

## Article

# Analysis of the Autism Spectrum Disorder (ASD) Knowledge of Cuban Teachers in Primary Schools and Preschools

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**Abstract:** Teachers' knowledge of autism spectrum disorder (ASD) plays a key role in the successful inclusion of children with ASD in regular schools. The objective of this study was to analyze Cuban teachers' knowledge of ASD of at inclusive primary schools and preschools and to compare it with the results obtained in previous studies carried out at an international level. To do this, a cross-sectional study was conducted with Cuban teachers from urban and rural areas throughout the country. The sample was selected using a non-probabilistic technique. In total, 131 primary school and preschool teachers participated. Data were collected by applying the Autism Knowledge Questionnaire (AKQ) that measures ASD knowledge. The results indicated that Cuban teachers had an acceptable knowledge regarding ASD (0.57). Primary education teachers ( $17.58 \pm 4.06$ ) showed a higher level of knowledge than preschool teachers ( $15.35 \pm 2.74$ ). Regarding previous training, teachers who claimed to have received some type of specific ASD training ( $10.88 \pm 3.29$ ) made a greater number of errors than teachers who had not received specific training on ASD ( $8.91 \pm 3.06$ ). At the international level, Cuban teachers were observed to have similar knowledge about ASD when compared to active teachers or pre-service teachers from other countries where similar studies have been carried out. The results suggest that the training of Cuban teachers is not yet optimal to educate students with ASD in primary schools and preschools which are open to diversity.

**Keywords:** autism spectrum disorder (ASD); inclusive education; preschool teachers; regular teachers; special education



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## 1. Introduction

Autism spectrum disorders (ASD) encompass a group of neurodevelopmental disorders that appear in the early stages of life, and they are characterized to variable extents by difficulties in verbal and non-verbal communication, reciprocal social interactions, and restricted or repetitive behaviors [1]. In recent decades, the prevalence of ASD has grown exponentially [2]; for example, an incidence of 2 to 4 per 10,000 is reported in Cuba [3] and at international level there is a global autism prevalence that ranges within and across regions, with a median prevalence of 100/10,000 [4]. This increase in prevalence has occurred in the midst of an inclusive educational scenario of an international nature that aims for children and young people, with and without disabilities, to learn together [5]. This scenario has led many students with ASD to participate more and more in regular schools [6].

In the opinion of [7], the cognitive, emotional, and volitional characteristics of students with ASD deviate from the developmental norm expected for their conventionally developing peers in primary schools. Given that their personal and social development depends to a large extent on the knowledge, beliefs, attitudes, and will of teachers [8], the teacher's role becomes essential for the educational care of these students. In this sense,

the inclusion statement in the United Nations Convention on Human Rights of Persons with Disabilities [9] has been driving research regarding the experiences of teachers who educate students with ASD disabilities.

More and more, teachers are convinced of the usefulness of inclusive practices for students with ASD due to the socializing potential of inclusion and the learning and development opportunities it provides [10]. However, many teachers still do not have positive opinions about educational inclusion, especially about the inclusion of students with ASD, and they continue having a stagnant vision of conventional education and clinical labeling [11]. Ref. [12] assert that many teachers experience feelings of distress and/or anxiety when they face the demands posed by disruptive behaviors inherent to ASD in the classroom, given the lack of available time and resources for them to develop their educational work. In this sense, teachers must know central aspects of the symptoms of autism, comorbidity with other neurodevelopmental pathologies, and intervention strategies in order to provide a quality educational service [13]. This knowledge is key for the transition of children with autism from preschool to kindergarten, since it contributes to maintaining the skills achieved and to boosting future social and academic development [14].

