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ADHD in practice

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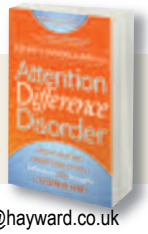

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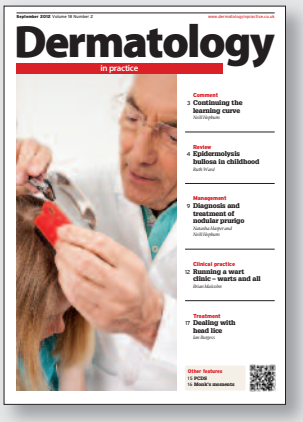

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Complex and heterogeneous

As I sit down to look at this issue of *ADHD in practice* I cannot but be amazed and impressed by how complex and heterogeneous this condition is. The stream of new information that keeps pouring in makes attention deficit hyperactivity disorder (ADHD) not only a very rewarding condition to work with, but a very diagnostically challenging one that demands a thorough and comprehensive evaluation if all associated conditions are to be identified and addressed.

Nocturnal enuresis is common in children with ADHD, especially if there is a co-existing learning disability, and boys are affected more frequently than girls. Hervé Caci makes the very important point that children presenting with ADHD must be screened for enuresis (especially if there is a family history) and vice versa. This is not often asked of older children – partly out of embarrassment, but also out of ignorance on the part of the clinician. There have been some suggestions that twice-daily atomoxetine may confer a small relief to the problem,[1] but more importantly, the deep sleep disorder needs to be investigated in its own right.

Lidy Pelsser brings to the fore an ongoing debate about the effect of certain foodstuffs on symptoms that mimic ADHD symptomatology or exacerbate it. Over the years we have been hearing anecdotal evidence that certain additives, colourants and ingredients – especially salicylates – trigger disruptive (hyperactive) behaviour in young children. Even though the results of the Feingold diet have not been replicated, the American Academy of Pediatrics recommends a low-additive diet for children with ADHD.[2] The results of the ALSPAC study suggest that children consuming a diet high in junk food at the age of four were more likely to be in the top third on the Strengths and Difficulties Questionnaire hyperactivity–inattention subscale by the age of seven; although the authors are guarded regarding the validity of their results, it is worth bearing this in mind.[3]

The '1-2-3 Magic' behaviour intervention programme for the under-12s, eloquently described from the point of view of a trainer and an educator, has seen phenomenal success over the years on the basis of its simplicity, affordability and efficacy, as well as the fact that it involves the whole family, with an emphasis on achievements and praise rather than blame. The basic principles are to control undesirable behaviours, encourage desirable ones and strengthen the parent–child relationship. Unsurprisingly, the emphasis is being placed on the parent being able to control their own behaviour (acting as a role model) before expecting the child to comply; this is a lesson to be heeded by parents and educators alike.

The clinical guidelines for the diagnosis of ADHD are fairly clearly set out – if somewhat loosely defined and open to interpretation – but the final outcome remains subjective. Very often, clinicians have been criticised for having a heuristic approach to the diagnosis, with male clinicians diagnosing more boys with ADHD than their female counterparts, and boys with motor symptoms being more likely to receive the diagnosis than girls with a similar presentation. The popular press has a field day every so often with headlines about overdiagnosis and overprescribing, with the USA particularly to blame: a fairly recent study concluded that about one million young children (out of 4.5 million children with an ADHD diagnosis in the USA) may have been wrongly diagnosed.[4]

In a meta-analysis of their caseload, Lordou *et al* found that, in a substantial minority of cases, conduct disorder was misdiagnosed as ADHD. Many of us will have at the end of a busy clinical day reflected as to whether we placed enough emphasis on the psychosocial circumstances of a child with ADHD-like symptoms and whether we were too quick to pronounce him as a sufferer, rushing to the prescription pad rather than considering a more concerted non-pharmacological approach.

