Journal of Childhood, Education & Society
Volume 4, Issue 1, 2023, 29-40
DOI: 10.37291/2717638X.202341209
ISSN: 2717-638X
Research Article

Greek early childhood educators' knowledge of attention-deficit/hyperactivity disorder

Iraklis Grigoropoulos[1]

Abstract: As more children enter preschool programs, there is an increasing need for early education professionals to recognize and understand Attention-Deficit/Hyperactivity Disorder (ADHD). This study examined 120 Greek early childhood educators' knowledge of ADHD using a Greek self-report ADHD Knowledge Questionnaire (ADHD-KQ). All participants worked in infant/child centers operated by municipalities in Greece. Results point out early childhood educators' lack of fundamental knowledge about the causes, symptoms/diagnosis, cognitive deficits, and interventions regarding ADHD. Among the personal and professional variables (years of teaching experience, age, and educational level) studied as predictors of overall knowledge about ADHD age was found as the only significant. Older participants seemed to have better knowledge regarding the basic aspects of ADHD. Results suggest greater efforts must be made to provide training specifically in the management of children with ADHD.

Article History
Received: 03 May 2022
Accepted: 10 October 2022

Keywords
Attention-deficit/hyperactivity disorder; Early childhood education; Greek context

Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is described in the Diagnostic and Statistical Manual of Mental Disorders (DSM) 5 as a neuro-developmental disorder with a persistent behavioral pattern of severe inattention and/or hyperactivity/impulsivity. The behaviors must be uncharacteristic for the developmental age of the child, be manifested in different settings (for example at home and school), have started before the age of 12, be present for at least 6 months, and interfere with social and academic performance. Children diagnosed with ADHD demonstrate high levels of inattention, hyperactivity, and impulsivity (American Psychiatric Association, 2013). Three subtypes of ADHD can be distinguished, namely the inattentive type (I; e.g. struggles to follow instructions, loses things, is easily distracted), the hyperactive-impulsive (HI; e.g. talks excessively, difficulty waiting or taking turns) type, and the combined type (both I and HI) (American Psychiatric Association, 2013). It is typically diagnosed during the school years, although features of the disorder can be identified in early childhood (Singh et al., 2015). Nowadays as more children enter preschool programs, early childhood educators might more often face the challenge of identifying and coping with ADHD before formal school entry. Successful management of this disorder (i.e., maximizing student's potential by emphasizing socialization, learning and behavior) during this time might increase the likelihood that children will have successful academic and social experiences (Phillips et al., 2002). Successful management can be achieved if early childhood educators are aware of what the research data suggest about ADHD, the varying theories of its cause, and the notion that there are no simple solutions. This knowledge will assist early childhood educators in supporting efficiently children with ADHD and their families as well. On the other hand, problems related to ADHD may be multiplied when teachers possess a low level of knowledge of efficient interventions or insufficient understanding of the causes of ADHD (Stampoltzis & Antonopoulou, 2013). Thus, knowledge about ADHD is most important since the meaning that adults (in general) attribute to children's behavior influences the nature and the quality of care that children receive (Singh et al., 2015).

Nevertheless, the seriousness of ADHD symptoms and whether thisdisorder should be regarded as

[1]International Hellenic University, Department of Early Childhood Education & Care, Thessaloniki, Greece, e-mail: griraklis@gmail.com, ORCiD: https://orcid.org/0000-0001-5987-5483

a disorder or just the results of normal behavioral variations among children have been questioned (Breggin, 1998; Singh et al., 2015). Researchers in the field support the notion that ADHD is a behavioral description based on criteria that are sensitive to subjectivity and cognitive biases since there are no measurable biological markers or objective tests to establish the presence or absence of ADHD(Gambrill, 2014).Thus, ADHD remains one of the most talked-about and controversial subjects in education. The debate ranges between two ends of a continuum (Singh, 2002a, 2002b,). On one end are those who support the biological perspective stating that neurological and chemical imbalances in the brain cause ADHD and therefore propose medication as the most effective treatment (Cooper, 2001). On the other end, environmental influences are suggested as a key role in the development of ADHD. Psychosocial risk factors, including stress, marital conflicts, separation and divorce, and maternal depression were reported to be associated with ADHD (Breggin, 1998; Kean, 2004; Leo, 2002). Furthermore, it is evident that many of the symptoms of ADHD are normative, age-related behaviors and part of the behavioral repertoire of preschoolers. This constitutes one of the main problems in determining the significance of ADHD in young children (Smidts & Oosterlaan, 2007). However, according to Smidtsand Oosterlaan (2005, as cited in Smidts & Oosterlaan, 2007), preschoolers with elevated ratings on the ADHD scales of the Preschool Behavior Questionnaire, specifically within the domain of inattention, may present a high risk for ADHD. In addition, past ADHD studies of older children suggest that ADHD symptoms are more common in boys rather than girls, even at preschool age (Smidts & Oosterlaan, 2007).