The scientific literature offers evidence that highlights knowledge of ASD as a predictor of the ability and willingness of teachers to provide learning opportunities that enhance the personal and social development of students with ASD [15,16]. However, although the variable of teacher knowledge is key in the care provided to students with ASD in classrooms open to diversity, recent studies have reported that there is a distinction between what teachers understand and what they should actually know so that they can provide a quality educational service [13,17–19]. Several studies have explored demographic characteristics such as teachers' work experience and educational background in order to understand teachers' preparation and attitudes toward inclusion of children with autism [20,21]. For example, a study [22] revealed that preschool teachers' positive attitudes toward children with autism was related to the number of special education credits taken during pre-service education. In this sense, teachers' characteristics, specialized training, and work experience are relevant elements in understanding teachers' perceptions and efficient service to autistic children [23,24].

According to [25], culture, as a unique and unrepeatable variable, has a direct impact on the organization of social norms. It is key in the training of teachers to understand the demands of students with special educational needs. Thus, the cultural variable has received considerable attention from the field of research when it comes to understanding and comparing the knowledge that teachers from different countries have on different neurodevelopmental disorders, such as dyslexia [26,27] or attention deficit hyperactivity disorder [28,29], given that these are diagnoses that are influenced by specific aspects that may be different across educational systems, such as the number of hours dedicated to reading, the type of discipline, or the support policies in place for students with these difficulties.

The social commitment of educators at an international level has been in line with the social development of Cuban educational organizations, although with notable cultural nuances, which make the Cuban context unique. In Cuba, there is a national multidisciplinary program aimed at the evaluation and the early intervention of individuals with ASD. In turn, the social and the public nature of the country's organization allows the connection of health programs and socialization agencies, which encourages the participation of students with ASD in regular classrooms. These social and institutional characteristics—inspired by the historical-cultural school, with Lev Semyonovich Vygotsky as the main author—have provided Cuban society with a solid commitment to education for all, especially for people with functional diversity. From a Vigotskian perspective, the process of culturalization is a determinant for the construction of the human psyche, delineating the concept of subjectivity closely associated with its cultural nature. It is very likely that in Cuban culture, teachers are building knowledge about autism, about and from interactions with others, seeing autistic children not as objects of learning but as subjects of learning, who also have

potentialities that can be exploited through social interaction [30]. We do not know to what extent this may mark in a distinctive way the knowledge of Cuban teachers about autism.

In the case of ASD, some studies reveal that the level of knowledge depends on the stage teachers work in. In this respect, a recent systematic review that analyzed 25 studies concluded that preschool teachers (and also university professors) have a higher level of knowledge than elementary school teachers [17]. Nonetheless, teachers at the primary stage seem to have a higher knowledge than post-primary school professionals [31,32]. In either case, the results of the [17] review show that, in general, teachers' knowledge of ASD is poor. The differences between countries may also be key for ASD and its role in the socialization of students with neurodevelopmental disorders. However, in the case of ASD, only one comparative study from different countries has been carried out so far on teachers' knowledge about this diagnosis [33]. This study concluded that teachers from the United Kingdom mastered the explanatory foundations of ASD with greater precision than their peers from China.

The social commitment of educators at an international level has been in line with the social development of Cuban educational organizations, although with notable cultural nuances, which make the Cuban context unique. In Cuba, there is a national multidisciplinary program aimed at the evaluation and the early intervention of individuals with ASD. In turn, the social and public nature of the country's organization allows the connection of health programs and socialization agencies, which encourages the participation of students with ASD in regular classrooms. These social and institutional characteristics—inspired by the historical-cultural school, with Lev Semyonovich Vygotsky as the main author—have provided Cuban society with a solid commitment to education for all, especially for people with functional diversity.

Way ahead of his time, Vygotsky expressed that the education of people with functional diversity in specialized schools:

“Not only is not developed, but the child's strength is systematically atrophied . . . The school system increases the psychology of separatism, in all its nature it is antisocial and educates the antisocial spirit. Only radical reform of all education in general provides a way out” [34], p. 98.

Despite in recent decades there have been new advances in the process of evaluation, diagnosis, and intervention for people with ASD; in practice these aspects are still influenced by a traditional psychological vision, entrenched in a biological conception of development, which has been marked by a strong trend towards labelling, favoring separation [35].

