

# Relationship between symptoms of attention-deficit/hyperactivity disorder and family functioning: a community-based study

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**Abstract** This study examined the relationship between family functioning and attention-deficit/hyperactivity disorder (ADHD) symptoms in an Australian community-based sample. Children were screened for ADHD in their second year of formal schooling. Two hundred and two (202) primary caregivers completed validated measures of family quality of life (QoL), parent mental health, parenting styles and parental relationship quality. Compared with controls, parents of children screening positive for ADHD reported poorer family QoL in the domains of emotional impact (mean difference [MD]  $-20.1$ ; 95% CI  $-38.2$  to  $-1.9$ ,  $p=0.03$ ) and impact on family activities (MD  $-17.2$ ; 95% CI  $-27.9$  to  $-6.5$ ,  $p=0.002$ ), less parental warmth (MD  $-3.4$ ; 95% CI  $-6.0$  to  $-0.9$ ,  $p=0.01$ ) and higher parental depression (MD  $6.8$ ; 95% CI  $1.8$  to  $11.7$ ,  $p=0.009$ ) and

anxiety (MD  $6.2$ ; 95% CI  $1.7$  to  $10.6$ ,  $p=0.008$ ) after adjusting for socio-demographic characteristics and child conduct symptoms. Parents of children screening positive for ADHD reported higher stress (MD  $4.5$ ; 95% CI  $1.2$  to  $7.1$ ,  $p=0.007$ ) and more inconsistent (MD  $3.0$ ; 95% CI  $1.2$  to  $4.8$ ,  $p=0.002$ ) and hostile (MD  $2.2$ ; 95% CI  $1.0$  to  $3.4$ ,  $p=0.001$ ) parenting after adjusting for socio-demographic factors only. No difference in parental relationship quality and parental inductive reasoning was identified. **Conclusion:** These findings suggest a strong association between poor family functioning and ADHD symptoms and carry implications for comprehensive ADHD management and the importance of seeing the child within the family context.

**Keywords** Attention-deficit/hyperactivity disorder · Family functioning · Parenting · Quality of life · Parent mental health

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## Introduction

Attention-deficit/hyperactivity disorder (ADHD) is the most common developmental condition in childhood, with a prevalence of approximately 5% of school-aged children worldwide [2, 38]. Research into the relationship between ADHD and family functioning has yielded inconsistent findings [31]. Further knowledge in this area may have important implications for management and lead to a reduction in the poor outcomes these children often demonstrate later in life [1, 3].

Family–environmental adversity has been associated with ADHD [8]. Families of children with ADHD exhibit higher levels of family conflict and lower cohesion than control families [4, 8, 36, 39]. Parents of children with ADHD have been found to have higher levels of psycho-

pathology than parents of control children [5, 7], including more parental depression, anxiety and stress [9–12, 16–18, 35, 37, 39, 48]. It is important to establish whether mental health problems in these parents are clinically significant, as this indicates the need for intervention. Unfortunately, many studies which use rating scales to define mental health problems do not indicate whether parental mental health problems fall within the clinical range [10–12, 16, 17]. Parents of children with ADHD also rate higher on scales of ADHD symptoms such as hyperactivity/restlessness and inattention/cognitive problems than parents of children without ADHD [19]. In addition, parents of children with ADHD use more aggressive parenting behaviours (such as losing their temper and resorting to physical punishment more frequently) and less proactive behaviours and are less likely to use inductive control methods (such as positive incentives and reasoning) than parents of control children [32, 46]. They have also been shown to use fewer direct commands, more child punishment, mother–child interactions which are less positive and more negative behaviours towards their child [18, 23, 27, 32, 43, 46]. Families of children with ADHD are also characterised by lower marital satisfaction [15, 43] and higher levels of parental separation and divorce than control families [3, 10–12].

