

Long-term outcome of Attention Deficit Hyperactivity Disorder (ADHD): Resolution – or practitioner inattention?

Andrew Darby MB BCh MRCPsych

The syndrome of hyperactive, inattentive and impulsive children was described in the medical literature as early as the 19th century. The frequency of the diagnosis of ADHD increased rapidly in the latter half of the 20th century although there were marked discrepancies between the rates of diagnosis of ADHD in children in the United Kingdom versus North America. More recently, the rates have converged as the criteria between the DSM IV and ICD 10 become more unified.

A key area that was not addressed by either diagnostic system was the longitudinal history of ADHD. What happened to ADHD as the child or adolescent matured? Was it a childhood disorder that was outgrown or a chronic disorder that changed over time?

It is well recognised that childhood ADHD is associated with significant impairments causing social, academic, psychiatric, and psychological morbidities. The child can be ostracised by their peers, teachers and family, and fall foul of the law. Do we see a similar picture in adults?

Previously ADHD was considered to be a transient disorder that resolved during adolescence, thus therapy usually ended prior to them entering employment or tertiary study. More recently, Adult ADHD sufferers are seeking medical atten-

Andrew Darby graduated from the University of the Witwatersrand (South Africa) in 1992. He completed his specialist psychiatric training in the Waikato and has since been working as the Consultant Psychiatrist to the Crisis, Assessment and Treatment Service and in private practice. His areas of special interest are Adult ADHD, mood disorders (depression, bipolar mood disorder and mood spectrum disorders), psychotic and anxiety disorders.



tion due to their inability to achieve their goals, but are often labelled a drug seeker.

It is now clear that ADHD persists into adulthood – up to 5% of the population are estimated to have Adult ADHD. There is a distinct evolution of symptoms and signs from childhood to Adult ADHD (Table 1) – hyperactivity tends to diminish but inattention is significantly more persistent.

Research by Biederman (Figure 1) described the longitudinal outcome of children that suffered from ADHD. They differentiated between syndromic remission (loss of full diagnostic status), symptomatic remission (loss of most ADHD symptoms) and functional remission (loss of

larly, 40% of 18 to 20-year-olds will no longer fulfil the criteria for inattention but only 5% will have a full functional recovery. This suggests that a large proportion of adults that suffered ADHD as a child will continue to have significant symptoms (and associated impairments) well into adulthood. Most battle through adulthood untreated.

The impact of untreated Adult ADHD is significant. Despite similar educational levels and IQ scores, non-medicated adults with ADHD have had problems at school (25% repeat a grade) and tend to obtain a lower occupational achievement. They have significantly higher rates of marital dissatisfaction and discord, higher divorce rates and parenting difficulties. Adult ADHD drivers have more crashes, scrapes and erratic driving whilst completing computer-simulated driving tests, and a higher incidence of speeding fines, licence suspensions, and motor vehicle accidents causing severe physical injury.⁴

More Adult ADHD patients smoke than in the general population, starting at an earlier age, and are less suc-

It is now clear that ADHD persists into adulthood – up to 5% of the population are estimated to have Adult ADHD

symptomatic remission diagnostic status with full functional recovery). The diagram demonstrates that around 60% of 18 to 20-year-olds will no longer fulfil the DSM-III-R criteria for ADHD but only 10% will have full functional recovery. Simi-

cessful at quitting. They are more than twice as likely to present with a psycho-active substance use disorder.⁵ There is an increased rate of psychiatric co-morbidity associated with Adult ADHD including higher rates of antisocial personality disorder, major depression, bipolar mood disorder, and anxiety disorders.⁶

The untreated Adult ADHD sufferer usually presents with chaotic personal and family routines. They have difficulty in organising and maintaining their home, display poor financial management, are less health-conscious and make riskier lifestyle choices.⁷

The pathophysiology of ADHD is recognised as a partly inherited disorder with significant influence by environmental factors.

Studies show an increased incidence of ADHD in siblings, parents, twins and adopted siblings of patients with ADHD. Neuropsychological literature has also described several similarities between the disinhibited behaviour of adult patients with frontal lobe damage compared to children with ADHD – areas important in modulating motor responses, organising information, planning and resolving complex problems and learning and recording of global material. More recent work suggests that there is dysregulation of the inhibitory influences of frontal-cortical activity (predominantly noradrenergic) on lower striatal structures (predominantly dopaminergic).