Teachers and other school personnel are often the first to suggest the diagnosis of ADHD in a child since ADHD is generally not formally diagnosed until children reach school-age (Phillips, 2006; Sax & Kautz, 2003). Research data suggest that even though the three ADHD subtypes (Hyperactive-Impulsive, Inattentive, and Combined) have been validated in a sample of children ages four to six (Lahey et al., 1998), preschool children tend to display symptoms consistent with the predominately hyperactive-impulsive subtype (i.e. Phillips et al., 2002) when diagnosed with ADHD. Research data, however, also show that education and healthcare professionals tend to classify relative immaturity as ADHD since the youngest children in a class are twice as likely as their older classmates to receive a diagnosis of ADHD and medication (Meerman et al., 2017). Further research has indicated that the majority of teachers and general practitioners are unaware of this association between relative age, ADHD diagnoses, and prescribed medicine (Krabbe et al., 2014). Educational professionals should be aware of the many potential causes of a child's "unruly" behavior. Age should be taken into account when a child seems more restless and less focused than their classmates. Seeing ADHD as the only explanation for restlessness might, for example, exclude any other possible explanations (i.e psychosocial factors) and in this way operate as an etiology for any other socially intolerant behavior (Erlandsson et al., 2016). Previous research indicates that educational professionals feel insecure when dealing with behavioral problems (Walter et al., 2006) and hesitant to deal with Special Educational Needs (Pijl, 2010). These feelings might result in a less favorable stance towards children with "unruly" behaviors regarding their intelligence, personality, and behavior (Batzle et al., 2010). These children are also more likely than typically developing classmates to be socially rejected and face greater difficulties with their peers (Hinshaw, 2002). Since such behaviors can be at the poles of any bell-curved behavioral indicator and for this reason be confused with normal "young" behaviors, the crucial role of educators in identifying children who need additional support, making referrals for their assessment, and being able to manage them in the classroom becomes more evident (Sherman et al, 2008). However, disputable yet pervasive claims of ADHD as a genetic neurodevelopmental disorder could make educational professionals feel inept and might urge them to find solutions outside the realms of their skills and facilities (SanneteMeerman et al., 2017). Therefore, it seems critical for educational professionals to be aware of this when confronted with inattention and hyperactivity in the classroom. This explains the increasing emphasis on teachers' knowledge and attitudes toward ADHD in recent years. Several studies from different parts of the world have found that teachers' knowledge is at best reasonable and in many cases, insufficient, requiring intervention (Skounti et al., 2010; Vereb & DiPerna, 2004; Youssef et al., 2015; Walter et al., 2006). All in all, given the significant role that knowledge about ADHD plays in teachers' attitudes toward children with ADHD and teachers' willingness to implement appropriate interventions the current study examines Greek early childhood educators' knowledge about ADHD and

analyzes the relationship between ADHD knowledge and certain educators' demographic characteristics.

Educators' Knowledge of ADHD

Because many ADHD symptoms listed in the Diagnostic and Statistical Manual of Mental Disorders (DSM 5; American Psychiatric Association, 2013).) are linked to school activities educators' reports are commonly used to diagnose children with ADHD (Havey et al., 2005; West et al., 2005). In addition, educators are considered more reliable than parents for offering information to mental health specialists (Manuzza et al., 2002; West et al., 2005). Furthermore, educators are often the first to suggest a referral to mental health services (Sax & Kautz, 2003). Also, other researchers report that environmental factors, for example, class size and culture may influence teachers' perceptions of which students may have ADHD (Einarsdottir, 2008; Havey et al., 2005). Much previous research shows that educators' knowledge of ADHD is limited and that ADHD misconceptions are common (Anderson et al., 2012; Ghanizadeh et al., 2006; Stampoltzis & Antonopoulou, 2013; Weyandt et al., 2009). Most importantly, previous research findings show that teachers with average to high knowledge of ADHD reported more positive behaviors toward children with ADHD and held more favorable beliefs about treatments than did teachers with low knowledge (Ohan et al., 2008).

On one hand, past research findings in Greece report that Greek teachers hold a medium knowledge of ADHD with several misconceptions concerning biological and environmental aspects of the disorder. In addition, their knowledge about the treatment of ADHD is rather limited (Antonopoulou et al., 2010; Dimakos, 2007; Galanis et al., 2021; Stampoltzis & Antonopoulou, 2013). Also, in the Greek educational system, most children with ADHD are served in a mainstream setting with a special education teacher's support (Skounti et al., 2010). On the other hand, more recent studies show that Greek primary school teachers are well-informed about the symptoms of ADHD disorder but lacked knowledge about the causes and management of ADHD in classrooms (Giannopoulou et al., 2017). Overall, past studies highlight the need for providing training to increase Greek teachers' knowledge and understanding of ADHD (Giannopoulou et al., 2017). Acknowledging that a) several assessment issues warrant special attention in preschool children, such as the level of activity, inattention, and impulsivity that should be considered "normal" for preschoolers or the issue of the technical adequacy of measures commonly used for assessing preschool-age children (e.g. behavior rating scales) (Phillips et al., 2002) and b) that DSM 5 has increased the age of onset criterion, as well as the impairment criterion compared to the previous version, the DSM 4 (Thomas et al., 2013) very limited research (especially in Greece) has examined the knowledge of early childhood educators knowledge regarding ADHD symptoms, causes, and possible interventions.Since early childhood educators are key figures in early care settings their knowledge of key aspects of ADHD is crucial as low knowledge or misconceptions may affect their attitudes toward children with ADHD influencing children's social experiences (Phillips et al., 2002). This study aimed to explore early childhood educators' knowledge about ADHD and the relationship of participants' knowledge with the number of years of teaching experience, age, and educational level of participants. Probing Greek early childhood educators' knowledge about ADHD will provide us with insight into the level of their awareness and understanding of children showing inattention and hyperactivity in early care settings.

The Greek Context of Early Childhood Education and Care

Early childhood education services in Greece are structured according to the age of the children. Thus, the responsibility for early childhood education and care falls under the Ministry of Education, which caters to children aged four to six-year-olds (Kindergartens), and the Ministry of interior which caters to children between 6 months and 4 years of age (Daycare-centers). Kindergartens follow anational curriculum whereas daycare centers have no explicit curriculum (Grigoropoulos, 2021a). The few regulations concerning daycare centers refer to operational issues. Public daycare centers operate from September 1st to July 31st and from 7.00 am to 4.00 pm, five days a week (Iraklis, 2020). Within daycare centers, children are usually divided into mixed gender and separate age groups (Grigoropoulos, 2022, 2021b, 2020a). Daycare centers have mixed educational personnel including early childhood educators/ childcare workers (graduated from Technological Educational Institutions) and teachers (kindergarten-

university graduates) offering custodial care and education services (depending on the case; Grigoropoulos, 2021a, 2020b). Regulations on the operation of daycare centers by the Greek government emphasize the child-centered role of the curriculum while respecting the children's personal social and cultural differences (Skourletis & Fotioy, 2017).