Vygotsky's social constructivism approach, on the other hand, not only measures the importance of the biological but also recognizes the child's cognitive, affective, and volitional development in an integral way, considering that all higher psychological functions are the product of social development [36]. For example, the concept of zone of proximal development (ZDP), one of the greatest contributions made by Vygotsky to the field of education, emphasizes social interaction as a tool for personal growth, and it has been the basis for different educational practices in the Cuban context, seeking to promote developmental and meaningful learning for students. In this line, learning is conceived by Cuban teachers as a permanent result of mediation in which written and oral language has a close interaction with the instruments created by them, and it is materialized in the culture through the activity, shaping their knowledge and social action [37].

This holistic view of development makes it possible to contribute to the detection and the understanding of the characteristic symptoms of people with ASD. In this sense, from a Vygotskian perspective, it is not about addressing the complexity of ASD as a simple sum of neurobiological defects, but a holistic analysis must be carried out, which allows us to decipher key contextual elements that can condition its development—also considering those positive aspects that people with this condition have [35].

The historical inclination of Cuban society towards educational inclusion based on Vygotskian epistemological and ontological principles, highlights—today more than ever—the

importance of teachers' ASD knowledge in responding appropriately and timely to the needs of the student body in classrooms open to neurodiversity [38].

Taking into account the inclusive school framework in which we currently live throughout the world [9] and the results of the scientific literature, which show the impact that teachers' knowledge has on the true inclusion of students [15,16], it is necessary to analyze the degree of knowledge about autism of Cuban teachers who work in ordinary classrooms. To date, as far as we know, in Cuba there are no studies that explore the ASD knowledge of teachers in primary schools and preschools. This results in an urgent need for research, given that the cultural variable is key to understanding teacher activity in inclusive classrooms [33].

Regarding the above, this manuscript has the following guiding objectives: (1) to describe the knowledge that Cuban teachers of regular schools and preschools have about ASD; (2) to compare the knowledge that Cuban teachers of regular schools and preschools have about ASD according to gender, age, teaching specialty, experience in regular and/or inclusive classrooms, specific training to teach students with autism, the educational level of the teacher, as well as by the nature of the school and its location; and (3) to compare the ASD knowledge of Cuban teachers in inclusive primary schools and preschools with teachers from other cultural latitudes with the same social assignment.

The results can be fundamental to understanding if Cuban teachers meet the necessary training that education demands under conditions of contemporary social development. In addition, studying this can contribute to the understanding of teachers' ASD knowledge from an international perspective, given that it is the first study that compares data from articles published in different cultures regarding the variable selected as the object of study.

## 2. Materials and Methods

### 2.1. Study Design and Sample

In light of the quantitative paradigm, a non-experimental, cross-sectional descriptive comparative study was carried out [39] with a sample of 131 teachers selected using a non-probabilistic convenience technique according to the [40] criteria. The participants belonged to 57 Cuban regular schools and preschools in conditions of inclusion from different western and eastern provinces throughout the country. The demographic characteristics of the participants are summarized in Table 1.

**Table 1.** Sample characteristics.

Variable		n (%)
Gender	Female	108 (82.4%)
	Male	23 (17.6%)
Age	Under 30 years	16 (12.2%)
	31 to 50 years	92 (70.2%)
	Over 50 years	23 (17.6%)
Educational level	Bachelor's	82 (62.6%)
	Master's	49 (37.4%)
Regular classroom experience	Less than 5 years	5 (3.8%)
	5 to 10 years	20 (15.3%)
	More than 10 years	106 (80.9%)
Inclusive classroom experience	Less than 5 years	103 (78.6%)
	5 to 10 years	25 (19.1%)
	More than 10 years	3 (2.3%)
Specific training to teach students with autism	Yes	17 (13%)
	No	114 (87%)

**Table 1.** *Cont.*

Variable		n (%)
Type of school	Primary	110 (84%)
	Preschool	21 (16%)
School location	Urban	87 (66.4%)
	Rural	44 (33.6%)

Teachers from inclusive preschools and regular schools who were directly responsible for educating students with ASD were included in the study. Other socializing agents related to students with ASD in schools were excluded, such as school principals, psychopedagogues, and teachers of special or regular schools and preschools who had no relationship with students with ASD.

