Original Article

Determinants of Teachers' Knowledge about Attention Deficit Hyperactivity Disorder

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Abstract

Background: Attention deficit hyperactivity disorder (ADHD) is a common neurodevelopmental disorder in children, affecting approximately 5% of school-aged children globally. ADHD prevalence in Greece is approximately 6%, while globally ranges from 1% to 20% among school-aged children.
Aim: The present study investigated the knowledge about ADHD and its determinants among teachers.
Methods: A cross-sectional study was conducted from May to July 2020. The study population consisted of 152 teachers from 15 public elementary schools in Attica region. A convenience sample was used with a response rate of 89.4% (152 out of 170). All the participants were informed about the study design and provided written informed consent to participate in the study. Demographic and job data were collected including gender, age, family status, children, teaching children with ADHD, years of experience, employment status (regular or supply teachers), MSc or/and PhD diploma, continuous education, teaching children with special needs and self-assessment of effectiveness to manage children with ADHD. Teachers' knowledge about ADHD was assessed with «The Knowledge of Attention Deficit Disorders Scale» (KADDS).
Results: Cronbach's alpha coefficients for the KADDS total, "associated features subscale", "symptoms/diagnosis subscale" and "treatment subscale" were 0.86, 0.7, 0.7 and 0.74 respectively, indicating very good reliability of the scale. Mean age of the teachers was 43.9 years. Teachers' total knowledge about ADHD was moderate. Teachers had more knowledge about ADHD symptoms/diagnosis, then about ADHD associated features and lastly about ADHD treatment. According to multivariate analysis, decreased age, increased work experience and increased self-assessment of effectiveness to manage children with ADHD were associated with increased knowledge about ADHD. Moreover, regular teachers and teachers that participate in continuous education activities had more knowledge about ADHD.
Conclusions: Early ADHD diagnosis is essential for better management of children and improved outcomes. Teaches are usually the first people that observed children with increased probability of having ADHD. Thus, teachers should have sufficient knowledge about ADHD in order to understand the disorder in depth, decrease their insecurity in classroom, have a favorable attitude toward children with ADHD and communicate and manage children with ADHD in an appropriate way.

Keywords: attention deficit hyperactivity disorder, knowledge, teachers, Attica

Introduction

Attention deficit hyperactivity disorder (ADHD) is a common neurodevelopmental disorder in children, affecting approximately 5% of school-aged children globally (Rydell et al. 2018, Collishaw 2015, Safer 2015, American Psychiatric Association 2013), with prevalence in Greece to be 6% (8% for boys and 3.8% for girls) (Skounti et al. 2010). ADHD commonly begins in childhood and is characterized by hyperactive-impulsive or inattentive symptoms that last at least six months in two or more settings e.g. at home and at school (American Psychiatric Association 2013). Comorbidity is usual in children with ADHD, mostly persists into adulthood and includes learning disabilities, oppositional defiant disorder, emotional and behavioral disorders, conduct disorder (Wright et al. 2015, Larson et al. 2011, Pliszka et al. 2007).

Children with ADHD have a variety of problems e.g. educational, psychological, behavioral, emotional, social etc. and an early and valid diagnosis is crucial for better outcomes (Pliszka et al. 2007). In that case, role of teachers is essential since they interfere with children on a daily basis and can observe behaviors and symptoms that could be associated with ADHD, identify children who need additional support and refer children for assessment by the experts (Moldavsky et al. 2014). Thus, teachers should have sufficient knowledge about ADHD in order to understand the disorder in depth, decrease their insecurity in classroom, have a favorable attitude toward children with ADHD and communicate and manage children with ADHD in an appropriate way (Ghanizadeh et al. 2006, Kos et al. 2006, Bekle 2004). In general, teachers have a moderate level of knowledge about ADHD with higher level of knowledge about diagnosis and symptoms of ADHD and lower level of knowledge about treatment and aetiology of the disorder (Hosseinnia et al. 2020, Woyessa et al. 2019, Al-Moghamsi & Aljohani 2018, Giannopoulou et al. 2017, Lee et al. 2015, Muanprasart et al. 2014, Canu & Mancil 2012, Anderson et al. 2012, Rodrigo et al. 2011, Perold et al. 2010, Antonopoulou et al. 2010, Ohan et al. 2008, Kakouros et al. 2006, Ghanizadeh et al. 2006, West et al. 2005, Herbert et al. 2004, Sciutto et al. 2004, Sciutto et al. 2000).