Finally, Delany and Boran extol the virtues of computerised individualised cognitive training. Although the research so far shows a modest effect size, it remains a valuable asset in the armamentarium of treatment options, particularly so for those youngsters who are committed and motivated and whose parents are involved and keen to explore alternatives – either on their own or in combination with medication – to maximize treatment effect. The field remains a very promising one.

Nikos Myttas, Editor

Declaration of interest
None declared.

References
1. Annual Meeting of the Section of Urology, American Academy of Pediatrics. November 1–3, 2003. New Orleans, Louisiana (Poster 43).
2. www.feingold.org/Research/PDFstudies/AAP08.pdf (last accessed 28/09/12)
3. Wiles NJ, Northstone K, Emmett P, Lewis G. 'Junk food' diet and childhood behavioural problems: results from the ALSPAC cohort. *Eur J Clin Nutr* 2009; **63:** 491–498.
4. Elder TE. The importance of relative standards in ADHD diagnoses: evidence based on exact birth dates. *J Health Econ* 2010; **29:** 641–656.

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Enuresis and ADHD

Attention deficit hyperactivity disorder (ADHD) is the most common psychiatric diagnosis in childhood and adolescence, and its prevalence is similar in those countries where epidemiological studies have been conducted. The mean prevalence worldwide was recently estimated at 5.48% of school-aged children[1] – meaning that, in France, it is likely that 600,000–800,000 children are affected by ADHD. Since ADHD has a strong genetic origin, it persists into adulthood in the majority of cases:[2] the mean prevalence was estimated at 3.5%,[3] which means that about 1.5 million adults are likely to be affected in France.

ADHD is characterised by its heterogeneity. The predominantly inattentive subtype is more frequent in girls, whereas the combined subtype is more frequent in boys. Comorbid diagnoses – for example, oppositional defiant disorder or conduct disorder – can model the clinical presentation and the course of the condition. Enuresis is listed among those co-morbidities.

We will not address the issue of diurnal imperious urination that might be associated with nocturnal enuresis and which has also recently been shown to be associated with ADHD;[4] the mechanisms of these two urinary problems are entirely different.

Box 1. Case study

David* – a fifteen-year-old boy who wets his bed almost every night, without any dry period of longer than two weeks – is referred to our centre by a paediatric urologist. All treatments for his enuresis have failed, or have had a very limited effect to date. David has poor concentration at school, avoids any tasks that require sustained attention and is disorganised. His self-esteem is very low.

During the interview with his parents, we suspect that both David and his mother may have ADHD. His mother is overweight and says she has suffered from inattention since she was at primary school, and that she is disappointed by her level of education: she feels she should have been able to do much better. She says she is unable to read a book and, therefore, cannot help her son, who has encountered problems at school for many years.

The provisional ADHD diagnosis is subsequently confirmed; David and his parents agree to begin treatment with methylphenidate. One week later, David reports that his enuresis disappeared the night following the first intake of medication.

During four years of follow-up, wet nights are not reported anymore – even when David discontinues his treatment during the school holidays, or forgets to take his medication in the morning (which happens more often than not). David graduated from secondary school last year; traits of disorganisation and procrastination were still noticeable ■

Enuresis

Enuresis is a parasomnia that tends to happen during the first few hours of sleep. Isolated, primary nocturnal enuresis (IPNE) is defined as 'intermittent incontinence, during sleep, after age five, without any continuous period of continence longer than six months, without any associated symptom, especially diurnal'.[5,6] Factors that need to be investigated during an assessment include excessive drinking, snoring or sleep apnoea, as these can cause nocturnal polyuria.

IPNE is a common childhood disorder that affects boys most commonly

After an extensive review of the literature, an expert consensus concluded that it was scientifically proven (Evidence Level A) that primary psychiatric disorders were not more frequent in children with IPNE, but that 20% of children with ADHD also have IPNE and, conversely, that 10% of children with IPNE also suffer from ADHD. The experts concluded that children with ADHD should be systematically screened for enuresis during a consultation, and vice versa.

