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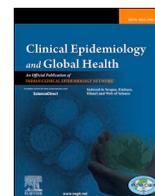
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Original article

Prevalence of Autism risk among children undergoing regular Psychophysical Development Screening in Kazakhstan

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ABSTRACT

Background: Information about the situation with autism in Kazakhstan is extremely limited due to the lack of research on autism in both Kazakhstan and Central Asia. The prevalence of autism spectrum disorder risk among young children during routine screening was assessed using the M-CHAT-R/F tool.

Methods: This study took place in the offices of pediatric neurologists and family doctors in three primary healthcare organizations in the Karaganda, Kazakhstan. The researchers offered participation in the study and M-CHAT-R checklist completion during visits by parents and children to pediatric neurologists and family doctors for the purpose of screening for psychophysical development. Linear regression analysis was used to determine risk factors for the development of autism spectrum disorder.

Results: The results of an analysis of 526 study participants showed the prevalence of high-risk autism spectrum disorders to be 27.4%. Factors associated with a high risk of autism spectrum disorder in this study were child age, gender, parental age, and a diagnosis of developmental disorder.

Conclusions: The use of specific tools to screen for developmental disorders by primary care organizations is recommended. Primary care providers have regular contact with children before they reach school age and can provide family-centered, comprehensive, and coordinated care, including more comprehensive medical assessments.

1. Introduction

Autism spectrum disorder (ASD) is a complex developmental condition involving persistent problems with social communication, restricted interests, and repetitive behaviors. Although autism is considered a lifelong disorder, the degree of impairment in functioning due to these problems varies among individuals with autism.¹ People with ASD are often susceptible to, among other things, physical and mental health problems such as gastrointestinal problems, epilepsy, eating problems, sleep disorders, attention deficit hyperactivity disorder, anxiety, depression, obsessive-compulsive disorder, schizophrenia, bipolar disorder.^{2–5}

The American Academy of Pediatrics reports three early signs of ASD: delayed or absent joint attention, language impairment, and skill

regression.^{6,7} According to a theory, behavioral indicators of autism do not appear at birth but rather develop over time as important social communication skills deteriorate.⁸

Even though data on the causes of ASD remain controversial, the results of numerous studies have established that parental age and preterm birth are true risk factors for ASD that require further analysis.^{9,10}

An analysis of studies on the prevalence of ASD before 2000 showed a prevalence of 10/10000.¹¹ A recent systematic review of studies estimating the global prevalence of autism indicates that approximately 1 in 100 children worldwide are diagnosed with ASD.¹²

Currently, the average age of diagnosis is over 3 years. However, over the past 15 years, an increasing number of studies have reported early signs of ASD. It is reported that the first warning signs in the

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development of children are noticed by parents at the age of 12–18 months, however, the first contact with health providers and formal diagnosis does not occur until the age of 2–6 years.¹³

Information about the situation with ASD in Kazakhstan is extremely limited due to the lack of research on ASD in both Kazakhstan and Central Asia, which is associated with a lack of research funding and lack of cooperation between researchers in the region.¹⁴ At the same time, existing research on ASD in Kazakhstan is mostly devoted to parental experience in families with children with autism. The main source of any statistical information about ASD in Kazakhstan is social networks, news portals, and regulatory documents. Thus, the Republican Scientific and Practical Center for Mental Health of the Ministry of Health of the Republic of Kazakhstan reports that over the past 13 years in Kazakhstan, the prevalence of ASD in Kazakhstan has increased from 0.8/100000 to 12.7/100000.¹⁵ In Kazakhstan, ASD is classified as a mental and behavioral disorders. According to the Ministry of Health of the Republic of Kazakhstan, the prevalence of mental disorders and behavioral disorders in children under 14 years of age in 2022 increased to 95.4 per 100,000 population, while in 2021 this figure was 80.2 per 100,000 population.¹⁶

