

The relationship between attention deficit/hyperactivity disorder and aggressive behaviour in preschool boys and girls

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Research regarding attention deficit/hyperactivity disorder (AD/HD) among preschoolers is limited. This study explored prevalence rates of AD/HD on a community-based sample of preschoolers in Athens. Moreover, it examined the relationship between AD/HD and aggressive behaviour and explored sex differences in this relationship. Nursery teachers completed the 'Strengths and Difficulties Questionnaire' and the 'Aggressive Behaviour Questionnaire' for each one of the 925 boys and girls of the sample (mean age =56.01 months, standard deviation =8.9). Results revealed a prevalence rate of 14.3%, validating the existence of the disorder in preschoolers. Aggressive behaviour was positively correlated with AD/HD. Moreover, although girls without AD/HD presented less aggressive behaviour than boys, girls with AD/HD displayed certain forms of aggressive behaviour more often than boys with the disorder. Implications of these findings for early identification of AD/HD and for the use of aggressive behaviour in girls as a stronger indication of AD/HD than in boys are discussed.

Keywords: *Attention deficit/hyperactivity disorder; Hyperactivity; Aggressive behaviour; Sex differences; Preschoolers; Greece*

Introduction

Extant research indicates that attention deficit/hyperactivity disorder (AD/HD) is a long-term disorder with neurobiological foundations and emergence of primary

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symptoms in early childhood (Faraone & Biederman, 1994; Barkley, 1998). According to DSM-IV (American Psychiatric Association, 1994), the AD/HD diagnosis requires an onset of primary symptoms (attention distractibility, impulsiveness and motor overactivity) prior to seven years of age. In fact, the peak age of onset of AD/HD has been identified between three and four years (Biederman *et al.*, 2002; Connor, 2002).

Nevertheless, the validity of the existence of AD/HD in preschoolers has been questioned. One of the impediments in determining the clinical significance of behaviours like inattention, impulsivity, overactivity and non-compliance in toddlers and preschoolers is that they often reflect, to a certain degree, age-appropriate patterns of behaviour during the preschool period. In addition, the presentation of preschool children in the DSM-IV field trials was relatively low and, as a result, the validity of the symptoms for preschool age children was not adequately established (Keenan & Wakschlag, 2003). Nevertheless, several recent studies have provided evidence that AD/HD symptoms can be detected before the age of seven and support the validity of the diagnosis of AD/HD in preschoolers (Lahey *et al.*, 1998; Hartung *et al.*, 2002; Keenan & Wakschlag, 2002; Wilens *et al.*, 2002; Sonuga-Barke *et al.*, 2003).

However, findings regarding the epidemiology of AD/HD in this age range are limited and ambiguous. Preschool AD/HD prevalence rates range from 2% to approximately 25%. This discrepancy may be due to the fact that different screening tests (usually variable rating scales) and/or different kinds of samples (clinic-referred or community-based samples) have been used (DuPaul *et al.*, 1998; Keenan & Wakschlag, 2000).

In studies with school-age samples, one of the most consistent findings regards the high comorbidity rates between AD/HD and oppositional defiant disorder and conduct disorder (Barkley *et al.*, 1991; Abikoff & Klein, 1992). Preschoolers with AD/HD are also likely to present aggressive behaviour at significantly higher frequency than their normal counterparts, according to teacher and parental reports (DuPaul *et al.*, 2001; Nolan *et al.*, 2001). However, research examining the nature of the association between AD/HD and aggressive behaviour in preschoolers remains scant.

Two separate lines of research have provided clear evidence that children with AD/HD and attendant socially aggressive behaviour constitute an exceptionally high-risk population for later psychological, emotional and social impairments. A series of longitudinal studies, in which children with high levels of AD/HD and aggressive behaviour had been followed until adolescence, document a high likelihood of stability of such behaviours over time (Manuzza *et al.*, 1993; Biederman *et al.*, 1996; Barkley *et al.*, 2004). Moreover, the aforementioned studies provide evidence that this group of children usually develops behaviour problems, conduct disorder and later substance use significantly more frequently compared with 'normal' children or children displaying only AD/HD.

Conversely, retrospective studies have associated the early onset of conduct disorder and antisocial behaviour with the early combination of AD/HD with social aggression (Loeber, 1990; Patterson *et al.*, 1992). Moffitt (1990) demonstrated that

children with AD/HD and comorbid delinquent behaviour at age 13 had had more chronic and severe conduct problems beginning at age five, as opposed to children who had a later onset of conduct problems or had no comorbid disorder. Shaw *et al.* (2000) provided further evidence that there are relatively few children who have a late onset of serious externalizing problems after the preschool period.