## 2.2. Instruments

### 2.2.1. Demographic Data

The teachers who participated in this research provided information about their gender, age (less than 30 years, 31 to 50 years, more than 50 years), educational level (Bachelor's, Master's, PhD), years of experience in general education (less than 5 years, 5 to 10 years, more than 10 years), years of experience in inclusive education (less than 5 years, 5 to 10 years, more than 10 years), specific training to teach students with autism (yes, no), type of school (primary school, preschool), and school location (urban or rural).

### 2.2.2. ASD Knowledge Questionnaire

In order to assess teachers' knowledge about ASD, the Autism Knowledge Questionnaire (AKQ) [41] was used. This questionnaire consists of 30 items with three options (T-True, F-False, and DK-I don't know). This response format allows discerning among knowledge (correct responses), misconceptions (wrong responses), and gaps (responses in which the "I don't know" option is chosen). This response format has been previously used in several questionnaires designed to assess the knowledge of professionals about other neurodevelopmental disorders (see, for example [29,42]).

In the original study [41], the validity of the AKQ was performed by expert judgment (the percentage of agreement reached 87%) and the reliability measured by Cronbach's alpha index reached a value of 0.93. The AKQ has evidence of validity in Spanish [33]. In our study, the AKQ showed a high capacity of reproducibility, with the internal consistency coefficient of Cronbach's Alpha being 0.83. According to the criteria of [39], Cronbach's alpha values that oscillate between 0.70 and 0.90 indicate good internal consistency in social sciences.

According to the original research [41], the scores obtained through the responses to the items are interpreted as follows: if the mean number of correct answers is greater than 0.7, knowledge about ASD is considered "good"; if the mean ranges from 0.5–0.7, it is considered "acceptable" knowledge; and if the mean is below 0.5, knowledge is considered "weak". In this sense, higher mean scores indicate a higher knowledge, and lower mean scores indicate a lower knowledge.

## 2.3. Procedure

The survey technique was used to measure the variable regarding the ASD knowledge of teachers in inclusive schools. The AKQ questionnaire administration was carried out by two pedagogues with experience in the field of educational sciences and with the survey technique. All teachers were fully aware of the objectives of the study and voluntarily authorized their participation. The data collection was carried out during the months of April and May 2021. The evaluations were always conducted during class time (8:00–14:30 h) without disrupting the teachers' schedule. The interviewers remained in the classroom during the administration of the questionnaire to resolve possible questions. The evaluation

period to answer the questionnaire ranged from 15 to 25 min. The traditional pencil and paper method was always used.

In order to compare the results of the present study with those obtained by other similar investigations carried out at an international level, the systematic review by [17] was used to identify the articles that had previously evaluated the ASD knowledge of teachers. Only the articles that used the AKQ questionnaire to eliminate measurement bias in the operationalization of the variable and that could provide the global level of knowledge of the teachers were selected. Each corresponding author was contacted for approval, as data from the articles were used. This approval request was done regardless of whether the articles were published for open access.

#### 2.4. Ethical Aspects

This research was carried out attending to the following ethical principles: value, scientific validity, equitable selection of subjects, favorable risk/benefit ratio, independent evaluation, informed consent, and respect for enrolled subjects. In this sense, the study was approved by the Ethics Committee of the University of Talca, Chile (Folio: 45-2020).

#### 2.5. Statistical Analysis

The statistical analysis of the results obtained from the AKQ was developed using the SPSS 18.0 statistical program. In order to study the reliability and the validity of the AKQ questionnaire, Cronbach's alpha coefficient was calculated. The normal distribution was verified by means of the Kolmogorov Smirnov test. Descriptive statistics of frequency (fi), mean ( $\bar{x}$ ), and standard deviation (SD) were used in the analyses. To compare possible differences between groups, MANOVAs multivariate analysis and Bonferroni's specific test were used. For all comparisons,  $p < 0.05$  was used.