Key questions regarding which child variables contribute to family dysfunction remain unresolved [31]. There is debate as to whether it is ADHD itself, or comorbid disruptive behaviour disorders, which relate to poor family functioning. This has important implications for treatment because knowing of which symptoms are detrimental to the family is vital to target interventions. Hurtig et al. [28] found few associations between family characteristics and ADHD only, but that children with ADHD and comorbid disorders were more likely to come from non-intact families and have parents who were more stressed and disinterested. One study found adolescents with ADHD and conduct problems to report higher inter-parental discord than adolescents with ADHD alone, or without ADHD [47]. Measures of family adversity have been more closely linked to symptoms of disruptive behaviour disorders than to ADHD [17]. Many studies have found no difference between ADHD and control families on various domains of family functioning such as parental conflict or separation and general family functioning [4, 16, 20, 22].

Much research on family functioning and ADHD is limited by the use of clinical samples [3, 4, 6, 15, 16, 30, 33, 35, 36]. These samples are often characterised by an over-representation of boys, children with ADHD-combined subtype and children with more severe ADHD symptoms and comorbidity. In addition, few studies have investigated multiple aspects of family functioning at a time. This makes it difficult to establish the extent to which

different domains of family functioning are associated with a single set of symptoms.

The present study aimed to investigate differences in family functioning in an Australian community-based sample of 6- to 9-year-old children with significant ADHD symptoms by parent and teacher report, compared with children without these symptoms. Specifically, this study aimed to investigate four domains of family functioning: family quality of life, parent mental health, parenting styles and parental relationship quality. These domains were chosen with the aim to cover a range of family problems, which have been previously connected to childhood ADHD symptoms in the literature. We specifically aimed to investigate a broad range of family functioning variables within one sample: as mentioned, few previous studies have achieved this. We hypothesised that parents of children with significant ADHD symptoms would report lower family quality of life (characterised by their child's behaviour having more emotional impact, time impact and impact on family activities), more parental psychopathology (higher levels of depression, anxiety and stress), less effective parenting styles (more hostile parenting, and less consistent parenting, parental warmth and inductive reasoning) and more parental conflict (less support from their partner and a more argumentative partner relationship) than parents of control children.

## Method

### Participants

Participants were parents of grade 1 (second year of formal schooling) children from nine primary schools in the Western Metropolitan Region of Melbourne, Australia who were participating in a larger longitudinal study. The area sampled was one of low socio-economic status (Index of Community Socioeconomic Advantage scores between 924 and 1,029 for schools in the area). The population mean of this index is 1,000 and the standard deviation is 100. Parents had completed an ADHD screening questionnaire as part of the larger study (see “Measures” section below). Also as part of the larger study, if parents gave consent for their child's classroom teacher to complete a questionnaire, teachers were sent a short screening questionnaire to complete (see “Measures” section below). Parents who had provided consent to further follow-up after completing the screening questionnaire were approached to participate in this study ( $N=349$ ). Parents, who were deemed by research staff during initial and follow-up telephone calls to have insufficient English skills to complete the questionnaire, were excluded from the study. Six families were excluded on this basis.

## Procedure

Ethics approval was obtained for this study through the Royal Children's Hospital and Department of Education and Early Childhood Development. Parents who completed the ADHD screening survey during their child's second year of formal schooling as part of the larger study (53% response rate) and provided contact details were contacted by telephone to participate in this study. Consenting families were mailed the family functioning questionnaire (to be completed by the primary caregiver), study information sheet and participant consent form. These questionnaires were completed at the end of the child's second year, or the start of the third year, of formal schooling. Parents were sent a reminder questionnaire 2 weeks after the first questionnaire was sent and received a reminder telephone call after another 2 weeks, had the questionnaire not been received.

## Measures

### *ADHD symptoms*

Child inattention and hyperactivity/impulsivity symptoms were measured using the ADHD Index of the Conners' Parent Rating Scale-Revised (CPRS-R) and the Conners' Teacher Rating Scale-Revised (CTRS-R) [13, 14]. The ADHD index comprises 12 items covering inattention, hyperactivity and impulsivity symptoms, rated from 0 ('Not true at all') to 3 ('Very much true'). We used the ADHD index because it provides a composite measure of the full spectrum of ADHD symptoms experienced in childhood. Furthermore, parents and teachers can complete it without much burden. The CPRS-R is a validated measure of problem behaviours in children, with excellent internal reliability and overall correct classification rate [13, 25]. Goyette et al. [25] showed no significant differences between maternal and paternal ratings on this measure. Children were considered to have screened positive for ADHD if they scored one standard deviation or more above the mean (based on normative data for age and gender) by both parent (CPRS-R) and teacher (CTRS-R) report on the ADHD index.

