Urgency in Improving Child Health Care Workers’ Awareness and Knowledge of ASD: Findings From a Cross-Sectional Study in Southwest China

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Objective: To evaluate the levels of awareness and knowledge of ASD among child health care workers in China, we conducted a cross-sectional, questionnaire-based study to assess the participants’ awareness and knowledge of ASD.

Methods: A total of 159 child health care workers from Southwest China participated in the survey and filled out the questionnaire. Descriptive analysis was conducted on the five parts of the questionnaire, including general knowledge, symptomology, screening and diagnosis, and intervention and treatment. Univariate analysis was used to assess impacts of the participants’ basic demographic characteristics on the questionnaire scores. Multivariate analysis was used to analyze association of the participants’ basic demographic characteristics and the questionnaire scores.

Results: Less than 15% of the participants knew that ASD is a developmental, congenital and genetic disorder. Few participants knew that the symptoms include language disorder (38.4%) and social dysfunction (29.6%). A minority of the participants knew the diagnostic criteria (22.6%) and the age for early screening (14.5%). A total of 23.9% of the participants agreed that there are no effective drugs to treat ASD, and 6.3% agreed that ASD is incurable. A number of years in practice of \( \geq 10 \) (OR = 0.3249, 95% CI: 0.1080–0.9189) was the main factor related to a high questionnaire score.

Conclusions: Most participants had relatively low levels of awareness and knowledge of ASD, especially in terms of general knowledge as well as knowledge of intervention and treatment. Working for more than 10 years was a significant predictor of higher levels of awareness and knowledge of ASD. ASD-related training and knowledge dissemination are crucial for the early diagnosis and intervention of ASD. Child health care workers’ awareness and knowledge of ASD needs to be improved to help build public awareness about ASD.

Keywords: autism spectrum disorders, awareness, knowledge, child health care workers, China
INTRODUCTION

Autism spectrum disorder (ASD) is a developmental disorder that is mainly manifested as social and communication impairments, as well as interest restriction and repetitive behaviors (1). The prevalence of ASD is increasing year by year. In the United States, the prevalence of ASD in children aged 8 years has reached 1.85% (2). The latest estimated prevalence of ASD in 6- to 12-year-old children in China is 0.70% (3). The number of disability-adjusted life-years (DALYs) of ASD is more than 58 per 100,000 population, which causes substantial health loss across the lifespan (4). Although it is widely recognized that genetic and environmental factors are responsible for the ASD phenotype, the exact pathogenic mechanisms are still poorly understood (5). Due to phenotypic and etiological heterogeneity among individuals with ASD, the early diagnosis of ASD remains a challenge (6).

Early intervention for ASD children could enhance their communication and social skills, and improve long-term prognosis and quality of life (7). Early diagnosis is essential to promote early intervention, appropriate education planning, and the arrangement of family support services (8, 9). A meta-analysis showed that global average age at ASD diagnosis is 60.48 months (10). In China, about a third of children with ASD are diagnosed at the age of older than 3 years old (11). Late diagnosis of ASD is associated with shortage of child psychiatrists and pediatricians, inadequate basic awareness of ASD in the general public, incomprehensive early screening of ASD in community, and economic development gap between urban and rural areas (12). Early diagnosis of ASD is largely depend on high level
of awareness and knowledge of ASD by clinicians and parents (13). Child health care workers’ ability to recognize the signs and symptoms of ASD and respond appropriately is critical to providing the best health care for children with ASD (14, 15). However, there is a lack of research on evaluation the levels of awareness and knowledge of ASD among child health care workers in China. Thus, we aimed to conduct a cross-sectional, questionnaire-based study to assess Chinese child health care workers’ awareness and knowledge of ASD in terms of their general knowledge and their knowledge of ASD symptomology, screening and diagnosis, and intervention and treatment.

**METHODS**

**Investigation Site and Participants**

The study was conducted in Baiyun District, Guiyang City, Guizhou Province, China, from May 2020 to June 2020. Baiyun District (Figure 1) is the urban and rural linking area of Guiyang City, Guizhou Province, which is located in southwestern China. In 2020, the total gross domestic product (GDP) of Baiyun District was 23.678 billion yuan, which at the middle level of Guizhou province. The survey subjects were child health care workers practicing in Baiyun District.