Method

This study aimed to explore participants' knowledge regarding ADHD, using a Greek self-report ADHD Knowledge Questionnaire (ADHD-KQ) by Giannopoulou et al. (2017), and the relationship of their knowledge with age, years of teaching experience, and educational level.

Participants

The current cross-sectional study was conducted from September to November 2019. The sample consisted of 120 (118 female and 2 male) early childhood educators working in elevenday-care centers (paidikos-stathmos) for children from 2-and-a-half to 4 years old in the northern Greek region operated by municipalities.The low number of men in this study's sample is indicative of the fact that a very low percentage of preschool teachers are men in Greece (Grigoropoulos, 2019).Participants were recruited using purposive sampling, with the homogenous feature of being a working early childhood educator in a public daycare center. All participants worked within one specific municipality in the northern part of Greece and volunteered to participate following general email contact with the daycare center supervisor.Participants were informed about the aims of the study to ensure informed consent.Data collected from this study were confidential. Participants were provided with an envelope to assure that their answers were anonymous along with a copy of the consent form. The researcher collected completed paper forms and then debriefed those who participated. The procedure lasted approximately 10-15 minutes. This study followed all principles of the Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects and all the ethical instructions and directions of the institution to which the researcher belongs. The Demographic characteristics of the sample are provided in Table 1. An information sheet giving details of the study was provided to each educator.

Table 1. Demographic characteristics of the sample

Variable	%	
Gender		
Male	1.7%	
Female	98.3%	
Age group		
20-30 years old	22.5%	
31-40 years old	29.2%	
41-60 years old	48.3%	
Educational level		
Post-secondary education institutions	30%	
Technological Educational Institution	60%	
Postgraduate studies	10%	
Years of teaching experience		
0-4	26.7%	
5-10	30.8%	
>11	42.5%	
	M	**SD**
Years of teaching experience	18	9.2
Age	36.6	7.2

Measures

A background/demographic questionnaire and a 29-item self-report ADHD-KQ that covers four domains (clinical presentation, causes, cognitive deficits, and interventions) were administered to the participants of the current study. The background/demographic questionnaire included demographic questions such as age group, gender, educational level, and years of teaching experience. The second questionnaire included 29 items evaluating respondents' knowledge of ADHD (i.e., ADHD-KQ). Following a three-option (True/False/I don't know) response format correct answers received 1 point and incorrect ones 0 points. The possible score range was from 0, the lowest level of knowledge, to 29 for the highest. The response "I don't know" was not included in the calculation of the total score. The three-option response format was chosen to mitigate the limits of the dichotomous format (True/False) as it allows discerning those areas in which educators have more knowledge, areas where they have the least knowledge, and the areas in which they commit the greatest number of errors (Giannopoulou et al., 2017). The items were grouped into four sub-scale domains: Symptoms/Diagnosis sub-scale (item example: Q 1. Children with ADHD present with hyperactivity, impulsivity, and distractibility- 8 items), Causation sub-scale (item example: Q 18. ADHD is an exclusively genetic disorder, 6 items), Cognitive/Learning sub-scale (item example: Q 20. Learning difficulties are due to child's limited capacity to encode and retain information in their memory, 7 items), Management sub-scale (item example: Q 11. Pharmacological treatment sedates children with ADHD and makes them more obedient, 8 items). Giannopoulou et al. (2017) reported internal consistency of a= 0.89 for the total ADHD-KQ scale. In addition, the alpha coefficients for the sub-scales were acceptable (0.70 for the Symptoms/Diagnosis sub-scale, 0.73 for the Cognitive Deficits sub-scale, and 0.75 for the Intervention sub-scale), except for the Causes sub-scale, which was poor (0.59).

In this study the internal consistency of the total ADHD-KQ scale measured by Cronbach's alpha coefficient was moderate (0.68). The alpha coefficients for the sub-scales were 0.66 for the Symptoms/Diagnosis sub-scale, 0.61 for the Cognitive Deficits sub-scale, and 0.68 for the Intervention sub-scale. The alpha coefficient for the Causes sub-scale was poor (0.48) possibly due to the low number of questions. More questions regarding this sub-scale might have improved inter-relatedness between items. According to Pallant (2001) Alpha Cronbach values in the range of 0.60- 0.80 are considered moderate, but acceptable. Also, each of the sub-scales showed a significant correlation with the total ADHD-KQ scale score and there also was a significant correlation between the four sub-scales (correlation between tool's sub-domains that are considered to measure the same construct- convergent validity) (Table 2).

Table 2. Pearson correlation matrix for study variables

	1	2	3	4	5
1. ADHD- KQ		.594**	.743**	.690**	.624**
2.Symptoms/ Diagnosis sub-scale			.187*	.137	.310**
3. Cognitive deficits sub-scale				.426**	.265**
4.Intervention sub-scale					.205*
5. Causes sub-scale					

Results

Descriptive Statistics

Descriptive statistics were used to summarize early childhood educators' knowledge of ADHD in general. The sum of scores from the 29 Likert-scale items was used as a measure of educators' knowledge with higher scores reflecting a more complete ADHD Knowledge. Scores on the total 29-item ADHD Knowledge Questionnaire (ADHD-KQ) ranged from 5 to 17 points. The mean score was 8.92 (SD = 3.28), indicating that participants had poor knowledge of ADHD as measured by this scale since their mean score was below the average and the mean score of Greek teachers respectively (M=16.1) (Giannopoulou et al., 2017). The results given in Table 3 show that the overall average rating of early childhood educators on

each of the four sub-scale domains was below average.

