while helping a child with ASD?" future pediatricians were asked to rate their confidence level on a scale from 1 to 10.

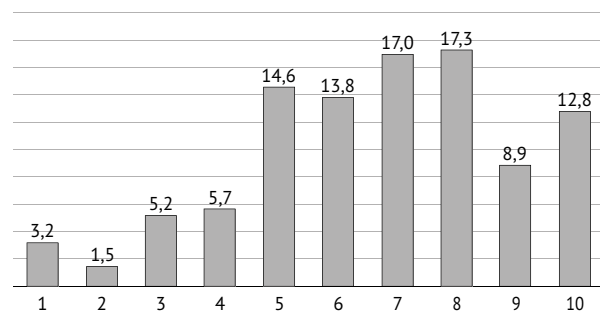


Fig. 1. Distribution of respondents' answers to the question "How confident will you feel while helping a child with ASD?"; the share (%) of the number of respondents ($n = 408$) is shown. The numbers indicate the respondent's confidence score in points from 1 (minimal confidence) to 10 (maximum confidence).

The test question evaluated the awareness level among pediatric students regarding signs that indicate a high risk of autism in children over the age of 1. Early diagnosis and intervention are crucial factors that influence the likelihood of correcting ASD and thus increase the chances of successful social adaptation and integration for children with autism. Therefore, early recognition of symptoms and diagnosis is crucial for the life trajectory of children with autism and is of utmost importance in pediatric practice of future physicians.

Of the respondents, 72.5% noted that a lack of response to a name is a sign of autism, while 60.8% reported that the inability to use gestures and separate words to indicate wishes is also a sign. In addition, 60.5% noted that a lack of smiling in response to other people's smiles is indicative of autism. This level of awareness may be considered insufficient, particularly when false markers of autism in children, such as the constant desire to make eye contact with the interlocutor (13.5% of students noted this sign as a symptom of autism) and the need for frequent bodily contact (12.7%), are mentioned.

This study revealed that a low percentage of students were aware of the scales used for screening diagnostics of ASD. Specifically, 59.1% of respondents found it difficult to answer, and only 19.1% of respondents were able to correctly identify M-CHAT/ADOS, which is the recommended screening diagnostic. Importantly, this screening was recommended in the normative documents at the time of the survey.

The Ministry of Health Order No. 396n in 2019 in Russia sets the age for screening the risk of mental disorders, including ASD, as part of the preventive medical examination of children at 2 years of age. Only 14.2% of the surveyed pediatric students correctly identified the age for ASD screening. The most common incorrect answers selected

by students were 12 months (20.1%), 18 months (25.2%), and 3 years (23.3%). 11% of respondents indicated the necessity of screening for ASD at 2.5 years of age, 4.7% found it difficult to answer, and 1.5% indicated that children in Russia are not screened for ASD. These results underscore the need to increase awareness among students about the importance of monitoring and preventing ASD.

The study asked students to evaluate the probability of different scenarios when parents first notice signs of autism in children aged 1–3 years and 3–6 years. Based on Fig. 2, if the child is 1–3 years old, the most probable scenario, as perceived by the students, is that the child will be referred to a neurologist (74%), speech therapist/defectologist (68.4%), or special educator (68.4%). Only half of the surveyed students believe that such a child will be referred to a psychiatrist.

According to survey, 57.9% of pediatric students believe that parents should delay referral to specialists for children under 3 years of age on the basis of the child's individual pace of development. However, only 35.8% of respondents consider this scenario unlikely. When parents of children aged 3–6 years appeal, only 30.4% of respondents believe that waiting is a likely recommendation, while 60.1% believe that it is either improbable or impossible. These results indicate a concerning trend in assessing future scenarios by pediatricians.

When considering older children, the likelihood of being evaluated increases by approximately 15% for a high probability assessment, 2% for a neurologist evaluation, 12% for a special educator evaluation, and 4% for a speech therapist/defectologist evaluation. As stated, there was a 2-fold decrease in the proportion of individuals who anticipated receiving a “wait” recommendation.

Of the students surveyed, 20.3% reported difficulty in identifying institutions that provide early ASD diagnosis. Interestingly, the most commonly cited option is private medical centers (42.2%), followed closely by children's polyclinics (41.2%). Only 30.6% of respondents mentioned psychiatric hospitals, 29.9% mentioned rehabilitation center, and 9.8% mentioned nonprofit organizations.

However, 90.2% of medical students reported that they were unaware of the institutions to which families with a child diagnosed with autism can turn to for professional medical, psychological, and social assistance.