Indeed, IPNE is a common childhood disorder that affects boys most commonly,[7] has a genetic origin (30–60% of children with IPNE have a family history of IPNE [Evidence Level A]),[5] may lead to low self-esteem and persists into adulthood. The mean prevalence of IPNE is about 10% in five- to ten-year-olds[8] (although estimates vary with the diagnostic criteria used),[5] with a quarter of children aged between five and ten years wetting their bed every night.[8]

The natural evolution of IPNE is spontaneous resolution (at a rate of 15% per year), but contrary to popular belief, it does not always disappear at adolescence; a prevalence of 2.23% was reported among healthy 19-year-olds.[7] It is estimated that 3% of untreated children are likely to wet their bed in adulthood.[9]

Diagnosing IPNE

IPNE diagnosis is clinical, involving questioning and physical examination, and confirmed by a

voiding diary over several consecutive days, without the need for additional investigations. For the reasons stated above, questioning and physical examination should also focus on the patient's behaviour (at school and at home) and their ability to pay attention and maintain focus.

To this end, parents and teachers may be asked to complete the Strengths and Difficulties Questionnaire, the ADHD Rating Scale-IV or the Strengths and Weaknesses of ADHD-Symptoms and Normal-Behaviour Scale. A family history of both IPNE and ADHD should be investigated, especially in parents. If ADHD is suspected, the patient should be referred to a specialist.

In our practice, it is not rare to diagnose ADHD in a child or an adolescent referred or treated for IPNE, and this may have positive outcomes for the treatment of both disorders.

Treating IPNE

Information and education (with advice relating to hygiene and diet, and keeping a voiding diary) are effective in IPNE in up to 20% of cases.[5] In case of failure and where appropriate, desmopressin or oxybutynin could be suggested, with or without an alarm system. Psychotherapeutic treatments have not been validated yet.

Several authors have commented that treating IPNE is more complicated in the case of comorbid ADHD. After two years of follow-up in children aged between six and ten years, 65% of those with ADHD still wet their beds, compared with 37% of non-ADHD children.[10] After four years, these proportions tend to even out (42% and 39%, respectively), suggesting that ADHD persists, but the course of each disorder differs with time.[11]

It is not unusual for patients to report quick resolution of their IPNE after pharmacological treatment for their ADHD – whether with atomoxetine or methylphenidate – has been prescribed (see Box 1). Clinical cases of children with ADHD who have experienced this effect are reported in case studies,[12,13] a controlled study versus placebo in children who may or may not have ADHD[14] and an open, multicentre study.[15] In our experience, methylphenidate (the only medication licensed for ADHD in France) is often effective in enuresis, which does not recur when the treatment is discontinued (during school holidays, for example). The mechanism of action of methylphenidate and atomoxetine on IPNE is probably central, but is not fully understood.

Conclusion

In conclusion, screening for IPNE should be included as part of the assessment process in children referred for ADHD, and vice versa. The management of enuresis is more difficult in the case of comorbid ADHD; commonly prescribed antidiuretic drugs (desmopressin or oxybutynin) are less effective than the drugs prescribed for ADHD. However, in all cases, the quality of life for patients and their families is greatly improved ■

* All names have been changed to protect patient confidentiality.

Declaration of interest
None declared.