In Kazakhstan, there is a three-level system of assisting children with disabilities, including screening, diagnostics, medical, pedagogical, and social assistance, however, the rehabilitation of children with developmental disorders is characterized by the priority of medical services and the weak development of psychological, pedagogical and social assistance. In recent years, psychological and pedagogical assistance to young children has been increasingly provided in the education system: in psychological, medical, and pedagogical consultations, rehabilitation centers, and psychological and pedagogical correction rooms, but specialized early intervention services, both in the education system and in healthcare and social protection is currently absent in Kazakhstan.¹⁷ The Modified Checklist for Autism in Toddlers, Revised with Follow-Up (M-CHAT-R/F) is one of the most common checklists for determining the risk of developing ASD in young children. It consists of a two-part questionnaire that is completed by parents of children aged 16–30 months. If the first stage shows a moderate risk, you should proceed to the second stage of M-CHAT-R/F, which is a Follow-Up with a focus on “failed” questions to reduce false positive results.¹⁸ The M-CHAT-R/F is currently the most accurate test available to identify risk for ASD and monitor symptoms of the disorder.¹⁹ However, the sensitivity of M-CHAT-R/F may vary between countries, likely due to cultural and linguistic differences.²⁰

The objective of our study was to investigate the prevalence, determinants and symptoms of the risk of developing ASD among children attending a routine screening of psychophysical development in Primary Care organizations of Central Kazakhstan using The Modified Checklist for Autism in Toddlers, Revised with Follow-Up (M-CHAT-R/F).

2. Methods

2.1. Screening of psychophysical development

Screening of psychophysical development is a mass standardized examination of the child population under the age of 3 years to identify a group of children at risk of disorders in psychophysical development and refer them to psychological, medical, and pedagogical consultations to provide them with correctional and developmental assistance. Screening is carried out by medical workers of obstetric institutions, children’s clinics, and primary health care organizations depending on the age of the child.

Screening of psychophysical development consists of five screening examinations, which are carried out in three stages:

The first examination stage is the “Prognosis of abnormalities in psychosomatic development in newborns” (Screening 1), including hearing screening. A neonatologist in maternity hospitals carries out this examination.

The second stage of the examination consists of the second screening “Prognostic screening of neuropsychiatric disorders” (Screening 2). This examination is carried out by a district health provider of the primary health care organization at the first patronage of the child at home.

The third stage of the examination consists of the “Screening certification of young children” (Screening 3), “Assessment of visual functions in children” (Screening 4), and the fifth “Assessment of auditory functions in children” (Screening 5). Our study using the M-CHAT-R/F questionnaire was conducted as part of the third stage “Screening certification of young children”.

2.2. M-CHAT-R/F

Our study used the Russian and Kazakh versions of the M-CHAT-R/F questionnaire. The M-CHAT-R/F questionnaire [<https://www.mchatscreen.com/>] consists of 2 stages. Stage 1 (M-CHAT-R) contains 20 items corresponding to symptoms of ASD, to which parents of the children being examined must answer either “Yes” or “No”. The total score is the sum of positive answers with reverse-coded items 2, 5, and 12. The total score on the M-CHAT-R reflects the level of the risk of developing ASD as low (score range 0–3), “medium” (score 3–7), or “high” (score range 8–20). While the second stage (Follow-Up) is usually recommended to be completed for children at risk, in the current study all parents, regardless of the results of the M-CHAT-R, were offered and accepted completion of the Follow-Up survey. Follow-up is an expanded version of the M-CHAT-R survey to collect additional information about child’s behavior and reactions. Based on the Follow-Up results, 2 or more positive answers reflect the risk of ASD, with the M-CHAT-R/F screening result interpreted as “Risk for developing ASD”.

2.3. Process and study design

The data was collected in the offices of pediatric neurologists and family doctors in three primary healthcare organizations in the Karaganda. The collection period fell within the post-pandemic phase of COVID-19, specifically from May to August 2023.

