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Teachers' Knowledge of ADHD: Relevance of Training and Individual Perceptions

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Abstract

The present study analyzes teachers' knowledge of ADHD and its relationship with different training and self-perceptive variables. The sample included 1278 teachers from 108 schools. Teachers' knowledge of ADHD ranged from low to moderate. In addition, it was observed that their knowledge of ADHD was related to variables such as having received formal, non-formal, and informal training in ADHD, as well as to their self-perceived knowledge of ADHD and self-perceived efficacy to teach children with ADHD. The results suggest that teachers' knowledge of ADHD should be increased. Improvement in the quality and quantity of the training they receive from different sources could have an impact both on their real knowledge and on their perceived knowledge and, consequently, on their perception of self-efficacy as teachers of children with ADHD.

Keywords: knowledge of ADHD, ADHD training, teachers, perceived self-efficacy.

Resumen

El presente estudio analiza el conocimiento que los maestros presentan sobre el TDAH y su relación con diversas variables formativas y auto-perceptivas. La muestra estuvo compuesta por 1278 docentes de 108 centros escolares. El conocimiento de los maestros sobre el TDAH osciló entre un nivel bajo y moderado. Además, se observó que dicho conocimiento estaba relacionado con variables tales como haber recibido educación formal, no formal e informal en la materia, así como con el conocimiento auto-percibido sobre el TDAH y la auto-eficacia percibida para ser docente de niños con TDAH. Los resultados sugieren que es necesario incrementar el conocimiento que los maestros tienen sobre el TDAH. La mejora en la calidad y cantidad de la formación que reciben por distintas vías podría repercutir tanto en su conocimiento real como en el percibido y, en consecuencia, en la percepción de auto-eficacia que presentan para ser docentes de niños con TDAH.

Palabras clave: conocimiento sobre el TDAH, formación acerca del TDAH, maestros, auto-eficacia percibida.

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Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that begins in childhood and presents a persistent pattern of behaviors of inattention, motor overactivity, and/or impulsivity. In general terms, the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2013) considers that the disorder is present when these behaviors happen with more frequency and intensity than usual in persons of the same age and same level of development. Furthermore, such manifestations can have a great impact on individuals' development if they are not identified and treated at an early age (Miranda, Colomer, Fernández, & Presentación, 2012; Wehmeier, Schacht, & Barkley, 2010), increasing the risk of low quality of life (Danckaerts et al., 2010).

The school stage plays a very important role in the identification of children with ADHD. It has been confirmed that teachers detect children with ADHD more frequently than do parents or physicians (Arnett, MacDonald, & Pennington, 2013). In this sense, the diagnosis of ADHD at the preschool stage or during the early educational stage may be difficult because the core symptoms of ADHD —impulsivity, inattention and/or overactivity— are common in young children, and the currently available detection instruments are limited in the identification of children under 5 years of age (Marco, Grau, & Presentación, 2011). Currently, as noted by Lavigne and Romero (2010), it is at the beginning of primary education, when the dynamics of class work become more formal and the level of demand increases, when most of the identifications are made.

Despite the popularity that ADHD has acquired in recent decades, it continues to be an underdiagnosed disorder (Moldavsky, Groenewald, Owen, & Sayal, 2013; Soroa, Balluerka, & Gorostiaga, 2014b). According to the results of epidemiological studies, worldwide, approximately 5% of children and adolescents may have the disorder (Polanczyk, De Lima, Horta, Biederman, & Rohde, 2007; Polanczyk & Rohde, 2007), which means that, very probably, every teacher may have at least one child with these characteristics in the classroom. However, despite the interest in teachers' having extensive knowledge on this subject, different investigations show that teachers' level of knowledge differs from one study to another. A study that has shown the lowest percentages of knowledge of ADHD (Alkahtani, 2013) reported that the teachers obtained 17.2% of correct responses on the Knowledge of Attention Deficit Disorders Scale (KADDS; Sciutto, Terjesen, & Bender, 2000). In contrast, the work of Bekle (2004) is

among the studies that have found higher levels of teachers' knowledge of ADHD, with 82.85% of correct responses to the items of the ADHD Knowledge Scale (Jerome, Gordon, & Hustler, 1994). In general terms, one must be cautious when interpreting the results obtained by teachers in the different investigations conducted to assess their level of knowledge of ADHD because most of the tools developed for this purpose do not have acceptable psychometric properties (see the review of those instruments in Soroa, Gorostiaga, & Balluerka, 2013). If we attend to the results of various studies using one of the most popular questionnaires in the literature on the subject, the KADDS (Sciutto et al., 2000), or the Spanish adaptation of this instrument (Jarque, Tárraga, & Miranda, 2007), the percentage of teachers' correct responses ranges between 17.2% (Alkahtani, 2013) and 57% (Stacey, 2003). These results show, more reliably and validly than the data obtained by means of other instruments, that teachers' level of knowledge about ADHD ranges between low and moderate.