### 3. Results

In this section, we describe the results performed for all analyses. We start with the description and comparison of the correct and incorrect answers, as well as the gaps in the knowledge of teachers, and then compare their total knowledge on ASD with the results of international studies.

#### 3.1. Cuban Teachers' Knowledge about ASD

Table 2 shows the mean values of the 30 item AKQ responses. These mean values were obtained calculating the percentage of correct, incorrect, and don't know responses for each item. All the participants correctly answered item number 30 ("Children with ASD demonstrate stereotyped behaviors such as hand flapping"). For the rest of the AKQ items, the means of the correct answers ranged from 0.04 (item 22) to 0.95 (item 28). Incorrect answers ranged between 0.02 (item 28) and 0.83 (item 9), and the gaps ranged between 0.02 (items 9 and 28) and 0.59 (item 22). The mean value of the total level of ASD knowledge of the teachers was 0.57. According to the criteria of the AKQ questionnaire, this value is in the range of "acceptable" knowledge scores.

**Table 2.** Number and average of teachers' correct and incorrect responses as well as gaps in knowledge for each of the items of the AKQ questionnaire.

(AKQ) Autism Knowledge Questionnaire		Correct		Incorrect		Gaps	
	Item	n	M	n	M	n	M
1	Most children with ASD have an intellectual disability	82	0.62	45	0.34	4	0.03
2	The diagnosis of ASD is usually made during the first three years of life	85	0.64	40	0.30	6	0.04
3	Children with ASD usually display special skills such as drawing and remembering facts and figures	79	0.60	48	0.36	4	0.03

Table 2. Cont.

(AKQ) Autism Knowledge Questionnaire		Correct		Incorrect		Gaps	
	Item	n	M	n	M	n	M
4	Children must exhibit difficulties in social interaction and communication to be diagnosed with ASD	119	0.90	7	0.05	5	0.03
5	ASD is a neurodevelopmental disorder	94	0.71	10	0.07	27	0.20
6	With proper intervention, most children with ASD “outgrow” the disorder	92	0.70	25	0.19	14	0.10
7	Many children with ASD do not speak	80	0.61	42	0.32	9	0.07
8	Most children with autism are girls	120	0.91	4	0.03	7	0.05
9	Children with ASD do not maintain visual contact when talking to other people	19	0.14	109	0.83	3	0.02
10	Most children with ASD have problems with pretend play	67	0.51	50	0.38	14	0.10
11	Some children with ASD have a high or a low sensitivity to visual, auditory, tactile, or olfactory stimuli	75	0.57	37	0.28	19	0.14
12	ASD is diagnosed by medical methods	40	0.30	70	0.53	21	0.16
13	Children with ASD have similar behavior patterns	22	0.16	96	0.73	13	0.09
14	ASD can be diagnosed based on the child’s physical features	99	0.75	10	0.07	22	0.16
15	Behavioral intervention is considered the most effective treatment method for ASD	69	0.52	39	0.29	23	0.17
16	In many cases, the cause of ASD is unknown	81	0.61	33	0.25	17	0.13
17	Children with ASD are often auditory learners	66	0.50	36	0.27	29	0.22
18	Some children with ASD show inconsistent motor skills	67	0.51	45	0.34	19	0.14
19	Poor parenting practices can cause ASD	65	0.49	30	0.22	36	0.27
20	Children with ASD do better in organized educational settings	77	0.58	34	0.26	20	0.15
21	If one method of treatment achieves effective results with some children with ASD, this method is necessarily effective with all children with ASD	104	0.79	7	0.05	20	0.15
22	ASD could be associated with epilepsy	6	0.04	47	0.35	78	0.59
23	Children with ASD prefer routine activities	80	0.61	35	0.26	16	0.12
24	Children with ASD appear to be deaf	76	0.58	33	0.25	22	0.16
25	ASD can be diagnosed by observing behaviors	34	0.26	78	0.59	19	0.14
26	Medicines can relieve the main symptoms of ASD	102	0.77	12	0.09	17	0.13
27	Genetic factors play an important role in causing ASD	28	0.21	96	0.73	7	0.05
28	Children with ASD repeat what they frequently hear	125	0.95	3	0.02	3	0.02
29	Children with ASD generally understand other people’s feelings and emotions	43	0.32	80	0.61	8	0.06
30	Children with ASD demonstrate stereotyped behaviors such as hand flapping	131	1	0	0	0	0
Total Level of Knowledge			0.57		0.31		0.13