### *Conduct symptoms*

The Strengths and Difficulties Questionnaire (SDQ) is a mental health screening questionnaire for children aged 3–16 years and was used to measure conduct symptoms [24]. The 'conduct problems' section of the SDQ comprises five items, rated by parents on a three-point scale from 0 ('Not true') to 2 ('Certainly true'), and has adequate internal reliability ( $\alpha=0.63$ ). Scores are added to give a total possible score of 10, with a higher score indicating more behavioural difficulties. Children scoring above the

90th percentile (based on normative data on age and gender) in this study were classified as having significant conduct problems. This was equivalent to a score of 7 or above. In a large Australian sample, having a 'high risk' score (top 10%) on the conduct problems scale of the SDQ was associated with a greater probability of a DSM-IV diagnosis of CD or ODD (odds ratio 30.5) [26].

### *Family quality of life*

The Child Health Questionnaire-Parent Version (CHQ-PF50) is a reliable and validated measure of health-related quality of life in children with ADHD [40]. The CHQ-PF50 has good to very good internal consistency on emotional impact ( $\alpha=0.68$ ), time impact ( $\alpha=0.75$ ) and family activities ( $\alpha=0.87$ ) scales [44]. The items used measure the impact of a child's behaviour on the family. The emotional impact on parent (two items, rated from 1 'None' to 5 'A lot'), time impact on parent (two items, rated from 1 'Yes, limited me a lot' to 4 'No, did not limit me') and family activities (six items, rated from 1 'Very often' to 5 'Never') scales were used. Each of these scales is scored as the mean of the items (score between 1 and 5) and converted to a score out of 100. The first section is reverse-coded, thus higher scores in all three scales represent a higher level of family functioning.

### *Parental psychopathology*

The Depression Anxiety Stress Scale (DASS) is a validated measure of adult depression, anxiety and stress ( $\alpha$ -coefficients 0.91, 0.81, 0.89 on the DASS, respectively) [34]. The DASS 21 item version (DASS-21), used in the present study, comprises seven items in each of three subscales (depression, anxiety, stress), rated on a four-point scale from 0 ('Never') to 3 ('Most of the time'). Scores are doubled to give a total possible score of 42 for each subscale, with an overall total possible score of 126. A higher score indicates greater parental psychopathology. Scores equal to or above 10, 8 or 15 on the depression, anxiety and stress scales of the DASS, respectively, indicate a clinically significant level of symptoms. Parents were also asked 'have you been diagnosed with a mental health condition by a health professional (e.g. depression, anxiety or psychosis)?' and if yes, were asked to describe further.

### *Parenting styles*

Scales of hostile parenting (four items, for example 'How often are you angry when you punish this child?', 'How often do you tell this child that he/she is bad or not as good as others?'), parental warmth (six items, for example 'How often do you hug or hold this child for no apparent reason?', 'How often do you enjoy listening to this child

and doing things with him/her?") and consistent parenting (seven items, for example 'How often is this child able to get out of punishment when he/she really sets his/her mind to it?', 'When you discipline this child, how often does he/she ignore the punishment?') were used. These scales were used by the Longitudinal Study of Australian Children (LSAC) and measure three dimensions of parenting identified by the LSAC as having a significant impact on a child's development and health [49]. Four items on inductive reasoning were also included (for example, 'How often do you explain to this child, the consequences of his/her behaviour?', 'How often do you give this child reasons why rules should be obeyed?'). The 21 items are scored on a five-point scale from 1 ('Never/Almost never') to 5 ('Almost always' for parental warmth and inductive reasoning items, or 'All the time' for hostile and consistent parenting items). Higher scores indicate more aggressive parenting, parental warmth and inductive reasoning, while a lower score indicates more consistent parenting. In this study, internal consistencies were good to very good for hostile parenting ( $\alpha=0.70$ ), consistent parenting ( $\alpha=0.71$ ), parental warmth ( $\alpha=0.88$ ) and inductive reasoning ( $\alpha=0.81$ ) scales.

