



# Child Healthcare Workers' Knowledge About Autism and Attitudes Towards Traditional Chinese Medical Therapy of Autism: A Survey from Grassroots Institutes in China

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## Abstract

**Background:** It is reported that there is increasing prevalence of autism spectrum disorder (ASD) in the world. Early recognition, diagnosis and intervention are known to be vital to improve the prognosis in children with ASD. In China, little research has been conducted on the knowledge of autism prevalence by child healthcare workers, or their attitude towards the traditional Chinese medical treatment of childhood ASD.

**Objectives:** This study assessed the knowledge of autism prevalence and attitudes towards traditional Chinese medical treatment among child healthcare workers in grassroots health organizations in China.

**Methods:** A total of 265 child healthcare workers were randomly selected in Chongqing, China. A socio-demographic questionnaire was administered to assess knowledge about autism prevalence as well as the attitudes towards the traditional Chinese medical treatment of childhood ASD. The correlations between socio-demographic variables and knowledge of childhood ASD were examined using univariate and multivariate analyses.

**Results:** Out of 12 possible scores of knowledge about autism, mean score was  $7.3 \pm 2.19$ . Knowledge about childhood ASD was statistically associated with the education level, geographic region, the area of specialty and level of work experience with ASD. 38% of participants believed that ASD could be treated by traditional Chinese medicine. 79% of participants did not agree that the prevalence of childhood ASD in China was approximately 1%.

**Conclusions:** The scores among child healthcare workers reflect deficits in knowledge about ASD. Therefore, education about childhood ASD is needed. Further studies on the effects of traditional Chinese medical treatment and a relatively accurate prevalence of ASD in China are needed.

**Keywords:** Autism, Autism Spectrum Disorder, Attitudes, China

## 1. Background

It is well known that an early diagnosis is vital for children with ASD and their families in order to facilitate earlier interventions (1). Studies have shown that some symptoms of ASD can frequently be observed before 12 months of age (2). Diagnostic delays lead to delays in intervention, which can jeopardize prognosis and life quality of children with ASD (3). Undoubtedly, child healthcare workers in medical facilities play a very important role in early recognition, diagnosis and referral for intervention.

ASD was not recognized by researchers until the early 1980s in mainland China (4, 5). Knowledge and awareness about children with ASD remains relatively low in China,

although ASD prevalence has been increasing, especially in developed countries (5-8). In China, the general population often has inaccurate perceptions concerning disorder etiology and intervention options (6, 9). The task of early recognition and diagnosis of childhood ASD/suspected ASD is primarily undertaken by child healthcare workers/psychiatric workers in medical facilities in China.

It is reported that child healthcare workers in Grassroots hospitals generally serve large populations in their areas (10-12). A lack of knowledge about child autism makes early identification and diagnosis difficult for primary child healthcare workers.

In developed countries, the prevalence of childhood ASD is approximately 1% (5). There is little data available

in China about the prevalence of autism, especially in the mainland, and there is a shortage of multi-center research on the prevalence of autism in China.

Many people believe in traditional Chinese medical science in China, so parents with ASD children may choose traditional Chinese medicine as treatment for their children (13). Currently, there are no reports about ASD knowledge or attitudes of primary health care workers in China. In this study, Chongqing, the Chinese fourth municipality, with a large area and large population of children (14) was selected to explore the knowledge and attitudes of childhood ASD among child healthcare workers in grassroots health service institutes. The study may further contribute to a growing body of literature concerning early diagnosis and intervention efforts (15). This research may also help to delineate the impact of policy initiatives in China, which has begun to help the needs of ASD children by expanding financial assistance (16). In the current study, we have adapted survey methods from studies (9, 15) that assessed healthcare workers.

## 2. Methods

### 2.1. Participants

All participants were from Chongqing, located in Southwest China, which is the fourth largest Chinese municipality. There was a relatively large number of children under 3 years in 2015 (17): approximately 960,000. There were more than 200 community health centers located in the urban center and approximately 900 township service centers located in rural areas of Chongqing. A total of 70 urban community health service centers and 60 rural township health service centers spread across Chongqing were randomly selected for this study.

Ethical approval was obtained by Chongqing Medical and pharmaceutical College. Informed consent was obtained prior to study participation. In this study, "child healthcare workers" refers to physicians, nurses and other workers undertaking child health care work who were free to participate and were informed that a refusal to participate would in no way affect their work status within the health service centers. Child healthcare workers were excluded if they had not obtained a certificate in their specialties, which was the exclusion criterion. 265 child healthcare workers completed the survey for analysis; which was a 97% response rate out of the total number of potential participants. The study was a point survey.