Focusing on teachers' knowledge of ADHD by areas, we note that there are few instruments in the scientific literature that propose different dimensions to assess this knowledge. Studies carried out by various authors have shown that, in general, teachers have more knowledge about the symptoms or the main characteristics of ADHD (Anderson, Watt, Noble, & Shanley, 2012; Jarque et al., 2007; Perold, Louw, & Kleymhans, 2010; Sciutto et al., 2000; Stacey, 2003), than about treatment and the nature, causes and impact of ADHD (Jarque et al., 2007; Perold et al., 2010; Sciutto et al., 2000; Stacey, 2003). However, some investigations note that teachers present greater knowledge of the dimension focusing on the causes of ADHD, followed by the main characteristics and treatment of ADHD (West, Taylor, Houghton, & Hudyma, 2005). In any case, it should be kept in mind that the instruments that have traditionally been used to assess teachers' knowledge of ADHD do not present evidences of factor validity, so the results obtained with them should be interpreted cautiously.

Most of the studies on teachers' knowledge of ADHD offer limited data about the sources of training used by this collective. Drawing from the definitions proposed by Touriñán (1996) on formal, non-formal, and informal education, the data published to date on the subject show that the teachers, in general, receive few hours or no training at all on ADHD through formal and/or non-formal sources such as university studies and/or continuing education courses (Bekle, 2004; Jarque et al., 2007; Kos, Richdale, & Jackson, 2004; Martinussen, Tannock, & Chaban, 2011; Stacey, 2003). However,

they have easy access to informal education sources such as the mass media and people from their environment (Akram, Thomson, Boyter, & McLarty, 2009; Ghanizadeh, Bahredar, & Moeini, 2006), or books and articles on the subject (Bekle, 2004; Bussing, Gary, Leon, & Garvan, 2002; Jerome et al., 1994; Stacey, 2003). Taking into account that teachers seek training on ADHD in very different sources and that the reliability of the available information on the topic is diverse, it is not surprising that they may obtain ambiguous information that causes confusion. Considering that the existing ambiguities about ADHD can lead to the creation of prejudice, stereotypes, and discrimination of the affected group (Mueller, Fuermaier, Koerts, & Tucha, 2012), we consider it relevant to examine more thoroughly the various types of training that teachers receive.

In the studies carried out to assess teachers' knowledge of ADHD, two of the variables that have presented more intense relationships with this construct are Teachers' self-perceived knowledge of ADHD (Anderson et al., 2012; Kos et al., 2004; Soroa, Balluerka, & Gorostiaga, 2014a, 2014b) and their Perceived capacity to teach or perceived self-efficacy to be a teacher of children with ADHD (Alkahtani, 2013; Jarque et al., 2007; Perold et al., 2010; Sciutto et al., 2000; Soroa et al., 2014a, 2014b). Both variables refer to the teachers' individual perceptions of the topic, which may or may not correspond to reality. Teachers' perception about their knowledge of ADHD can be contrasted with their results on a questionnaire validated to assess their real knowledge. Anderson et al. (2012) suggest that, in general, teachers' perception often agrees with the real knowledge they display in the topic. To assess the correspondence between perceived teaching capacity and real teaching capacity is more complicated because teaching capacity is a more complex construct than that of knowledge. Girio (2006) indicates that beliefs about one's perceived ability to teach can influence the course of individual actions and the way in which the skills one possesses are used. In particular, this author's review of perceived self-efficacy indicates that teachers with a greater degree of perceived self-efficacy, compared to colleagues who obtain lower scores in this construct, tend to show higher levels of planning and organization, they present a more open attitude toward educational innovation that leads to providing a better adapted response to students' needs, they tend to be less critical when students make mistakes, they are willing to work for long periods of time with students who have difficulties, and they are more reluctant to send students with difficulties to special education classrooms. In the

same vein, Kos, Richdale, and Hay (2006) indicate that the attitudes of teachers towards students with disabilities are often mediated by their self-perceptions of competence. Given the impact that self-perceived knowledge of ADHD and perceived self-efficacy to teach children with ADHD may have on teaching these children, we consider it interesting to examine the relationship of both these variables with real knowledge of ADHD in broader samples than those used to date.

