Attention-deficit/hyperactivity disorder or hyperactivity in preschool children

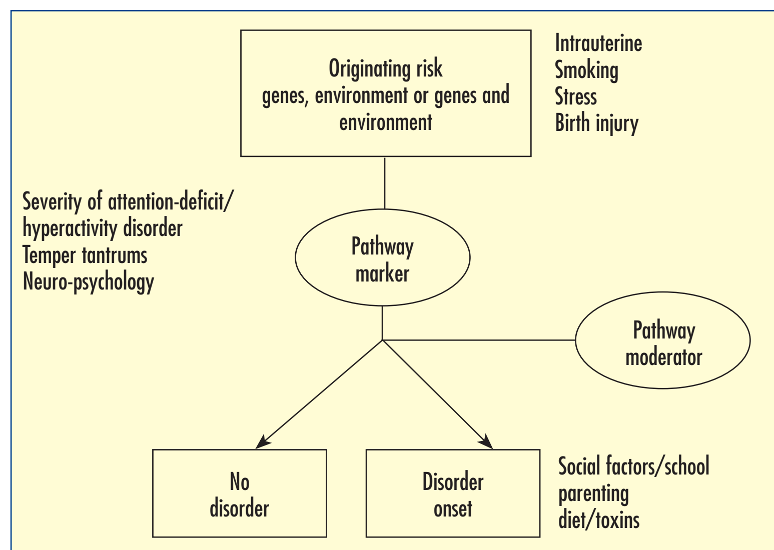
This article describes the evidence for the presentation of attention-deficit/hyperactivity disorder in young children and discusses the literature describing the manifestations of the condition, and assessment and treatment techniques.

In this article both preschool hyperactivity or preschool attention-deficit/hyperactivity disorder (ADHD) will be used as the American trials have used ADHD as a term while British articles tend to use hyperactivity. Campbell (2002) suggested that the definition of disorder in young children should consider normal development and the expectations of parents and other carers including teachers.

She also reminds us of the importance of developmental windows for the development of language, self-regulation and moral realism, and suggests that the child might be disadvantaged if other processes prevent the child from reaching appropriate developmental milestones.

Several useful reviews have been published debating the existence of the concept of preschool hyperactivity (Sonuga-Barke et al, 2003a), outlining the presentation of preschool hyperactivity in the American literature (Dreyer, 2006), and discussing the treatment paradigms to be considered (Sonuga-Barke et al, 2005; 2006).

Figure 1. Conceptualising disorder pathways: moderators.



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Sonuga-Barke and colleagues (2003a) debated, as others have done, whether ADHD should be considered a dimensional disorder or a discrete, qualitatively distinct categorical entity. Most surveys of ADHD in the community have shown that the symptoms in community samples follow a normal distribution.

The other paradigm to consider is whether or not it is a medical condition or a developmental endpoint of emotional dysregulation. Sonuga-Barke and colleagues (2003a) suggest it could be called a preschool hyperactive dysregulated disorder. They debate that a child is born with a trait that suggests that he/she might have a temperament that is 'difficult', with poor emotional regulation and overactivity and with a poor attention span. If the parenting is positive and optimal, the child will be taught to control his/her behaviour and the possibility of the child going on to manifest the symptoms of a disorder will be averted. Should the child be emotionally labile as well, then positive, containing parenting could offset the possibility of development of oppositional disorder (Sonuga-Barke et al, 2003a) (*Figures 1* and *2*). Not all children presenting at a young age with dysregulated, hyperactive behaviour go on to have difficulty (Pierce et al, 1999; Lahey et al, 2004). For a review of positive parenting techniques see Grusec and Goodnow (1994).

On the other hand, although non-optimal parenting in itself probably does not cause the development of preschool hyperactivity it will influence the ability of the parent to help the child learn emotional regulation and help with improving concentration and attention. If the parent is unable to contain the child's temperament then the symptoms may continue with the further development of oppositional disorder.

The ability to parent will be affected by the parent's mental state, style of parenting, marital hostility, the support the parent has, and the parent's understanding of children's needs which in turn will be influenced by the parent's own parenting and learning style. Parental ADHD will also influence the parents' ability to be organized, focussed and consistent (Sonuga-Barke et al, 2002) (*Figure 3*) and the way they interact with their children (Psychogiou et al, 2007).