### 2.2. Socio-Demographic Questionnaire

A socio-demographic questionnaire was used to obtain information including gender, age, educational sta-

tus, work experience as a child healthcare worker, and experience of diagnosing ASD/suspected ASD.

### 2.3. Knowledge About Childhood ASD Among Child Healthcare Workers

All questionnaires and individual questionnaire items were adapted for a Chinese cultural context from measures utilized in previous studies assessing knowledge of ASD (6, 17, 18). The questionnaires (Additional files 1) assessed knowledge of children with ASD. A minimum total score of 0 and maximum total score of 12 was possible. The questionnaire and the scoring system are shown in supplementary file Appendix 1.

### 2.4. Attitudes Towards Autism Prevalence and Traditional Chinese Medical Treatment of Childhood ASD

A three-item questionnaire measuring attitude was adapted from previous studies. The items were: "ASD in China occurs at approximately 1% among children," "ASD can be treated by traditional Chinese medical science" and "Traditional Chinese medical treatment is the most effective treatment for children with ASD." The questionnaire about attitudes is also shown in supplementary file Appendix 1.

### 2.5. Procedure

To assess legibility and ensure clarity of translation, pilot data were gathered on the questionnaires in a sample of 26 child healthcare workers at a district in Chongqing in January of 2015. The final version of the questionnaire was created using the feedback from this pilot study concerning item wording. The questionnaires were then administered to child healthcare workers in Chongqing over the span of eight weeks (August 2015 to October 2015). The questionnaires were completed by the participants and collected from them at the point of administration to prevent them from seeking any study materials or discussing before marking their responses.

### 2.6. Data Analysis

SPSS 17.0 for Windows (SPSS Inc., Chicago, IL, USA) was used to analyze the outcomes of the study. Chi-squared test was used for categorical variables and t-test (or analysis of variance) was used for continuous variables. The correlations between socio-demographic variables and knowledge of childhood ASD were examined using univariate and multivariate analyses. The value of P used the probability of two sides and  $\alpha$  used 0.05 as a test standard.

### 3. Results

#### 3.1. Participant Demographics

A total of 265 child healthcare workers consented to participate in the study, 153 (57.7%) from community health service centers in urban and 112 (32.3%) from town health service centers in rural group areas. 164 (61.9%) were females and 101 (38.1%) were males. When area of specialty was considered, 131 (49.4%) came from clinical medicine, the other specialties included nursing, pharmacy, etc., of which nursing had the majority. 86 (32.5%) had work experience with ASD/suspected ASD. Socio-demographic variables of the participants are shown in [Table 1](#).

#### 3.2. Knowledge of ASD

Out of 12 possible scores of the childhood ASD knowledge questionnaire among the child healthcare participants, the mean score was  $7.3 \pm 2.19$ . The percentage of

items answered more than 50% accurately was 75%. The items answered correctly by 50% or less of the sample were 'Autistic children have special talent,' 'ASD is a neurodevelopmental disorder' and 'ASD is curable if diagnosed early and the appropriate intervention provided.'

#### 3.3. Factors Affecting Knowledge About Childhood Autism Among the Child Healthcare Workers

The influence of demographic variables on the knowledge of childhood ASD is provided in [Tables 2](#) and [3](#). There was a significant relationship between the total mean score of the knowledge of childhood ASD and education level. Participants from urban areas scored significantly higher than those from rural areas ( $8.87 \pm 1.22$  vs.  $5.18 \pm 1.20$ ,  $P < 0.001$ ). Participants with college degrees scored higher than those with middle vocational and high school levels (the mean scores:  $8.39 \pm 1.83$ ,  $6.53 \pm 1.58$ , and  $4.44 \pm 1.88$ , respectively). There was a statistically higher score in participants majoring in clinical medicine than those majoring in nursing and others ( $7.65 \pm 2.20$  vs.  $6.97 \pm 2.13$ ,  $P < 0.001$ ). The work experience of ASD/suspected ASD contributed positively to the total mean scores. Participants with work experience of childhood ASD/suspected ASD had a total mean score of  $8.45 \pm 1.85$ , while the total mean score was  $6.76 \pm 2.13$  for those who did not have work experience ( $P < 0.001$ ). Multivariate analysis also showed that there was a significant association between scores of knowledge of childhood ASD and education level ( $t = 6.894$ ,  $P < 0.001$ ), area of specialty ( $2.384$ ,  $P = 0.018$ ), as well as work experience of ASD/suspected ASD ( $t = 4.916$ ,  $P < 0.001$ ). Region of residence was also found to statistically influence the mean score of autism knowledge in this study.