#### Parental conflict

The 'argumentative relationship' (four items, for example 'How often do you and your partner argue?', 'How often is there anger or hostility between you and your partner?') and 'reciprocal support for parenting' (three items, for example 'How often is your partner a resource and support to you in raising your child(ren)?') scales, as used by the LSAC, were employed to examine these two aspects of parental relationship functioning [49]. Items are scored on a five-point scale from 1 (Never) to 5 (Always), with higher scores indicating a more argumentative relationship and a higher level of reciprocal support respectively. In this study, internal consistencies were good to very good for reciprocal support ( $\alpha=0.67$ ) and argumentative relationship scales ( $\alpha=0.83$ ).

#### Statistical analyses

Study variables are described using percentages for categorical variables and medians, inter-quartile ranges and ranges for quantitative variables. Family functioning variables were compared between positive-screen and negative-screen groups using *t* tests. The *p* values from using Mann–Whitney (rank sum) tests to compare the groups were similar to those of the *t* tests suggesting that the sampling distribution of the mean difference is normal for these analyses. We therefore report the results from the *t* test analyses in this article. To control for possible confounders, two separate linear regression models were used. ADHD and conduct symptoms often occur together; therefore, it may be challenging to

separate the effects of these on family functioning. We believe that this makes it difficult to adjust for conduct symptoms without possibly removing some of the effect of the child's ADHD. Thus, in the first regression model, we adjusted for socio-demographic factors (child gender, parent education, single-parent status) only, and in the second, we additionally adjusted for conduct symptoms.

The percentage of parents with mental health scores in the clinical range was compared between the positive- and negative-screen groups using the Chi-squared test. ADHD score was dichotomised because the relationship between ADHD score family functioning was not linear.

## Results

### Sample characteristics

Family functioning data were collected for 202 children (59% of the 343 eligible participants) aged between 6.3 and 9.1 years (mean 7.5 years). Families who returned the questionnaire did not differ markedly from those who did not return the questionnaire in terms of mean (SD) parent-reported ADHD index raw score (10.9 (SD 9.0) versus 10.1 (SD 8.4), respectively), primary caregiver education (52% versus 48% completed high school) or child gender (51% versus 49% were male). Respondents did, however, differ from non-respondents on single-parent status (57% versus 43%). Single parents were less likely to return the questionnaire in the negative-screen group (61% versus 39%), but there was no marked tendency for this in the positive-screen group (43% versus 47%).

Fifty-one percent of the children were male. Of the respondents, 92% were the mother of the child, and 74% of children were living with both biological parents. Ninety-two percent of parents reported English as the main language spoken at home. Seventy-eight percent of primary caregivers had completed at least high school or equivalent education (Table 1). Fifty-six parents (28%) reported that they had been previously diagnosed with a mental health condition. Forty-one parents provided information describing their previous diagnosis. Diagnoses included depression ( $n=23$ ), anxiety ( $n=17$ ), ADHD ( $n=2$ ), bipolar disorder ( $n=2$ ), obsessive compulsive disorder ( $n=2$ ), panic disorder ( $n=2$ ) and borderline personality disorder ( $n=2$ ).