Several factors influence teachers' knowledge about ADHD. In particular, knowledge is higher among females (Saffan et al. 2017, Suleiman 2015), teachers with a MSc or/and a PhD degree (Saffan et al. 2017, Yussef et al. 2015, Perold et al. 2010), experienced teachers with children with ADHD (Al-Moghamsi & Aljohani 2018, Saffan et al. 2017, Yussef et al. 2015, Soroa et al. 2014, Alkahtani 2013, Anderson et al. 2012, Perold et al. 2010, Kos et al. 2006, Sciutto et al. 2000), and teachers that have been participated in seminars about ADHD (Saffan et al. 2017, Soroa et al. 2014, Alfageer et al. 2018, Rodrigo et al. 2011, Perold et al. 2010). Also, increased age (Saffan et al. 2017), increased experience (Al-Moghamsi & Aljohani 2018, Saffan et al. 2017, Sciutto et al. 2000) and increased teachers' self-assessment to manage children with ADHD (Saffan et al. 2017, Alkahtani 2013, Perold et al. 2010, Sciutto et al. 2000) are associated with increased knowledge.

To the best of our knowledge, four studies (Giannopoulou et al. 2017, Stampoltzis & Antonopoulou 2013, Antonopoulou et al. 2010, Kakouros et al. 2006) in Greece have already investigated teachers' knowledge about ADHD, but there is no study that provides information regarding determinants of this knowledge. Therefore, we decided to investigate the knowledge about ADHD and its determinants among teachers in Greece.

Material and method

Study design: A cross-sectional study was conducted from May to July 2020. The study population consisted of 152 teachers from 15 public elementary schools in Attica region with children aged from six to eleven years old. A convenience sample was used due to practical and financial reasons. The response rate was 89.4% (152 out of 170). All the participants were informed about the study design and provided written informed consent to participate in the study. Data collection was performed anonymously and participants were allowed to withdraw at any time.

Measures: Demographic and job data were collected including gender, age, family status, children, teaching children with ADHD, years of experience, employment status (regular or supply teachers), MSc or/and PhD diploma, continuous education, and self-assessment of effectiveness to manage children with ADHD (five-point Likert scale; not at all effective, slightly, moderately, very, extremely).

We used the "Knowledge of Attention Deficit Disorders Scale" (KADDS) to measure teachers' knowledge about ADHD after written permission of the creators' scale (Sciutto et al. 2000). KADDS is translated and validated in many languages including Greek (Sciutto et al. 2016). KADDS includes 39 items and is designed to measure teachers' knowledge about (a) associated features (i.e. cause, nature and prognosis of ADHD; 15 items), (b) symptoms and diagnosis of ADHD (9 items), and (c) treatment of ADHD (12 items). The last three items of KADDS are not included in the above scales. Answers in KADDS items are on a true, false, or do not know format. Each item has a correct answer that gets a score of 1, while incorrect and don't know answers get a score of 0. Thus, a total knowledge score is calculated by dividing the total number of correct answers with 39 and then multiplying by 100 in order to get a total score from 0% to 100%. In the same way, total scores for the three subscales are calculated. Increased scores on KADDS indicate increased teachers' knowledge about ADHD. In our study, Cronbach's alpha coefficients for the KADDS total, "associated features subscale", "symptoms/diagnosis subscale" and "treatment subscale" were 0.86, 0.7, 0.7 and 0.74 respectively, indicating very good reliability of the scale.

Statistical analysis: Continuous variables are presented as mean and standard deviation, while categorical variables are presented as numbers and percentages. We used the Kolmogorov-Smirnov test and graphs (histograms and normal Q-Q plots) and we found that knowledge scores according to KADDS followed normal distribution. Demographic and job characteristics of the teachers were the independent variables, while the KADDS scores were the dependent variables. First, we performed bivariate analysis, including independent samples t-test, Pearson's correlation coefficient and Spearman's correlation coefficient. Variables that were significantly different in bivariate analysis were entered into the backward stepwise multivariate linear regression analyses with the KADDS scores as the dependent variables. Multivariate linear regression analysis was applied to eliminate confounding. We estimated adjusted coefficients beta with 95% confidence intervals and p-values. P-values less than 0.05 were considered as statistically significant. Statistical analysis was performed with the Statistical Package for Social Sciences software (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.).