**Questionnaire Content**

The setting of questions in the questionnaire was original. The multidisciplinary team of the questionnaire development was composed of clinical experts with rich experience in children’s behavioral development, psychology, epidemiology and neurological rehabilitation. The questions refer to the DSM-5 diagnostic criteria for the core symptoms of ASD, as well as the interventions recommended in the evidence-based guidelines of ASD (16, 17). The questionnaire consisted of five parts (Supplementary Table 1). The first part collected the basic demographic characteristics of the participants, including their age, gender, ethnicity, education, number of years in practice, occupation, professional title and economic income. The second part contained 6 questions that assessed the participants’ general knowledge of ASD, such as whether ASD is a developmental disorder, congenital disorder or a genetic disorder. The third part contained 7 questions that evaluated their knowledge of the symptomology of ASD, including questions about special skills or interests, social withdrawal, and language barriers. 5 questions in the fourth part were about the screening and diagnosis of ASD, including diagnostic criteria and age for early screening of ASD. Knowledge of the intervention and treatment of ASD was assessed by 4 questions in the fifth part, including questions on behavioral interventions and drug therapy. All questions were multiple choice and included options for “Yes,” “No” and “I do not know.” After designing the questionnaire, we invited 20 child health care workers from the Guiyang Baiyun District Hospital to complete the questionnaire. The questions were easy understand under the health care workers’ culture background, based on the feedback from these respondents.

**Survey Method**

WeChat (Tencent Corp) is the most widely used social networking platform in China. The questionnaires were administered on the WeChat network using Sojump (Changsharan Xing InfoTech Ltd). Sojump (http://www.sojump.com) is a professional online survey, evaluation and polling platform, providing personalized services including questionnaire design, data collection, customized reports and results analysis. There were totally 195 child health care workers practicing in Baiyun District, Guiyang City, Guizhou Province of China. A link to the questionnaire was sent to the WeChat group of all child health care workers. There is no time limit to fill in the questionnaire. If participants have any questions, professional staff would

| Characteristics | n   | %   |
|-----------------|-----|-----|
| Total           | 159 |     |
| **Age (years)** |     |     |
| <30             | 64  | 40.3|
| 30–39           | 70  | 44.0|
| 40–49           | 20  | 12.6|
| ≥50             | 5   | 3.1 |
| **Gender**      |     |     |
| Male            | 17  | 10.7|
| Female          | 142 | 89.3|
| **Ethnicity**   |     |     |
| Han             | 128 | 80.5|
| Minority        | 31  | 19.5|
| **Education**   |     |     |
| ≤Middle vocational | 11 | 6.9 |
| High vocational | 73  | 45.9|
| ≥College        | 75  | 47.2|
| **Number of years in practice** |     |     |
| <10             | 98  | 61.6|
| 10–19           | 47  | 29.6|
| 20–29           | 12  | 7.5 |
| ≥30             | 2   | 1.3 |
| **Occupation**  |     |     |
| Doctor          | 44  | 27.7|
| Nurse           | 81  | 50.9|
| Unknown         | 34  | 21.4|
| **Professional title** |     |     |
| Primary         | 28  | 17.6|
| Middle          | 19  | 11.9|
| High            | 9   | 5.7 |
| Unknown         | 103 | 64.8|
| **Economic income (RMB/month)** |     |     |
| <3,000          | 41  | 25.8|
| 3,000–4,999     | 52  | 32.7|
| 5,000–9,999     | 45  | 28.3|
| ≥10,000         | 1   | 0.6 |
| Unknown         | 20  | 12.6|
answer them. All questionnaires were voluntarily completed with informed consent. Questionnaires with incomplete basic information and unchecked questions were excluded.

**Data and Statistical Analysis**

There were 22 questions on the questionnaire; each question was scored one point for a correct answer and no point for a not sure answer. Enumeration data are expressed as the mean ± SD, and measurement data are expressed as the constituent ratio or rate. The participants' basic demographic characteristics and their awareness of ASD in terms of general knowledge, symptoms, screening and diagnosis, and intervention treatment were analyzed by descriptive analysis.