References
1. Polanczyk G, Laranjeira R, Zaleski M *et al.* ADHD in a representative sample of the Brazilian population: estimated prevalence and comparative adequacy of criteria between adolescents and adults according to the item response theory. *Int J Methods Psychiatr Res* 2010; **19:** 177–184.
2. Kooij SJ, Bejerot S, Blackwell A *et al.* European consensus statement on diagnosis and treatment of adult ADHD: The European Network Adult ADHD. *BMC Psychiatry* 2010; **10:** 67.
3. Fayyad J, De Graaf R, Kessler R *et al.* Cross-national prevalence and correlates of adult attention-deficit hyperactivity disorder. *Br J Psychiatry* 2007; **190:** 402–409.
4. von Gontard A, Moritz AM, Thome-Granz S, Freitag C. Association of attention deficit and elimination disorders at school entry: a population based study. *J Urol* 2011; **186:** 2027–2032.
5. Aubert D, Berard E, Blanc JP *et al.* [Isolated primary nocturnal enuresis: international evidence based management. Consensus recommendations by French expert group]. *Prog Urol* 2010; **20:** 343–349.
6. Nevéus T, von Gontard A, Hoebeke P *et al.* The standardization of terminology of lower urinary tract function in children and adolescents: report from the Standardisation Committee of the International Children's Continence Society. *J Urol* 2006; **176:** 314–324.
7. Yeung CK, Sreedhar B, Sihoe JD, Sit FK, Lau J. Differences in characteristics of nocturnal enuresis between children and adolescents: a critical appraisal from a large epidemiological study. *BJU Int* 2006; **97:** 1069–1073.
8. Lottmann H. [Traitement de l'énurésie nocturne en France]. *Presse Médicale* 2000; **29:** 987–990.
9. Hjalmas K, Arnold T, Bower W *et al.* Nocturnal enuresis: an international evidence based management strategy. *J Urol* 2004; **171:** 2545–2561.
10. Baeyens D, Roeyers H, Demeyere I *et al.* Attention-deficit/hyperactivity disorder (ADHD) as a risk factor for persistent nocturnal enuresis in children: a two-year follow-up study. *Acta Paediatr* 2005; **94:** 1619–1625.
11. Baeyens D, Roeyers H, Van Erdeghem S, Hoebeke P, Vande Walle J. The prevalence of attention deficit-hyperactivity disorder in children with nonmonosymptomatic nocturnal enuresis: a 4-year followup study. *J Urol* 2007; **178:** 2616–2620.
12. Shatkin JP. Atomoxetine for the treatment of pediatric nocturnal enuresis. *J Child Adolesc Psychopharmacol* 2004; **14:** 443–447.
13. Diamond JM, Stein JM. Enuresis: a new look at stimulant therapy. *Can J Psychiatry* 1983; **28:** 395–397.
14. Sumner CR, Schuh KJ, Sutton VK, Lipetz R, Kelsey DK. Placebo-controlled study of the effects of atomoxetine on bladder control in children with nocturnal enuresis. *J Child Adolesc Psychopharmacol* 2006; 16: 699–711.
15. Tomás Vila M, Aleu Pérez-Gramunt M, Beseler Soto B *et al.* [Methylphenidate and sleep: Results of a multicentre study on a population of children with attention deficit hyperactivity disorder]. *An Pediatr (Barc)* 2010; **73:** 78–83.

Key points

- Isolated, primary nocturnal enuresis (IPNE) affects 20% of children with attention deficit hyperactivity disorder (ADHD), and it is reported that 10% of children with IPNE suffer from ADHD.
- Treating IPNE is more complicated in the case of comorbid ADHD. After two years of follow-up, 65% of children with ADHD still wet their beds, compared with 37% of non-ADHD children.
- It is not unusual for patients to report quick resolution of their IPNE after medication is prescribed for ADHD.
- ADHD patients should be systematically screened for enuresis, and vice versa.

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Food as a trigger for ADHD symptoms: time for a paradigm shift?

Attention deficit hyperactivity disorder (ADHD) is a common psychiatric disorder in children that often leads to significant impairment of the child's social and family life. A large number of children with ADHD suffer from comorbid oppositional defiant disorder (ODD): these children are even more difficult for parents and teachers to handle, and show increased risks of academic failure.[1] The exact causes of ADHD are unclear; ADHD treatment, perforce, is bound to focus on addressing symptoms – mostly by means of medication like methylphenidate and behavioural therapy.