Children with severe behavioural symptoms are children who are hard to parent and their behaviour may

contribute in turn, to the coercive cycle and chains of conflict. This may lead to the behaviour becoming worse and persisting.

Sonuga-Barke et al (2003a) suggest that the next developmental milestone will be starting school. Schools that are well structured, with positive methods of handling children with overactivity or poor attention, may avert the continuation of a disorder or pre-empt the development of one (*Figure 3*).

The article by Sayal in this issue (p. 352) has discussed the aetiology of ADHD development, discussing the importance of the role of genetics, but also the gene environment interaction with the influence of assaults on the pregnant fetus, including smoking, alcohol, infection and stress. Post birth toxins, nutrition, infection and injury are also important. Parenting style may also affect genetic expression in children's behaviour.

What is the prevalence of preschool hyperactivity?

Dreyer (2006) reviewed the prevalence studies in the American literature and outlined some of the difficulties found in making the diagnosis in preschool children. The screening tools valid for older school-aged children have not been tested as thoroughly in field trials in the preschool group. Many trials have also only used one informant, which means that the definition of ADHD as applied to older children cannot be used (symptoms occurring in more than one setting).

Using figures from studies, weighted for sample size, including studies using *Diagnostic and Statistical Manual of Mental Disorders* version IV screening tools, and including studies that used impairment as part of the diagnostic category, Dreyer (2006) suggested that the prevalence was 4.9% (2.8–6.3%). This was similar to the findings from studies of school children. Interestingly the distribution of the subtypes is different from that found in older children with most preschool children presenting with symptoms of hyperactivity with impulsivity (Lahey et al, 1998).

These figures have been confirmed in epidemiological studies in different cultures.

Which symptoms are specific to preschool children with symptoms of ADHD?

A factor analysis of the behaviour checklist used with a community sample of 1047 3-year-olds indicated that factors for over-activity and inattention were present (Sonuga-Barke et al, 1997) and that these factors distinguished children with hyperactivity from children who had symptoms of conduct disorder. Moreover, children with conduct disorder were more likely to have mothers who were single, depressed and were more likely to be more socially disadvantaged.

These findings were confirmed by Psychogiou et al (2006) who found higher expressed emotion toward their more hyperactive preschool children by their mothers compared with mothers who had less hyperactive children. They also made less positive comments, with less warmth in a 5-minute speech sample and they also played with their children less.

Preschool children with ADHD may well also have mild intellectual impairment, developmental deficits and poor pre-academic skills (Sonuga-Barke et al, 1994), are more likely to have accidents and motor coordination problems (Lahey et al, 1998), and deficits in social skills and problems with close relationships (Lahey et al, 1998; Campbell, 2002). These children also use language for negotiation less well (Hughes et al, 2000).