The design of this study was cross-sectional. During standard pediatric visits to family doctors and pediatric neurologists for psychophysical development screening, researchers proposed to caregivers the option of participating in the study. This participation included completing the M-CHAT-R checklist and the Follow-Up questionnaire. The inclusion criteria for this study were as follows: children must be between 24 and 40 months old, written parental consent must be obtained, and the child must have visited both a pediatrician and a pediatric neurologist for routine screening of mental and physical development. Additionally, children and their parents should be in a stable medical condition, without any acute or severe illnesses that could prevent participation in the study assessment. These criteria ensure the study targets an appropriate population, making the data collected relevant and reliable for assessing the prevalence of autism risk in undiagnosed children in hospitals.

For children identified as having moderate or high risk of developing ASD, appropriate recommendations were given, and referrals for consultation with a child psychiatrist were made. To ensure privacy compliance, all collected data was de-identified prior to analysis. The local Bioethics Committee of Karaganda Medical University granted approval for this study (protocol code 2 and date of August 05, 2019).

2.4. Statistical analysis

An adequate sample size is needed to evaluate the population prevalence with precision. The following simple formula would be used for calculating the adequate sample size in the prevalence study:

$$n = z^2 * p * (1 - p) / d^2$$

Where n is the sample size, z is the statistic corresponding to the confidence level (in this study - 95 %), p is the expected prevalence (obtained from similar studies. For this study $p = 5\%$), and d is the precision (corresponds to the effect size, here $d = 0.01$). Calculated sample size is 429, in our study we collected data from 526 caregivers.

We used descriptive statistics to describe the sample and the results of the M-CHAT-R and Follow-Up screening. A t -test was used to determine the difference in mean M-CHAT-R and Follow-Up scores between binary categories. Because M-CHAT-R and Follow-Up screening scores are continuous variables, linear regression analysis was used to determine demographic factors influencing them. To assess the inter-observer reliability and internal consistency of the Russian and Kazakhs versions of the questionnaire, we used Cronbach's Alpha. Additionally, Guttman's lambda-6 indicator was calculated to evaluate the reliability of the Russian and Kazakh versions of the M-CHAT-R/F by considering the variance in each item explained by the linear regression of other items.

For statistical analysis, we used R-Studio software.

3. Results

3.1. General sample characteristics

A total of 526 parents gave their consent to be screened while undergoing a standard checkup conducted by a neurologist and family physician. Mothers made up 100 % of the parents who gave their assent and responded to the M-CHAT-R/F checklist. More than half of the parents are of Kazakh nationality. The children's mean age, expressed in months, was 31.59 ± 5.8 . The general characteristics of the sample are presented in Table 1.

Routine screening of the psychophysical development of children in primary health care organizations was also carried out by children with various diagnoses of developmental disorders, in turn, the parents of 80 (15.2 %) diagnosed children gave their consent to participate in the M-CHAT-R/F screening.

3.2. M-CHAT-R and Follow-Up results

The mean M-CHAT-R score was 2.75 (range 0–15), which corresponds to a low risk of developing ASD ($n = 526$). Most results also correspond to a low risk of developing ASD (382 patients or 72.6 %), followed by mediate (76 or 14.4 %) and high (68 or 12.9 %) risk. The Follow-Up survey focused on the difference in responses between low risk and moderate/high risk groups. The mean Follow-Up score decreased to 1.87 (range 0–14) points. According to the M-CHAT-R results, 144 (27.4 %) children were identified as having a high and

Table 1
General characteristics of the sample.

Variable	n	Percentage
Child's age, in month (mean, min-max, SD)	31.59 (24–40, ± 5.8)	
Mother's age (mean, min-max, SD)	29.98 (21–50, ± 5.1)	
Father's age (mean, min-max, SD)	31 (21–61, ± 5.8)	
Childs' gender		
Female	218	41.4
Male	308	58.6
Father's ethnicity		
Kazakh	308	58.6
Russian	134	25.5
Other	84	15.9
Mother's ethnicity		
Kazakh	316	60.1
Russian	64	12.2
Other	146	27.8
Developmental disorder diagnosis		
yes	80	15.2
no	446	84.8

Table 2
M-CHAT-R and Follow-Up results.