Results

Sample characteristics: The study population consisted of 152 teachers and demographic and job characteristics of the teachers are shown in Table 1. Mean age was 43.9 years, while the majority of the teachers were females (73.7%), were married/in cohabitation (48%), did not have children (52.6%), were regular teachers (67.1%) and taught children with ADHD (84.9%). Mean years of experience was 17.8, while 34.2% of the teachers had MSc or/and PhD diploma, and 13.8% participated in continuous education activities. Fifty three point three percent self-assessed their effectiveness to manage children with ADHD as very good to extremely good, 37.5% as moderate and 9.2% as not at all to slight good.

Teachers' knowledge about ADHD: Descriptive statistics for the KADDS are shown in Table 2. Teachers' total mean knowledge score of ADHD was 49.9% indicating moderate knowledge. Teachers had more knowledge about ADHD symptoms/diagnosis, then about ADHD associated features and lastly about ADHD treatment. Mean knowledge score for symptoms/diagnosis of ADHD was the highest (73.8%), while mean knowledge score for treatment of ADHD was the lowest (40.6%). Mean knowledge scores for associated features and treatment scales were lower than 50% indicating knowledge lower than the average, while mean knowledge score for symptoms/diagnosis was higher than 50% indicating knowledge higher than the average.

Table 1. Demographic and job characteristics of the teachers.

Characteristics	N	%
Gender		
Males	40	26.3
Females	112	73.7
Age[a]	43.9	11.3
Family status		
Married/in cohabitation	73	48.0
Singles	64	42.1
Divorced	12	7.9
Widowers	3	2.0
Children		
No	80	52.6
Yes	72	47.4
Teaching children with ADHD		
No	23	15.1
Yes	129	84.9
Years of experience[a]	17.8	11.2
Employment status		
Regular teachers	102	67.1
Supply teachers	50	32.9
MSc or/and PhD diploma		
No	100	65.8
Yes	52	34.2
Continuous education		
No	131	86.2
Yes	21	13.8
Self-assessment of effectiveness to manage children with ADHD		
Not at all effective	3	2.0
Slightly	11	7.2
Moderately	57	37.5
Very	69	45.4
Extremely	12	7.9

[a] mean, standard deviation

Table 2. Descriptive statistics for the KADDS.

Scale	*Mean*	*Standard deviation*	*Median*	*Minimum value*	*Maximum value*
Associated features	*47.5*	*16.4*	*46.7*	*0*	*86.7*
Symptoms/diagnosis	*73.8*	*16.7*	*77.8*	*0*	*100*
Treatment	*40.6*	*19.7*	*41.2*	*0*	*75*
Total	*49.9*	*13.9*	*48.7*	*0*	*76.9*

Values are expressed as percentages.

Table 3. Bivariate analysis between the independent variables and the KADDS scores

Independent variables	Total score			Associated features score			Symptoms/diagnosis score			Treatment score		
	Mean	SD	P-value	Mean	SD	P-value	Mean	SD	P-value	Mean	SD	P-value
Gender			0.9[a]			0.9[a]			0.5[a]			0.6[a]
Males	49.6	13.8		47.7	17.2		72.2	13.1		39.2	19.2	
Females	50.0	13.9		47.4	16.2		74.3	17.8		41.1	19.9	
Age		-0.1[b]	0.2[b]		-0.3[b]	0.2[b]		-0.13[b]	0.1[b]		-0.11[b]	0.1[b]
Family status			0.2[a]			0.5[a]			0.03[a]			0.2[a]
Married/in cohabitation	48.4	16.2		46.7	19.5		70.8	19.0		38.6	21.6	
Singles/widowers/divorced	51.2	11.3		48.3	12.9		76.5	13.8		42.5	17.6	
Children			0.4[a]			0.9[a]			0.1[a]			0.2[a]
Yes	48.7	16.6		47.3	19.7		71.1	19.2		38.4	21.6	
No	50.9	10.8		47.7	12.9		76.1	13.8		42.6	17.6	
Teaching children with ADHD			0.9[a]			0.6[a]			0.5[a]			0.4[a]
Yes	49.9	13.3		47.8	15.9		74.2	16.2		39.9	19.1	
No	49.7	16.8		45.8	19.4		71.5	18.9		44.5	22.8	
Years of experience		0.3[c]	0.2[c]		0.1[c]	0.2[c]		0.1[c]	0.2[c]		0.01[c]	0.2[c]
Employment status			0.7[a]			0.2[a]			0.8[a]			0.7[a]
Regular teachers	50.2	14.0		48.4	17.6		74.0	14.9		40.2	19.9	
Supply teachers	49.3	13.7		45.7	13.5		73.3	20.1		41.5	19.4	
MSc or/and PhD diploma			0.6[a]			0.9[a]			0.9[a]			0.3[a]
Yes	50.6	12.1		47.4	14.7		73.5	13.9		42.8	19.3	