#### 3.4. Attitudes Towards the Prevalence and Traditional Chinese Medical Treatment of ASD

Regarding the prevalence of ASD in China, 79% of child healthcare workers in this study did not believe that the prevalence of autism in China was approximately 1%. In their opinion, the prevalence of ASD in China was much lower than 1%, and none of them thought it was higher than 1% because they seldom encountered children with ASD in their work or lives. In the eyes of 38% of the participants, traditional Chinese medical science should be chosen as a way of treatment, although 97% did not think traditional Chinese medical treatment was the most effective treatment for children with ASD.

### 4. Discussion

In the current study, child healthcare workers were relatively young, with comparatively short work experience.

**Table 1.** Socio-Demographic Variables of the Participants

Socio-Demographic Variable	No. (%)
<b>Gender</b>	
Male	101 (38.1)
Female	164 (61.9)
<b>Age, y</b>	
≤ 25	95 (35.8)
26 - 30	110 (41.5)
> 30	60 (22.6)
<b>Region</b>	
Urban	153 (57.7)
Rural	112 (42.3)
<b>Education</b>	
High school	29 (10.9)
Middle vocational school	92 (34.7)
High vocational school and college	144 (54.3)
<b>Area of specialty</b>	
Clinical medicine	131 (49.4)
Nursing and others	134 (50.6)
<b>Work experience, y</b>	
≤ 5	116 (43.7)
6 - 10	80 (30.2)
> 11	69 (26.1)
<b>Work experience of ASD/suspected ASD</b>	
No	179 (67.5)
Yes	86 (32.5)

**Table 2.** The Analysis of Some Demographic Variables on the Score of Knowledge of Childhood ASD

Demographic Variables	Mean $\pm$ SD	F Value	P Value
<b>Region rural</b>	5.18 $\pm$ 1.20	591.6	0.000
<b>Urban</b>	8.87 $\pm$ 1.22		
<b>Sex</b>			
Male	7.15 $\pm$ 2.26		
Female	7.42 $\pm$ 2.14	0.953	0.330
<b>Work duration, y</b>			
$\leq 5$	7.5 $\pm$ 2.13		
6 - 10	7.29 $\pm$ 2.24		
$> 11$	7.03 $\pm$ 2.03	1.001	0.369
<b>Area of specialty</b>		6.517	0.011
Clinical medicine	7.65 $\pm$ 2.20		
Nursing and others	6.97 $\pm$ 2.13		
<b>Educational level</b>			
High school	4.44 $\pm$ 1.88		
Middle vocational	6.53 $\pm$ 1.58		
College	8.39 $\pm$ 1.83	75.23	0.000
<b>Work experience ASD/suspected ASD</b>		39.468	0.000
Yes	8.45 $\pm$ 1.85		
No	6.76 $\pm$ 2.13		

Another feature of these healthcare workers was the relatively low level of education. None of the participants had more than a university level education (i.e., none of them possessed a master's degree). Demographic variables indicated an obvious lack of child healthcare professionals among primary health organizations in China, which may be a challenge to the quality of child health care, especially facing the two-child policy in China (10-12).

Among the study cohorts, the scores reflect deficits in knowledge about childhood ASD. In comparison to participants working at community health service centers, participants at town health service centers lacked more knowledge of ASD in Chongqing. It is probable that the urban-rural gap in medical human resources influences the knowledge of children with ASD (19, 20). Childhood neurodevelopmental disorders are increasingly being recognized along with demands for earlier diagnosis and intervention. However, the total mean of  $7.3 \pm 2.19$  out of 12 possible scores on the knowledge of childhood ASD questionnaire in the study group is low, and it reflects the deficits in knowledge, education and awareness about childhood autism among the primary child healthcare workers working at grassroots health service institutes in

Chongqing, China.

Multivariate analysis also showed that there was a significant association between knowledge of childhood ASD and work experience with ASD/suspected ASD. Participants with experience scored higher regarding their knowledge of childhood ASD than those who did not, which was consistent with prior research (8). Presumably, such experience could increase the understanding of children with ASD in general. It was found that about thirty percent had work experience with ASD/suspected ASD among all the child healthcare workers in this study. Lack of such experience may indicate a lack of knowledge of childhood ASD, which directly leads to signs and symptoms that may not be recognized in children with ASD, especially in children with early atypical manifestations and signs. The other reason for lack of such experience maybe because parents with ASD children prefer to choose large hospitals (such as public children hospitals), rather than primary medical organizations (21, 22).

Higher education levels may have also contributed to the score during the current study. Within the current sample, education level did have a significant effect on knowledge of ASD: child healthcare workers with college instruction scored significantly higher on ASD knowledge tests than those with lower levels of academic instruction.

