1 Attention deficit hyperactivity disorder

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Attention deficit hyperactivity disorder (ADHD) is one of the most prevalent psychiatric disorders of childhood. Although once a vigorously debated issue, it is now accepted that ADHD can be reliably distinguished from other behavioural problems in childhood and adolescence (Goldstein, 1999). The disorder is also recognized as existing beyond childhood (Tannock, 1998), resulting in the need for clinicians to increase their understanding of the various developmental outcomes and age-related changes in presentation and response to treatment.

This chapter begins by summarizing the research and clinic-based evidence regarding the nature of ADHD. The manner in which the disorder can affect individuals as they mature from childhood to adulthood is then discussed and various intervention strategies are presented.

Diagnostic classifications and prevalence

An important difference exists between simple hyperactivity, which describes a tendency to behave in an inattentive, overactive and impulsive way, and the psychiatric diagnostic category of ADHD. Most children are hyperactive in some situations. Indeed, hyperactivity is a trait, not unlike intelligence, that appears to be normally distributed in the general population (Taylor et al., 1991). However, in most children, their behaviour is regulated by environmental demands. This influence, and accompanying behavioural control, increases with age and maturity. Society expects increased behavioural control as children develop. At school, for example, a 5-year-old child might be expected to sit quietly listening to a 10-minute story, whereas a 15-year-old child would be required to sit and attend for a 45-minute lesson.

Some children consistently exhibit hyperactive behaviour across many situations and appear to have difficulty modifying their behaviour in response to their environment. These children exhibit levels of inattention, impulsiveness and overactivity that can actually impair their functioning in one or more areas

(e.g. academic, social). When such difficulties are early in onset (before the age of 7 years), persistent over time (at least 6 months), pervasive across situations (evident in at least two different settings), and, importantly, out of keeping with their general developmental level (global intellectual functioning), a psychiatric diagnosis may be appropriate.

The two main current classification schemes, namely the fourth edition of the *Diagnostic and Statistical Manual* (DSM-IV), published by the American Psychiatric Association (APA, 1994), and the tenth edition of the *International Classification of Diseases* (ICD-10), published by the World Health Organization (WHO, 1994) both contain a disorder characterized by a cluster of three core behavioural symptoms: inattention; hyperactivity; and impulsivity. However, the two schemes differ in important ways and it is these differences that have contributed, in part, to the different ways in which the symptoms have been conceptualized and managed in Europe and North America. Both the DSM-IV and ICD-10 classification schemes are now used in the United Kingdom (UK).

Currently, the DSM-IV lists ADHD as a primary disorder. However, the scheme allows for the subtyping of the disorder based on the predominance of symptoms: ADHD Combined Type (all three core symptoms present); ADHD Predominantly Inattentive Type; and ADHD Predominantly Hyperactive–Impulsive Type. In contrast, all three symptoms must be present for a child to meet criteria for an ICD-10 diagnosis of Hyperkinetic Disorder (HKD). Thus, all children with a diagnosis of ADHD or HKD exhibit hyperactivity. Moreover, all children with HKD would meet criteria for ADHD Combined Type but those with ADHD Predominantly Inattentive Type or Predominantly Hyperactive–Impulsive Type would not meet the more stringent criteria for HKD. Prevalence figures for disorders, therefore, will vary depending on which diagnostic scheme is being used and whether or not the subtypes in the DSM-IV are being applied.

Approximately 1.7% of children meet criteria for HKD (Taylor et al., 1991). In comparison, ADHD, a more broadly defined disorder, affects 3–5% of children (Szatmari, Offord & Boyle, 1989). The ratio of affected boys to girls is around 4:1 (Ross & Ross, 1982; James & Taylor, 1990). Hyperactivity is more common in urban than rural areas (Taylor et al., 1991). Links exist between hyperactivity and pervasive developmental disorder (PDD) in that children with autistic spectrum disorders can be very hyperactive. However, in the hierarchy of diagnoses, PDD is given priority in such cases. The treatment of hyperactive behaviour in a child with a pervasive developmental disorder may be quite different to that used in straight forward cases of ADHD.