M-CHAT-R risk groups	Frequency	Percentage	Follow-Up risk groups	Frequency	Percentage
Low risk	382	72.6	Low risk	399	75.9
Mediate risk	76	14.4	High risk	127	24.1
High risk	68	12.9			

medium risk of developing ASD, but this number decreased to 127 (24.1 %) according to the Follow-Up results (Table 2) (Fig. 1).

Statistical analysis revealed a gender difference between the mean values of M-CHAT-R ($t = -5.63$, p -value <0.001) and M-CHAT-R/F ($t = -5.38$, p -value <0.001) of boys and girls, (Fig. 2), as well as a statistically significant difference in the mean values of M-CHAT-R ($t = -14.41$, p -value <0.001) and M-CHAT-R/F ($t = -12.52$, p -value <0.001) among respondents based on existing developmental disorders. The Russian and Kazakh versions of the M-CHAT-R/F demonstrated high internal consistency, with Cronbach's alpha calculated at 0.87 and 0.93, respectively (CI = 0.95). Additionally, Guttman's lambda-6 showed an excellent result of 0.94 for the Russian version of the checklist and 0.95 for the Kazakh cersion of the checklist.

Both model were statistically significant (M-CHAT $F(9, 516) = 49.5$, $p < 0.001$ and M-CHAT R/F $F(9, 516) = 41.35$, $p < 0.001$), and explained 45.4 % and 40.9 % of variation in the scores correspondingly. As expected, males tend to have a higher score in either survey. Maternal age was found as a statistically significant predictor, while age of the father was not affecting the score (Table 3).

3.3. Prevalence of symptoms

Table 4 presents the prevalence of questions relevant to risk for developmental disorders among at-risk groups based on the two steps of the M-CHAT-R/F.

The majority of mothers (Item 16–160 responses corresponding to risk) answered “no” to the question “If you turn your head to look at something, does your child look around to see what you are looking at?”. At the same time, after clarifying questions in Follow-Up, the total number of “failed” answers decreased to 150. At the same time, for this item, there was a slight decrease in the number of answers corresponding to the risk in the high-risk group according to the Follow-Up results (110, 20.9 %) compared to the high and medium-risk group according to the M-CHAT-R results (114, 21.7 %).

Also, a large number of risk-related answers ($n = 124$, 23.57 %) are noted to the question “Does your child point with one finger to show you something interesting” (Item 7) at the M-CHAT-R. However, after clarifying questions from the Follow-Up, the number of “failed” questions is significantly reduced to 70. Moreover, on this question, the number of risk responses in the high-risk group Follow-Up (50, 9.5 %) was halved compared to M-CHAT-R (102 failed responses in the high- and medium-risk group, 19.4 %).

The question “Does your child play pretend or make-believe?” (Item 3) also has a large number of responses corresponding to the risk ($n = 104$, 19.77 %) in the first stage. And in this case, there is a sharp decrease in the number of “failed” answers after the Follow-Up ($n = 28$, 5.32 %). In the high-risk group, according to the M-CHAT-R/F results, the most common failed questions were Item 16, Item 6 (87, 16.5 %) (“Does your child point with one finger to ask for something or to get help?”), and Item 1 (73, 13.9 %) (“If you point at something across the room, does your child look at it?”).

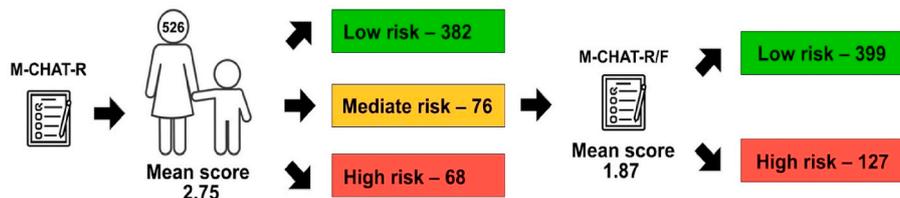


Fig. 1. Autism risk assessment summary.