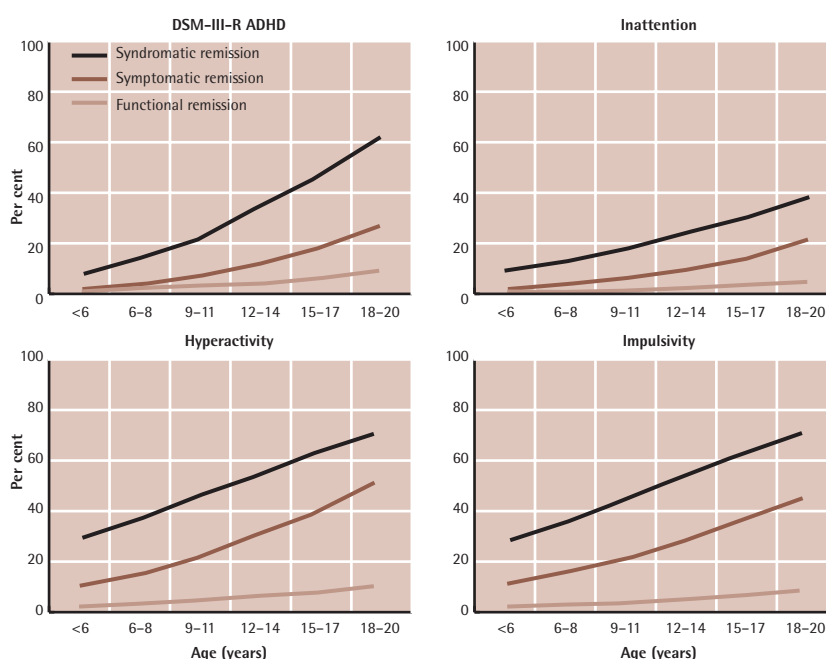
Smoking or drinking during pregnancy result in a 2.5-fold increased risk of ADHD, while both drinking and smoking during pregnancy result in a fivefold increased risk of ADHD.

A challenge for the clinician is to correctly diagnose the disorder. A number of the symptoms described earlier could easily be accounted for by life stresses and possibly by other psychopathology. The use of self-rating scales is effective in determining past childhood symptoms and current Adult

Table 1. Evolution of ADHD symptoms

DSM IV Symptoms ¹	Common Adult Manifestations ²
HYPERACTIVITY	
Squirms and fidgets	Workaholic
Can't stay seated	Overscheduled/overwhelmed
Runs/climbs excessively	Self-select very active job
Can't play/work quietly	Constant activity leading to family tension
'On the go'/'driven by a motor'	Talks excessively
Talks excessively	Difficulty with downtime/free time
IMPULSIVITY	
Blurts out answers	Low frustration tolerance:
Can't wait turn	• Losing temper
Intrudes/interrupts others	• Quitting jobs
	• Ending relationships
	• Driving too fast
	• 'Addictive personality'
ATTENTION	
Difficulty sustaining attention	Difficulty sustaining attention:
Doesn't listen	• Meetings, readings, paperwork
No follow through	Paralysing procrastination
Can't organise	Slow and inefficient
Lose important items	Poor time management
Easily distractible, forgetful	Disorganised

Figure 1. Long-term remission rates for ADHD⁸



ADHD symptoms⁸ but these scales could be open to abuse.

The long-term history of childhood and adolescent ADHD is the cornerstone of making a diagnosis. One should obtain a thorough longitudinal and collateral history (if available), and evaluate the current impact upon the patient and their environment. This should help differentiate ADHD from other psychiatric illnesses, and from drug seekers trying to legitimise their amphetamine habits.

Medication is the mainstay of treating ADHD in both childhood and adulthood. Stimulant medication is by far the most studied, and most effective, and thus is the first line treatment of childhood ADHD. Clinicians may be reluctant to prescribe amphetamines to adults due to their abuse potential and thus tend to use non-stimulant alternatives first line despite them being less effective.