Autism awareness involves considering therapies, forms of correction, and interventions. In the survey, pediatric students were asked to identify the most effective nonmedication interventions for ASD therapy. 71.3% of the respondents found this question challenging.

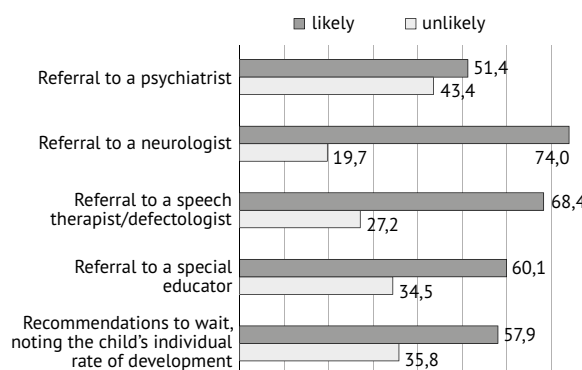


Fig. 2. Distribution of respondents' answers to the question “Estimate the probability of the following scenario of actions when parents discover the first signs of autism in a child aged 1–3 years and visit a district pediatrician”; share (%) of the number of respondents (n = 408)

Effective methods in the modern world include applied behavior analysis (ABA) [13]. However, only 4.7% of the respondents mentioned this type of therapy. The other forms of therapy mentioned by students included psychotherapy (5.9%), psychological correction (2%), play therapy (3.9%), work with a speech therapist (3.7%), defectologist (1%), neurologist and rehabilitation therapist (1.5%), and parents (6.6%).

Some responses can be attributed to interventions with unproven efficacy that have not undergone clinical trials. These interventions include hippotherapy and dolphin therapy (1.7%), osteopathy (0.7%), and acupuncture (0.5%). The use of these interventions may delay the provision of real help to children with ASD. Some methods mentioned by students are associated with potential harm. For example, diet, which was mentioned by only 0.7% of respondents, can cause deficits. In addition, frequent body contact (1%) can cause problems for children with ASD due to hypersensitivity. Most people with autism have sensory impairments, which is why the 2020 clinical guidelines do not recommend the holding therapy methodology as it is ineffective and dangerous [20].

With regard to diet, respondents were asked if adherence to a specific diet (such as gluten-free, casein-free, or ketogenic) is necessary for pathogenetic therapy of ASD. It is concerning that 20.1% of medical students answered positively, while 37% found it difficult to answer. The remaining 42.9% of respondents answered negatively. Furthermore, there were no statistically significant differences in the responses to this question between medical students and physicians.

Assessments of pediatric students' satisfaction with the amount of knowledge about infantile autism and methods of its diagnosis obtained during higher education are concerning. Future

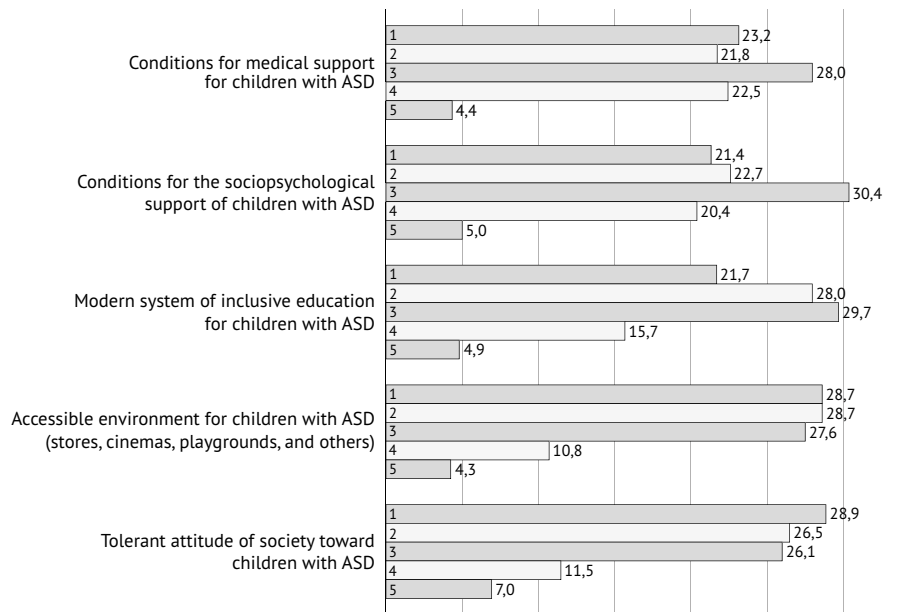


Fig. 4. Distribution of respondents' answers to the question "How would you rate the following environment components for children with ASD in your region on a 5-point scale?"; share (%) of respondents (n = 408). ASD, autism spectrum disorders. Figures indicate the respondent's assessment of the components of the environment in points from 1 (very bad) to 5 (very good).