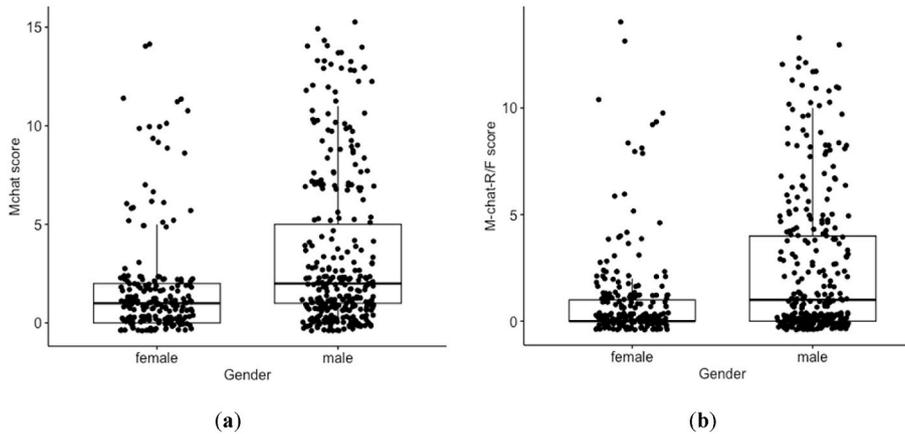


Fig. 2. Gender differences in M-CHAT-R and Follow-Up scores. (a) M-CHAT-R score by gender; (b) Follow-up score by gender.

Table 3
Linear regression coefficients.

	M-CHAT				M-CHAT-R/F			
	b	SE	T	p-value	b	SE	T	p-value
(Intercept)	-0.93	0.950	-0.977	0.329	-0.81	0.826	-0.977	0.329
Child age, months	-0.01	0.022	-0.496	0.620	-0.03	0.019	-1.740	0.082
Gender (male)	1.03	0.243	4.229	<0.001	0.83	0.211	3.930	<0.001
Maternal age, year	0.11	0.035	3.011	<0.001	0.08	0.031	2.653	<0.001
Paternal age, year	-0.02	0.031	-0.749	0.454	0.00	0.027	0.029	0.977
Developmental Disorder	6.25	0.360	17.385	<0.001	5.01	0.313	16.009	<0.001

4. Discussion

This is the first epidemiological study of ASD in Kazakhstan at the moment. M-CHAT-R/F as part of preventive examinations in primary health care organizations is recommended by the clinical protocol for diagnosis and treatment “Common disorders of psychological (mental) development (autism spectrum disorders)”.²¹ Because pediatricians play an important role in the early recognition of ASD and are usually the first point of contact for parents, it is important that pediatricians recognize the signs and symptoms of ASD and have a strategy for systematically assessing them.²² At the same time, many studies confirm that the use of special checklists for the early detection of ASD during routine screening examinations of young children has a positive effect on the early diagnosis of ASD.²³ A meta-analysis of 667 studies on the M-CHAT-R/F confirms the effectiveness of the questionnaire in primary care settings for early diagnosis of ASD in young children.²⁴ Moreover, the importance of including Follow-Up after completing the M-CHAT-R is emphasized to avoid excessive referrals for expensive diagnostic examinations with long waiting lists, or combining the two stages to prevent inequalities in the identification of ASD in children, reducing parental awareness of development as a result of different social-economic barriers.²⁵

The high-risk prevalence of ASD in this sample is 24.1 %, which is quite high, while studies report the prevalence of ASD among samples of children in primary care organizations as 3.2 %, and 2.5 %.²⁶ This may

be due to that M-CHAT-R/F can detect not only ASD but also other developmental disorders.²⁷ Reliable statistical data on the prevalence of ASD in our country currently does not exist for several reasons. Stigmatization of psychiatry and mental disorders, low awareness of the population about the diagnosis of developmental disorders, and inaccessibility of psychiatric care in the regions - all lead to significant underdiagnosis of this type of disorder. Families turn to non-core specialists (neurologists, psychologists, general practitioners, educational institutions - psychological, medical, and pedagogical consultations), receiving diagnoses such as “delayed psycho-speech development”, “delayed emotional-communicative development”, “developmental delay with autistic traits”, “residual organic damage to the central nervous system with traits of autism”, etc. As a result, official statistics on the prevalence of autism among the child population of the Republic of Kazakhstan include only data on patients observed in state mental health clinics and do not reflect the real picture.