Note: n = Number; M = Mean.

### 3.2. Comparison of Cuban Teachers’ Knowledge about ASD According to Different Personal and Professional Variables

Table 3 shows the comparisons of the correct and the incorrect responses as well as the gaps in knowledge of the teachers according to the independent variables studied. The MANOVA revealed statistically significant differences between teachers according to the specific training to teach students with ASD (Wilk’s lambda ( $\lambda$ ) = 3.517,  $F(2,128)$ ,  $p = 0.033$ ,  $\eta p^2 = 0.052$ ) and also to the educational level (Wilk’s lambda ( $\lambda$ ) = 13.71,  $F(2,128)$ ,  $p = 0.001$ ,  $\eta p^2 = 0.176$ ).

**Table 3.** MANOVA comparison of correct, incorrect, and gap responses.

Variables		N	Correct		Incorrect		Gaps		F	Df	Sig.	$\eta^2$
			M	SD	M	SD	M	SD				
Gender	Female	108	17.09	3.86	9.25	3.19	3.66	3.93	0.570	2,128	0.567	0.009
	Male	23	16.57	4.06	8.78	3.02	4.65	4.83				
Age	<30	16	17.31	3.36	8.81	2.40	3.88	3.10	0.718	4,254	0.580	0.011
	30–50	92	16.71	3.91	9.40	3.48	3.89	4.44				
	>50	23	17.96	4.07	8.48	1.95	3.57	3.40				
Specific training to teach students with ASD	Yes	17	15.47	3.85	10.88 *	3.29	3.65	3.29	3.517	2,128	0.033 *	0.052
	No	114	17.23	3.85	8.91 *	3.06	3.86	4.22				
Educational stage	Primary	97	17.58 *	4.06	8.42 *	2.99	4.00	4.37	13.710	2,128	<0.001 *	0.176
	Preschool	34	15.35 *	2.74	11.29 *	2.58	3.35	3.21				
Educational level	Bachelor's	82	16.50	3.87	9.20	3.06	4.30	4.48	1.992	2,128	0.141	0.030
	Master's	49	17.84	3.79	9.12	3.32	3.04	3.28				
School location	Urban	87	17.31	4.18	8.86	3.31	3.83	4.03	1.563	2,128	0.214	0.024
	Rural	44	16.39	3.16	9.77	2.73	3.84	4.30				
Experience in general education	<5 years	5	17.80	5.36	8.00	2.45	4.20	3.35	0.248	4,254	0.911	0.004
	5–10 years	20	17.30	4.01	9.30	3.10	3.40	4.84				
	>10 years	106	16.91	3.82	9.20	3.21	3.90	4.02				
Experience in inclusive education	<5 years	103	17.20	3.64	8.99	2.85	3.81	4.10	2.090	4,254	0.083	0.032
	5–10 years	25	16.68	4.74	9.36	4.07	3.96	4.44				
	>10 years	3	12.67	0.58	13.67	1.16	3.67	1.53				

Note: \* =  $p < 0.05$ ; N = number; M = arithmetic mean; SD = standard deviation; Df = degrees of freedom; Sig. = Statistical significance.



Specifically, the differences between teachers, with and without specific training in the education of children with ASD, were observed in the number of incorrect responses when answering the questionnaire. However, contrary to expectations, teachers with specific training made significantly more errors than teachers who had not received specific training. Regarding the level of education, primary school teachers obtained a greater number of correct answers and fewer incorrect answers than preschool teachers.