The short- to medium-term therapeutic effects of methylphenidate are beneficial, but the long-term effects are disappointing.[2] Further research into the causes of ADHD is imperative, and may eventually lead to new diagnostic procedures and innovative treatments.

Editor's note

Some readers may be taken by surprise that we are including an article that emphasises the role that certain foodstuffs may play in the genesis and/or exacerbation of symptoms associated with ADHD. This is a long-neglected area that has received little attention in the past due to the relatively small effect size that elimination diets confer to the treatment of ADHD symptoms. There is already good evidence for the effectiveness of a few-foods diet, and diligent, committed and well-organised parents will have already tried it. Others may have found it impossible to implement. With many of these studies it is difficult to know whether children adhere to the prescribed diet or whether the improvement in behaviour is down to parental expectations. Be that as it may, we will continue keeping an open mind ■

A restricted elimination diet avoids many foods, but will vary according to the individual child

MARTIN POOLE/GETTY

Table 1. All eight randomised controlled RED trials, including effect sizes[14]

Article	RCT type	Age (years)	Diagnosis at start	Methods	Selection Weight	RED period	ES	ACS	Contribution to weighted ES
Egger *et al*[6] (1985)	DBPCFC	2–15	Hyperkinetic syndrome	Open RED n=76, open challenge n=56, DBPCFC* **n=25**	Selected group†	4 weeks	1.03	0.11	0.12
Kaplan *et al*[7] (1989)	DBPC diet	3.5–6	DSM-III	RED vs placebo diet, DBPC* **n=24**	Aselected group	4 weeks	0.55	0.11	0.06
Carter *et al*[8] (1993)	DBPCFC	3–12	DSM-III	Open RED n=78, open challenge n=59, DBPCFC* **n=19**	Selected group†	3–4 weeks	0.61	0.09	0.05
Boris and Mandel[9] (1994)	DBPCFC	7.5±2.2	DSM-III-R	Open RED n=26, open challenge n=19, DBPCFC **n=16**	Selected group‡	2 weeks	1.60	0.07	0.12
Schulte-Körne *et al*[11] (1996)	Open RCT	8.4±2.0	ICD-9	Open RED vs challenge diet*, **n=21**	Aselected group§	3 weeks	1.26	0.10	0.12
Schmidt *et al*[10] (1997)	DBPC diet	6–12	DSM-III	RED vs placebo diet, DBPC* **n=49**	Aselected group	8 days	0.59	0.22	0.13
Pelsser *et al*[12] (2009)	Open RCT	3–8	DSM-IV	RED **n=15** vs waiting list n=12	Aselected group§	5 weeks	2.35	0.07	0.16
Pelsser *et al*[13] (2011)	Open RCT, blinded measurements	4–8	DSM-IV	RED **n=50** vs waiting list n=50, blinded measurements	Aselected group	5 weeks	1.82	0.23	0.42
				Total n RCT=219			Average ES=1.2	Total=1.00	Weighted ES=1.2

ACS = abbreviated Conners' scale; DBPCFC = double-blind, placebo controlled food challenge; DSM-III/-III-R/-IV = *Diagnostic and Statistical Manual of Mental Disorders*, 3rd edn/3rd edn, text revision/4th edn; ES = effect size; ICD-9 = WHO *International Statistical Classification of Diseases and Related Health Problems*, 9th rev; RCT = randomised controlled trial; RED = restricted elimination diet
* crossover; † subjects selected via diet clinics; ‡ subject selected via allergy clinic; § exclusion of children with risk factors for ADHD (for example, premature, dysmature, foster child, IQ<70)

Nutrition and its effects on the brain

A research area showing promising results is that which examines the relationship between everyday foods and child psychiatric disorders. There are two different types of research study that have been conducted to investigate the effects of food on children with ADHD: additive research studies and restricted elimination diet (RED) research studies.