The diagnosis of either ADHD or HKD, is based on patterns of behaviours,

not aetiological factors, and involves the ruling out of alternative, differential diagnoses such as autism. The issue of comorbidity, however, is addressed differently in the DSM-IV and ICD-10. The DSM system allows for multiple diagnoses to be given (e.g. ADHD *and* Conduct Disorder; or ADHD *and* Generalized Anxiety Disorder), but the ICD system views HKD as a relatively rare condition that occurs in isolation. When other problems are also present to a significant degree, then other diagnoses may be given (e.g. Hyperkinetic–Conduct Disorder or Mixed Disorder of Conduct and Emotion).

This chapter will use the terms hyperactivity and ADHD interchangeably to imply the presence of developmentally inappropriate levels of inattention, overactivity and impulsiveness. However, it is important that readers appreciate the subtle differences in the way terms are used within professional and lay circles.

Nature of the disorder

Hyperactive behaviour can be relatively easy to operationalize and quantify. Rating scales or direct observations can provide reliable measures of the occurrence and frequency of selected behaviours (e.g. number of times a child is out of his/her seat during a lesson; percentage of a task completed; frequency of calling out in class without raising a hand). In contrast, it has proven considerably more difficult to identify the specific cognitive delays, deficits or dysfunctions that might underpin these behaviours. Indeed, much of the recent research in the field has focused on the identification of cognitive and genetic factors, as well as the identification of abnormalities in brain structure and function (see Tannock, 1998, for a review).

Despite the name attention *deficit* hyperactivity disorder, children with ADHD do not necessarily have a deficit in their cognitive attentional processes, even though they may exhibit behaviours that are suggestive of cognitive inattentiveness, such as frequently changing activity or being easily distracted. Experimental studies indicate that the primary problem in ADHD is not one of a poor level of attention, or inability to sustain it or a failure selectively to attend (Taylor, 1995). Rather, research evidence is converging to support the theory that the underlying deficit lies in a problem with behavioural inhibition and self-regulation (Taylor, 1994).

Behavioural inhibition has been seen as three inter-related processes: (1) the inhibition of a prepotent response; (2) the cessation of an on-going response such that a delay occurs which allows an individual to make a decision about the response; and (3) the ability to maintain this delay and prevent other events

and responses from interfering with the self-directed responses that are happening within it (Barkley, 1997a). Those areas of the brain that control attention and the organization of responses, namely the frontostriatal areas, are being extensively investigated.

It is quite possible that children with ADHD Primarily Inattentive Type differ in terms of aetiology, prognosis and response to treatment from children with ADHD Primarily Hyperactive–Impulsive Type or those with ADHD-Combined subtype. Although the inattentive behaviours may be topographically similar across the subtypes, the nature of the cognitive attention deficit may be quite different. In particular, the inattentive subtype appears more closely linked to educational difficulties (Warner-Rogers et al., 2000) and socio-economic disadvantage (Taylor et al., 1991). These children tend to be described by their teachers as inattentive and dreamy, but not particularly overactive or impulsive (Taylor et al., 1991). Many researchers now argue that children with ADHD Primary Inattentive Type should not be included in the same study groups as ADHD Combined Type (Barkley, 1997a).

In a book written primarily for parents raising a child with ADHD, Barkley (1995) provides a useful summary of the cognitive nature of the disorder and the associated behavioural symptoms. In terms of their *attentional* functioning, Barkley (1995) notes that children with ADHD have: (1) difficulty sustaining attention; (2) get bored or lose interest in work faster than other children; and are (3) drawn to the most rewarding, stimulating or fun feature of any situation – a tendency that can make them appear easily distractible. With regards to *impulsive* behaviour, children with ADHD have difficulty controlling their impulses and deferring gratification. These tendencies can lead to: (1) more risk taking; (2) impulsive thinking; and (3) problems managing money. The *hyperactivity* aspect is described as 'a problem with too much behaviour' (Barkley, 1995: p. 36). Children with ADHD are both more physically active and respond to more aspects of their environment than non-ADHD children, making them seem 'hyper-responsive'. Finally, these children have difficulty with following instructions and working consistently. All of these behavioural symptoms are linked theoretically and reflect a disorder of self-control, and the ability to organize and direct behaviour towards a future goal (Barkley, 1995, 1997a).

Aetiology of the disorder

The development of ADHD in any given individual is likely to be multifactorial (Taylor, 1998). Genetic contributions, neurobiological factors, illness or injury, psychological variables and environmental factors may all play a role.

Tannock (1998: p. 65) describes ADHD as 'a paradigm for a true bio-psychosocial disorder', reflecting the complex relations and interactions between genetic, biological and environmental factors.