Furthermore, child healthcare workers' knowledge of ASD was also affected by their area of specialty in this study. Participants with a clinical medicine specialty had significantly higher knowledge scores than those with a nursing specialty. Multivariate analysis also showed that there were significant associations between scores of knowledge of childhood ASD and specialty. Monday et al. reported that medical students had a statistically higher score of ASD knowledge than nursing students (15). The difference in knowledge found among the healthcare workers between doctors and nurses in our study is likely to be due to the discrepancies of schools curricula, as well as occupational history.

As previous research has shown (6, 8), there were no significant associations among childhood ASD knowledge, age and work duration for healthcare workers. Those who are older and probably with more years of experience may not necessarily score higher on the knowledge of childhood ASD questionnaire.

In this study, we found that 79% of child healthcare workers did not believe the prevalence of autism in China was approximately 1%. In their opinions, the prevalence of ASD in China was much lower than 1%, and none of them thought it was approximately 1%. Sun reported that available studies had methodological weaknesses, and therefore previous results about autism prevalence suffered from lack of comparability with studies from developed

**Table 3.** Predictors of Composite Score Performance

Variables	B	SE	$\beta$	t	P Value	95% CI for B
Age	-0.038	0.059	-0.017	-0.653	0.515	-0.154,0.078
Sex	0.150	0.121	0.033	1.239	0.216	-0.089,0.389
Education level	0.678	0.098	0.211	6.894	0.000	0.484,0.872
Work experience	0.020	0.069	0.007	0.282	0.778	-0.117,0.156
Area of specialty	0.409	0.171	0.093	2.384	0.018	0.071,0.746
Work experience of ASD/suspected ASD	0.855	0.174	0.183	4.916	0.000	0.513,1.197
Region	3.336	0.134	0.753	24.881	0.000	3.072,3.600

countries. One study showed autism prevalence was approximately 10.3/10000 based on eight epidemiological studies in the mainland of China (5). There has not been a multicenter study of prevalence on childhood ASD. Further studies about a relatively accurate prevalence of ASD are needed in China.

In the eyes of 38% of participants, traditional Chinese medical science should be chosen as a way of treatment, although 97% did not think traditional Chinese medicine was the most effective treatment for children with ASD. It is reported that ASD could be improved to a certain degree by Chinese acupuncture. Nevertheless, tolerability and safety of acupuncture was not the focus of any of the previous studies (13). While serious side effects are rare when acupuncture is performed by an experienced acupuncturist, potential serious side effects can occur. A multicenter controlled double-blinded study of acupuncture treatments in children with ASD is needed.

Overall, the current results indicated the lack of knowledge about childhood ASD among child healthcare workers in grassroots health care institutes in Chongqing, China. Furthermore, the demographic variables affecting knowledge of ASD were region, educational level, area of specialty and work experience of ASD/suspected ASD. Multicenter controlled double-blind studies on the prevalence of acupuncture treatments in children with ASD is needed. It is encouraging that the government has been paying a large degree of attention to child healthcare and primary medical services in China, which may benefit the early development of children and to children with ASD.

#### 4.1. Limitations of the Study

The current study has its limitations. The sample size of this study was not large. A larger sample size may have provided more insight into the reliability of the translated measure. Additionally, relying completely on the knowledge of a childhood ASD questionnaire to assess child healthcare workers' knowledge of ASD may have limited

the results. Another instrument may have created different results or may have provided additional information on the knowledge of ASD among healthcare workers. However, no other instruments have been recommended for use in China, and this instrument would be the most applicable for this context.

#### 4.2. Conclusions

The scores reflect deficits in knowledge about childhood autism among the study cohorts. Primary child healthcare workers are expected to provide holistic care and appropriate counselling to the families of these children. Unfortunately, in this environment, there is not enough knowledge about childhood ASD. Further education on childhood autism is therefore needed, and can be provided through continuing medical education in professional training. This will enhance early identification and diagnosis of childhood autism with early intervention which is known to improve prognosis. Lastly, policies are needed to create more involvement of primary child healthcare professionals in these institutions and to provide children with ASD more help.

Some participants did not agree that the prevalence of ASD in China is approximately 1%, and they thought it was much lower than 1%. Further studies need to be administered on ASD in China, especially about the comparatively accurate prevalence and treatment using traditional Chinese medical science.

#### Supplementary Material

Supplementary material(s) is available [here](#) [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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## Footnotes

**Ethics Approval and Consent to Participate:** Each participant was asked for their consent to participate before answering questions.

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