Table 3. Participants' mean scores on the ADHD knowledge questionnaire and its four sub-scale domains

	Means and standard deviation	Rank range of each scale
ADHD-KQ total	8.92 (3.28)	0-29
Symptoms/ Diagnosis sub-scale (8 items)	2.89 (1.18)	0-8
Causation sub-scale (6 items)	1.44 (1.04)	0-6
Cognitive/ Learning sub-scale (7 items)	2.89 (1.38)	0-7
Management sub-scale (8 items)	1.7 (0.9)	(0-8)

Multiple Regression Analysis

Table 4. Pearson correlation matrix for age, experience, educational level and ADHD-KQ

	1	2	3	4
1.Age	1			
2.Years of teaching experience	.804**	1		
3. Educational level	.129	.148	1	
4. ADHD- KQ	.234*	.139	-.024	1

Notes: *Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

First, correlation analysis measured the degree of the relationships between age, experience, educational level, and ADHD-KQ. Results indicated that there was a significant positive association between age and years of teaching experience (r (120) = .804, p= .000) and between age and ADHD-KQ (r (120) = .234, p= .010) (Table 4). Multiple linear regression analysis was used to examine the association between predictor variables and the ADHD-KQ. The assumptions of regression analysis were tested and were not violated (Tabachnick & Fidell, 2001). ADHD Knowledge Questionnaire (i.e., ADHD-KQ) served as the criterion variable, and the number of years of teaching experience, age, and educational level as simultaneous predictors. Visual inspection of data plots showed that variables had normal distributions. The assumptions of no multicollinearity and independence of errors were checked using the SPSS available procedures (Collinearity diagnostics and Durbin–Watson test). Each of the VIFs was near one, suggesting a lack of multicollinearity. The value for the Durbin–Watson test was 1.541 suggesting that the assumption of independence has been met (Tabachnick & Fidell, 2001). The analysis showed that demographical variables included accounted for 15% of the variance F (3,119)= 6,80, p< 0.05. Multiple regression analysis showed that the age group variable (b = .197, t = 2.181 p< .05) was the only significant predictor of early childhood knowledge about ADHD. Educational level (b = .111, t = 1.221 p= 0.59) and years of teaching experience (b = -.018, t = -.118 p= 0.38) were not significant predictors (Table 5). Additional analyses were run with the separate subscales as criterion variables. None of the independent variables had any effect on the dependent variables (all p>.10).

Table 5. Linear regression of variables predicting ADHD knowledge

Variable	b	SE (b)	β	t	p
Age	.197	0.63	0.29	2.18	0.028
Years of teaching experience	-0.52	0.60	-0.13	-0.87	0.38
Educational level	-0.20	0.38	-0.04	-0.54	0.59

Conclusion and Discussion

This study aimed to explore early childhood educators' knowledge regarding ADHD, using a Greek self-report ADHD Knowledge Questionnaire (i.e., ADHD-KQ), and the relationship of their knowledge with participants' age, educational level, and years of teaching experience. Previous research has shown

teachers' lack of knowledge about ADHD and the need to understand it better to be more efficient with children who present aspects of this disorder (Nur & Kavakci, 2010).

The results of this study highlighted gaps in knowledge and understanding participants had about the causes, symptoms/diagnosis, cognitive deficits, and interventions regarding ADHD. Given this finding, there is room for increasing early childhood educators' knowledge of ADHD. This will also influence educators' behaviors and perceptions of children with ADHD (Galanis et al., 2021). Improving early childhood educators' knowledge about ADHD is essential to overcome any early negative perceptions of a child and his/her behaviors in early care settings or classrooms. Strong knowledge of the basic aspects of ADHD (e.g. symptoms, causation, and management) might empower early childhood educators to feel more confident and comfortable with these children since they are often the first to witness some of the characteristics of this disorder. Furthermore, as early childhood educators in Greece seem to play a role in the referral of children's problems (Maniadaki et al., 2003) it is crucial to have accurate, up-to-date, information for ADHD since early childhood educators could serve as effective gatekeepers to mental health services. Thus the basic knowledge of the causation and symptoms of ADHD is critical since it can prevent the inappropriate judgment of a child and/or his/her parents and also ensure further support for them (see Flanigan & Climie, 2018). On the other side, limited knowledge of ADHD might lead to the perpetuation of false beliefs (Bekle, 2004), and poor use of classroom interventions (Blotnicky-Gallant et al., 2015). Overall, as a consequence of increased knowledge, educators may feel more familiar with ADHD-specific behaviors and more confident in their ability to adequately respond. Training programs are important not only for the future management of children in early care settings but also because educators can be utilized to help educate parents and the wider society and dispel myths concerning ADHD.