As can be inferred from in this introduction, although various studies have been conducted to assess teachers' knowledge of ADHD, more work is needed using instruments with adequate psychometric properties, providing information about teachers' ADHD training sources, and analyzing the relationships between teachers' real knowledge of ADHD and self-perceptive variables such as their perceived knowledge and perceived efficacy to teach children with ADHD. Given the low number of investigations carried out in our context and their importance for the elaboration of materials or training courses in this field, this study has three main goals: (1) To examine the level of knowledge that teachers of infant and primary school present about ADHD, using an instrument that has appropriate psychometric properties; (2) to analyze the relationships between teachers' knowledge of ADHD and sources of formal, non-formal, and informal training; and (3) to study the relationship between teachers' real knowledge of ADHD and their self-perceptions about knowledge of ADHD and about their competence to be teachers of children with ADHD. The three working hypotheses were: First, we expected teachers to show a low to moderate level of knowledge of ADHD. We also expected them to have more knowledge about the main symptoms of ADHD than about aspects concerning treatment, etiology, or general information of ADHD. Second, we expected teachers to have received few hours of training in ADHD and for them to increasingly resort to informal pathways in search of training rather than to formal and/or non-formal sources. Third and last, we expected teachers with higher self-perceived knowledge of ADHD and higher self-perceived efficacy about teaching children with ADHD to have more real knowledge of ADHD than teachers with lower self-perceived knowledge and lower self-perceived teaching capacity.

Method

Participants

The sample was made up of 1,278 teachers. The teachers worked in 108 public and subsidized schools in the Autonomous Community of the Basque Country and

Navarre. These schools were randomly selected from databases provided by the Departments of Education of the corresponding Autonomous Communities. All participants gave their consent to participate in the study. The study received the favorable report from the Ethics Committee for Research with Human Beings of the University of the Basque Country. Sociodemographic, professional career and training characteristics of sample are presented in Table 1.

Table 1

Socio-Demographic, Professional Career, and Training Characteristics of the Participants

Variables	*n*	%
Sex		
Females	1,089	85.0
Males	178	14.0
Teaching stage		
Primary	622	49.0
Infant	340	26.6
Both	312	24.4
Teaching specialty		
Primary education	591	46.2
Infant education	417	32.6
Special education	142	11.1
Foreign language	129	10.1
Physical education	70	5.5
Music education	61	4.8
Type of training		
Formal education on ADHD (subjects of the Teaching career, postgraduate or Master's degree courses)	210	16.4
Non-formal education on ADHD (conferences and continuing education courses)	411	32.2
Informal education on ADHD (mass media, books, journals, professionals outside of the work center, families of children with ADHD, etc.)	1015	79.4
All types of training on ADHD (formal, non-formal and informal education)	77	6.0
No training on ADHD	200	15.6

Variables	*n*	%
Presence of children with ADHD in the classroom throughout the career		
Yes	754	59.0
No	499	39.0
Knowing someone with ADHD outside of the school (child or adult diagnosed with ADHD)		
Yes	584	45.7
No	640	50.1
	Mean (*SD*)	Range
Age	42.00 (10.21)	20-65
Years of teaching experience	17.20 (10.72)	0-46
Number of students in class	42.73 (61.87)	0-500
Number of hours of formal and/or non-formal education on ADHD received	6.48 (21.49)	0-400
Number of children with ADHD in the classroom throughout the professional career	2.17 (3.62)	0-40

Instruments

The tools used were as follows:

Questionnaire to assess teacher's knowledge of ADHD [Irakasleek AGHNari buruz duten ezagutza ebaluatzeko galdera sorta (IRA-AGHN; Soroa et al., 2014a) and *Cuestionario para evaluar el conocimiento de los maestros acerca del TDAH (MAE-TDAH; Soroa et al., 2014b)]*: These are two linguistic versions of the same questionnaire to assess infant and primary education teachers' real knowledge of ADHD. Both versions of the questionnaire have 26 items written in Basque or Spanish, 21 true items and 5 false ones, assessing four areas of knowledge: (1) *general information about ADHD*, (2) *ADHD symptoms/diagnosis*, (3) *etiology of ADHD*, and (4) *treatment of ADHD*. The questionnaire has a three-option response format (True/False/I don't know). One point is assigned to each correct response and 0 points to incorrect responses and gaps in knowledge, with scores ranging between 0 (minimum) and 26 (maximum) points. For this study, 58.8% of the participants chose the Basque version of the questionnaire, and 41.2% chose the Spanish version. In this sample, the IRA-AGHN showed adequate levels of internal consistency (Omega values between .76 and .90), tem-

poral stability (Pearson correlations between r = .49 and r = .77), composite reliability (IFC values between .84 and .95) and average variance extracted (AVE values between .47 and .68) for its four dimensions. On the other hand, the correlations between the scores obtained by the participants in the equivalent dimensions of the IRA-AGHN and the KADDS (Jarque et al., 2007) ranged between r = .33 and r = .55, providing evidence of the instrument's convergent validity.

Similarly, the MAE-TDAH presented appropriate levels of internal consistency (Omega values between .83 and .91), temporal stability (Pearson correlations between r = .62 and r = .79), composite reliability (IFC values between .77 and .91) and average variance extracted (AVE values between .46 and .72) for its four dimensions. The correlations between the participants' scores obtained in the equivalent dimensions of the MAE-TDAH and the KADDS (Jarque et al., 2007) ranged between r = .39 and r = .58, providing evidence of the instrument's convergent validity.

Questionnaire to assess teachers' training in ADHD: Through this instrument, they were asked about the types of ADHD training that they had received (formal, non-formal, and informal education). Given that the number of participants who had received only formal training (through university Teaching studies or postgraduate studies) and/or non-formal training (through continuous education courses, conferences, etc.) was very small, the variable type of training was operationalized in the following categories: Participants who had not received any training (N = 200), those who had only received informal training (e.g., books, journals, mass media, etc.) (N = 520), and participants who had received all types of training (N = 77).

Scales to assess perceived knowledge of ADHD and perceived efficacy to adequately teach children with ADHD: Low scores on these scales indicate that teachers perceive they had no knowledge of ADHD or that they did not feel prepared to teach children with ADHD adequately. In contrast, high scores imply that teachers perceive they possess excellent knowledge of ADHD or that they were fully prepared to teach children with ADHD adequately (see both scales in the Appendix). For the statistical analysis, the variables were operationalized as follows. Teachers were considered to have higher self-perceived knowledge of ADHD or higher self-perceived efficacy to adequately teach children with ADHD when they obtained scores equal to or higher than the 65th percentile, whereas they were considered to have lower levels on these variables when their scores were equal to or lower than the 35th percentile.

Socio-demographic data questionnaire: Lastly, we used an ad hoc questionnaire to obtain information about another series of socio-demographic data of the sample such as age, sex, teaching stage and specialty, number of students in the class, years of teaching experience, number of children diagnosed with ADHD who had been in their classrooms throughout their professional career, and whether or not they knew anybody (child or adult) diagnosed with ADHD outside of their workplace.

Procedure

Random selection was performed of the population of public and subsidized schools in the Autonomous Community of the Basque Country and Navarre. We contacted the management team of these schools and, after receiving preliminary information about the study, 108 schools agreed to participate. In collaboration with the research team, the directors or heads of study of each school coordinated the administration and collection of questionnaires. All the teachers participated voluntarily, individually, and anonymously in the study.

Data analysis

Participants with more than 5% of unanswered items were eliminated (5 cases in total). In the case of the 21 participants who had less than 5% of missing responses, a score of 3 (I don't know) was assigned to the items with missing answers. Then, various descriptive statistics were calculated to obtain data about socio-demographic variables, professional trajectory, and training of the sample. We carried out a repeated measures one-factor analysis of variance to determine possible statistically significant differences in the teachers' scores in the different dimensions of the questionnaire. We also calculated the effect size using the η^2 statistic. A posteriori comparisons between the scores obtained in the dimensions were carried out using the Bonferroni test. We calculated the effect size associated with these comparisons using the *r* index. In order to compare the real knowledge of ADHD of the teachers who had received all types of training with that of teachers who had only received informal training and with those who had not received any training, we used the Kruskal-Wallis analysis of variance. We decided to use this non-parametric test because the assumptions of normality and homoscedasticity were not met. In addition, both the global score and the scores of the different dimensions followed an asymmetrical distribution (negative in three dimensions and positive in one). Regarding kurtosis, two dimensions presented a platykurtic distribution and one dimension had a leptokurtic distribution. Subsequent a posteriori inter-group comparisons were performed using Mann-Whitney's *U*-

test. The effect size associated with each comparison was calculated with the *r* index. Lastly, we used Mann-Whitney's *U* to compare the scores obtained by the teachers in each of the dimensions and the global score as a function of whether their self-perceived knowledge of ADHD or their perceived self-efficacy to adequately teach children with ADHD was higher (equal to or higher than the 65th percentile) or lower (equal to or lower than the 35th percentile). All analyses were performed with the SPSS 22.0 statistical package.