No	49.5	14.7		47.6	17.3		73.9	18.0		39.5	19.8	
Continuous education			0.2[a]			0.7[a]			0.6[a]			0.02[a]
Yes	53.2	14.9		48.9	15.1		72.0	17.4		50.0	20.1	
No	49.3	13.7		47.3	16.6		74.0	16.6		39.1	19.3	
Self-assessment of effectiveness to manage children with ADHD		0.32[c]	<0.001[c]		0.15[c]	0.07[c]		0.16[c]	0.05[c]		0.4[c]	<0.001[c]

SD: standard deviation

[a] independent samples t-test

[b] Pearson's correlation coefficient

[c] Spearman's correlation coefficient

Table 4. Multivariate linear regression analysis with the KADDS scores as the dependent variables.

Dependent variable Independent variable	**Coefficient beta**	**95% confidence interval for beta**	**P-value**	**R^2**
Total knowledge score				24.4%
Age	-1.4	-2.0 to -0.8	<0.001	
Years of experience	1.0	0.4 to 1.6	0.001	
Self-assessment of effectiveness to manage children with ADHD	5.5	2.9 to 7.9	<0.001	
Regular teachers vs. supply teachers	11.2	3.8 to 18.6	0.003	
Associated features score				14.4%
Age	-1.6	-2.3 to -0.8	<0.001	
Years of experience	1.2	0.5 to 1.9	0.001	
Self-assessment of effectiveness to manage children with ADHD	3.3	0.09 to 6.4	0.044	
Regular teachers vs. supply teachers	11.6	2.3 to 20.9	0.015	
Symptoms/diagnosis score				15%
Age	-1.3	-2.1 to -0.5	0.001	
Self-assessment of effectiveness to manage children with ADHD	5.2	1.9 to 8.4	0.002	
Regular teachers vs. supply teachers	15.6	6.1 to 25.1	0.001	
Treatment score				23%
Age	-1.6	-2.4 to -0.7	<0.001	
Years of experience	1.1	0.3 to 1.9	0.008	
Self-assessment of effectiveness to manage children with ADHD	7.7	4.1 to 11.3	<0.001	
Continuous education	9.9	1.4 to 18.4	0.022	

Determinants of teachers' knowledge about ADHD: Bivariate analysis between independent variables (demographic and job characteristics of the teachers) and the KADDS scores are shown in Table 3, while multivariate linear regression analysis with the KADDS scores as the dependent variables are shown in Table 4. According to multivariate analysis, decreased age, increased work experience and increased self-assessment of effectiveness to manage children with ADHD were associated with increased knowledge about ADHD. Moreover, regular teachers and teachers that participate in continuous education activities had more knowledge about ADHD. In particular, decreased age and increased self-assessment of effectiveness to manage children with ADHD were associated with increased total knowledge about ADHD, associated features knowledge, symptoms/diagnosis knowledge and treatment knowledge. Also, increased work experience was associated with increased total knowledge about ADHD, associated features knowledge, and treatment knowledge. Moreover, regular teachers had more total knowledge about ADHD, associated features knowledge and symptoms/diagnosis knowledge, while teachers that participate in continuous education activities had more knowledge about treatment.