Sixteen families were excluded from the analyses because they had incomplete teacher ADHD screening data. Of the children with complete parent and teacher screening data ( $N=186$ ), 30 children (16%) screened positive for ADHD and 156 (84%) screened negative. Nine children (30%) screening positive for ADHD had a previous diagnosis of ADHD by parent report. There was one child with a previous diagnosis of ADHD who did not screen positive for ADHD. Children screening positively for ADHD symptoms were more likely

**Table 1** Socio-demographic characteristics of participating families ( $N=202$ )

Characteristic	Statistic	
	<i>n</i>	%
<b>Child</b>		
Age (years) (mean (SD), range)		7.5 (0.4), 6.3–9.1
Male	103	51
Living with both biological parents	149	73.8
<b>Primary caregiver</b>		
Age (years) (mean (SD), range)		36.5 (5.8), 23–59
<b>Relationship to child</b>		
Mother	185	91.6
Father	15	7.4
Other	2	1
<b>Education status</b>		
Did not complete high school	44	21.8
Completed high school only	112	55.5
Completed tertiary certificate/degree	46	22.8
In paid employment	109	54
Married/de facto	169	83.7
Diagnosis of ADHD	2	1
Diagnosis of mental health condition	56	27.7
<b>Secondary caregiver</b>		
Age (years) (mean (SD), range)		39 (5.9), 26–68
<b>Relationship to child</b>		
Biological parent	149	73.8
Other	14	8.4
<b>Education status</b>		
Did not complete high school	49	24.3
Completed high school only	91	45
Completed tertiary certificate/degree	26	12.9
In paid employment	151	74.8
Diagnosis of ADHD	2	1
Diagnosis of mental health condition	23	11.4
<b>Number of siblings</b>		
None	16	7.9
1–3	159	78.7
More than 3	22	10.9
English is main language spoken at home	185	91.6
<b>Household income (AUS)</b>		
Below 30,000	31	15.3
Between 30,001 and 60,000	45	22.3
Between 60,001 and 90,000	65	32.2
Above 90,000	49	24.3

to live in a single-parent family than their negative-screening counterparts (40% versus 12%). There was a greater percentage of parents with a lower education level for children screening positive compared to those screening negative (33% versus 22%). The proportion of males was 53% and 49% in the positive-screen and negative-screen groups, respectively.

#### Unadjusted analyses

Parents of children who screened positive for ADHD reported lower family quality of life in the domains of the impact of their child's behaviour on their emotions (mean difference [MD]  $-29.5$ ; 95% CI  $-39.4$  to  $-19.5$ ,  $p<0.001$ ), time (MD  $-10.1$ ; 95% CI  $-18.6$  to  $-1.5$ ,  $p=0.02$ ) and family

activities (MD  $-28.7$ ; 95% CI  $-36.7$  to  $-20.8$ ,  $p<0.001$ ). These parents also had higher depression (MD  $8.4$ ; 95% CI  $5.5$  to  $11.3$ ,  $p<0.001$ ), anxiety (MD  $6.4$ ; 95% CI  $4.2$  to  $8.6$ ,  $p<0.001$ ) and stress (MD  $5.8$ ; 95% CI  $2.7$  to  $8.9$ ,  $p<0.001$ ) scores than parents of children who screened negative. The scores for these mental health scales were also more likely to be within the clinical range (15% versus 53%,  $p<0.001$ ; 13% versus 46%,  $p<0.001$ ; 14% versus 53%,  $p<0.001$ , respectively). Parents of children who screened positive were also more likely (57% versus 21%) to have a previously diagnosed mental health condition ( $p<0.001$ ).

Parents of children who screened positively also reported significantly lower parental warmth (MD  $-2.6$ ; 95% CI  $-4.0$  to  $-1.8$ ,  $p<0.001$ ), less consistent parenting styles (MD  $3.6$ ; 95% CI  $1.9$  to  $5.4$ ,  $p<0.001$ ) and more hostile parenting styles (MD  $2.3$ ; 95% CI  $1.1$  to  $3.4$ ,  $p<0.001$ ) than parents of children who screened negatively (Table 2). There was little evidence of a difference in inductive reasoning between groups (MD  $-0.8$ ; 95% CI  $-0.2$  to  $1.7$ ,  $p=0.12$ ) (Table 2). Similarly, there was little evidence of a difference on parent conflict measures of reciprocal support (MD  $-0.02$ ; 95% CI  $-0.86$  to  $0.90$ ,  $p=0.96$ ) and argumentative couple relationship (MD  $1.0$ ; 95% CI  $0.4$  to  $2.4$ ,  $p=0.15$ ).