This study's results also show age as the only significant factor in ADHD knowledge. In particular, increased age was associated with increased educators' knowledge about ADHD. The role of educators' age concerning their knowledge about ADHD remains a controversial issue. While several scholars (see Al-Moghamsi & Aljohani, 2018; Saffan et al., 2017; Sciutto et al., 2000) have associated older teachers with increased knowledge about ADHD, other scholars have found the opposite (see Hosseinnia et al., 2020). An offered explanation for older educators' increased knowledge about ADHD is that probably older educators are more experienced and increased experience is linked to increased ADHD knowledge (see Saffan et al., 2017). Based on this assumption we could argue that older participants may feel more confident, experienced, and/or better qualified to understand for example why some children fail to comply with rules and requests or display 'unruly' behaviors. Given their experience with a larger number of young children, older participants may consider ADHD causes, symptoms, cognitive deficits, and interventions according to their experience about what is typical and appropriate for this particular age group. Thus, their knowledge might be influenced by their overall experience with children and their interaction with them.However, it should be noted that because educators are older this does not necessarily mean that they are also more experienced with children. Future studies should emphasize uncomplicating this relationship. Moreover, this study's results report participants' lower ADHD knowledge compared to previous data concerning Greek teachers' knowledge of ADHD (see Giannopoulou et al., 2017). This may be attributed to the fact that more than half of Giannopoulou et al. (2017) study participants were attending a postgraduate training course in special education. In addition, as regards this study's low alpha coefficients it should be noted that even though Cronbach's alphas are the common value stated for scale reliability, this value minimizes the internal consistency of scales consisting of less than 10 items (see Herman, 2015, p.8).

Furthermore, this study failed to find an association between years of teaching experience and knowledge. This result coincides with previous research data (Stampoltzis & Antonopoulou, 2013; Weyandt et al., 2009). However, other researchers report a positive correlation between ADHD knowledge and teaching experience (see Sciutto et al., 2000). The fact that the number of years of teaching experience and educational level did not affect ADHD knowledge in this study could be an indication of the necessity for educators to participate in education programs regarding inattention and hyperactivity behaviors. The implementation of educational programs related to ADHD may improve educators' knowledge about the

range of inattention and hyperactivity behaviors and subsequently their attitudes and intervention techniques (Pijl, 2010). Thus, a significant implication of this study is that early childhood educators would benefit from education, training, and possible consultation with mental health professionals providing them with adequate information about ADHD. This information could allow a more suitable response or intervention in incidents involving a child with inattention and hyperactivity behaviors or a child who fails to comply with rules and requests or displays "unruly" behaviors. Research data suggest that providing educators with training opportunities in the area of ADHD could increase their knowledge of such behaviors improving also their attitudes toward ADHD (Giannopoulou et al., 2017).

Another important point of this study is that educators' views on children's behavior cannot be understood without considering the educational and social context within which they are professionally educated and that ADHD diagnosis and treatment are culturally contingent, as suggested by Singh (2002a). This becomes more crucial since little is known about the level of activity, inattention, and impulsivity that should be considered "normal" in early childhood (Barkley, 1998). A practical implication of this study's results is that there may be a need for early childhood educators to be better informed about ADHD. This study also offers a broader cultural perspective since most of the research data regarding educators' knowledge of ADHD focus primarily on English-speaking countries (Flanigan & Climie, 2018).Overall, studies in this research field are significant since gaps in knowledge about ADHD explain the low levels of educators' confidence about their ability to successfully support children diagnosed with ADHD (Nur & Kavakci, 2010; Vereb & DiPerna, 2004). According to Bell et al. (2011) knowing the important aspects of ADHD reduces common myths and false perceptions and attitudes while at the same time knowledge about ADHD helps educators to feel more confident in creating a more positive learning environment.This knowledge may also help educators deal with ADHD difficulties during and outside classroom and reassure parents and students that they have an understanding of the disorder. Future studies could also address the role of children's gender in influencing perceptions of ADHD. All in all, this study contributes to the research on early childhood educators' ADHD knowledge and has implications for their training.

Limitations

This study was limited by the use of a convenience sample, of early childhood educators working with children aged 3–5 in urban early care contexts in the northern part of Greece. Results cannot be generalized to other geographical locations in Greece. The questionnaire used was a self-report questionnaire. While self-report questionnaires are easily administered and relatively easy to analyze, there may be a tendency to respond in keeping with socially accepted norms. No information was collected on teachers' access to specialized consultation concerning individual children or access to sufficient specialized resources, suggesting interesting directions for future research. Despite the above-discussed limitations, the current study is felt to be an important first step in assessing early childhood educators' ADHD knowledge in Greece and providing basic data for understanding their beliefs, attitudes, and possible intervention techniques within early care settings in Greece.

Declarations

Author's Declarations

Acknowledgments:Not applicable.

Authors' contributions: There is one author.

Competing interests: The authors declare that they have no competing interests.

Funding: There was no funding for this research .

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Publisher's Declarations

Editorial Acknowledgement: The editorial process of this article was carried out by Dr. Ibrahim H. Acar.

References

Al-Moghamsi, E. Y., & Aljohani, A. (2018). Elementary school teachers' knowledge of attention deficit/hyperactivity disorder. *Journal of Family Medicine and Primary Care*, *7*(5), 907–915. https://doi.org/10.4103/jfmpc.jfmpc_183_18

American Psychiatric Association. (2013). *DSM-5 Task Force. (5th ed.). American Psychiatric Publishing, Inc.* https://doi.org/10.1176/appi.books.9780890425596

Anderson, D. L., Watt, S. E., Noble, W., & Shanley, D. C. (2012). Knowledge of attention deficit hyperactivity disorder (ADHD) and attitudes toward teaching children with ADHD: The role of teaching experience. *Psychology in the Schools, 49*(6), 511–525. https://doi.org/10.1002/pits.21617

Antonopoulou, A., Staboltzi, A., &Kouvava, S. (2010). Teacher's knowledge regarding ADHD. *Pedagogic Subjects Inspection*, *3*, 162–178.

Barkley R. A. (1998). Attention-deficit hyperactivity disorder. *Scientific American*, *279*(3), 66–71. https://doi.org/10.1038/scientificamerican0998-66

Batzle, C. S., Weyandt, L. L., Janusis, G. M., & DeVietti, T. L. (2010). Potential impact of ADHD with stimulant medication label on teacher expectations. *Journal of Attention Disorders*, *14*(2), 157–166. https://doi.org/10.1177/1087054709347178

Bekle, B. (2004). Knowledge and attitudes about attention-deficit hyperactivity disorder (ADHD): A comparison between practicing teachers and undergraduate education students. *Journal of Attention Disorders*, *7*(3), 151-161. https://doi.org/10.1177/108705470400700303

Bell, L., Long, S., Garavan, C., & Bussing, R. (2011). The impact of teacher credentials on ADHD stigma perceptions. *Psychology in the Schools, 48*(2), 184–197.