Twin studies indicate that the tendency to behave in a hyperactive manner is highly heritable (e.g. Goodman & Stevenson, 1989a,b; Silberg et al., 1996). Pervasive hyperactivity is more concordant in monozygotic than in dizygotic twins. Goodman & Stevenson (1989a,b) found concordance rates of 51% in monozygotic twins compared to 30% in dizygotic twins. Several possible genetic mechanisms are currently being explored, including variations in the dopamine 4 receptor gene (LaHoste et al., 1996). Current consensus among genetic researchers suggests that inherited variants of those genes that function to modulate dopaminergic neurotransmission may contribute to changes in the structure and function of particular brain regions. These changes in function at the neurological level may give rise to the abnormalities in psychological functioning, characterized by difficulties in inhibiting inappropriate responses (Taylor, 1999a).

However, genetic research highlights the impact that other, non-genetic factors, particularly non-shared aspects of a child's environment, can have on the developmental course of the disorder. Epidemiological research indicates that ADHD is not associated with minor obstetric abnormalities at birth (Taylor et al., 1991); however, prenatal exposure to alcohol is linked with hyperactive behaviour (Taylor, 1991). Other factors, such as maternal smoking during pregnancy and pre-eclamptic toxaemia are also associated with hyperactivity, although the exact mechanisms of the effect have not been firmly established (see Taylor, 1999a). Very low birth weight, severe anoxia, and early lead poisoning are also risk factors for the later development of ADHD. Problems related to family function may not give rise to ADHD symptoms per se, but can affect the development of conduct problems in children with ADHD (Taylor, 1999a), which in turn has implications for outcome.

Findings from magnetic resonance imaging (MRI) studies indicate that ADHD is associated with changes in brain morphology. However, the results from different studies have been contradictory at times and the disparate findings across some studies are believed to reflect the true heterogeneity of aetiological routes to ADHD symptoms (see Eliez & Reiss, 2000, for a review). There is a tendency for total brain volume to be slightly lower in children with ADHD compared to controls (e.g. Castellanos et al., 1996), with particular reductions in the white matter of the right frontal region (Filipek et al., 1997). Abnormal morphologies of the basal ganglia, corpus callosum and cerebellum have also been suggested, but the results across studies remain conflicting with regards to the exact pathology (Eliez & Reiss, 2000).

ADHD in childhood

Although the diagnostic criteria state that at the minimum, the three core behavioural symptoms – inattention, hyperactivity and impulsivity – must be present by the age of 7 years, in many cases the behavioural disturbance is evident much earlier in the child's development. In the pre-school years, many children are inattentive and can exhibit behaviours that are difficult to manage. However, the demands for sustained attention on pre-schoolers are limited and certainly not all difficult-to-manage young children will go on to develop ADHD. None the less, Cohen and colleagues (1981) suggest that 60–70% of children who are later diagnosed as having ADHD exhibited the characteristic behavioural symptoms by their pre-school years. Parental reports of hyperactivity at the age of 3 years have also been associated with the later presence of conduct problems (e.g. Campbell, 1987).

Speech and language difficulties are very common in young children with ADHD (Baker & Cantwell, 1987; Taylor et al., 1991). Poor motor co-ordination and delayed reading skills are also frequent (e.g. Taylor et al., 1991). Young children with hyperactivity are likely to be more impersistent in their activity, change activities frequently, and explore their environments in an unsystematic and disinhibited manner (Luk, Thorley & Taylor, 1987).

By the time children enter formal education, around the age of 4–5 years, they are expected to have some capacity for concentration and behavioural control. Even in reception classes, children are required to sit quietly for periods of time listening to stories or instructions. At this early stage in education, although the day is clearly structured and organized for them, the children still need to learn to modify their behaviour in accordance with the demands of the environment – lessons and assembly necessitate settled behaviour, playtime allows for more boisterous activity. Children must learn to socialize with other children – to wait their turn and to share the attention of the adult. Children who have difficulties with attention, activity control and impulsiveness struggle with the limits placed on them in the early school environment. It is often at this point that the characteristic difficulties begin to be formally recognized.