Since the combination of AD/HD and aggressive behaviour seems to place children at a greater risk for negative outcomes, the study of such behaviours at their early manifestation seems crucial for prevention and early intervention. Preschool years appear to serve as a critical period during which clinically significant disruptive behaviour problems may emerge and continue into childhood and adolescence.

However, aggression is not a unitary construct and different forms of aggression may be related to different outcomes. Bjorkqvist *et al.* (1992) proposed a classification of children's aggressive behaviour into three categories: 'Physical Aggression', 'Direct Verbal Aggression' and 'Indirect Aggression'. Nevertheless, only limited research has looked into which forms of aggressive behaviour are usually exhibited by preschoolers with AD/HD. Therefore, the current study takes a first step towards this goal by categorizing target behaviours as physical, direct verbal and indirect aggressive behaviours.

Furthermore, it has been suggested that AD/HD and aggressive behaviour are more frequently manifested by males than females. School-aged boys with AD/HD have been found to demonstrate disruptive and aggressive behaviours more frequently than girls. School-aged girls with AD/HD often display less inappropriate behaviour and peer aggression (Carlson *et al.*, 1997; Gaub & Carlson, 1997; Biederman *et al.*, 1999). It seems, therefore, that aggressive behaviour is differently expressed in boys and girls with AD/HD during childhood. It remains unclear, however, whether preschool boys and girls with AD/HD differ in the manifestation of aggressive behaviour. A key aim of the present study is to examine whether the development of aggressive behaviour is related to the presence of AD/HD to the same degree for preschool boys and girls.

Within this framework, in the present study we sought to: (a) report on prevalence rates of AD/HD among preschoolers; (b) investigate the presence of different forms of aggressive behaviour in preschoolers; and (c) investigate whether the development of aggressive behaviour in preschool children is related to the presence of AD/HD to the same degree for boys and girls.

Method

Participants

Nursery teachers provided anonymously ratings for 925 preschoolers aged three to six, attending kindergartens and nursery schools situated within the area of Athens, representing a socio-economically diverse population. Age and gender distributions were as follows: mean age=56.01 months, standard deviation = 8.9; 51.6% males, 48.4% females. The mean time of attendance of the kindergarten or the nursery

school was 20.27 months (standard deviation = 11.87). Twenty-nine per cent of the preschoolers had at least one sibling.

Measures

The Greek version of the Strengths and Difficulties Questionnaire, teacher form, 3–16 years old (Goodman, 1997). The Strengths and Difficulties Questionnaire (SDQ) is a one-page behavioural screening questionnaire designed to measure the psychological well-being of children and adolescents. Several studies have demonstrated the usefulness of the SDQ as a screening and research tool, as part of a clinical assessment and as a treatment–outcome measure (Garralda *et al.*, 2000; Goodman *et al.*, 2000a, 2000b).

The SDQ asks about 25 attributes, positive and negative. The 25 items are divided between five scales of five items each, generating scores for Conduct Problems, Inattention-Hyperactivity, Emotional Symptoms, Peer Problems and Prosocial Behaviour. The items' selection was based on current concepts regarding the classification of disorders, as presented in the contemporary diagnostic manuals, as well as on previous factor analyses. Each item is scored as 0 (not true), 1 (somewhat true) or 2 (certainly true). All but the last scale are summed to generate a Total Difficulties Score. According to whether scores fall above or below a cut-off point, children and adolescents are classified as 'normal', 'borderline' and 'abnormal'. The psychometric properties of the SDQ have been well documented in large epidemiological studies within the preschool age group (Goodman, 2001).

The Aggressive Behaviour Questionnaire. An 11-item teacher-completed rating scale was constructed for the identification of preschoolers exhibiting aggressive behaviours. Five items (hit, throw objects, snatch objects, destroy objects, argue) constitute the 'Physical Aggression Scale'; four items (swear, lie, threat, steal) constitute the 'Verbal/Indirect Aggression Scale'; and the remaining two items (is liked, is obedient) reflect prosocial behaviours. The items are scored as 0 (not at all), 1 (a little), 2 (quite a lot). The two scales had good internal reliability, with coefficient alphas ranging from 0.73 for the 'Verbal/Indirect Aggression Scale' to 0.89 for the 'Physical Aggression Scale'.

Procedure

Educators' participation was anonymous and voluntary. Nursery teachers were told that the aim of the study was to investigate their perceptions towards children's behaviour. Teachers were asked to fill in the questionnaires within a few weeks' time. The questionnaires were then collected and handed in to the researcher.