On the contrary, the MANOVA did not reveal significant differences in the comparisons of correct and incorrect responses as well as the gaps in knowledge of the teachers according to the descriptive variables gender, age, educational level, school location, experience in general education, and experience in inclusive education ( $p < 0.05$ ).

### 3.3. Comparison between the Total Level of Knowledge of Cuban Teachers with International Studies

Table 4 shows a comparison between the total level of knowledge of Cuban teachers in the present study; teachers from Saudi Arabia, evaluated in the study by [41]; and Spanish pre-service teachers evaluated in the study by [43]. Teachers from Cuba (0.57) and Saudi Arabia (0.58) had a slightly higher knowledge than Spanish pre-service teachers (0.54). The scores of the three groups ranged between 0.5 and 0.7, which suggests that the knowledge about ASD in the analyzed studies is very similar, and it can be considered acceptable according to ASK standards.

**Table 4.** Comparison between the total level of knowledge of teachers from Cuba, Saudi Arabia, and Spain.

Study	Knowledge Level (Mean)	Country
Present study	0.57	Cuba
[41]	0.58	Saudi Arabia
[43]	0.54	Spain

## 4. Discussion

The first objective of this study was to describe Cuban teachers' knowledge about ASD. The results showed that Cuban teachers have "acceptable" knowledge. This result suggests that the reality of the ASD knowledge of Cuban teachers is located far from the inclusive narrative that orbits the Cuban educational system, as well as from the guiding principles of the historical-cultural school of Vygotsky [35]. These results are consistent at an international level with the general findings of previous studies [17,20], which conclude that the knowledge of teachers of special and/or inclusive schools regarding ASD is not optimal. At a national Cuban level, the results found in our study are in line with those of [35], who conclude that teachers are not prepared to stimulate the socialization of students with ASD in inclusive schools.

In the case of Cuba, it is possible that this situation is due to the fact that the schools remain frozen in an inclusive narrative that is directed by the Ministry of Education. However, in practice, inclusive schoolteachers are not adequately prepared to deal with the behavioral onslaught of students with ASD in the classroom. In this sense, [44] believes that the educational guidance programs for primary school teachers in Cuba, which seek to promote adequate and timely educational care for schoolchildren with ASD, are still in an embryonic state. These findings deserve special attention if teachers are expected to fulfill the mission and the purpose of the inclusive educational paradigm, particularly when the majority of teachers have a social responsibility to educate students diagnosed with ASD in a classroom open to diversity but still lack the knowledge to do so efficiently.

The items of the ASQ questionnaire in which teachers had scores below 50% correct were related to aspects of the clinical diagnosis and the comorbidity of autism with other psychiatric pathologies. According to the criteria of [45], although teacher training programs have changed in recent years, there are still areas in which further progress could be made. In this sense, although there are no previous studies in the Cuban reality that

explain these results, it is possible that one of the areas that needs to be strengthened is the inclusion of clinical courses in the basic preparation programs, as well as promoting the participation of psychiatrists and clinical psychologists who provide ongoing advice to teachers of children with autism.

In this sense, it is necessary for government authorities to develop plans, programs, and curriculum structures that are more open and committed to diversity so that teachers can make use of the primary cognitive and pedagogical tools to properly fulfill their social obligation. This will allow teachers to respond appropriately and in a timely manner to the cognitive, emotional, and volitional needs of students with ASD who participate in inclusive classrooms. Today, this is a practice that has been taking place internationally in the field of educational sciences, given that training teachers is key to accomplishing the purpose of achieving a more inclusive society [46–48].

