


# Knowledge of attention-deficit hyperactivity disorder among the general public, parents, and primary school teachers

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## Abstract

We compared the knowledge of attention-deficit hyperactivity disorder (ADHD) among the general public, parents of children with ADHD, and primary school teachers and identified factors associated with ADHD knowledge in each group, separately.

Secondary data analysis was made on the pre-lecture data from those (122 from the general public, 64 parents of children with ADHD, and 515 primary school teachers) attending education lectures by the Department of Public Health, New Taipei City Government, Taiwan, 2014.

ADHD onset age was least known in these 3 groups. Knowledge of ADHD was significantly better among teachers (test score, 75.3%) than among parents (65.5%) and the general public (59.2%). Among the general public, the test score significantly decreased with age and was worst in those who did not know their friends or relatives with ADHD. Among parents, service workers, and retired/unemployed knew significantly less about ADHD than housewife did. Among teachers, men knew significantly less than women; those who taught children with ADHD knew significantly more than those who did not.

Primary school teachers knew more about ADHD than parents and the general public. Factors associated with ADHD knowledge varied among the 3 groups.

**Abbreviations:** ADHD = attention-deficit/hyperactivity disorder, ANOVA = analysis of variance, CI = confidence interval, KADD-Q = Attention Deficit Disorder Questionnaire, SD = standard deviation, UK = United Kingdom.

**Keywords:** attention-deficit/hyperactivity disorder, knowledge, parents, public, teacher

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## 1. Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a common childhood mental disorder that affects children's education, interpersonal relationships, and sense of esteem.<sup>[1]</sup> The American Psychiatric Association defined ADHD as a neurodevelopmental disorder and characterised the symptoms as difficulty with sustained attention, hyperactive-impulsive behavior, or both.<sup>[2]</sup> ADHD is typically diagnosed up to age 12 years, and a diagnosis requires that symptoms occur in more than 1 setting and affect school, social, or work productivity.<sup>[2]</sup> About 30% to 50% of ADHD patients who were diagnosed with ADHD during childhood and continue to have symptoms in adulthood.<sup>[3]</sup>

The general public who know more about ADHD should better tolerate the strange behaviour of children with ADHD than those who know less. For example, people will be friendlier or more patient with an overly talkative or hyperactive child if they realize he/she has ADHD. However, few studies have investigated knowledge of ADHD among the general public. A United State of America (USA) interview study reported that a quarter of parents (366/1404, 26%) who did not have children with ADHD incorrectly responded that ADHD is caused by excessive sugar consumption.<sup>[4]</sup> Another US study reported that most general public were unaware of the symptoms of ADHD, or preferred counselling to medication for ADHD treatment.<sup>[5]</sup>

Parental knowledge of ADHD is critical on how they raise their affected children, including how the disorder being diagnosed,

how ADHD treatment affecting the daily life of affected children, and increasing the treatment compliance. A recent review suggested that parents of children with suspected ADHD need a well-informed understanding of ADHD before they make decisions on managing their children's illness.<sup>[6]</sup> Parents of children with ADHD have many misconceptions of the disorder. In Iran, fewer than half (47.7%) of parents of children with ADHD correctly answered that ADHD is caused by biological and genetic vulnerabilities.<sup>[7]</sup> Another study in Iran reported that fewer than half of parents (45.3%) of children with ADHD understood that ADHD symptoms can be controlled by medication; 71.3% falsely believed that hyperactivity releases the energy of children with ADHD and thus reduces symptoms, and 52.7% falsely believed that psychological testing is necessary to diagnose the disorder.<sup>[8]</sup> In the USA, 25% of parents of children with ADHD considered sugar consumption to be a cause of ADHD.<sup>[9]</sup>

Teachers' knowledge of ADHD is important because they are often the first to notice ADHD symptoms in children,<sup>[10]</sup> can provide information valuable for ADHD diagnosis,<sup>[11]</sup> and can influence student school performance and general learning ability.<sup>[12]</sup> However, many misconceptions about ADHD persist among teachers. In the United Kingdom (UK), only 18.3% of qualified teachers and 20% of student teachers correctly responded to items regarding ADHD medications.<sup>[13]</sup> In Sri Lanka, 80.1% of elementary school teachers with an average of 15 years of teaching experience falsely believed that ADHD symptoms are caused by a bad upbringing, and only 19.8% agreed that ADHD can be treated with drugs.<sup>[14]</sup> In Iran, 21.9% of preschool teachers falsely believed that ADHD is a result of a bad upbringing, and only slightly more than half (55.6%) correctly believed that ADHD is a chromosomal disorder.<sup>[15]</sup>