Differences in scores by age, gender, ethnicity, education, number of years in practice, occupation, professional title and economic income were evaluated by Student's t-test when the distribution was normal or the Mann-Whitney U test when the distribution was skewed.

In order to study the influence factors of score, half of the total score was set as the cut-off value. Univariate analysis of the group with scores >11 and the group with scores ≤11 was conducted with the chi-square test. For sequential measures of two layers (scores >11 group and scores ≤11 group), logistic regression analysis was used to investigate the influence of age, gender, ethnicity, education, number of years in practice, occupation, professional title and economic income on the ASD awareness and knowledge scores. For the total score as a continuous variable, multiple linear regression was conducted to explore the contributions of demographic variables to total scores. Statistical analyses were performed using the SPSS statistical package program (version 20, SPSS Inc., Chicago, IL, USA), and $P < 0.05$ was considered statistically significant.

**RESULTS**

**Basic Demographic Characteristics and Professional Information of the Participants**

A total of 195 child health care workers from Baiyun District, Guiyang City, Guizhou Province, China, were invited to fill in the questionnaire. Among them, 159 of participants completed the questionnaire, with the response rate of 81.5%. The basic demographic characteristics and professional information of the participants are shown in Table 1. The mean age of the participants was 32.26 ± 7.21. The male-to-female ratio was 1:8.35. The overwhelming majority of the participants were of Han ethnicity (128/159, 80.5%). Of the participants, 47.2% (75/159) had completed a college education or above. Among the participants, 27.7% were doctors, and 50.9% were nurses, with an average work experience of 8.97 ± 6.58 years.
Participants’ Awareness and Knowledge of ASD in Children

Less than 15% of the participants knew that ASD was a developmental, congenital and genetic disorder (Table 2). Although the participants had higher levels of awareness of symptoms, a proportion of the participants lacked awareness of some of the symptoms. Only a few participants knew that the symptoms include language disorder (38.4%) and social dysfunction (29.6%) (Table 3). More than 90% of the participants were aware of the diagnosis of ASD, but a minority of the participants knew the diagnostic criteria (22.6%) and the age for early screening (14.5%) (Table 4). Regarding the intervention and treatment of ASD, 23.9% of the participants agreed that there are no effective drugs to treat ASD, and 6.3% agreed that ASD is incurable (Table 5).

Impacts of the Participants’ Basic Demographic Characteristics on the Questionnaire Scores

Regarding general knowledge, the number of years in practice ($P = 0.025$) and occupation ($P = 0.046$) were the main causes of differences in scores. The number of years in practice also greatly affected the scores for intervention and treatment ($P = 0.009$). For all parts of the questionnaire, there were significant differences in the scores by the number of years in practice ($P = 0.037$) (Table 6). The average score of the whole questionnaire was $10.21 \pm 3.34$. A total score of $\leq 11$ was considered to indicate a lack of awareness and knowledge of ASD. A total of 56 (35.2%) participants had scores $> 11$, and 103 (64.8%) participants had scores $\leq 11$. The univariate analysis showed that occupation influenced the questionnaire scores ($\chi^2 = 5.087, P = 0.024$) (Table 7).

Logistic regression was used for the multivariate regression analysis, and the results showed that a number of years in practice of $\geq 10$ (OR = 0.3249, 95% CI: 0.1080–0.9189) was the main factor leading to high questionnaire scores (Figure 2).

Using total scores as the dependent variable and age, gender, ethnicity, education, number of years in practice, occupation and economic income as independent variables, the analysis of total scores influencing factors was performed using multiple linear regression. The results showed that number of years in practice was the factor influencing total scores ($F = 7.284, P = 0.008$). The results showed that number of years in practice of $\geq 10$ contributed to the higher level of total scores ($P = 0.008$, shown in Table 8).