#### Adjusted analyses

All of the results outlined above that were significant at the 5% level remained so except for time impact after using

linear regression to adjust for parent education, single-parent status and child gender (Table 3). The results for emotional impact, family activities and parental warmth, as well as primary caregiver depression and anxiety, remained significant at the 5% level when conduct symptoms were added to the regression model (Table 3). The difference, however, in time impact, hostile and consistent parenting and parent stress was no longer significant at the 5% level after adjusting for conduct symptoms (Table 3).

#### Discussion

This study highlights that children with significant parent- and teacher-reported ADHD symptoms have poorer family functioning than children who screen negative for ADHD. Specifically, children screening positive for ADHD had lower parent-reported family quality of life (measured as emotional and time impact on the parent and impact on family activities), more parental depression, anxiety and stress and parents who reported less parental warmth, less consistent parenting and more hostile parenting styles compared with children who screened negative. These results, except for time impact on the parent, remained significant at the 5% level when controlled for socio-demographic factors (child gender, parent education and single-parent status). The results for emotional impact and impact on family activities, parental warmth, and

**Table 2** Outcome variables in children screening positive for ADHD symptoms ( $N=186$ )

Outcome variables	Positive ( $N=30$ )			Negative ( $N=156$ )			$p$ value <sup>b</sup>
	Median	IQR <sup>a</sup>	Range	Median	IQR	Range	
Family quality of life							
Emotional impact	50.0	25.0–62.5	0–100	87.5	62.5–100	0–100	<0.001
Time impact	66.7	66.7–100	16.7–100	100	83.3–100	0–100	0.02
Family activities	56.3	37.5–75.0	8.3–100	91.7	75.0–100	12.5–100	<0.001
Parental psychopathology							
Depression	12.2	2.4–19.5	0–41.5	2.1	0–6.3	0–37.7	<0.001
Anxiety	7.1	2.1–14.3	0–28.6	2.1	0–4.1	0–30.7	<0.001
Stress	15.8	5.9–19.7	0–35.5	5.9	2.0–11.8	0–39.5	<0.001
Parenting styles							
Parental warmth	24.0	21.0–26.0	12.0–30.0	27.0	24.0–29.0	15.0–30.0	<0.001
Hostile parenting	11.0	9.0–14.0	6.0–19.0	9.0	7.0–11.0	4.0–17.0	<0.001
Consistent parenting	16.0	14.0–20.0	8.0–30.0	12.0	10.0–15.0	7.0–28.0	<0.001
Inductive reasoning	16.0	15.0–19.0	11.0–20.0	17.0	16.0–19.0	9.0–20.0	0.12
Parental relationship							
Reciprocal support	14.0	12.0–15.0	11.0–15.0	14.0	12.0–15.0	8.0–15.0	0.96
Argumentative relationship	8.5	7.0–11.0	4.0–20.0	8.0	6.0–10.0	4.0–19.0	0.15

<sup>a</sup> Inter-quartile range

<sup>b</sup>  $t$  test comparing mean between positive and negative groups

**Table 3** Adjusted analyses for outcome variables in children screening positive for ADHD symptoms

Outcome variables	Adjusted analysis 1 <sup>a</sup>			Adjusted analysis 2 <sup>b</sup>		
	MD	95% CI	<i>p</i> value	MD	95% CI	<i>p</i> value
Family quality of life						
Emotional impact	-25.3	-35.4 to -14.8	<0.001	-20.1	-38.2 to -1.9	0.03
Time impact	-3.3	-11.8 to -5.2	0.45	-2.3	-13.2 to 8.6	0.67
Family activities	-24.6	-32.6 to -15.5	<0.001	-17.2	-27.9 to -6.5	0.002
Parental psychopathology						
Depression	7.0	4.0 to 10.0	<0.001	6.8	1.8 to 11.7	0.009
Anxiety	5.7	3.4 to 8.0	<0.001	6.2	1.7 to 10.6	0.008
Stress	4.5	1.2 to 7.1	0.007	4.8	-0.4 to 10.1	0.07
Parenting styles						
Parental warmth	-2.5	-4.0 to -1.0	0.001	-3.4	-6.0 to -0.9	0.01
Hostile parenting	2.2	1.0 to 3.4	0.001	1.7	0.1 to 3.5	0.07
Consistent parenting	3.0	1.2 to 4.8	0.002	2.8	-0.7 to 6.2	0.12
Inductive reasoning	-0.7	-1.7 to 0.4	0.19	-0.7	-2.7 to 1.2	0.46
Parental relationship						
Reciprocal support	-0.06	-0.96 to 0.82	0.90	0.7	-0.9 to -2.2	0.37
Argumentative relationship	0.9	-0.5 to 2.3	0.21	0.9	1.6 to 3.4	0.48