In 2014, the Department of Public Health, New Taipei City Government, Taiwan, provided 3 lecture series on ADHD to educate the general public, parents of children with ADHD, and primary school teachers. The lectures conveyed ADHD information to the concerned parties, so that ADHD could be diagnosed and managed promptly, and the affected children can be treated equitably. The participants were asked to complete a questionnaire before and after the lecture series. Using prelecture data, we compared knowledge of ADHD among the general public, parents of children with ADHD, and primary school teachers and identified factors associated with ADHD knowledge in these groups. We believe that the finding of this study would help to locate which aspects of ADHD and which population (such as specific age group, sex, education level, etc.) should be focused to receive the education.

## 2. Methods

### 2.1. Participants

In this cross-sectional study with purposive sampling, we performed a secondary data analysis of participants who completed questionnaires before educational lectures provided by the Department of Public Health, New Taipei City Government, Taiwan, in 2014. The institutional review board (IRB) of Chang Gung Medical Foundation, Taiwan, approved this study and waived the requirement for informed consent because the questionnaires were administered anonymously (103-6897B).

After excluding questionnaires with missing data, the study sample comprised 122 (88.4%) members of the general public,

64 (89.8%) parents of children with ADHD, and 515 (90.3%) primary school teachers. Teachers certified in special education or with a child with ADHD were excluded because of the very small numbers of such teachers.

### 2.2. Measurements

We developed the questionnaire of ADHD knowledge with acceptable psychometric properties. The mean content validity index was 85% among 16 experts. The index of difficulty was 46.6% to 68.6% for the general public and 29.1% to 87.2% for the teachers. The index of discrimination was 55.7% to 89.2% for the general public and 24.3% to 57.9% for the teachers. Construct validity was evaluated by known-group differences analysis of the general public and teachers. The internal consistency (Cronbach's  $\alpha$ ) was 0.52 for teachers and 0.69 for parents. Among those who answered the questionnaire twice within 2 weeks, most data were within the 95% agreement limits, indicating a good test-retest reliability.<sup>[16]</sup> The 9-item questionnaire on ADHD knowledge (Table 1) covers signs (#1), age at onset (#2), epidemiological characteristics (#3), description (#4), possible causes (#5), parenting (#6), when to stop drug treatment (#7), behavioral therapy (#8), and management of children with ADHD by parents (#9a), and teachers (#9b). Each item included the answer option "don't know" to avoid guessing and improve the questionnaire's overall validity. Besides, negative words were highlighted to avoid misunderstanding. Teachers and parents were asked 9 questions, while members of the general public were asked only 5 questions (#1, #3, #4, #5, #9) because ADHD was not an immediate concern for them.

### 2.3. Statistical analysis

Descriptive statistics, such as frequency, percentage, mean, and standard deviation (SD), were used. The Chi-Squared test or analysis of variance (ANOVA) was used to compare percentages of correct answers for each item and for the entire test among the 3 study groups, where appropriate. The 95% confidence interval (CI) of test scores was computed using the one-sample *t* test. Multiple linear regression with forward selection was used to identify factors associated with item scores. An alpha of 0.05 was considered to indicate statistical significance. The significance level for pair-wise comparison was reduced to 0.0167 (0.05/3) to maintain the designated type I error, as Bonferroni suggested. All statistical analyses were performed using SAS 9.4.

## 3. Results

### 3.1. Demographic characteristics

The participants were 122 persons from the general public, 64 parents of children with ADHD, and 515 primary school teachers. The percentage of female respondents was 82.8% for the general public, 51.6% for the parents, and 90.3% for the teachers. Mean (SD) age was 45.7 (11.4) years for the general public and 42.0 (7.7) years for the teachers. Half (50.8%) of the general public and parents (56.3%) had college/university degrees. A substantial number of study participants were housewives, including 38.5% of the general public and 31.3% of parents. About 28% of the general public and 33% of parents reported having friends/relatives with ADHD. Most (80.8%) primary school teachers had taught students with ADHD (Table 2).