As in most studies, the high risk of ASD is more common among boys than girls in our study.²⁸ However, current methods for assessing autism have been reported to be not optimized for girls compared to boys, resulting in more false positives among girls.²⁹ Thus, although male sex is considered an important biological factor in ASD, establishing the true difference in prevalence between boys and girls is difficult.

Our study found an association between the age of both parents and the risk of developing ASD. That is, the M-CHAT-R/F score, and therefore the risk increases with increasing parental age. However, studies

Table 4
Prevalence of the “failed” MCHAT-R/F items among risk groups.

M-CHAT-R/F item	M-CHAT-R risk-related answers, n (%)			Follow-Up risk related answers, n (%)	
	High risk	Mediate risk	Low risk	High risk	Low risk
Item 1	52 (9,9 %)	14 (2,7 %)	2 (0,4 %)	73 (13,9 %)	5 (0,9 %)
Item 2	40 (7,6 %)	24 (4,6 %)	22 (4,2 %)	33 (6,3 %)	7 (1,3 %)
Item 3	52 (9,9 %)	30 (5,7 %)	22 (4,2 %)	28 (5,3 %)	0
Item 4	12 (2,3 %)	2 (0,4 %)	10 (1,9 %)	4 (0,8 %)	2 (0,4 %)
Item 5	36 (6,8 %)	28 (5,3 %)	40 (7,6 %)	8 (1,5 %)	0
Item 6	38 (7,2 %)	14 (2,7 %)	6 (1,1 %)	87 (16,5 %)	7 (1,3 %)
Item 7	58 (11,0 %)	44 (8,4 %)	22 (4,2 %)	50 (9,5 %)	20 (3,8 %)
Item 8	44 (8,4 %)	14 (2,7 %)	14 (2,7 %)	72 (13,7 %)	14 (2,7 %)
Item 9	58 (11,0 %)	32 (6,1 %)	6 (1,1 %)	70 (13,3 %)	0
Item 10	32 (6,1 %)	6 (1,1 %)	6 (1,1 %)	68 (12,9 %)	10 (1,9 %)
Item 11	14 (2,7 %)	0	2 (0,4 %)	8 (1,5 %)	0
Item 12	40 (7,6 %)	20 (3,8 %)	72 (13,7 %)	34 (6,5 %)	26 (4,9 %)
Item 13	0	4 (0,8 %)	0	4 (0,8 %)	0
Item 14	28 (5,3 %)	12 (2,3 %)	2 (0,4 %)	9 (1,7 %)	1 (0,2 %)
Item 15	30 (5,7 %)	8 (1,5 %)	0	30 (5,7 %)	0
Item 16	66 (12,5 %)	48 (9,1 %)	46 (8,7 %)	110 (20,9 %)	40 (7,6 %)
Item 17	46 (8,7 %)	24 (4,6 %)	22 (4,2 %)	60 (11,4 %)	0
Item 18	46 (8,7 %)	28 (5,3 %)	6 (1,1 %)	67 (6,8 %)	3 (0,6 %)
Item 19	44 (8,4 %)	26 (4,9 %)	22 (4,2 %)	52 (9,9 %)	14 (2,7 %)
Item 20	8 (1,5 %)	2 (0,4 %)	0	4 (1,5 %)	2 (0,4 %)

often report a greater influence of paternal age on the risk of developing ASD than maternal age. Thus, Reichenberg et al. report that children born to men over 40 years of age are 5.75 times more likely to have autism than children born to men under 30 years of age, with the relationship between the risk of developing ASD and maternal age.³⁰