Statistics

Group comparisons were conducted using *t*-tests and chi-square (χ^2) tests. Analyses of variance were performed in order to identify possible interaction effects.

Table 1. Ratings (%) on the 'abnormal' band of the SDQ scales and the effect of the child's sex

SDQ scales	Sex of the child		Total	χ^2
	Male	Female		
Emotional Symptoms	5.1	6.8	5.9	$\chi^2(2,916)=1.4$
Conduct Problems	21.8	13.3	17.7	$\chi^2(2,916)=17^{**}$
Hyperactivity	19.2	9.0	14.3	$\chi^2(2,916)=26^{**}$
Peer Problems	11.0	9.9	10.5	$\chi^2(2,916)=.29$
Prosocial	25.2	12.4	19.0	$\chi^2(2,916)=26^{**}$
Total Difficulties	18.4	11.5	15.1	$\chi^2(2,916)=11.4^*$

* $p < .01$; ** $p < .001$.

Results

According to descriptive analysis (Table 1), 14.3% and 17.7% of the sample were classified as 'abnormal' in the 'Hyperactivity' and 'Conduct Problems Scale' of the SDQ respectively. About 19% of the boys was considered to manifest hyperactivity symptoms, as compared with 9% of the girls [$\chi^2(2,916) = 26, p < .001$]. Additionally, 21.8% of the boys was considered to exhibit conduct problems, as compared with 13.3% of the girls [$\chi^2(2,916) = 17, p < .001$].

Furthermore, nursery teachers reported that the preschoolers of the sample exhibited physical aggression to a greater degree (mean=0.43, standard deviation=0.48) than Verbal/Indirect Aggression (mean=0.22, standard deviation=0.35).

In order to investigate whether aggressive behaviour varied with sex of the child, a series of independent sample *t*-tests were conducted. The analysis (Table 2) revealed significant main effects of the child's sex on aggressive behaviour. In particular, boys were found to behave more aggressively than girls in general, and to score significantly higher on the 'Physical Aggression' and 'Indirect/Verbal Aggression Scales'.

Table 2. The effect of the child's sex on several forms of aggressive behaviour

Forms of aggressive behaviour	Sex of the child				<i>t</i> value
	Male		Female		
	Mean	Standard deviation	Mean	Standard deviation	
Aggressive Behaviour	0.61	0.31	0.48	0.23	7.44**
Physical Aggression Scale	0.57	0.54	0.29	0.38	8.76**
Indirect/Verbal Aggression Scale	0.27	0.40	0.18	0.31	3.72**

** $p < .001$.

Table 3. The effect of the child's sex on the 11 items of the Aggressive Behaviour Questionnaire

Items of the questionnaire	Sex of the child						<i>t</i> value
	Male		Female		Total		
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	
Hits	0.61	0.66	0.30	0.50	0.46	0.61	7.92***
Throws objects	0.48	0.63	0.15	0.40	0.32	0.55	9.30***
Snatches objects	0.65	0.67	0.39	0.56	0.53	0.64	6.27***
Destroys objects	0.29	0.57	0.09	0.32	0.19	0.47	6.63***
Swears	0.28	0.55	0.12	0.36	0.20	0.47	5.05***
Lies	0.31	0.54	0.29	0.51	0.30	0.52	0.67
Threats	0.36	0.61	0.24	0.48	0.30	0.56	3.31**
Is liked	1.49	0.59	1.53	0.54	1.51	0.56	-1.22
Argues	0.79	0.66	0.54	0.58	0.67	0.63	6.27***
Steals	0.12	0.39	0.07	0.24	0.09	0.35	2.11*
Is obedient	1.34	0.65	1.52	0.58	1.43	0.63	-4.53***

* $p < .05$, ** $p = .001$, *** $p < .001$.

Furthermore, investigation of the effect of the child's sex on each one of the 11 items of the Aggressive Behaviour Questionnaire revealed significant main effects on nine of these items. As Table 3 shows, boys were reported to hit, throw, snatch and destroy objects, swear, threat, argue and steal to a greater extent than girls. Girls were reported to be more obedient than boys.

Chi-square tests were then carried out, in order to investigate whether there were any significant associations between aggressive behaviour and Hyperactivity. Table 4 shows that the majority of children who presented several forms of aggressive behaviour 'quite a lot' were reported by their nursery teachers as falling in the 'abnormal' band of the Hyperactivity scale. Moreover, significantly fewer hyperactive than 'normal' children were reported to be liked by their peers and to be obedient. Thus, it seems that clinically significant hyperactive behaviour is strongly related to a wide range of aggressive behaviours in preschoolers.