As children progress though the primary school years, the lessons become more structured and children are expected to begin to acquire the basic foundations for literacy and numeracy. The demands for behavioural control within this environment steadily increase and unmodulated and inattentive behaviour will pose an increasing impediment on a child's ability to function effectively at age-level expectations (Taylor, 1995). The rapid and often chaotic

style with which children with ADHD tend to process information can impair their ability to learn. This in turn means that they may not develop their knowledge base at the same rate as their peers. As other children are consolidating new skills and applying them in their classroom work, the children with ADHD may be unable to keep up. As tasks become increasingly difficult for them, rates of inattentive and disruptive behaviours may increase. Socially, their peers may begin actively to reject them as their behaviour becomes more intrusive and disruptive.

In secondary school, the demands on independent learning and self-organization are considerably higher than in primary school. Children with ADHD are at risk of becoming disaffected with education if they cannot cope with these demands. Problems with peer relationships or compliance may become exacerbated. Some children will, by this stage, already have had their ADHD diagnosed and be linked into appropriate treatment services. However, the needs of these children will change as they mature and their progress must be carefully monitored at regular intervals.

Other youngsters will reach adolescence with their difficulties as yet unrecognized and untreated. Their poor inhibition and attentional skills render them ill-equipped to master the developmental tasks of adolescence. Why had their problems not been identified earlier? Some children may have coped successfully, having benefited from other strengths and supports, such as high general intelligence, a good primary school, or a supportive, accepting family. In other cases, the children might have had such disrupted early lives (e.g. neglect, abuse, multiple foster placements) that the professionals involved in their care had focused on these factors as the most likely cause of any dysfunctional behaviour, and thus overlooked the possibility of a neurodevelopmental problem.

Associated difficulties in childhood

Although the core behavioural symptoms in children with ADHD cause impairment in functioning, these are not the only aspects of their development that jeopardize educational attainment. Recent reviews suggest between 50 and 80% of children with ADHD will also exhibit another disorder (see Jensen, Martin & Cantwell, 1997). Oppositional Defiant Disorder and Conduct Disorder are the most frequently co-occurring problems, with estimates of comorbidity ranging from 40 to 90% (Jensen et al., 1997). Another common problem is academic underachievement, with reading difficulties occurring in about one-third of clinic-referred children with ADHD (August & Garfinkel, 1990).

Poor peer relationships are another frequently encountered area of difficulty

(Pelham & Milich 1984), though the actual deficits in social skills functioning can vary widely. Some children with ADHD are very good at making friends, but have difficulty keeping them. Other children struggle to make appropriate overtures to children and are actively rejected or neglected by their peers (Nixon, 2001). Children with ADHD have a tendency to be more dominating and aggressive in their social interactions (Guevremont, 1990) and their impulsiveness can affect their ability accurately to process social cues and information (Milich & Dodge, 1984).

As children with ADHD tend to be frequently in trouble with adults, be unpopular amongst their peers, and do poorly at school, they often develop a low self-image. Emotional disturbance, including mood disorders and anxiety problems, may affect 15–25% of children with ADHD (Jensen et al., 1997). Collectively, ADHD and the associated difficulties can pose a major risk to a child's potential to succeed in school, to view themselves as a valued member of the family, peer group or wider community, or to develop a positive sense of self-worth. Clearly, therefore, the assessment of ADHD must address symptoms beyond the three core problems.

Historically, it was believed that when conduct problems were comorbid with hyperactivity, it was the conduct difficulties and not the hyperactivity that posed the greatest risk to development. It is now recognized that hyperactivity itself is a risk for poor psychosocial adjustment in adolescence and adulthood (Taylor et al., 1996) although the presence of comorbid difficulties may play a critical role in later functioning (Goldstein, 1999). It is not clear yet whether or not cases of ADHD that present comorbidly with other disorders, particularly conduct problems or anxiety, should be conceptualized and treated substantially differently from cases in which ADHD occurs in isolation. Certainly, the outcome for comorbid cases appears more negative (Barkley et al., 1993). The presence of comorbid disorders may also alter the response to treatment. Longitudinal research, in which comorbidity has been identified and classified more systematically, will hopefully address these issues.

Transition into adolescence

Until recently, parents of a child with hyperactivity were often reassured that their child would 'outgrow it'. In some cases, this is true – in general, the level of ADHD symptoms, particularly overactive behaviour, does decrease with time (Hill & Schoener, 1996). However, longitudinal studies that were published in the late 1980s and early 1990s, dispelled the idea that *most* children would outgrow their hyperactivity problems. To some degree, the majority of children with ADHD will continue to experience the core symptoms of the disorder into early adolescence and they remain at risk of developing other

behavioural and relationship difficulties (Hinshaw, 1994). Indeed, less than a third of children with hyperactivity will outgrow their difficulties by late adolescence (Barkley et al., 1990).