The second objective of the study was to compare the knowledge that Cuban teachers of regular schools and pre-schools have about ASD according to gender, age, educational level of the teacher, teaching specialty, experience in regular and/or inclusive classrooms, specific training to teach students with autism, as well as by the nature of the school, and its location. The results showed that there were no statistically significant differences when comparing the percentage of correct and incorrect responses, and gaps in teachers' ASD knowledge with gender, educational level, school location, age, general education experience, and inclusive education experience. These findings are not in line with the previous studies [41,49], which found that teachers' ASD knowledge was related to educational level, teaching experience, and type of school. Despite the differences found between studies, significant differences did appear according to the specific training to teach students with ASD and the teaching level of the teachers in the present work.

In other studies, training and experience with students with ASD turned out to be a determining variable in the knowledge of teachers and/or teaching students [41,43,50]. Although these differences appeared in our study, it is surprising that they ran in the opposite direction, given that those who did not have specific ASD training registered fewer errors when answering the knowledge questionnaire. This may be because more experienced teachers may have completed ASD courses a long time ago and are not adequately updated. On the other hand, teachers who did not receive specific training to teach students with ASD had graduated in the last five years, where the commitment to the education of people with ASD has grown exponentially in the international reality and especially in Cuban society.

In line with other studies, we also obtained statistically significant differences regarding the educational stages at inclusive primary schools and preschools [32,51]. In these studies, the educational stage at which teachers teach is a determining variable in terms of the level of ASD knowledge. However, research is needed to continue exploring the educational stages and their relationship with the training of teachers to educate students with ASD, given that educational stages should not be seen as something separate, but as a framework that contributes to the development of people for social life, especially when it comes to people with unique characteristics in their neurodevelopment.

The third objective of the study was to compare the ASD knowledge of Cuban teachers of inclusive primary schools and pre-schools, with teachers from other cultural latitudes with the same social assignment. The results showed that Cuban teachers have an acceptable knowledge of ASD (but not good), which is very similar to the knowledge of Saudi teachers [41] and Spanish pre-service teachers [43]. However, given that other studies [52,53] have been able to observe that geographic area, curriculum, cultural beliefs, or access to specific programs to educate people with ASD largely determine the ability of teachers to master the explanatory foundations of ASD, it is necessary to continue studying the cultural variable and its impact on the knowledge of teachers of students with autism, using not only quantitative methodologies but also qualitative and mixed techniques, which allow a more global understanding of the issue that was selected as the object of study.

Therefore, despite the fact that teachers generally want to learn more about ASD and support inclusion, there is still a lot to do in practice so that their training is at a level suitable for education in terms of contemporary social development [54,55]. In this sense, our findings point to a dissonance between discourse and inclusive educational practice, where the ASD knowledge of teachers has been underestimated. This could be because at present Cuban primary and preschool teachers are not using the pedagogical strategies necessary to support the inclusion and the active participation of students with ASD in classrooms open to diversity.

#### *Limitations of the Study and Future Lines of Research*

This study has some limitations that should be pointed out. For example, although the sample used in the study comes from different Cuban provinces, the selection was a non-randomized convenience sampling, which does not allow the results to be generalized. There are also some variables that have not been controlled or used to compare teachers' ASD knowledge, such as socioeconomic status and the subjects taught by teachers. These variables should be the subject of study in the future to have a more global understanding of the characteristics that determine teacher's knowledge. Researching teacher training in Cuban society should continue in order to compare it with other realities and to give us the possibility to better understand the role of culture. Furthermore, it would be important to explore what role teachers' knowledge plays in responding to a wide range of singularities that overlap with the reality of students with ASD, such as comorbidity with other psychiatric pathologies.

## 5. Conclusions

The ASD knowledge of Cuban teachers at inclusive primary schools and preschools is acceptable, but not good. In this sense—and in addition to the goodwill of Cuban educational organizations aiming for an inclusive narrative—it is necessary to promote systematic and updated training on ASD in schools to develop teacher training and accomplish the mission of inclusivity. The specific training to teach students with ASD and the level of teaching have a significant impact on the level of knowledge of teachers. These results indicate the need for research regarding the ASD knowledge of teachers at all levels of education, such as secondary school, high school, and university education, in order to obtain a more global vision of the current state of knowledge of Cuban educators regarding this disorder.

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