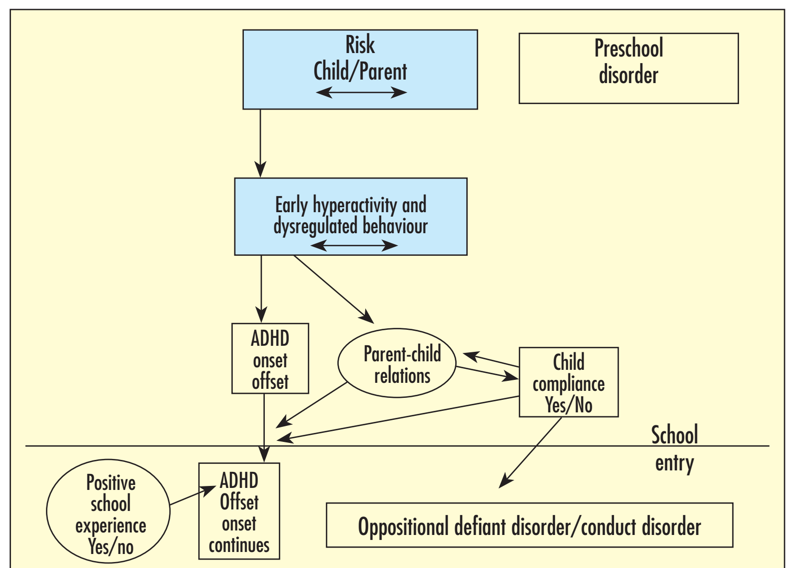
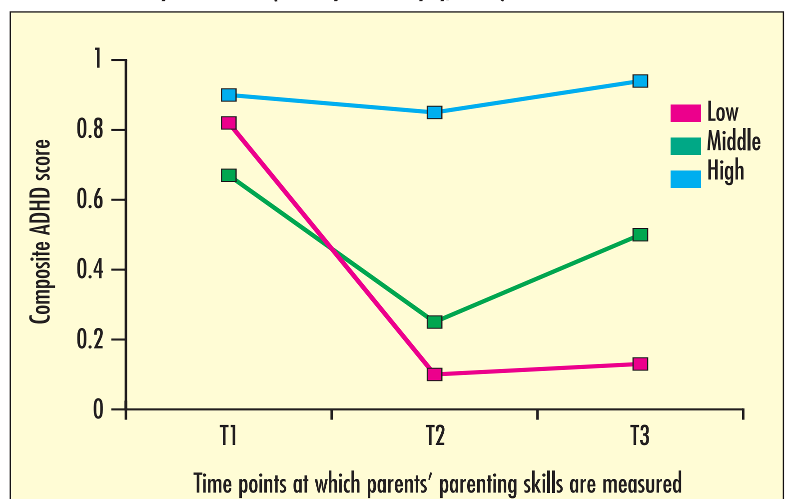


Figure 2. Possible pathways for attention-deficit/hyperactivity disorder (ADHD) in preschool children. Adapted from Sonuga-Barke et al (2003a).

Figure 3. Parental attention-deficit/hyperactivity disorder (ADHD) and parenting skills. From Sonuga-Barke et al (2001). Composite ADHD score represents standardized scores for three scales: the Werry Weis Peters scale (Routh, 1978); the activity scale from the behaviour check list (Richman et al, 1982) and the Parent Account of Childhood Symptoms scale (ADHD subscale) (Taylor et al, 1991). The ADHD scores on the parent were three cut offs on the Barkley adult scale (Barkley and Murphy, 1998).



There are differences in the neuropsychology of these children as is the case with their school counterparts (Solanto et al, 2001); with executive deficits and delay intolerance (Sonuga-Barke et al, 2003b). Deficits in working memory planning, inhibition and attention flexibility (Hughes et al, 2000) have all been implicated along with delay sensitivity displayed on delay-of-gratification tasks (Sonuga-Barke et al, 2004).

Do these problems persist and why?

Studies which have followed up these children into middle childhood have all found evidence that these problems do not go away (Sonuga-Barke et al, 1997; Pierce et al, 1999). Factors linked with poorer outcome were marital dissatisfaction, parental criticism especially by fathers of mothers and children, maternal irritability to children, maternal depression and severity of hyperactivity.

Individual child differences will also play a part. Children who also have developmental delay in language, physical control or learning will find it more difficult to control their hyperactivity and inattention. Abnormalities of neuropsychological function lead directly to disorganized behaviour and reluctance to delay. Children who are unpredictable, aggressive and oppositional are in turn hard to parent.

Hyperactivity in childhood has also been linked with major behaviour problems in adolescence and academic failure (Swanson et al, 1998).

What treatment works for these children?

Medication

Psychostimulants are the preferred treatment for this disorder in older children and there is evidence for efficacy of psychostimulants on school performance, social skills and interaction, and behavioural symptoms (Swanson et al, 2001).

There has been an increase in the USA of use of psychostimulants (mostly methylphenidate) with preschoolers during the last 5 years even in children as young as 2 years with an increase from 1.1 to 3.5 per 1000 in 2-year-olds (Zito et al, 2000).

There have been only 10 double-blind trials in preschool children (for reviews see Dreyer (2006) and Sonuga-Barke et al (2005, 2006)). The number of children in each trial was few, and there were no children under the age of 3 years. The trials often had a wide age range of participants, and contained children with learning difficulties. The medication used was mainly methylphenidate although two trials used amphetamine salts. The comparison groups were placebo not another medication. Not all trials were completely double blind. There were no long-term safety trials.