**Table 1****Content of questionnaire assessing knowledge of attention-deficit/hyperactivity disorder (ADHD) among the general public, parents of children with ADHD, and primary school teachers (italicized items are the correct answers).**

1. Which of the following is “not” a symptom of ADHD?
  - (A) Having difficulty maintaining attention
  - (B) Hyperactivity most of the time
  - (C) Showing emotions without restraint
  - (D) Intellectual inadequacy*
  - (E) Do not know
2. The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) specifies that a child should exhibit some of the diagnostic symptoms of ADHD before age 7 years. What is the revised age in the DSM-V?
  - (A) Before age 6 years
  - (B) Before age 12 years*
  - (C) Before age 15 years
  - (D) Before age 18 years
  - (E) Do not know
3. Regarding the ADHD epidemiological profile in Taiwan, which of the following is “incorrect”?
  - (A) ADHD affects about 6% to 12% of children
  - (B) ADHD prevalence is equal in boys and girls*
  - (C) ADHD is not associated with family economic status
  - (D) ADHD is not associated with parental education level
  - (E) Do not know
4. Regarding the description of ADHD, which of the following is correct?
  - (A) Children with ADHD do not have a mood disorder or anxiety
  - (B) Children with untreated ADHD are likely to show maladaptive behavior, antisocial behavior, or antisocial personality when they mature*
  - (C) Children do not have ADHD if they can watch TV or play video games quietly for more than 30 minutes
  - (D) Symptoms of ADHD tend to go away with age
  - (E) Do not know
5. Which of the following is “not” a possible cause of ADHD?
  - (A) Maternal smoking or drinking during pregnancy
  - (B) Epilepsy in a child
  - (C) A history of head injury in a child
  - (D) Improper parental disciplining of a child (e.g., excessive or inappropriate punishment)*
  - (E) Do not know
6. Which of the following is “not” related to how parents educate or discipline their children?
  - (A) Severity of ADHD symptoms in children
  - (B) Persistence of ADHD symptoms in children
  - (C) Treatment compliance among children with ADHD
  - (D) Intellectual development among children with ADHD*
  - (E) Do not know
7. Which of the following is “not” a good time to stop or reduce the dose of medication for children with ADHD?
  - (A) When children do not have symptoms of ADHD for longer than 1 year
  - (B) When children show better control of symptoms with the same dose of medication
  - (C) When children are intermittently stable when taking their medication*
  - (D) When children are able to maintain attention or focus for an extended period of time
  - (E) Do not know
8. Which of the following choices of behavioral therapies for ADHD is correct?
  - (A) When a child misbehaves, punishments and rewards should follow quickly rather than slowly*
  - (B) To increase the ability of children with ADHD to maintain attention, do not interrupt their work
  - (C) To avoid their being rejected in class, arrange for hyperactive children to sit together
  - (D) Punishments are more beneficial than rewards
  - (E) Do not know
- 9a. For the general public and parents
 

Which of the following is “inappropriate” for parents when they suspect their child has ADHD?

  - (A) Bring their children for ADHD assessment
  - (B) Observe, record, and describe the behavior of their children, to help physicians make the correct diagnosis
  - (C) After their child has received an ADHD diagnosis, protect the child from discrimination and stigma by not telling the child's teacher about the disorder*
  - (D) After their child has received an ADHD diagnosis, help or encourage him/her to take their medication, to relieve symptoms
  - (E) Do not know
- 9b. For primary school teachers
 

Which of the following is “inappropriate” for teachers managing ADHD students?

  - (A) When they suspect that a student has ADHD, discuss it with the student's parents and recommend that they bring their children for ADHD assessment
  - (B) Observe, record, and describe the behavior of the student, to help physicians make the correct diagnosis
  - (C) Place all ADHD students in a resource class, so that they can obtain more resources*
  - (D) Arrange for the ADHD students to sit close to the teacher, to help them maintain their attention
  - (E) Do not know

**Table 2**  
Demographic characteristics of the general public, parents of children with attention-deficit/hyperactivity disorder (ADHD), and primary school teachers, New Taipei City, Taiwan, 2014.