<sup>a</sup> Adjusted for primary caregiver education, single-parent status and child gender

<sup>b</sup> Adjusted for primary caregiver education, single-parent status, child gender and child conduct symptoms

caregiver depression and anxiety also remained significant at the 5% level when controlled for child conduct symptoms. Contrary to expectations, little evidence of a difference was found between positive-screen and negative-screen groups on the reciprocal support and argumentative relationship scales used to measure parental conflict, nor on the parental inductive reasoning scale.

Our findings regarding parent mental health confirm the results of previous research which has demonstrated more parental depression and anxiety and higher stress levels in parents of children with ADHD [9–12, 16–18, 30, 35, 37, 39, 48]. Parents in our study not only scored higher on these measures, but were more likely to have scores within the clinical range. Some studies have used a diagnostic interview to determine parent mental health problems and so have also reported problems which fall within the clinical range [9, 15, 37]. Several studies which use rating scales to measure parent mental health, however, simply report higher scores on these scales as an indication of parental psychopathology [10–12, 16, 17]. Although these studies report that such scales are correlated with clinical ratings of depression, they give no indication of whether parents' scores are clinically significant. This is one of only a handful of studies investigating multiple mental health domains within one sample. Most studies in this field have investigated depression as a mental health outcome for caregivers of children with ADHD, rather than broadening to other mental health conditions. Of note, only two parents in our sample reported a diagnosis of ADHD. It is likely that many more parents display similar symptoms to their children, but have not been diagnosed with ADHD [19].

Although we did not assess ADHD symptoms in parents, this would be an interesting point for future research. Unrecognised and untreated ADHD symptoms in these parents may also contribute to poorer family functioning. These results highlight the importance of recognising parent mental health problems when children present with behavioural difficulties.

Results with regard to hostile parenting and parental warmth and consistency are consistent with previous research, which has found parents of children with ADHD to use less positive and more aggressive parenting behaviours (such as parents losing their temper and using physical punishment more frequently) [32, 46]. The consistent parenting and inductive reasoning measures used in this study, which are also used by the LSAC [49], investigate more specific aspects of parenting to many previous studies, which have focussed more on general 'positive' and 'negative' parenting behaviours and parental aggression and punishment [23, 27, 32, 46]. Our results provide more specific information regarding the parenting styles in young school-aged children with symptoms of ADHD.

Little evidence of a difference was found between children who did and did not screen positive for ADHD on the parenting measure of inductive reasoning, which measured whether parents explained to their child the consequences of behaviours, and the reasoning behind rules and punishments. We hypothesise that this finding may be due to participating children being quite young (mean age 7.5 years) and that inductive reasoning is a less prominent parenting behaviour in this age group overall. A

difference in this measure between positive-screen and negative-screen children may have been seen in an older cohort, when inductive reasoning may become more important as a parenting behaviour. Indeed, in the study by Woodward et al. [46], which found parents of boys with hyperactivity to be less likely to employ inductive control methods, the mean age of children was 9 years.

The results of lower family quality of life (greater emotional impact on parents and impact on family activities) were also expected, given previous findings on general family functioning [4, 8, 11, 18, 36, 39, 41]. Much of the research in this area, however, has investigated measures of general family functioning such as family conflict, cohesion and expressiveness, as opposed to the specific impact of child behaviour on family functioning in areas such as the family's ability to complete day-to-day activities. Thus, these results provide new insights into different aspects of family functioning which are affected in families of children with ADHD. This includes an indication of the direction of association between ADHD and family quality of life, given that our measures asked specifically about how the child's behaviour impacts on these areas.