Blotnicky-Gallant, P., Martin, C., McGonnell, M., & Corkum, P. (2015). Nova Scotia teachers' ADHD knowledge, beliefs, and classroom management practices. *Canadian Journal of School Psychology, 30*(1), 3–21.

Breggin, P. R. (1998). *Talking back to Ritalin: What doctors aren't telling you about stimulants and ADHD*. Courage Press.

Cooper, P. (2001). Understanding AD/HD: a brief critical review of literature. *Children & Society*, 15(5), 387–395.

Dimakos, I. (2007). What do teachers know and think about attention deficit hyperactivity disorder (ADHD). *Scientific Yearbook of University of Patras Arethas, 4*, 151–161.

Einarsdottir, J. (2008). Teaching children with ADHD: Icelandic early childhood teachers' perspectives. *Early Child Development and Care, 178*(4), 375–397. https://doi.org/10.1080/03004430701321696

Erlandsson, S., Lundin, L., & Punzi, E. (2016). A discursive analysis concerning information on "ADHD" presented to parents by the National Institute of Mental Health (USA). *International Journal of Qualitative Studies on Health and Well-Being*, *11*(1), 30938.https://doi.org/10.3402/qhw.v11.30938

Flanigan, L., & Climie, E. (2018). Teachers' knowledge of ADHD: Review and recommendations. *Emerging Perspectives: Interdisciplinary Graduate Research in Education and Psychology*, *2*(1), 1-13.

Galanis, P., Tsakalaki, A., Papa, M. T., & Fragkou, D. (2021). Determinants of teachers' knowledge about attention deficit hyperactivity disorder. *International Journal of Caring Sciences, 14*(2), 909-918.

Gambrill, E. (2014). The diagnostic and statistical manual of mental disorders as a major form of dehumanization in the modern world. *Research on Social Work Practice*, *24*(1), 13–36. https://doi.org/10.1177/1049731513499411

Ghanizadeh, A., Bahredar, M. J., & Moeini, S. R. (2006). Knowledge and attitudes towards attention deficit hyperactivity disorder among elementary school teachers. *Patient Education and Counseling*, *63*(1-2), 84–88. https://doi.org/10.1016/j.pec.2005.09.002

Giannopoulou, I., Korkoliakou, P., Pasalari, E., & Douzenis, A. (2017). Greek teachers' knowledge about attention deficit hyperactivity disorder. *Psychiatrike= Psychiatriki*, *28*(3), 226-233.

Grigoropoulos, I. (2019). Male early childhood educators in childcare centers. Attitudes about their role and absence. A qualitative study. *Investigating the Child's World, 16*, 42-57. https://doi.org/10.12681/icw.19006

Grigoropoulos, I. (2020a). Early childhood educators' experiences of bullying episodes: a qualitative approach. *European Early Childhood Education Research Journal, 28*(6), 774-788. https://doi.org/10.1080/1350293X.2020.1836581

Grigoropoulos, I. (2020b). Classroom (in) discipline. Behavior management practices of early childhood educators. *Education 3-13. 50*(1), *16-24.* https://doi.org/10.1080/03004279.2020.1817966

Grigoropoulos, I. (2021a). Greek early childhood educators' engagement practices and facilitative roles during free play. *Contemporary School Psychology.* https://doi.org/10.1007/s40688-021-00400-6

Grigoropoulos, I. (2021b). Acknowledging early bullying behaviors in early childhood education. *Investigating the Child's World, 17*, 6–23. https://doi.org/10.12681/icw.21620

Grigoropoulos, I. (2022). Can we talk about life without taking death into account? Early childhood educators' self-perceived ability to approach the topic of death with children. *OMEGA - Journal of Death and Dying, 0*(0). https://doi.org/10.1177/00302228211057733

Havey, J. M., Olson, J. M., McCormick, C., & Cates, G. L. (2005). Teachers' perceptions of the incidence and management of attention-deficit hyperactivity disorder. *Applied Neuropsychology*, *12*(2), 120-127. https://doi.org/10.1207/s15324826an1202_7

Herman, B. C. (2015). The influence of global warming science views and sociocultural factors on willingness to mitigate global warming. *Science Education, 99*(1), 1–38. https://doi.org/10.1002/sce.21136

Hinshaw, S. P. (2002). Preadolescent girls with attention-deficit/hyperactivity disorder: I. Background characteristics, comorbidity, cognitive and social functioning, and parenting practices. *Journal of Consulting and Clinical Psychology*, *70*(5), 1086–1098. https://doi.org/10.1037//0022-006X.70.5.1086

Hosseinnia, M., Mazaheri, M. A., & Heidari, Z. (2020). Knowledge, attitude, and behavior of elementary teachers regarding attention deficit hyperactivity disorder. *Journal of Education and Health Promotion*, *9*, 120. https://doi.org/10.4103/jehp.jehp_696_19

Iraklis, G. (2020). Subtle forms of prejudice in Greek day-care centres. Early childhood educators' attitudes towards same-sex marriage and children's adjustment in same-sex families. *European Journal of Developmental Psychology, 18*(5), 711–730. https://doi.org/10.1080/17405629.2020.183563

Kean, B. (2004) What the multimodal treatment study really discovered about intervention for children diagnosed with ADHD: Implication for early childhood. *Ethical Human Psychology and Psychiatry, 6*(3), 193–200.