Results

Teachers' real knowledge, erroneous beliefs, and gaps about ADHD

In terms of teachers' real knowledge of ADHD, as shown in Table 2, they responded correctly to slightly more than one half of the total items in the questionnaire (62.85% of hits). In particular, the dimension *treatment* received the most correct responses (83.54%), followed by the dimensions *symptoms/diagnosis* (72.41%), *etiology* (56.23%) and, finally, the *general information* dimension (39.22%). However, it should be noted that the percentage of ignorance about ADHD was quite high. To be more precise, the total percentage of mistakes made by the teachers was very low (5.33%) but the percentage of gaps was fairly high (31.82%). Teachers showed higher percentages of errors in the dimensions *symptoms/diagnosis* (7.49%) and *etiology* (7%), and higher percentages of gaps in the dimensions *general information* (56%) and *etiology* (36.77%). In addition, in the case of the *general information* dimension, the percentage of ignorance was higher than that of knowledge.

We also compared the mean scores averaged as a function of the number of items in the corresponding dimension. The result obtained in the repeated measures ANOVA used to compare these scores revealed statistically significant differences among the four dimensions, $F(2.41, 3081.56) = 703.28$, $p < .0001$. The effect size had a value of $\eta^2 = .36$. Comparisons between pairs of means, carried out with the Bonferroni test showed statistically significant differences in all cases ($p < .0001$), although the effect sizes associated with such comparisons were moderate (ranging between $r = .35$ and $r = .39$). Specifically, the teachers have greater average knowledge in the dimension *treatment,* followed by the dimensions *symptoms/diagnosis*, *etiology* and *general information*, respectively.

Table 2

Descriptive Statistics and Mean Percentages of Hits, Misses, and Gaps in Teachers' Knowledge of ADHD in the Different Dimensions and in the Total Score of the Questionnaire

Dimensions	Number of items	Descriptive statistics		Mean percentage (%)		
				Hits	Misses	Gaps
Treatment	7	*M*	5.85	83.54	2.06	14.40
		SD	1.35			
Symptoms/diagnosis	11	*M*	7.96	72.41	7.49	20.10
		SD	2.81			
Etiology	4	*M*	2.25	56.23	7.00	36.77
		SD	1.55			
General information	4	*M*	1.57	39.22	4.78	56.00
		SD	1.31			
Total	26	*M*	17.63	62.85	5.33	31.82
		SD	4.80			

Note. Hits = correct answers; Misses = failed responses; Gaps = items in which the participants did not know how to answer and chose the response "I don't know".

Differences in teachers' real knowledge of ADHD as a function of type of training in ADHD

Before testing possible differences in knowledge of ADHD according to the type of training received, we examined the assumptions of normality and homoscedasticity. The results led us to use a nonparametric test, specifically, the Kruskal-Wallis analysis of variance, to analyze such differences.

The Kruskal-Wallis analysis of variance revealed statistically significant differences between the average ranks of knowledge of ADHD as a function of type of training. The values of the statistic were: $\chi^2(2) = 71$, $\chi^2(2) = 107.85$, $\chi^2(2) = 24.39$, $\chi^2(2) = 32.88$, and $\chi^2(2) = 130.48$, respectively, for dimensions *general information*, *symptoms/diagnosis*, *etiology*, *treatment*, and *global score* ($p < .001$, in all cases). The results of the a posteriori Mann-Whitney *U*-test are presented in Table 3. Focusing on differences of at least medium effect size, it can be observed that the comparisons of the scores obtained by teachers who had not received any training and teachers who had received informal training revealed statistically significant differences of medium size between the mean ranks of both groups in the dimension

symptoms/diagnosis and in the *global score* of the questionnaire. On the other hand, the comparisons between the results obtained by teachers who had only received informal training in ADHD and teachers who, in addition to these sources, had also received formal and non-formal training, showed that the last ones had a statistically significant higher level of knowledge in the *global score* of the questionnaire with a moderate effect size. Finally, the scores in ADHD knowledge of the teachers who had not received any training were lower than the scores of teachers who had received informal, formal, and non-formal training in all the dimensions and in the *global score*, with moderate to high effect sizes.