We found little evidence of a difference between parents of children who screened positive and parents of children who screened negative in terms of parental relationship (the amount of support they felt they had from their partner or on the argumentative relationship scale). While inconsistent with some research [15, 33, 43], these results are in accordance with other studies [4, 20, 22]. In our study, this measure was only collected from parents who were living with a partner. A greater percentage of children who screened positive, however, came from single-parent families. It is possible that those parents with the most conflict had already separated, rendering it more difficult to detect a difference between groups in parental relationship which may still exist. Johnston and Mash [31] present a similar hypothesis to explain comparable results in other studies.

Only some results remained significant at the 5% level after controlling for conduct symptoms. ADHD and conduct symptoms commonly occur together [29]. Indeed ADHD symptom severity in childhood has been found to predict CD symptom scores in adolescence [45]. It is possible that many children would not have developed significant conduct symptoms if they did not have ADHD; thus, conduct symptoms may be on a causal pathway from ADHD to poorer family functioning. In addition, given that ADHD is a major risk factor for the development of other disruptive behaviour disorders, the treatment of ADHD may help prevent conduct symptoms from developing and in turn could reduce the severity of family dysfunction.

The use of a community sample in this study overcomes a limitation of many previous studies which use clinically

referred samples; these are often over-represented by boys, subjects with greater ADHD symptom severity and more comorbid conditions. The 1:1 gender ratio in this sample was also a strength in this respect and is consistent with a recent community-based study [42]. Although the 16% positive-screen rate was high, this is because impairment and symptom duration components of the DSM-IV criteria were not taken into account. Of note, only 30% of children screening positive for ADHD had a previous diagnosis of ADHD. This may have impacted on our findings in many ways. Perhaps failure to identify, diagnose and manage ADHD symptoms is influencing the level of family dysfunction reported in this study. Previous studies of children diagnosed with ADHD, however, have reported similar findings to the present study [31]. It is difficult to gain an overall picture of family functioning in children with ADHD based on past research, given that many studies only examine one or two aspects of family functioning, and studies are difficult to compare due to differing definitions of ADHD. An additional strength of this study is the investigation of the impact of a single set of symptoms on a range of different family functioning variables.

This study has a number of limitations including that it is a cross-sectional study; therefore, causality cannot be inferred. Future longitudinal research in this area will be vital in determining the direction of association between ADHD and poorer family functioning. In addition, this study is limited by the bias inherent in self-report measures used to collect data, and in particular, that family functioning measures were only collected from one source—the parents of children with ADHD. Parents of children who screened positive for ADHD have been demonstrated in this study to have more depression symptoms, which have been associated in previous research with an over-reporting of child behaviour problems [21]. This was somewhat overcome by the use of both parent and teacher ratings to define ADHD symptoms. These results cannot be generalised to an ADHD population, as the sample was described by symptoms rather than by diagnosis of ADHD. Comorbid conduct disorder was also defined by symptoms from a screening questionnaire only. In addition, our response rate of 59% was not ideal, meaning that this sample may not be representative of the population as a whole. As this was 59% from the 53% who responded to the screening questionnaire, our sample of full family functioning data was only 30–35% of the original sample. A low response rate was somewhat expected, as the area sampled was one of low socio-economic status. Although all results remained significant at the 5% level when controlled for single-parent status, our negative-screen group was under-represented by single-parent families and thus may not be representative of the wider population.



Despite these limitations, the results of this study suggest a strong association between poor family functioning and ADHD. This has important implications for management, highlighting particularly the importance of identifying family and parental difficulties in children who present with ADHD symptoms. In addition, given the link between family functioning and these symptoms, it is possible that greater emphasis on family-directed interventions may improve the management of ADHD. Future longitudinal studies investigating the direction of the association between these variables will be important in improving outcomes for this large and vulnerable group of patients.

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