	Public (n = 122)	Parents (n = 64)	Teachers (n = 515)
<b>Sex</b>			
Male	21 (17.2%)	8 (12.5%)	44 (8.5%)
Female	101 (82.8%)	33 (51.6%)	465 (90.3%)
Missing	–	23 (35.9%)	6 (1.2%)
<b>Age (years)</b>			
Mean (SD)	45.7 (11.4)	–	42.0 (7.7)
20–29	4 (3.3%)	–	33 (6.4%)
30–39	40 (32.8%)	–	123 (23.9%)
40–49	43 (35.2%)	–	230 (44.6%)
50+	35 (28.7%)	–	73 (14.2%)
Missing	–	–	56 (10.9%)
<b>Education</b>			
Elementary/junior high	15 (12.3%)	6 (9.4%)	–
Senior high	37 (30.3%)	8 (12.5%)	–
College/university	62 (50.8%)	36 (56.3%)	–
Master's degree or higher	7 (5.7%)	3 (4.7%)	–
Missing	1 (0.8%)	11 (17.2%)	–
<b>Occupation</b>			
Teacher/medical/government	19 (15.6%)	8 (12.5%)	–
Blue-/white-collar worker	22 (18.0%)	11 (17.2%)	–
Service worker/freelancer	26 (21.3%)	6 (9.4%)	–
Housewife	47 (38.5%)	20 (31.3%)	–
Retired/unemployed	7 (5.7%)	4 (6.3%)	–
Missing	1 (0.8%)	15 (23.4%)	–
<b>Friends or relatives with ADHD* / taught students with ADHD#</b>			
No	64 (52.5%)	23 (35.9%)	72 (14.0%)
Yes	34 (27.9%)	21 (32.8%)	416 (80.8%)
Unknown	24 (19.7%)	12 (18.8%)	27 (5.2%)
Missing	–	8 (12.5%)	–

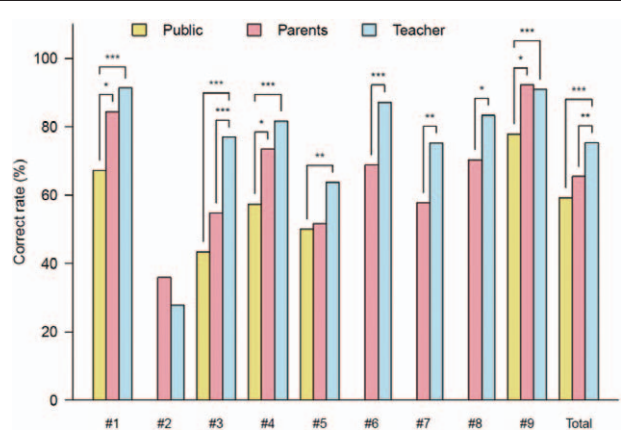
\* For general public and parents of children with ADHD.

# For primary school teachers.

### 3.2. Knowledge of ADHD

ANOVA reveals that the knowledge of ADHD significantly differed among the 3 study groups ( $P < .001$ ). The mean test score was 59.2% (SD, 31.9; 95% CI, 53.5%–64.9%) for the general public, 65.5% (22.9; 59.7%–71.2%) for the parents of children with ADHD, and 75.3% (16.7; 73.9%–76.8%) for the primary school teachers. Multiple comparisons indicated that ADHD knowledge was significantly greater for teachers than for the general public and parents of children with ADHD but did not differ between the general public and parents (Fig. 1).

As shown in Figure 1, only a minority of respondents were aware of age at onset (#2) (35.9% of parents and 27.8% of teachers). In contrast, most respondents knew the signs of ADHD (#1) (67.2% of the general public, 84.4% of parents, and 91.3% of teachers) and how to manage a child with suspected ADHD (#9) (77.9% of the general public, 92.2% of parents, and 90.9% of teachers). On multiple comparison testing, mean scores for items #1 and #3 were significantly higher for teachers than for the general public and parents. Besides, scores for items #4, #5, and #9 were significantly higher for teachers than for the public, and scores for items #6, #7, and #8 were significantly higher for teachers than for parents.



**Figure 1.** Rates of correct item responses among the general public, parents of children with ADHD, and primary school teachers. Please refer to Table 1 for the text of the items (\* $P < .05$ , \*\* $P < .01$ , \*\*\* $P < .001$ ).