Table 3

Differences in the Teachers' Real Knowledge of ADHD as a Function of Type of Training on ADHD Received (No Training vs. Informal Training vs. All Types of Training)

Groups compared	Statistics	Dimensions				Total
		General information	Symptoms/ diagnosis	Etiology	Treatment	
No training-Informal training		$Mdn_{NoTrain} = 1$ $Mdn_{InfTrain} = 1$	$Mdn_{NoTrain} = 6$ $Mdn_{InfTrain} = 8$	$Mdn_{NoTrain} = 2$ $Mdn_{InfTrain} = 2$	$Mdn_{NoTrain} = 6$ $Mdn_{InfTrain} = 6$	$Mdn_{NoTrain} = 14$ $Mdn_{InfTrain} = 17$
	Mann-Whitney *U*	38887**	32628**	48123.5**	42360	32300.5**
	r	.20	.29	.06	.15	.29
Informal training-All types of training		$Mdn_{InfTrain} = 1$ $Mdn_{AllTrain} = 3$	$Mdn_{InfTrain} = 8$ $Mdn_{AllTrain} = 10$	$Mdn_{InfTrain} = 2$ $Mdn_{AllTrain} = 3$	$Mdn_{InfTrain} = 6$ $Mdn_{AllTrain} = 7$	$Mdn_{InfTrain} = 17$ $Mdn_{AllTrain} = 22$
	Mann-Whitney *U*	12324**	11997.5**	14384.5**	15662.5**	9635.5**
	r	.23	.24	.17	.14	.31
No training-All types of training		$Mdn_{NoTrain} = 1$ $Mdn_{AllTrain} = 3$	$Mdn_{NoTrain} = 6$ $Mdn_{AllTrain} = 10$	$Mdn_{NoTrain} = 2$ $Mdn_{AllTrain} = 3$	$Mdn_{NoTrain} = 6$ $Mdn_{AllTrain} = 7$	$Mdn_{NoTrain} = 14$ $Mdn_{AllTrain} = 22$
	Mann-Whitney *U*	3403**	2506**	4868.5**	4760.5**	1961.5**
	r	.46	.53	.30	.31	.58

** $p < .001$.

Relationship between teachers' real knowledge of ADHD and variables related to individual perceptions

On a scale ranging from 1 to 10, the teachers rated their level of self-perceived knowledge of ADHD and their self-perceived competence to be teachers of children with ADHD at a mean of 4.14 and 4.23 points, respectively (SD = 1.76 and SD = 1.90).

Before testing possible differences in knowledge of ADHD as a function of self-perceived knowledge of ADHD and of self-perceived efficacy to teach children with ADHD, we examined the assumptions of normality and homoscedasticity. On the basis of the results, we used a nonparametric test, specifically, the Mann-Whitney U, to analyze such differences.

Regarding the perception of knowledge of ADHD, as can be seen in Table 4, the results obtained in the Mann-Whitney U test showed that teachers who perceived they had higher knowledge of ADHD had more real knowledge about the disorder than teachers who perceived they had a lower level of knowledge. The differences between the mean ranges were statistically significant, with moderate effect sizes both in the global score and in different dimensions.

Regarding perceived self-efficacy to teach children with ADHD, as shown in Table 5, the results obtained in the Mann-Whitney U test showed that teachers who perceived themselves as being more competent to teach children with ADHD had more knowledge of the disorder than did teachers who perceived their competence was lower. The differences between the mean ranges were statistically significant, with moderate effect sizes both in the global scale and in different dimensions.