Two stimulant treatments are available in New Zealand (methylphenidate

and dextroamphetamine). Stimulant treatments are known to improve both core symptoms of ADHD (inattention, impulsivity and hyperactivity) and other symptoms including poor compliance, impulsive aggression, impaired social interactions, and poor academic efficiency and accuracy.⁹

Methylphenidate is a recognised substance of abuse that is usually snorted or used intravenously in order to produce a 'high'. The rate of administration and absorption are directly correlated to the intensity of the 'high' and the reinforcing effects thereof. Different delivery systems have been developed with this in mind but only Concerta® is available in New Zealand.

Concerta® is a 'clever capsule' that consistently delivers methylphenidate over three phases during a 12 hour period. The capsule is tamper-resistant, insoluble and highly unlikely to be abused. Concerta® is not subsidised by Pharmac.

Non-stimulant treatments include Desipramine, Bupropion, Monoamine Oxidase Inhibitors, and Atomoxetine. Atomoxetine (a noradrenergic antidepressant) is the first non-stimulant FDA approved medication for the treatment of childhood, adolescent and Adult ADHD.

Some authors would suggest that there are lower success rates with the treatment of Adult ADHD. Possible explanations include: too low a dose of methylphenidate (e.g. 0.6 mg/kg), differing diagnostic methods, different assessment methodology and ignorance of potential co-morbidities. A significantly improved response rate (73% vs. 23%; $p < 0.001$) occurred

Key Points

- Hyperactivity reduces with age but inattention remains.
- Up to 5% of adults still suffer symptoms with significant psychosocial morbidity.
- A longitudinal history is the key to diagnosis.
- Treatment with stimulants is the most effective.

with doses up to 1.1mg/kg/day.¹⁰ These doses were usually well tolerated although some subtle cardiovascular side effects (e.g. tachycardia) did occur.

In conclusion, Adult ADHD could be affecting a significant proportion of the population, though there is currently no formalised diagnostic system. The diagnosis of Adult ADHD is often challenging and is sometimes a diagnosis of exclusion. A long-term history of ADHD symptoms throughout the patient's developmental years is the best evidence to validate the diagnosis. These patients can achieve a significant improvement in symptoms and reduced morbidity with medication.

So, where have all the Ritalin children gone? The chances are that their childhood ADHD has not resolved but, rather, evolved – and been missed due to practitioner inattention.

The diagnosis of Adult ADHD is often challenging and is sometimes a diagnosis of exclusion

References

1. American Psychiatric Association, DSM-IV, 1994:83–85.
2. Weiss M, Hechtman LT, Weiss G. ADHD in adulthood: A guide to current theory, diagnosis, and treatment. Baltimore, MD: Johns Hopkins University Press; 1999.
3. Biederman J, Mick E, Faraone SV. Age-dependent decline of symptoms of attention deficit hyperactivity disorder: impact of remission definition and symptom type. *Am J Psychiatry*. 2000 May; 157(5):816–8.
4. Barkley RA, Guevremont DC, Anastopoulos AD, DuPaul GJ, Shelton TL. Driving-related risks and outcomes of attention deficit hyperactivity disorder in adolescents and young adults: a 3- to 5-year follow-up survey. *Pediatrics* 1993; 92(2):212–8.
5. Seidman LJ, Biederman J, Weber W, Hatch M, Faraone SV. Neuropsychological function in adults with attention-deficit hyperactivity disorder. *Biol Psychiatry* 1998; 44(4):260–8.
6. Biederman J, Mick E, Faraone SV, Braaten E, Doyle A, Spencer T, Wilens TE, Frazier E, Johnson MA. Influence of gender on attention deficit hyperactivity disorder in children referred to a psychiatric clinic. *Am J Psychiatry* 2002; 159(1):36–42.
7. Barkley R, Murphy K. *J Atten Disord* 1996; 1:41–54.
8. Murphy P, Schachar R. Use of self-ratings in the assessment of symptoms of Attention Deficit Hyperactivity Disorder in adults. *Am J Psychiatry* 2000; 157:1156–1159.
9. ADHD Practice Parameters. *JAACAP* 1997; 36:85s.
10. Spencer T, Biederman J, et al. A review of the pharmacotherapy of adults with attention-deficit/hyperactivity disorder. *J Atten Disord* 2002; 5(4):189–202.