### 3.3. Factors associated with knowledge of ADHD

Univariate and multivariate analysis was conducted separately for each study group because of the substantial differences in occupation and education. For the general public, age ( $P < .001$ ), education ( $P < .001$ ), awareness of having friends or relatives with ADHD ( $P = .009$ ), and age of the youngest child ( $P < .001$ ) were associated with ADHD knowledge (Table 3). Participants 50 years or older had significantly less knowledge of ADHD (37.7%) than did those aged 40 to 49 years (62.8%), 30 to 39 years (73.0%), and 20 to 29 years (70.0%). Mean test score was significantly higher among those with a college/university degree (69.4%) than among those with a senior high school (50.8%) and elementary/junior high school (36.0%) education. Those who were unsure whether they had friends or relatives with ADHD had significantly less knowledge of ADHD (41.7%) than those who had or did not have such friends or relatives (63.5%; 63.4%). Multiple linear regression showed that age and awareness of having relatives or friends with ADHD were significantly associated with ADHD knowledge and explained 30.7% of ADHD variation. Respondents aged 30 to 39 years knew considerably more about ADHD than did those 50 years or older. Those who did not know friends or relatives with ADHD had significantly less ADHD knowledge than those who reported having or not having such friends or relatives.

Univariate analysis of the parents showed that occupation was significantly associated with ADHD knowledge ( $P = .003$ ). Among parents, knowledge of ADHD was significantly greater for teachers/medical professionals/government workers (75.0%) and housewives (73.9%) than for service workers (46.3%) or those who were retired/unemployed (38.9%). Multiple linear regression showed that occupation explained 26.6% of the variation in ADHD knowledge (Table 4).

Among primary school teachers, the univariate analysis indicated that sex ( $P = .001$ ), grade taught ( $P = .02$ ), and experience teaching children with ADHD ( $P = .02$ ) were significantly associated with knowledge of ADHD. Female teachers (76.2%) had significantly more knowledge of ADHD than male teachers (66.9%). Teachers who taught grades 1 and 2 (77.1%) had significantly more knowledge of ADHD than those who did not report the grade taught (69.0%). Multiple linear

**Table 3****Results of univariate and multivariate analysis of knowledge of attention-deficit/hyperactivity disorder (ADHD) among the general public (n = 122).**

	n (%)	Test score Mean (SD)	P	Regression coefficient (SE)	P	R <sup>2</sup>
Intercept				78.67 (4.96)	–	
Age (years)			<.001*			20.5%
20–29	4 (3.3%)	70.00 (25.82) <sup>A</sup>		–9.76 (14.35)	.50	
30–39	40 (32.8%)	73.00 (26.62) <sup>A</sup>		Reference	–	
40–49	43 (35.3%)	62.79 (28.14) <sup>A</sup>		–11.18 (5.97)	.06	
50+	35 (28.7%)	37.71 (32.09) <sup>B</sup>		–38.15 (6.33)	<.001	
Friends or relatives with ADHD			.009*			30.7%
No	64 (52.5%)	63.44 (30.97) <sup>A</sup>		Reference	–	
Yes	34 (27.9%)	63.53 (28.49) <sup>A</sup>		2.20 (5.79)	.71	
Unknown	24 (19.7%)	41.67 (33.84) <sup>B</sup>		–24.86 (6.54)	<.001	
Age (years) of youngest child among those with children			<.001**			
0–5	19 (15.6%)	64.21 (24.57) <sup>A</sup>	<.001 <sup>#</sup>			
6–12	49 (40.2%)	67.35 (28.19) <sup>A</sup>				
13–29	9 (7.4%)	37.78 (25.39) <sup>B</sup>				
30 +	16 (13.1%)	30.00 (30.98) <sup>B</sup>				
Missing	29 (23.8%)	64.83 (33.66) <sup>A</sup>				
Education			<.001*			
Elementary/junior high	15 (12.3%)	36.00 (34.81) <sup>A</sup>				
Senior high	37 (30.3%)	50.81 (33.53) <sup>AB</sup>				
College/university	62 (50.8%)	69.35 (25.79) <sup>C</sup>				
Master's degree or higher	7 (5.7%)	65.71 (34.09) <sup>BC</sup>				
Sex			.78 <sup>##</sup>			
Male	21 (17.2%)	60.95 (30.64)				
Female	101 (82.8%)	58.81 (32.23)				
Occupation			.06 <sup>#</sup>			
Teacher/medical/government	19 (15.6%)	74.74 (26.53)				
Blue-/white-collar worker	22 (18.0%)	64.54 (23.85)				
Service worker	26 (21.3%)	54.62 (29.70)				
Housewife	47 (38.5%)	51.49 (35.57)				
Retired/unemployed	7 (5.7%)	68.57 (37.05)				
Missing	1 (0.8%)	–				
Marital status			.06 <sup>##</sup>			
Single	8 (6.6%)	80.00 (21.38)	.12 <sup>**</sup>			
Married	99 (81.2%)	58.59 (31.59)				
Missing	15 (12.3%)	52.00 (35.29)				

\* ANOVA test.