Table 4

Differences in the Teachers' Real Knowledge of ADHD as a Function of Self-Perceived Knowledge (Low vs. High)

Statistics	Dimensions				Total
	General information	Symptoms/ diagnosis	Etiology	Treatment	
	Mdn_{Low} = 1 Mdn_{High} = 2	Mdn_{Low} = 8 Mdn_{High} = 10	Mdn_{Low} = 2 Mdn_{High} = 3	Mdn_{Low} = 6 Mdn_{High} = 7	Mdn_{Low} = 16 Mdn_{High} = 20
Mann-Whitney U	93681**	84251.5**	104885**	105394.5**	72929**
R	.30	.35	.23	.23	.42

** $p < .001$.

Table 5

Differences in the Teachers' Real Knowledge of ADHD as a Function of Self-Perceived Efficacy to be a Teacher (Low vs. High)

Statistics	Dimensions				Total
	General information	Symptoms/ diagnosis	Etiology	Treatment	
	$Mdn_{Low} = 1$ $Mdn_{High} = 2$	$Mdn_{Low} = 8$ $Mdn_{High} = 9$	$Mdn_{Low} = 6$ $Mdn_{High} = 7$	$Mdn_{Low} = 2$ $Mdn_{High} = 3$	$Mdn_{Low} = 16$ $Mdn_{High} = 20$
Mann-Whitney *U*	103548**	94629.5**	111212.5**	109061.5**	83977.5**
R	.25	.30	.20	.22	.36

** $p < .001$.

Discussion

The first aim of this study was to examine the level of knowledge that teachers have about ADHD, using an assessment instrument with appropriate psychometric properties. The teachers who participated in the study presented a global knowledge of ADHD ranging between low and moderate. This result is similar or slightly higher than the results obtained by the majority of the studies that have used instruments with similar response formats (Anderson et al., 2012; Jarque et al., 2007; Kos et al., 2004; Sciutto et al., 2000; Stacey, 2003; Vereb & DiPerna, 2004; West et al., 2005). The global percentage of mistakes made by the teachers was also much lower than the global percentage of gaps, a result that coincides with the findings of another series of studies that have also used instruments with a three-option response format (True/False/I don't know) (Jarque et al., 2007; Sciutto et al., 2000; West et al., 2005). Teachers who have erroneous beliefs about ADHD are usually unaware of them, whereas the gaps indicate that they are aware of their ignorance. In addition, erroneous knowledge tends to be particularly resistant to change (Kos et al., 2004; Sciutto et al., 2000), so it is preferable for the percentage of gaps to exceed that of erroneous beliefs.

On the other hand, we note that, in the present study, participants displayed more knowledge in the field of *treatment*, followed by aspects related to *symptoms/diagnosis*, *etiology*, and *general information on ADHD*. This result does not match the findings of the studies that have examined teachers' knowledge by dimensions. In particular, much of the literature on the subject suggests that teach-

ers have more knowledge about the *symptoms* or the *main characteristics of ADHD* (Anderson et al., 2012; Jarque et al., 2007; Jarque & Tárraga, 2009; Perold et al., 2010; Sciutto et al., 2000; Stacey, 2003), followed by *treatment* and *general information* (Jarque et al., 2007; Perold et al., 2010; Sciutto et al., 2000; Stacey, 2003). This difference in the results may be due to the content of items in the *treatment* dimension of the questionnaire used in this study, which mainly includes items referring to psycho-educational interventions and not to medical or pharmacological interventions, as occurs in other questionnaires. The teachers may be less familiar with such treatments as they are not an area of knowledge related to their university training. In addition, it must be taken into account that the IRA-AGHN or MAE-TDAH is, to date, the only instrument published in the field that presents evidences of factor validity (Soroa et al., 2013), which strengthens the validity of the instrument and ensures adequate measurement of the dimensions it includes.

The second goal aimed to analyze the relationships between teachers' knowledge of ADHD and different sources of training. Among the teachers who had received some form of training in ADHD, we noted a marked preference for informal sources instead of formal and non-formal sources. This finding is consistent with the results of previous studies on the subject (Akram et al., 2009; Ghanizadeh et al., 2006). However, the comparisons of our study showed that, in order to achieve either specific knowledge or global knowledge of ADHD, it is more effective to receive all the types of training (formal, non-formal and informal) than to rely exclusively on informal sources. In addition, it was observed that teachers who receive all types of training present higher levels of knowledge in all the dimensions than those who do not receive any type of training in ADHD, but especially in the areas referring to *symptoms/diagnosis* and *general information about ADHD*. Formal, non-formal, and informal training about ADHD received by the teachers may primarily affect such areas of knowledge because these types of training tend to focus on providing the teachers with knowledge that enables them to perform early detections.