DISCUSSION

The prevalence estimates of ASD in China differ significantly from those in the West, and the key factor in this difference may be the lack of awareness of ASD in China (18). Gaps in awareness and knowledge of ASD among child health care workers may lead to delays in diagnosis and intervention. Therefore, child health care workers’ awareness and knowledge of ASD are crucial for the early intervention and treatment of ASD. Our study is the first to investigate awareness and knowledge of ASD among Chinese child health care workers based on an original questionnaire. Some studies used Knowledge about Childhood Autism among

| Questions on screening and diagnosis of ASD in children | Correct response | Incorrect/“not sure” responses |
|--------------------------------------------------------|------------------|-----------------------------|
| Correct response                                       | Incorrect/“not sure” responses |
| Children with ASD should go to medical institutions for consultation and treatment. | 148 (93.1) | 11 (6.9) |
| A clinic for children with ASD includes a children’s neurology department, children’s health department and other departments. | 152 (95.6) | 7 (4.4) |
| The DSM-5 has the latest diagnostic criteria for ASD. | 36 (22.6) | 123 (77.4) |
| Early detection and early screening are helpful to the prognosis of ASD. | 146 (91.8) | 13 (8.2) |
| The earliest age for the early screening of ASD is one year old. | 23 (14.5) | 136 (85.5) |

| Questions on the intervention and treatment of ASD in children | Correct response | Incorrect/“not sure” responses |
|---------------------------------------------------------------|------------------|-----------------------------|
| Correct response                                              | Incorrect/“not sure” responses |
| There are no effective drugs to treat ASD.                     | 38 (23.9) | 121 (76.1) |
| Behavioral interventions for ASD include applied behavioral analysis therapy, picture vocabulary communication systems. | 159 (100) | 0 (0) |
| ASD is incurable.                                              | 10 (6.3) | 149 (93.7) |
| Vitamin supplements during pregnancy may prevent ASD.         | 41 (25.8) | 118 (74.2) |
| Characteristics       | N (%) | General knowledge | Symptomology | Screening/ diagnosis | Intervention/ treatment | All questions |
|-----------------------|-------|-------------------|--------------|---------------------|-------------------------|--------------|
|                       |       | Mean score ± SD   | Mean score ± SD | Mean score ± SD | Mean score ± SD | Mean score ± SD | Mean score ± SD |
|                       |       | P value^b         | P value^b    | P value^b          | P value^b               | P value^b   |
| Age (years)           |       |                   |              |                     |                         |              |
| <30                   | 64 (40.3) | 1.38 ± 1.06       | 0.204        | 3.94 ± 1.61        | 0.857                  | 3.20 ± 0.89 | 0.704          | 1.53 ± 0.64 | 0.827          | 10.05 ± 3.05 | 0.573          |
| ≥30                   | 95 (59.7) | 1.64 ± 1.22       | 3.94 ± 1.82  | 3.16 ± 0.87        | 1.58 ± 0.72            | 1.58 ± 0.72 | 10.32 ± 3.53 |
| Gender                |       |                   |              |                     |                         |              |
| Male                  | 17 (10.7) | 1.65 ± 1.32       | 0.708        | 3.82 ± 1.47        | 0.538                  | 3.35 ± 0.79 | 0.799          | 1.59 ± 0.80 | 0.993          | 10.41 ± 3.47 | 0.753          |
| Female                | 142 (89.3) | 1.52 ± 1.15       | 3.95 ± 1.77  | 3.15 ± 0.89        | 1.56 ± 0.68            | 1.56 ± 0.68 | 10.18 ± 3.33 |
| Ethnicity             |       |                   |              |                     |                         |              |
| Han                   | 128 (80.5) | 1.54 ± 1.14       | 0.694        | 3.93 ± 1.70        | 0.663                  | 3.20 ± 0.86 | 0.530          | 1.59 ± 0.72 | 0.465          | 10.26 ± 3.31 | 0.928          |
| Minority              | 31 (19.5) | 1.52 ± 1.29       | 3.97 ± 1.89  | 3.06 ± 0.93        | 1.45 ± 0.57            | 1.45 ± 0.57 | 10.00 ± 3.49 |
| Education             |       |                   |              |                     |                         |              |
| Vocational            | 84 (52.8) | 1.42 ± 1.12       | 0.231        | 3.80 ± 1.73        | 0.251                  | 3.20 ± 0.92 | 0.389          | 1.54 ± 0.67 | 0.677          | 9.95 ± 3.35 | 0.445          |
| College               | 75 (47.2) | 1.67 ± 1.20       | 4.09 ± 1.73  | 3.15 ± 0.83        | 1.59 ± 0.72            | 1.59 ± 0.72 | 10.49 ± 3.33 |
| Number of years in practice |       |                   |              |                     |                         |              |
| <10                   | 98 (61.6) | 1.35 ± 1.01       | 0.025^*      | 3.74 ± 1.75        | 0.072                  | 3.15 ± 0.99 | 0.749          | 1.44 ± 0.59 | 0.009**        | 9.68 ± 3.22 | 0.037^*        |
| ≥10                   | 61 (38.4) | 1.84 ± 1.33       | 4.25 ± 1.68  | 3.21 ± 0.66        | 1.75 ± 0.79            | 1.75 ± 0.79 | 11.05 ± 3.37 |
| Occupation            |       |                   |              |                     |                         |              |
| Doctor                | 44 (35.2) | 1.91 ± 1.44       | 0.046^*      | 4.23 ± 1.79        | 0.082                  | 3.07 ± 0.95 | 0.267          | 1.66 ± 0.64 | 0.111          | 10.86 ± 3.81 | 0.092          |
| Nurse                 | 81 (64.8) | 1.36 ± 1.04       | 3.69 ± 1.82  | 3.19 ± 0.94        | 1.48 ± 0.63            | 1.48 ± 0.63 | 9.72 ± 3.35  |
| Economic income (RMB/month) |       |                   |              |                     |                         |              |
| <5,000                | 93 (66.9) | 1.48 ± 1.08       | 0.739        | 3.89 ± 1.66        | 0.825                  | 3.20 ± 0.89 | 0.223          | 1.53 ± 0.64 | 0.280          | 10.11 ± 3.12 | 0.937          |
| ≥5,000                | 46 (33.1) | 1.65 ± 1.40       | 3.93 ± 2.03  | 3.07 ± 0.96        | 1.67 ± 0.73            | 1.67 ± 0.73 | 10.33 ± 4.07 |