\*\* ANOVA test (missing data included).

# ANOVA test (missing data not included).

## Independent t-test. A, B, C: Multiple comparison with LSD test: Different letters represent a significant difference between groups and same letter represents no difference between groups.

SD = standard deviation, SE = standard error.

regression showed that sex and whether had taught children with ADHD were associated with knowledge of ADHD and explained 6.5% of the variation in ADHD knowledge (Table 5).

#### 4. Discussion

This study shows that primary school teachers knew significantly more about ADHD than did parents of children with ADHD and the general public. There was no difference in knowledge between the general public and parents. ADHD knowledge was associated with age and awareness of having friends or relatives with ADHD (among the general public), grade taught (among teachers), and occupation (among parents).

In this study, we saw teachers knew more about ADHD than parents and the general public. Teachers who knew more about ADHD than others can be partly explained by the recent exam scope of recruiting primary teachers containing ADHD questions,<sup>[17]</sup> and having more experience dealing with their students

with suspected ADHD. In this study, ADHD knowledge did not significantly differ between the general public and parents. It contradicts a previous study that parents of children with ADHD had more information about ADHD than did parents without children with ADHD.<sup>[4]</sup> A possible explanation for this discrepancy is that the present parents had recently learned of their child's ADHD diagnosis and were not yet seeking information on the disorder. Thus, there was no difference in overall ADHD knowledge between the general public and parents.

In this study, the general public's mean test score was 59.2% (95% CI, 53.5%–64.9%), which is higher than in previous studies. A USA interview study found that 31% of parents with children without ADHD reported that they knew a great deal about ADHD, and 26% falsely believed that ADHD was caused by overconsumption of sugar.<sup>[4]</sup> A face-to-face interview study in the USA reported that 46% of respondents could describe ADHD symptoms, medications, and chemical/biological causes.<sup>[5]</sup> The

**Table 4**  
**Results of univariate and multivariate analysis of knowledge of attention-deficit hyperactivity disorder (ADHD) among parents of children with ADHD (n = 64).**

	n (%)	Test score Mean (SD)	P	Regression coefficient (SE)	P	R <sup>2</sup>
Intercept				73.89 (4.58)	–	
Occupation			.003*			26.6%
Teacher/medical/government	8 (12.5%)	75.00 (21.21) <sup>AC</sup>	.001**	1.11 (8.56)	.90	
Housewife	20 (31.3%)	73.89 (15.83) <sup>A</sup>		Reference		
Blue-/white-collar	11 (17.2%)	73.74 (17.41) <sup>AC</sup>		–0.15 (7.68)	.98	
Service worker	6 (9.4%)	46.30 (25.74) <sup>B</sup>		–27.59 (9.53)	.005	
Retired/unemployed	4 (6.3%)	38.89 (14.34) <sup>B</sup>		–35.00 (11.21)	.003	
Missing	15 (23.4%)	57.78 (25.96) <sup>BC</sup>		–16.11 (6.99)	.03	
Sex			.65*			
Male	8 (12.5%)	68.06 (26.18)	.93 <sup>#</sup>			
Female	33 (51.6%)	67.34 (19.03)	.			
Missing	23 (35.9%)	61.84 (27.18)				
Education			.19*			
Elementary/junior high	6 (9.37%)	55.56 (19.88)	.15**			
Senior high	8 (12.5%)	59.72 (27.18)				
College/university	36 (56.3%)	69.14 (19.36)				
Master's degree or higher	3 (4.7%)	81.19 (12.83)				
Missing	11 (17.2%)	57.58 (30.56)				
Friends or relatives with ADHD			.76*			
No	23 (35.9%)	61.35 (22.69)	.65**			
Yes	21 (32.8%)	67.72 (23.55)				
Unknown	12 (18.8%)	66.67 (25.95)				
Missing	8 (12.5%)	69.44 (19.47)				

\* ANOVA test (missing data included).