In summary, the current study has shown that teachers who resort to informal sources of training have more global knowledge about ADHD than teachers who have not received any form of training. We also noted that receiving formal and non-formal training, as well as informal training, had a greater impact on teachers' global knowledge than receiving exclusively informal training. Therefore, taking into consideration that all sources of training may be valid to increase teachers' knowledge of

ADHD, actions aimed at increasing teachers' interest to seek or receive such training should be promoted. In particular, the training offered by formal sources could be expanded (e.g., increasing the presence of ADHD in university Teaching studies), non-formal sources could be enhanced (e.g., increasing the number of conferences and specific courses on the subject or, alternatively, increasing the publicity about them), and teachers could be provided with a set of guidelines to help them to discern the quality of the information being offered mainly by informal sources. Moreover, given teachers' tendency to rely on such sources to obtain training in ADHD, it would also be interesting for the relevant authorities or associations of families of children with ADHD to offer teachers a virtual space where they could share their doubts on the subject, and consult and obtain advice from different professionals who work with people with ADHD. In addition, it would be interesting for the training proposals targeting teachers to take into account the various functions that teachers may perform with children with ADHD, as their role is not solely the early detection of such children. Through such actions, teachers could obtain more extensive and truthful information on the topic and work more effectively with students with ADHD.

The third aim was to study the relationship between teachers' real knowledge of ADHD and several self-perceptions related variables. We note that teachers, in general, obtained low mean scores in the variables self-perceived knowledge of ADHD and self-perceived competence to be a teacher of children with ADHD. In this regard, the results of this research are consistent with the approach of Anderson et al. (2012), who point out that teachers' perception of their knowledge on the topic tends to be close to their real knowledge. In particular, we observed that teachers with higher self-perceived knowledge of ADHD have more real knowledge about it than teachers with lower self-perceived knowledge. In addition, teachers' real knowledge of ADHD has been shown to be related to their self-perceived competence to teach children with ADHD. That is, we found that teachers with higher self-perceived efficacy to teach children with ADHD have more real knowledge about the disorder than teachers with lower self-perceived efficacy. This last finding is particularly important due to the fact that perceived self-efficacy in turn is associated with academic variables referring to the students (students' motivation for studies, academic success and sense of self-efficacy) and to the teachers (professional dedication, enthusiasm, absenteeism, stress and burnout) (Girio, 2006). Due to the positive effects that increased knowledge of ADHD could have on teaching these children, it would be desir-

able for teachers to participate in training options on the topic.

In general terms, it should be noted that the school sample used in this study was large. In addition, the sample was selected randomly. On the other hand, the instrument used to evaluate the teachers' knowledge of ADHD has appropriate psychometric properties. Therefore, we believe that the results obtained in this study present guarantees of validity and reliability. In any event, the geographical setting of questionnaire application should be extended, as the current study focused on a fairly homogeneous population. It would be interesting to extend the study to other regions of the Spanish state as well as to other countries, and to observe the differences and similarities in teachers' knowledge of ADHD in different geographical settings. This would overcome the study's limitation concerning external validity.

Research like this confirm that teachers' knowledge of ADHD is not high, especially in aspects related to the *etiology* and *general information* of the disorder, and such studies provide detailed information about the correct responses, gaps, and mistakes made by teachers when their knowledge of ADHD is assessed. Using this information, it is possible to design training materials or training plans to respond to the real needs of the collective. At the same time, the analysis of the sources through which teachers most frequently receive training in ADHD leads to suggesting new training activities to facilitate the increase of knowledge and to propose criteria to help teachers to select higher quality resources. Such initiatives can significantly improve teachers' knowledge and perception of self-efficacy in the face of one of the most common problems in early childhood, with the consequent impact this may have on the quality of life of children with ADHD and of their families. Several authors have pointed out that teachers need more training in ADHD, and teachers have also expressed their interest in expanding this training (Bekle, 2004; Jarque & Tárraga, 2009; Kos et al., 2006; Sciutto et al., 2000), so we consider that the results of this study can be useful to respond adequately to that need.

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Appendix

Teachers' self-perceived knowledge and self-perceived efficacy scales translated into English

1. Self-Perceived Knowledge of ADHD

   1.1. How would you describe your level of knowledge about ADHD? (Cross out the appropriate response)

1	2	3	4	5	6	7	8	9	10
Null									Excellent

2. Self-Perceived Competence to Teach Children with ADHD

   2.1. How would you describe your capacity to teach children with ADHD? (Cross out the appropriate response)

1	2	3	4	5	6	7	8	9	10
Not prepared									Totally prepared