^a: The total score was calculated by summing the scores of each question; 1 indicates a correct response, and 0 indicates incorrect / "not sure" responses.
^b: Bold value indicate that the difference was considered statistically significant (* P < 0.05, ** P < 0.01).
^c: Unknown data were removed.
Health Workers (KCAHW) questionnaire, which was a useful tool for assessing health workers’ baseline knowledge of ASD in children, to measure knowledge level of health workers on ASD in primary care settings (19–21). The KCAHW questionnaire is divided into four domains, including impairments in social interaction, communication, obsessive and compulsive, as well as type of disorder and possible comorbid conditions and onset (22). Compared with KCAHW questionnaire, our original questionnaire adds the questions beyond the symptomology. The assessment of our questionnaire includes general knowledge and knowledge of symptomology, screening and diagnosis, and intervention and treatment of ASD. In our study, most participants had relatively low levels of awareness and knowledge of ASD, especially in terms of general knowledge as well as knowledge of intervention and treatment.

Other reports on awareness of ASD among medical practitioners are consistent with the findings of our study. Only 44.6% of general practitioners in Pakistan had heard of ASD (23). Approximately 66.7% of family physicians had not received professional education on ASD, and 70.8% of them had not referred any child who was suspected to have ASD to a child psychiatrist in the past 6 months (24). Non-neuropsychiatric resident doctors also lacked knowledge about ASD in children (25). In addition, pharmacists were found to have gaps in their awareness and knowledge of ASD, especially in terms of etiology (26–28). These studies suggest that the lack of awareness of ASD is consistent across different countries and among different groups of health care workers.

In addition to medical practitioners, there is also a lack of awareness and knowledge of ASD in the general public. According to a report, in the Chinese population, knowledge of ASD is mainly lacking regarding the topics of core symptoms, comorbidity and prognosis (18). Parents and teachers are important members of the general public, whose cognitive level of ASD affecting the early recognition of ASD (29). In a survey of parents, 75% had heard of ASD, but the parents had poor knowledge of signs and symptoms (30). In addition, 83% of preschool teachers answered incorrectly on more than half of the questions on a questionnaire that assessed knowledge of ASD (31).