\*\* ANOVA test (missing data not included).

<sup>#</sup> Independent-t test. A, B, C: Multiple comparison with LSD test: Different letters represent a significant difference between groups and same letter represents no difference between groups.

SD = standard deviation, SE = standard error.

limited knowledge of ADHD among the present members of the general public might be attributable in part to the fact that ADHD is not an immediate concern for them.

In this study, the mean test score for parents was 65.5% (95% CI, 59.7%–71.2%), similar to previously reported results. The score for overall knowledge of ADHD among Iranian parents was 66%.<sup>[18]</sup> In Australia, the score for overall knowledge on the Attention Deficit Disorder Questionnaire (KADD-Q) was 62.1%.<sup>[19]</sup> However, the correct rate for a particular item in this study was quite different from other studies. The rate of correctly answering the item regarding signs of ADHD (#1) in this study was higher than that in an Australian study (84.4% vs 62.8%). Still, the correct rate for the item on possible causes of ADHD (#5) in this study was lower than that in the Australian study (51.6% vs 76.7%).<sup>[19]</sup>

In this study, the mean test score for teachers was 75.3% (95% CI, 73.9%–76.8%), which is similar to the results for true/false questionnaires in previous studies of elementary teachers in Australia (73.68%)<sup>[20]</sup> and the USA (76.8%)<sup>[21]</sup> and much higher than in the UK (34% for UK primary and secondary teachers; 36% for UK student teachers)<sup>[13]</sup> and Pakistan (53.5% for teachers of grades 1–8).<sup>[22]</sup>

Regarding different items of ADHD knowledge, this study reveals that a limited number of respondents (35.9% of parents and 27.8% of teachers) were aware that age at onset (#2) was changed from 7 years to 12 years, as indicated in the Diagnostic and Statistical Manual of Mental Disorders-5, in 2013. A possible explanation for this finding is that they were not proactively seeking ADHD information. This misunderstanding of onset age could lead to delayed diagnosis and treatment.

For the treatment of ADHD, we asked the teachers and parents of children with ADHD to stop drug treatment (#7) and behavioral therapy (#8). The correct rates of these 2 items were significantly higher in teachers than those in the parents of children with ADHD. The correct rate of stopping drug treatment (#7) was lower than behavioral therapy (#8). The famous Multimodal Treatment Study of ADHD (MTA) in 1999 concluded that the carefully crafted medication management was superior to behavioral treatment and to routine community care that included medication.<sup>[23]</sup> A review article also reported that the medications for ADHD are highly effective, have good safety profiles, and relatively minor adverse effects.<sup>[24]</sup> The low rates of ADHD medication use or persistence use is a concern in the USA (especially for different racial and ethnic children),<sup>[25,26]</sup> Australia,<sup>[27]</sup> and Taiwan.<sup>[28]</sup> Parents' misperception of leading drug abuse,<sup>[29]</sup> worsen sleep problems of their affected kids<sup>[30]</sup> is a partial reason of the low rate of ADHD medication use.

In this study, age and awareness of having relatives or friends with ADHD were significantly associated with ADHD knowledge among the general public. Younger respondents tended to know more about ADHD, perhaps because young people are concerned about ADHD in their children.<sup>[31]</sup> Another possible reason for the better knowledge of ADHD among young people is that, compared with adults 50 years older, they could obtain ADHD information from a greater variety of sources.<sup>[31]</sup> Those with an awareness of relatives/friends with ADHD had significantly more knowledge of ADHD than those without such awareness because they had heard of the disorder from friends and relatives. However, only one-fifth of the general