Krabbe, E. E., Thoutenhoofd, E. D., Conradi, M., Pijl, S. J., & Batstra, L. (2014). Birth month as predictor of ADHD medication use in Dutch school classes. *European Journal of Special Needs Education*, *29*(4), 571–578. https://doi.org/10.1080/08856257.2014.943564

Lahey, B. B., Pelham, W. E., Stein, M. A., Loney, J., Trapani, C., Nugent, K., Kipp, H., Schmidt, E., Lee, S., Cale, M., Gold, E., Hartung, C. M., Willcutt, E., & Baumann, B. (1998). Validity of DSM-IV attention-deficit/hyperactivity disorder for younger children. *Journal of the American Academy of Child and Adolescent Psychiatry*, *37*(7), 695–702. https://doi.org/10.1097/00004583-199807000-00008

Leo, J. (2002). American preschoolers on Ritalin. *Society, 39*(2), *52–60.* https://doi.org/10.1007/BF02717529

Maniadaki, K., Sonuga-Barke, E. J. S. & Kakouros, E. (2003) Trainee nursery teachers' perceptions of disruptive behaviour disorders; the effect of the sex of the child on judgements of typicality and severity, *Child: Care, Health & Development, 29*(6), 433–440

Mannuzza, S., Klein, R. G., & Moulton, J. L. (2002). Young adult outcome of children with "situational" hyperactivity: A prospective, controlled follow-up study. *Journal of Abnormal Child Psychology, 30*(2), 191–198. https://doi.org/10.1023/a:1014761401202

Nur, N., & Kavakci, O. (2010). Elementary school teachers' knowledge and attitudes related to attention deficit hyperactivity disorder. *HealthMED*, *4*(2), 350-355.

Ohan, J. L., Cormier, N., Hepp, S. L., Visser, T. A., & Strain, M. C. (2008). Does knowledge about attention deficit/hyperactivity disorder impact teachers' reported behaviors and perceptions?. *School Psychology Quarterly, 23*(3), 436–449.

Pallant, J. (2001). *SPSS survival manual: A step by step guide to data analysis using SPSS for Windows version 10.* Open University Press.

Phillips, C. B. (2006). Medicine goes to school: Teachers as sickness brokers for ADHD. *Plos Medicine, 3*(4), e182. https://doi.org/10.1371/journal.pmed.0030182

Phillips, P. L., Greenson, J. N., Collett, B. R., & Gimpel, G. A. (2002). Assessing ADHD symptoms in preschool children: Use of the ADHD Symptoms Rating Scale. *Early Education & Development, 13*(3), 283–300. https://doi.org/10.1207/s15566935eed1303_3

Pijl, S. J. (2010). Preparing teachers for inclusive education: Some reflections from the Netherlands. *Journal of Research in Special Educational Needs, 10*(1), 197–201. https://doi.org/10.1111/j.1471-3802.2010.01165.x

Saffan, N. A., El-Nagar, S. A., & Saleh, A. G. (2017). Teachers' knowledge about attention deficit hyperactivity disorder among primary school children. *American Journal of Nursing Research*, *5*(2), 42-52. https://doi.org/10.12691/ajnr-5-2-2

Sax, L., & Kautz, K. J. (2003). Who first suggest the diagnosis of attention-deficit/hyperactivity disorder?. *Annals of Family Medicine, 1*(3), 171-174. https://doi.org/10.1370/afm.3

Sciutto, M. J., Terjesen, M. D., & Bender Frank, A. S. (2000). Teachers' knowledge and misperceptions of Attention-Deficit/Hyperactivity Disorder. *Psychology in the Schools, 37*(2), 115–122. https://doi.org/10.1002/(SICI)1520-6807(200003)37:2%3C115::AID-PITS3%3E3.0.CO;2-5

Sherman, J., Rasmussen, C., & Baydala, L. (2008). The impact of teacher factors on achievement and behavioural outcomes of children with Attention Deficit/Hyperactivity Disorder (ADHD): A review of the literature. *Educational Research*, *50*(4), 347-360. https://doi.org/10.1080/00131880802499803

Singh, A., Yeh, C. J., Verma, N., & Das, A. K. (2015). Overview of attention deficit hyperactivity disorder in young children. *Health Psychology Research*, *3*(2), 2115. https://doi.org/10.4081/hpr.2015.2115

Singh, I. (2002a). Bad boys, good mothers, and the 'miracle' of Ritalin. *Science in Context, 15*(4), 577–603.

Singh, I. (2002b). Biology in context: Social and cultural perspectives on ADHD. *Children & Society, 16*(5), 360–367.

Skounti, M., Giannoukas, S., Dimitriou, E., Nikolopoulou, S., Linardakis, E., & Philalithis, A. (2010). Prevalence of attention deficit hyperactivity disorder in schoolchildren in Athens, Greece. Association of ADHD subtypes with social and academic impairment. *ADHD Attention Deficit and Hyperactivity Disorders, 2*(3), 127–132. https://doi.org/10.1007/s12402-010-0029-8

Skourletis, P., &Fotiou, T. (2017). *Model regulations for the operation of municipality child and infant care centres*. Ministerial Decision N. 41087. Government Paper of the Hellenic Republic.

Smidts, D. P., & Oosterlaan, J. (2007). How common are symptoms of ADHD in typically developing preschoolers? A study on prevalence rates and prenatal/demographic risk factors. *Cortex*, *43*(6), 710-717. https://doi.org/10.1016/S0010-9452(08)70500-8

Stampoltzis, A., & Antonopoulou, K. (2013). Knowledge and misconceptions about attention deficit hyperactivity disorder (ADHD): A comparison of Greek general and special education teachers. *International Journal of School & Educational Psychology*, *1*(2), 122-130. https://doi:10.1080/21683603.2013.803000

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Allyn & Bacon.