In our study, working for more than 10 years was a significant predictor of higher levels of awareness and knowledge of ASD. Similarly, Akhter et al. reported that medical workers with 11 to 15 years of practice experience had higher awareness scores, while those with 1 to 5 years had lower scores (20). As was reported, the level of awareness of ASD was also associated with a number of other factors. Compared with medical practitioners, alliance medical practitioners were found to have better knowledge of ASD (20). Pediatricians, psychiatrists and doctors working in tertiary hospitals had good knowledge of ASD, while general practitioners had poor knowledge (32).

In our study, the medical institutions in Baiyun District have a low level of medical resources and an inefficient
hierarchical structure. Specialized hospitals are insufficient in number and small in scale. Therefore, the investigation of Baiyun District reflects the level of medical services in areas with poor medical care, such as Southwest China. A Chinese study showed that children with ASD who live in suburban and rural areas were diagnosed at least 6 months later than children who live in urban areas (11). Economic development gaps between urban and rural areas might contribute to differences in the knowledge of ASD. In high-income economies, increased scientific interest in the development of evidence-based interventions for ASD could help raise awareness and knowledge of ASD among the public and professionals (33).

Ninety-eight percent of parents said that the significance of an ASD diagnosis and access to support services were important, but professionals rarely provided relevant professional guidance to them (34, 35). Therefore, child health care workers’ knowledge of ASD needs to be improved. Increasing the level of awareness of ASD, especially in terms of general knowledge as well as knowledge of intervention and treatment, among child health care workers is critical to early diagnosis and intervention for children with ASD.

LIMITATIONS

The small sample size due to the restriction of the scope of the respondents may affect the generality of the study findings. The study was based on a self-completed questionnaire, which may be subject to reporting bias. We cannot exclude that only motivated medical workers were more likely to participate. Therefore, findings on awareness of ASD may be overestimated. Besides, the methods adopted for the scoring of this original questionnaire might impact the results. In our single-center study, the participants were limited to child health care workers in Baiyun District, Guiyang City, Guizhou Province, China, so the results only represent the situation in southwestern China. Further multicenter, large-scale studies are needed to better investigate the awareness and knowledge levels of ASD in China.

### TABLE 8 | Multiple linear regression analysis for factors influencing total scores.

|                          | B     | SE (B) | β    | t     | P value * | 95% CI for B |
|--------------------------|-------|--------|------|-------|-----------|--------------|
| Age (years) (1 = "<30", 2 = "≥30") | −1.366 | 0.866  | −0.187 | −1.577 | 0.118 | −3.083–0.351 |
| Gender (1 = "Female", 2 = "Male") | 0.337 | 1.506  | 0.022 | 0.224 | 0.824 | −2.650–3.323 |
| Ethnicity (1 = "Minority", 2 = "Han") | 0.575 | 0.883  | 0.064 | 0.651 | 0.516 | −1.175–2.325 |
| Education (1 = "Vocational", 2 = "College") | 0.677 | 0.864  | 0.090 | 0.784 | 0.435 | −1.035–2.390 |
| Number of years in practice (1 = "<10", 2 = "≥10") | 2.436 | 0.903  | 0.318 | 2.699 | 0.008* | 0.646–4.226 |
| Occupation (1 = "Nurse", 2 = "Doctor") | 0.596 | 0.899  | 0.079 | 0.663 | 0.509 | −1.186–2.378 |
| Economic income (RMB/month) (1 = "<5000", 2 = "≥5000") | −0.103 | 0.825  | −0.013 | −0.125 | 0.901 | −1.738–1.533 |

*a: Bold value indicate that the difference was considered statistically significant (* P < 0.05).*

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**FIGURE 2** | Forest plot of logistic regression.
CONCLUSIONS