**Table 5**  
**Univariate and multiple analysis of knowledge about attention-deficit hyperactivity disorder (ADHD) among primary school teachers (n=515).**

	n (%)	Test score Mean (SD)	P	Regression Coefficient (SE)	P	R <sup>2</sup>
Intercept				63.51 (2.99)	–	
Sex			.001*			2.6%
Male	44 (8.5%)	66.92 (22.79) <sup>A</sup>	.01**	Reference		
Female	465 (90.3%)	76.18 (15.81) <sup>B</sup>		9.08 (2.60)	.001	
Missing	6 (1.2%)	68.52 (17.80) <sup>AB</sup>		6.79 (8.01)	.40	
Experience of teaching children with ADHD			.02*			6.5%
No	72 (14.0%)	71.45 (16.56) <sup>A</sup>	.02**	Reference		
Yes	416 (80.8%)	76.31 (16.58) <sup>B</sup>		4.47 (2.10)	.03	
Missing	27 (5.2%)	69.96 (17.38) <sup>AB</sup>		–1.78 (4.09)	.66	
Current teaching grade			.02*			
1–2	278 (54.0%)	77.10 (15.97) <sup>A</sup>	.16 <sup>#</sup>			
3–4	95 (18.5%)	75.20 (17.17) <sup>AB</sup>				
5–6	58 (11.3%)	74.52 (16.26) <sup>AB</sup>				
Different grade	37 (7.2%)	71.17 (17.07) <sup>AB</sup>				
Missing	47 (9.1%)	69.03 (18.81) <sup>B</sup>				
Age (years)			.15*			
<29	33 (6.4%)	75.08 (16.20)	.13 <sup>#</sup>			
30–39	123 (23.9%)	78.59 (16.23)				
40–49	230 (44.6%)	74.54 (17.37)				
50+	73 (14.2%)	73.82 (15.64)				
Missing	56 (10.9%)	73.21 (16.24)				
Number of children with ADHD			.52*			
Unknown	136 (26.4%)	76.31 (16.27)	.78 <sup>#</sup>			
0	80 (15.5%)	74.58 (15.53)				
1	103 (20.0%)	74.54 (17.23)				
2	75 (14.6%)	77.48 (17.42)				
3	32 (6.2%)	77.78 (18.07)				
≥4	23 (4.5%)	74.88 (11.71)				
Missing	66 (12.8%)	71.83 (18.35)				

\* ANOVA test (missing data included).

\*\* Independent t test.

<sup>#</sup> ANOVA test (missing data not included).

A, B: Multiple comparison with LSD test: Different letters represent a significant difference between groups and same letter represents no difference between groups.

SD = standard deviation, SE = standard error.

public (19.7%) and parents (18.8%) reported having no friends or relatives with ADHD.

For parents of children with ADHD, our results showed that housewives had significantly more knowledge of ADHD than did service workers ( $P=.005$ ) and retired/unemployed respondents ( $P=.003$ ). We believe that housewives spend more time managing their children’s behavior and that their knowledge of ADHD increases with their parenting experience. A recent study found that knowledge of ADHD symptoms was positively associated with parental education level but not with factors such as age, sex, and place of residence.<sup>[18]</sup>

For primary school teachers, sex and grade taught were associated with ADHD knowledge. Because only a few male teachers (8.5%) were surveyed, a future study should explore the association of teacher sex with ADHD knowledge. In this study, teachers who taught grades 1 and 2 tended to know more about ADHD than did those who did not provide grade information taught. The latter may have included more administrators or part-time teachers, who might be less familiar with ADHD. We noted no association between age and ADHD knowledge, which is consistent with a previous study’s findings.<sup>[32,33]</sup>

Based on the finding of this study and literature reviews, we suggest that education campaigns or promotions should be

ongoing to increase the awareness of this disorder. For the education content, we suggest that age at onset being changed from 7 years to 12 years should be focused on to avoid the delay of ADHD diagnosis and receive treatment promptly. The under-treatment issue should be highlighted and improved by explaining the importance of medication treatment<sup>[23]</sup> and the safety profiles of medication use.<sup>[24,30]</sup> Movies may help reach different people (general public, parents, teachers) and play a role in learning the humanization of the disease (diagnosis, management, development, family relation, etc.).<sup>[34]</sup>

### 5. Limitation

This study has limitations that warrant mention. First, it used a convenience sample from New Taipei City, Taiwan. Our results thus cannot be generalized to other areas in Taiwan. Second, the instrument used was a self-administered questionnaire based on participant responses. The people who chose to complete the questionnaire might have had more knowledge of ADHD. Third, the present statistical analysis only provides information on associations between variables and cannot explain these associations’ underlying causes. Fourth, the IRB did not allow us to ascertain the ages of parents of children with ADHD.

Therefore, the ages of parents were not available for the group of parents of children with ADHD. Fifth, the sample sizes for the general public and parents of children with ADHD were small. Bigger samples for these 2 groups are needed for future study.

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