Te Meerman, S., Batstra, L., Grietens, H., & Frances, A. (2017). ADHD: a critical update for educational professionals. *International Journal of Qualitative Studies on Health and Well-Being*, *12*(sup1), 1298267. https://doi.org/10.1080/17482631.2017.1298267

Thomas, R., Mitchell, G. K., & Batstra, L. (2013). Attention-deficit/hyperactivity disorder: are we helping or harming?. *BMJ (Clinical research ed.)*, *347*, f6172. https://doi.org/10.1136/bmj.f6172

Vereb, R. L., & DiPerna, J. C. (2004). Teachers' knowledge of ADHD, treatments for ADHD, and treatment acceptability: An initial investigation. *School Psychology Review*, *33*(3), 421-428. https://doi.org/10.1080/02796015.2004.12086259

Walter, H. J., Gouze, K., & Lim, K. G. (2006). Teachers' beliefs about mental health needs in inner city elementary schools. *Journal of the American Academy of Child & Adolescent Psychiatry*, *45*(1), 61-68. https://doi:10.1097/01.chi.0000187243.17824.6c

West, J., Taylor, M., Houghton, S., & Hudyma, S. (2005). A comparison of teachers' and parents' knowledge and beliefs about attention-deficit/hyperactivity disorder (ADHD). *School Psychology International*, *26*(2), 192-208. https://doi.org/10.1177/0143034305052913

Weyandt, L. L., Fulton, K. M., Schepman, S. B., Verdi, G. R., & Wilson, K. G. (2009). Assessment of teacher and school psychologist knowledge of attention-deficit/hyperactivity disorder. *Psychology in the Schools, 46*(10), 951–961. https://doi.org/10.1002/pits.20436

Youssef, M. K., Hutchinson, G., & Youssef, F. F. (2015). *Knowledge of and Attitudes Toward ADHD Among Teachers. SAGE Open*, *5*(1), 215824401456676. https://doi.org/10.1177/2158244014566761

Appendix: ADHD Knowledge Questionnaire (ADHD-KQ)

Q1. Children with ADHD present with hyperactivity, impulsivity and distractibility **T (True)[Symptoms/Diagnosis sub-scale]**

Q2. Children with ADHD are no different from their peers in their cognitive skills, they are just more lively and unruly. **F (False) [Cognitive/Learning sub-scale]**

Q3. ADHD is just as common in boys and girls. **F [Symptoms/Diagnosis sub-scale]**

Q4. Children with ADHD have good social skills. **F [Symptoms/Diagnosis sub-scale]**

Q5. Children with ADHD usually have cognitive deficits (e.g. memory). **T [Cognitive/Learning sub-scale]**

Q6. Children with ADHD usually have no problem with information processing. **F [Cognitive/Learning sub-scale]**

Q7. Children with ADHD have less activity in areas of the brain that regulate behavior. **T [Causation sub-scale]**

8. Learning difficulties of children with ADHD are primarily due to behavioral problems, such as disobedience, nervousness. **F [Cognitive/Learning sub-scale]**

Q 9. Students with ADHD can follow the instructionsand organize complex tasks if they really want to. **F [Cognitive/Learning sub-scale]**

Q10. Improper/inadequate parenting can cause ADHD in children. **F [Causation sub-scale]**

Q11. Pharmacological treatment sedates children with ADHD and makes them more obedient. **F [Management sub-scale]**

Q12. A child who concentrates on tasks of his choice, e.g. computer cannot have ADHD. **F [Symptoms/Diagnosis sub-scale]**

Q13. Pharmacological treatment has no effects for ADHD. **F [Management sub-scale]**

Q14. The child with ADHD needs nothing more than strict discipline. **F [Management sub-scale]**

Q15. Decreased learning performance is more associated with symptoms of hyperactivity and impulsivity than with attention deficits. **F [Cognitive/Learning sub-scale]**

Q16. The symptoms of ADHD change as the child grows older. **T [Symptoms/Diagnosis sub-scale]**

Q17. Child who doesn't show hyperactivity does not qualify for ADHD Diagnosis. **F [Symptoms/Diagnosis sub-scale]**

Q 18. ADHD is an exclusively genetic disorder. **F [Causation sub-scale]**

Q 19. ADHD is a short-term disorder that gets better with time and doesn't require any intervention. **F [Symptoms/Diagnosis sub-scale]**

Q 20. Learning difficulties are due to child's limited capacity to encode and retain information in their memory. **T [Cognitive/Learning sub-scale]**

Q 21. Sugar or/and additives intake is responsible for the disorder. **F [Causation sub-scale]**

Q22. Children whose mothers smoked during pregnancy are more likely to develop ADHD. **T [Causation sub-scale]**

Q23. ADHD symptoms are secondary to generalized or specific learning(e.g. dyslexia) disability or conduct problems, therefore the diagnosis of ADHD does not apply. **F [Symptoms/Diagnosis sub-scale]**

Q24. When there are problems in the family (e.g. disturbed family relations, marital conflicts) it is appropriate to intervene in the family and not in the child to deal with ADHD. **F [Management sub-scale]**

Q25. If the child responds to medication, educational interventions are not necessary. **F [Management sub-scale]**

Q26. Children with ADHD have no difficulty maintaining motivation for activities that offer, albeit delayed, reward or pleasure. **F [Causation sub-scale]**

Q27. Students with ADHD require the same teaching strategies as other students. **F [Management sub-scale]**

Q28. Modifying the classroom environment worsens child's behavior with ADHD. **F [Management sub-scale]**

Q29. The teacher's role is limited in helping a student with ADHD. **F [Management sub-scale]**