Although not all these children may meet diagnostic criteria, residual, subclinical symptoms of the disorder, such as poor organization or rapid decision-making may remain aspects of their personality. These may or may not impair functioning but professionals are now suggesting that ADHD should be seen as a chronic problem that requires specific support and treatment over many years (Goldman et al., 1998). Some have even implied that ADHD should be viewed as a lifelong condition (Fargason & Ford, 1994).

Associated difficulties in adolescence

The two-thirds of children whose ADHD symptoms continue into adolescence are at increased risk for developing other disruptive behaviour problems, particularly aggression, oppositionality, antisocial behaviour and delinquency (Gittelman, et al., 1985; Barkley et al., 1990; Taylor et al., 1996). Poor academic performance and educational underachievement are additional serious problems (Fischer et al., 1990). Social incompetence and emotional maladjustment are also characteristic of children whose ADHD is identified for the first time in adolescence (Barkley et al., 1991). Substance abuse problems appear to be more associated with the development of conduct difficulties in adolescence (Gittelman et al., 1985). Adolescents with a history of attentional and hyperactivity problems also have a higher rate of driving accidents and other traffic violations (Cox et al., 2000; Woodward, Fergusson & Horwood, 2000).

Of the three core symptoms of ADHD, hyperactivity is the most likely to decrease with time, whereas difficulties with impulsivity and inattention are more likely to persist. When considering the longitudinal course of the disorder and its impact on development, one must separate the actual continuity of the core behavioural symptoms from the disturbance in functioning that might arise in reaction or response to these symptoms. These secondary difficulties may persist even if the core ADHD problems eventually remit.

Longitudinal studies, in documenting the developmental course of ADHD, have firmly established that childhood hyperactivity is a risk factor for future adjustment and behavioural difficulties. However, the exact mechanism whereby hyperactivity functions as a risk factor remains less well understood and this is now an area of intensive research. It is possible, for example, that other factors, such as how people respond to the child and how behavioural difficulties are managed, play an important role in the development and maintenance of future problems (Barkley, 1998).

ADHD in adulthood

Although professionals in the UK are becoming increasingly aware of the importance of assessing and treating *children* with ADHD (see Sayal & Taylor, 1997), services dedicated to the mental health needs of adults may be less well-informed. Wender (1998a: p. 761) recently described ADHD as 'probably the most common chronic undiagnosed psychiatric disorder in adults'. Although its very existence in adulthood remains controversial amongst some professionals, reviews of the current literature indicate that the disorder can be reliably diagnosed in adults and that it has a definable course and response to treatment (Spencer et al., 1998). None the less, like other developmental disorders and psychiatric illnesses originating in childhood, the presence of ADHD can remain unnoticed by adult psychiatrists (Burger & Lang, 1998). A recent survey of adult psychiatrists in the Trent region in England suggests that few felt they were seeing cases of ADHD (Bramble, 2000). This implies that many adult mental health services may be ill-prepared to deal with the increasing number of young adults who will require assessment and treatment of ADHD. As ADHD becomes increasingly recognized as a chronic, possibly life-long, condition, more services will need to be developed to address the needs of this population.

The presence of hyperactivity in childhood is associated with hyperactivity and poor social and academic adjustment in early adulthood in both community, non-referred samples (Taylor et al., 1996) and clinic-based populations (Lambert, 1988). Mannuzza and colleagues (1991), in their follow-up of children diagnosed with ADHD, found that almost half (43%) of their sample continued to meet diagnostic criteria for ADHD as young adults. Moreover, one-third of their sample met diagnostic criteria for antisocial personality disorder and one-tenth were abusing drugs. A recent study, comparing a clinically referred sample of adults with ADHD to a clinic-referred control group, highlighted the increased psychiatric and social morbidity of the ADHD group. The adults with ADHD were more impaired on measures of academic achievement and both antisocial and criminal behaviour (Young, Toone & Tyson, unpub. data). Prospective studies (e.g. Satterfield & Schell, 1997) indicate that the risk of adult criminality is mediated predominantly by the presence of conduct problems which may also be associated with hyperactivity. Children with hyperactivity, but no conduct problems, are not at increased risk for criminality in adulthood.

Poor peer relationships and lack of participation in constructive activities are also common in young adults with ADHD (Taylor et al., 1996). Not sur-