An international study of ASD symptoms included in the M-CHAT-R/F questionnaire reports that parents in 10 countries similarly report symptoms related to joint attention, social functioning, and language comprehension, and can be interpreted as universal symptoms of autism in kids.²⁰ Similarly, in our study, the bulk of the “overwhelmed” questions fall into these categories of universal symptoms of autism in young children, especially problems with joint attention. Moreover, regarding joint attention, our study most often shows a violation in the child’s response to joint attention (Item 16, Item 1), that is, the child does not respond to others’ attempts to attract joint attention. For example, a parent points to a ball and says, “Look at the toy!”, but the child does not respond and does not follow the parent’s gaze and gesture (for example, pointing with the index finger) to look at the toy. Even though responding to joint attention is easier than initiating it.

An important limitation of our study is the lack of diagnostics and the relatively small sample size of parents who consented to participate. These research problems are primarily related to parents’ fear of the diagnosis of ASD, false prejudices, as well as historically developed negative attitudes toward psychiatrists. Moreover, we would like to highlight several information biases that may have influenced the results of the study, including.

1. Respondent Composition: All 526 respondents who provided consent and completed the M-CHAT-R/F checklist were mothers. This lack of diversity in respondents may introduce bias, as fathers or other caregivers might report different observations. This single-gender reporting could skew the results, particularly if mothers and fathers perceive or report their child’s behavior differently.
2. Cultural and Linguistic Factors: More than half of the parents were of Kazakh nationality, and the study included both Russian and Kazakh versions of the M-CHAT-R/F. Cultural differences in interpreting and responding to the questionnaire could affect the reliability of responses. Despite the high internal consistency reported for both versions (Cronbach’s alpha 0.87 and 0.93 for Russian and Kazakh, respectively), subtle cultural nuances might still lead to differential item interpretation.
3. Parental Reporting: The M-CHAT-R/F relies on parental reporting, which can be subjective. Parents may overestimate or underestimate

their child’s developmental issues due to lack of knowledge, recall bias, or social desirability bias. The significant reduction in “failed” answers after the Follow-Up survey (e.g., from 124 to 70 for Item 7) suggests that initial responses may have been influenced by misunderstanding the questions or by parents initially responding in a more concerning manner.

4. Medical Context: The context in which the screening took place might also influence responses. Since the parents were undergoing a standard checkup conducted by a neurologist and family physician, their responses might be influenced by the immediate medical environment, potentially leading to more cautious or exaggerated reporting of symptoms.

5. Conclusions

In conclusion, we would like to say that our results from the first epidemiological study regarding autism spectrum disorders in Kazakhstan highlight the problem of ASD and other developmental disorders in children. If there is the slightest suspicion of a developmental disorder in a child of any age, including up to one year, parents should contact their healthcare providers as quickly as possible. At the same time, the use of special tools for identifying developmental disorders by primary healthcare organizations is recommended. Primary care providers have regular contact with children before they reach school age and can provide family-centered, comprehensive, and coordinated care, including more comprehensive medical evaluation when testing indicates that a child is at risk for developmental problems.

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Ethics approval statement

The local Bioethics Committee of Karaganda Medical University granted approval for this study (protocol code 2 and date of August 05, 2019). The informed consent was obtained from participated caregivers.

Author contribution

Karina Nukeshtayeva: Conceptualization, investigation, writing—original draft preparation, visualization Bauyrzhan Omarkulov:

Conceptualization, data curation, supervision, project administration Marina Lyubchenko: Conceptualization, writing—review and editing, supervision Zhaniya Dauletaliyeva: methodology; formal analysis, writing—review and editing Olzhas Zhamantayev: methodology; formal analysis, writing—original draft preparation Gulden Karzhalova: investigation, writing—review and editing Nurzhamal Shintayeva: resources, writing—original draft preparation Gulmira Zhanalina: resources, writing—original draft preparation Maira Kenzhekeyeva: resources data curation, writing—original draft preparation Nailya Delellis: writing—review and editing, supervision, project administration.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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