There is, however, concern about side effects in this age group with concern over the developing dopamine systems and concern over neurodevelopment, which has been emphasized by magnetic resonance imaging and animal research. There is a lack of evidence for long-term effectiveness and ethical objections to altering children's behaviour and intellectual style. Because of side effects, flattening of affect, weight loss, social withdrawal, and nightmares, doses have to be lower with less positive effects on the ADHD symptoms.

The American Academy for Child and Adolescent Psychiatry (AACAP) parameters suggest that behaviour work should be the first treatment of choice for this age group.

Should medication be considered the starting dosage should be low and the dose should be titrated slowly. Careful monitoring should take place to look for side effects. The Preschool ADHD treatment study (PATS), a multisite, randomized control study of treatment for preschool children which has an initial behaviour treatment arm then a titration trial of methylphenidate in children 3–5.5 years, used a dose of 1.25 mg three times a day as the starting dose with a maximum dose of 10 mg three times a day. The PATS study was published in 2006 (Greenhill et al, 2006). Effects sizes were smaller than in trials with school children.

Psychosocial interventions

Considering the theoretical discussion above about pathways to disorder and considering the developmental argument against using medication in young children, psychosocial interventions might be usefully introduced before patterns of resistant abnormal behaviour set in. Good review papers concerning preschool parenting packages are by Sonuga-Barke at al (2005, 2006) and Dreyer (2006).

Most parent training has been developed for children with externalizing behaviour problems. Successful adaptations of these for children with ADHD have added a psychoeducational element for example and an enhanced psychosocial package (Sonuga-Barke et al, 2001; Bor et al, 2002).

A successful parenting approach was developed based on the principles of developing positive parenting with this group of children. Work on attention training and controlling impulsivity and learning was also included (*Table 1*).

The New Forest parenting package was a randomized control trial with two treatment arms (a cognitive parenting arm and a reflective counselling arm) with a control group. The package was delivered weekly for 8 weeks in the parents' home. The effect size was 0.87 for treatment of ADHD symptoms with an effect size of 0.63 for observed symptoms (the same effect size as medication with fewer side effects). Fifty three per cent of the families achieved scores within normal ranges. The effect was maintained at 15 weeks following the end of the package (Sonuga-Barke et al, 2001). A trial in the community was not as successful, highlighting the need for treatment integrity. Mothers with higher scores on an adult hyperactive scale did less well (Sonuga-Barke et al, 2002) (*Figure 3*).

Conclusions

This article has discussed the importance of preschool hyperactivity, has indicated that the problems in these children do not go away and that intervention should be introduced early so that the negative trajectory that may occur for these children may be interrupted. **BJHM**

Conflict of interest: Dr Thompson has received educational grants, research funding, money to run education meetings, and has spoken at conferences on behalf of Eli Lilly, Janssen-Cilag and UCB Pharma. She has also run trials for Janssen-Cilag and Eli Lilly.

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Table 1. New Forest Parenting Programme

Psychoeducation	Genetics
	The hyperactive brain
	Why these children need different parenting
Mother-child relationship	Scaffolding, positive parenting
	Importance of play
	Attributions, motivation
	Teachable moments
Behaviour training	Rewards, praise
	Time out
Attention training and delay de-restructuring	Cue in to events, count down
	Delay for rewards, waiting for meals
	Extending play
	Use of language
	Use egg timers, clock
	Specific games to extend attention
	To extend working memory

KEY POINTS

- Hyperactivity (attention-deficit/hyperactivity disorder; ADHD) occurs in young children.
- Better screening tools need to be developed for this age group.
- The problems persist and can lead to major behaviour and academic problems in adolescence.
- Intervention should be early before problems become entrenched.
- Medication prescriptions have increased for preschool children, but there have been few trials in young hyperactive children.
- Side effects are common, and the effect size is not as high as in older children, as doses are lower.
- Parenting interventions do work especially if they include psychoeducation and are based on positive parenting principles.