Discussion

The present study investigated the knowledge about ADHD and its determinants among teachers. Teachers' knowledge was moderate, while they had more knowledge about ADHD symptoms/diagnosis, then about ADHD associated features and lastly about ADHD treatment. A great number of studies in Greece (Giannopoulou et al. 2017, Stampoltzis & Antonopoulou 2013, Antonopoulou et al. 2010) and worldwide (Hosseinnia et al. 2020, Woyessa et al. 2019, Al-Moghamsi & Aljohani 2018, Lee et al. 2015, Muanprasart et al. 2014, Canu & Mancil 2012, Anderson et al. 2012, Rodrigo et al. 2011, Perold et al. 2010, Ohan et al. 2008, Ghanizadeh et al. 2006, Herbert et al. 2004, Sciutto et al. 2004, Sciutto et al. 2000) confirm this finding. Teachers have a moderate level of knowledge about ADHD with higher level of knowledge about diagnosis and symptoms of ADHD and lower level of knowledge about treatment and aetiology of the disorder. Teachers are more familiar with issues such as diagnosis and symptoms of ADHD, but there is a major gap in knowledge regarding more difficult issues such as treatment and aetiology of the disorder.

We found that increased self-assessment of effectiveness to manage children with ADHD is associated with increased knowledge about ADHD. Several studies (Safan et al. 2017, Alkahtani 2013, Perold et al. 2010, Sciutto et al. 2000), are in accordance with this finding. This relationship could be attributed to the fact that teachers with more knowledge about ADHD feel more confident to manage children with the disease, approach in a better way these children, and create a safe school environment without discrimination.

In a similar way, we found that teachers that participate in continuous education activities had more knowledge about ADHD. Continuous education activities e.g. seminars, training sessions, literature reading etc. improve teachers' knowledge about ADHD, strength teachers' character to deal appropriately with difficult situations in a classroom, increase teachers' ability to manage children with ADHD, enable teachers to take decisions on their own initiatives, increase teachers' self-assessment to manage children with ADHD, and give teachers the opportunity to have a better relationship with children with ADHD (Alfageer et al. 2018, Safan et al. 2017, Soroa et al. 2014, Perold et al. 2010).

In our study, increased work experience was associated with increased knowledge about ADHD a finding that is confirmed from the literature (Al-Moghamsi & Aljohani 2018, Safan et al. 2017, Sciutto et al. 2000). Increased work experience seems to be a key-factor for teachers to improve their knowledge about ADHD especially in the case that they work in classrooms with children with ADHD (Al-Moghamsi & Aljohani 2018, Saffan et al. 2017, Yussef et al. 2015, Soroa et al. 2014, Alkahtani 2013, Anderson et al. 2012, Perold et al. 2010, Kos et al. 2006, Sciutto et al. 2000). Experience allows teachers to observe children with ADHD in a better way during the lessons, and understand deeper the feelings and reactions of these children. In that case, teachers become more familiar with the disease and make children feel more comfortable in classrooms.

We found that decreased age is associated with increased teachers' knowledge about ADHD. The role of age regarding teachers' knowledge about ADHD remains a controversial issue since Saffan et al. (2017) found that increased age is

associated with increased teachers' knowledge about ADHD, but Hosseinnia et al. (2020) found the opposite. Younger teachers are usually more educated with a greater percentage with a MSc or/and a PhD degree than older teachers. Probably the higher educational level among young teachers could explain the increased level of knowledge about ADHD (Saffan et al. 2017, Yussef et al. 2015, Perold et al. 2010). On the other hand, older teachers are more experienced and increased experience is associated with increased knowledge about ADHD as mentioned above (Al-Moghamsi & Aljohani 2018, Saffan et al. 2017, Sciutto et al. 2000).

Our study has several limitations. Given the limited resources available, a convenience sample was used preventing from generalization of results. In a similar way, the cross-sectional nature of our study cannot infer etiological relationships in the population of teachers in Greece. We used a self-reported questionnaire to measure teachers' knowledge about ADHD and thus an information bias could emerge. Finally, we measured several demographic and job determinants of teachers' knowledge about ADHD but many other determinants could be investigated.

In conclusion, early ADHD diagnosis is essential for better management of children and improved outcomes. Teaches are usually the first people that observed children with increased probability of having ADHD. Thus, teachers should have sufficient knowledge about ADHD in order to understand the disorder in depth, decrease their insecurity in classroom, have a favorable attitude toward children with ADHD and manage children with ADHD in an appropriate way.

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