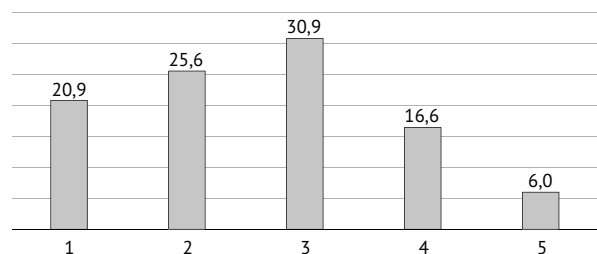


Fig. 3. Distribution of respondents' answers to the question "Rate your satisfaction with the amount of knowledge about children's autism and diagnostic methods received during study at the university from 1 to 5"; share (%) of the number of respondents (n = 408). Figures indicate the respondent's assessment of satisfaction in points from 1 (not satisfied) to 5 (fully satisfied)

pediatricians were asked to rate their satisfaction on a scale of 1 to 5 points. 45.3% of respondents expressed low satisfaction, while 30.1% gave an average score of 3 points. 16.2% were rather satisfied, and only 5.9% of students chose the highest rating of 5 points. 2.5% found the question difficult to answer. The distribution, excluding those who found it difficult to answer, is shown in Fig. 3.

Regarding finding informative sources on autism, students find special websites of public, non-profit organizations dealing with autism issues (58.6%), special foreign literature and journals (55.6%), and Russian scientific journals, textbooks, and books (50%) to be the most useful. Some students also mentioned additional educational programs and circles (43.6%), as well as materials from special networks (42.6%). 10% of students found it difficult to answer.

In the survey, 42.9% of students expressed the need for additional theoretical knowledge and practical skills related to ASD. Of these respondents, 27.2% indicated a general need for knowledge, while the rest specified a need for skills in diagnosing ASD (4.7%), treating and providing therapy for children with ASD (3.4%), and understanding the origin, varieties, and development of ASD (2%), among other areas. Meanwhile, 15.7% of respondents indicated that they did not require additional knowledge or skills, and 41.4% found it difficult to answer. Senior students, compared with junior students, place a higher value on the importance of understanding typical behavior patterns of children with ASD ($\chi^2 = 29.299$, $p = 0.02$). However, confidence in assisting a child with ASD is not dependent on the study course.

Discrimination issues against adults and children with autism are considered a topic in Russian society, according to most medical students. Specifically, 34.3% of respondents rated it 5 points, 31.3% rated it 4 points, and 24.5% rated it 3 points. A small percentage of respondents chose minimum scores, with only 4.2% choosing 2 and 2.2% choosing 1. Meanwhile, 3.7% of students found it difficult to answer.

The survey asked participants to rate the environment components for children with ASD in their region on a 5-point scale. Figure 4 reveals that there were few maximum evaluations of the environment components. The system of medical and sociopsychological support for children with ASD was rated slightly more favorably by future doctors compared with other components of the environment. The components related to environment

accessibility and societal tolerance toward children with ASD received the lowest frequency scores.

Summary

Outdated and mythologized knowledge about ASD can hinder the ability of the healthcare system to meet the needs of this population. Although medical students are better informed than practicing physicians on many issues on ASD, their knowledge is not as accurate and comprehensive as it should be. Contributing factors may be the lack of reflection on autism issues in pediatric educational programs and the underutilization of resources by organizations working with this group of children. These concerns have also been raised by researchers in other countries [14–17].

The students reported a lack of knowledge and practical experience. The current advances in autism knowledge should be considered to improve the competence of medical students. Because working with patients with ASD is more complex because of limited evidence-based knowledge and resources, ongoing training and/or prior experience, interdisciplinary communication and collaboration, care coordination, and systemic change are necessary [18].

Interdisciplinary interaction and involvement of educational psychologists, speech therapists, and representatives of the parent community in practical training can increase the effectiveness of teaching pediatric students how to work with children with ASD [17].

Conclusions

1. This study found that pediatric students have insufficient awareness of ASD screening, interventions, and routing for children with autism.

2. Students need both more theoretical knowledge and practical experience in communicating with this group of children.

Authors' contribution. J.V.S., analyzing the results; L.M.M., theoretical substantiation of the problem, collecting sociological information, supervising the work.

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Conflict of interest. The authors declare no conflict of interest on the presented article.

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