Finally, in order to investigate whether aggressive behaviour varies with the child's sex and the presence of hyperactive symptoms, a series of 2x2 analyses of variance were carried out. The sex of the child and the presence of hyperactivity were used as independent variables, while the items of the Aggressive Behaviour Questionnaire were used as the dependent variables. This type of analysis allowed us to reveal not only the presence of main effects of each factor considered separately, but also of any interactions among the factors. Significant interactions between the sex of the child and the presence of AD/HD symptoms were found for two of the 11 items assessing aggressive behaviour. In particular, it was found that among 'normal' children, boys

Table 4. Ratings (%) and chi-square tests of the items of the Aggressive Behaviour Questionnaire for the Hyperactivity scale

Items of the questionnaire, 'quite a lot'	Hyperactivity scale			χ^2
	Normal	Border	Abnormal	
Hits	25.5	12.7	61.8	$\chi^2(4,924)=181^{**}$
Throws objects	19.0	9.5	71.4	$\chi^2(4,924)=188^{**}$
Snatches objects	26.4	11.1	62.5	$\chi^2(4,925)=223^{**}$
Destroys objects	19.4	12.9	67.7	$\chi^2(4,924)=160^{**}$
Swears	25.0	3.6	71.4	$\chi^2(4,924)=110^{**}$
Lies	44.8	6.9	48.3	$\chi^2(4,923)=88^{**}$
Threats	33.3	11.1	55.6	$\chi^2(4,922)=80^{**}$
Is liked	88.2	5.2	6.6	$\chi^2(4,920)=90^{**}$
Argues	32.9	11.0	56.1	$\chi^2(4,924)=161^{**}$
Steals	47.1	11.8	41.2	$\chi^2(4,925)=50^{**}$
Is obedient	96.3	2.2	1.5	$\chi^2(4,925)=233^{**}$

** $p < .01$.

hit at a higher frequency than girls; whereas among hyperactive children, girls hit at a higher frequency than boys [$F(1,911)=9.2, p=.002$]. Similarly, among 'normal' children, boys were reported to snatch objects more often than girls; whereas among hyperactive children, girls were reported to snatch objects more often than boys [$F(1,912)=6.21, p=.013$]. No significant interactions were found between the sex of the child and the presence of AD/HD symptoms for the remaining nine items of the Aggressive Behaviour Questionnaire.

Discussion

The aim of the present study was threefold. First, it aimed to report on prevalence rates of AD/HD in a community-based sample of preschoolers in Athens. It was found that the teacher-reported prevalence rate of AD/HD was 14.3%. Hence, our findings are commensurate with those of other related studies, which cluster preschool prevalence rates of AD/HD between 2% and 25% (Keenan *et al.*, 2000; DuPaul *et al.*, 1998; Keenan & Wakschlag, 2000; Nolan *et al.*, 2001; Sonuga-Barke *et al.*, 2003) and report a male-female ratio of 3:1 in community-based samples (Szatmari *et al.*, 1989). Furthermore, the aforementioned results are comparable with those for older children (Lavigne *et al.*, 1996). It seems, therefore, that extreme levels of certain behaviours, such as hyperactivity, distractibility and impulsivity, can indeed be detected and characterized as 'deviant' by nursery teachers. Hence, our findings are in agreement with those from related studies that support the meaningfulness of the preschool AD/HD construct (Lahey *et al.*, 1998; Connor, 2002; Wilens *et al.*, 2002; Sonuga-Barke *et al.*, 2003).

Second, the present study aimed to investigate which form of aggressive behaviour (physical, direct verbal and indirect aggression) is considerably manifested by preschoolers with AD/HD. It was found that preschoolers with AD/HD typically exercise physical aggressive actions. This finding can be explained in the framework of the frustration these children usually experience. During the preschool period, children are expected to verbally communicate adequately, master motor coordination and successfully respond to the demands of the preschool setting both in terms of achievements and behaviour. However, preschoolers with AD/HD are unlikely to fulfil parents' and teachers' expectations as they usually have deficits in speech/language development, demonstrate poor motor coordination (Barkley *et al.*, 1990) and face difficulties in following instructions and adhering to rules. Consequently, parents and teachers often display disapproval, fewer rewards and overall negative behaviour towards them (Johnston, 1996). As their verbal abilities may be limited or deficient, preschoolers with AD/HD tend to become more negative and irritable and use physical aggression in order to express their frustration (Mash & Johnston, 1982; Lahey *et al.*, 1998; Wells *et al.*, 2000). It seems, therefore, that aggressive behaviour may develop very early in children with AD/HD, even before the transition to elementary school (DuPaul *et al.*, 2001; Nolan *et al.*, 2001).