We conducted a cross-sectional, questionnaire-based study to assess Chinese child health care workers’ awareness and knowledge of ASD. We revealed that most participants had relatively low levels of awareness and knowledge of ASD, especially in terms of their general knowledge as well as their knowledge of intervention and treatment. Moreover, working for more than 10 years was a significant predictor of higher levels of awareness and knowledge of ASD. ASD-related training and knowledge dissemination are crucial for the early diagnosis and intervention of ASD. Child health care workers’ awareness and knowledge of ASD needs to be improved to help build public awareness about ASD.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Institutional Ethics Committee at Guizhou Provincial People's Hospital. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

HZ conceived of the study. YM contributed to the analysis, synthesis and interpretation of the results, and wrote the manuscript. YZ, YL, YP, YW, XH, CZ, and TW contributed to the recruitment of the participants and questionnaire collection. All authors contributed to the preparation of the manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.703609/full#supplementary-material
19. Govindan R, Ramu R. Nurses’ knowledge and understanding about autism. *Indian J Community Med.* (2020) 45:382–3. doi: 10.4103/ijcm.IJCM_290_19

20. Akhter N, Mumtaz N, Saqulain G. Autism cognizance: a dilemma among medical and allied medical practitioners. *Pak J Med Sci.* (2020) 36:678–82. doi: 10.12669/pjms.36.4.1703

21. Özgur BG, Eser E. Adaptation of the knowledge about childhood autism among health workers questionnaire aimed for usage in Turkey. *North Clin Istanb.* (2021) 8:199–200. doi: 10.14744/nci.2020.65632

22. Bakare MO, Ebigbo PO, Agomoh AO, Menkiti NC. Knowledge about childhood autism among health workers (KCAHW) questionnaire: description, reliability and internal consistency. *Clin Pract Epidemial Ment Health.* (2008) 4:17. doi: 10.1186/1745-0179-4-17

23. Rahbar MH, Ibrahim K, Assassi P. Knowledge and attitude of general practitioners regarding autism in Karachi, Pakistan. *J Autism Dev Disord.* (2011) 41:465–74. doi: 10.1007/s10803-010-1068-x

24. Altay MA. Family physicians’ awareness of autism spectrum disorder: results from a survey study. *Open Access Maced J Med Sci.* (2019) 7:967–72. doi: 10.3889/oamjms.2019.199

25. Hidiroglu S, Lüleci NE, Karavus M, Tanriover O, Bayar ES, Karavus A. The awareness of childhood autism among residents of neuropsychiatric and other disciplines of a research and training hospital in Istanbul, Turkey. *J Pak Med Assoc.* (2018) 68:247–51.

26. Lüleci NE, Hidiroglu S, Karavus M, Karavus A, Sanver FF, Özgur F, et al. The pharmacists’ awareness, knowledge and attitude about childhood autism in Istanbul. *Int J Clin Pharm.* (2016) 38:1477–82. doi: 10.1007/s11096-016-0394-2

27. Shawahna R, Fahed B, Qadri D, Sharawi L, Soroghli M, Dweik M. Awareness and knowledge of autism spectrum disorders among pharmacists: a cross-sectional study in palestinian pharmacy practice. *J Autism Dev Disord.* (2017) 47:1618–27. doi: 10.1007/s10803-017-3085-5

28. Khanna R, Jariwala K. Awareness and knowledge of autism among pharmacists. *Res Social Adm Pharm.* (2012) 8:464–71. doi: 10.1016/j.sapharm.2011.11.002

29. Andersson GW, Miniscalco C, Gillberg C. Preschoolers assessed for autism: parent and teacher experiences of the diagnostic process. *Res Dev Disabil.* (2014) 35:3392–402. doi: 10.1016/j.ridd.2014.08.027

30. Anwar MS, Tahir M, Nusrat K, Khan MR. Knowledge, awareness, and perceptions regarding autism among parents in Karachi, Pakistan. *Careus.* (2018) 10:e3299. doi: 10.7759/careus.3299

31. Liu Y, Li J, Zheng Q, Zaroff CM, Hall BJ, Li X, et al. Knowledge, attitudes, and perceptions of autism spectrum disorder in a stratified sampling of preschool teachers in China. *BMC Psychiatry.* (2016) 16:142. doi: 10.1186/s12888-016-0845-2

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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