Third, the present study gave rise to important findings regarding the development of aggressive behaviour among preschool boys and girls with AD/HD. Although the analysis did not reveal any sex differences in the manifestation of nine of the 11 forms of aggressive behaviours examined in children with AD/HD, sex differences were revealed in the two remaining aggressive forms of behaviour. It was found that nursery teachers considered 'normal' girls as displaying all forms of aggressive behaviour less often than boys, but they reported that girls with AD/HD 'hit' and 'snatch objects' more often than boys with AD/HD. Therefore, it appears that the manifestation of certain forms of aggressive behaviour is differently related to the presence of AD/HD for preschool boys and girls.

The fact that girls in the general population are less aggressive than boys is well documented in the literature and is attributed to several factors, biological and/or sociocultural (Maccoby & Jacklin, 1974; Tieger, 1980). Within the framework of social learning theory, it is suggested that aggression might be more tolerated in boys but discouraged in girls (Tieger, 1980). This view is supported by research showing that disruptive behaviours are considered more untypical when present in girls than in boys (Maniadaki *et al.*, 2003). It seems that girls are taught to exert more self-control when they feel like acting aggressively from very early in their life (Smetana, 1989).

Thus, frequent manifestation of significant forms of aggressive behaviour like 'hitting' and 'snatching objects' is more likely to be a result of deficits in self-regulation in the case of girls than in the case of boys, where these behaviours might also be attributed to other reasons, like the tolerance (or even encouragement) of the environment. Therefore, the manifestation of aggressive behaviours like the ones reported could constitute an important indication of the presence of AD/HD in preschool girls.

The findings of this study could have several implications both for the diagnosis and treatment of AD/HD. First, it has been shown that aggressive behaviour manifested by preschoolers should not be effortlessly regarded as an age-appropriate pattern of behaviour, rather, the possibility of the presence of AD/HD should be thoroughly investigated. Second, if clinically significant disruptive behaviour problems, such as AD/HD, could be reliably identified at preschool age, professionals should intensify prevention efforts by promoting preschool educators' knowledge of the nature of the disorder and training them at the use of relevant screening instruments (Kakouros *et al.*, 1999; Keenan & Wakschlag, 2000).

Third, the implications of social dysfunction are of concern given that the combination of AD/HD and attendant aggressive behaviour has been shown to be a strong predictor of future negative outcomes. Hence, the identification and treatment not only of the primary symptoms of the disorder, but also of its sequela is of high clinical importance. Besides, interventions implemented at preschool age have been proved more successful than interventions targeted at school-aged children (Reid, 1993; Keenan & Wakschlag, 2000).

Finally, the close relationship between aggressive behaviour and AD/HD in preschool girls provides some evidence that aggressive behaviour in preschool girls could be used as an important indication of the presence of AD/HD. Second, this could be possibly taken into account in the adjustment of the diagnostic criteria and the norms used in rating scales for the screening of AD/HD in boys and girls. Moreover, clinicians should be aware that aggressive behaviour might have different correlates when manifested by boys and girls, in order to avoid under-referral and under-diagnosis of preschool girls with AD/HD, especially in the light of recent research findings demonstrating that girls with AD/HD and comorbid conduct problems are at a very high risk of psychiatric admission in adulthood.

However, our findings are subject to several limitations and certainly need replication with the use of AD/HD-specific rating scales, based on the DSM-IV, and standardized measures of aggressiveness. In addition, it cannot be inferred that the children in this study are equivalent to clinically referred samples with a diagnosis of AD/HD who might be presented with a relatively different clinical pattern. Moreover, the generalization of our results is limited to nursery teachers' perceptions of the presence of AD/HD symptoms and aggressive behaviour among preschoolers. Finally, the nursery teacher sample was narrowly derived from a certain urban centre and may not be representative of all nursery teachers.

Despite methodological limitations, these results clearly underscore the high-risk nature of boys and girls exhibiting a constellation of symptoms characterized by elevated levels of attention distractibility, impulsiveness and motor overactivity, even at a young age, and furthermore encourage efforts of prevention and early intervention. Moreover, the child's sex has been revealed as a factor to consider in the identification of AD/HD at preschool age as several forms of aggressive behaviour might account differently for the diagnosis of the disorder in the two sexes.

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