Additive research, which involves eliminating or supplementing only a few food components, like colourings or preservatives, has shown that additives are not causal of ADHD – although they may have a small effect on the behaviour of all children, independent of any psychiatric morbidity.[3,4] Consequently, avoiding additives is not part of ADHD treatment.[5]

RED research – which involves changing the patient's diet completely and eliminating a wide range of foods – has shown that a five-week RED may have an impressive beneficial effect on the behaviour of children with ADHD and ODD.[6–13]

Double-blind RED trials

The effects of an RED on ADHD have been investigated in five independently conducted randomised controlled trials, using a double-blind, placebo controlled design (see Table 1)[6–10] – a meta-analysis of which resulted in an overall effect size of 0.9 (range 0.6–1.1).[14,15] (For comparison, the average effect size of methylphenidate is 0.6–0.9.)[16,17] All five studies have shown that an RED may result in statistically significant and clinically relevant beneficial effects on ADHD, which are – taking the double-blind, placebo controlled design into account – not attributable to parental expectations or improvement of parenting abilities.

A restricted diet, like behavioural therapy, is very difficult to blind

It may be obvious that a restricted diet, like behavioural therapy, is very difficult to blind. Consequently, to conceal the treatment conditions and secure the blinding, some dietary sacrifices had to be made. For instance, to prevent jeopardising the double-blind conditions in two of five studies using a placebo versus verum design, the placebo diet had to be restricted as well, while the verum diet could not be restricted as much as optimally desired.[7,10] Despite the unfavourable conditions, these studies resulted in an effect size of 0.6 (see Table 2). Three of five studies used a double-blind, placebo controlled challenge design: following an open RED (to identify the diet responders) and an open challenge period (to identify the incriminated foods), a double-blind, placebo controlled challenge was

performed using foods suitable for blinding.[6,8,9] Considering that only small amounts of foods can be blinded, the dose of challenged foods had to be limited. Nevertheless, these studies demonstrated an effect size of 1.1 (see Table 2), resulting in inclusion of RED research in an algorithm for treatment of ADHD.[18]

Randomised controlled RED trials

To date, additional randomised controlled trials investigating the effect of an RED in randomly assigned, heterogeneous groups of children with ADHD have been conducted, with the aim of defining the effect size of an optimal RED on ADHD[11–13] and ODD[12,13] in an open design. Considering the limitations of the double-blind, placebo controlled design – as described above – and the evidence already available (where double-blind, placebo controlled randomised controlled trials[6–10] resulted in effect sizes comparable with, or exceeding the effect size of, methylphenidate, and the open findings of parents were convincingly corroborated in a double-blind, placebo controlled design[6,8,9]), the choice for an open design is legitimate. The open randomised controlled trials resulted in an effect size of 1.8 (see Table 2), and the parent measurements were confirmed by those of teachers[11–13] and blinded paediatricians[13] – thus strengthening the previous study results in heterogeneous groups of children with ADHD.

Additionally, in two out of three studies, the effect of an RED on ODD was investigated,[12,13] demonstrating impressive effects on ODD as well. Following the RED, 60% of children with ADHD and ODD did not meet the criteria for those conditions anymore; according to parents', teachers' and the blinded paediatrician's measurements, they displayed 'normal' behaviour instead.

Disregarding of RED research

Unfortunately, although RED research 1) goes back to 1985,[6] 2) has from the first study been shown to be a very promising ADHD intervention approach, 3) has been published in well-known journals[6–13] and 4) has shown an average effect size exceeding that of medication,[14] many scientists and physicians are taken by surprise when confronted with the evidence. This may be due to the predominant disregarding of RED trials in review articles analysing the current literature concerning the treatment of children with ADHD;[16,19,20] quite a few authors discussing the connection between food and ADHD seem to have missed the RED studies, mentioning the most recent Dutch open randomised controlled trial only,[21] or erroneously referring to additive studies to underline that there is no connection between food and ADHD.[16,19,20,22]

It is unfortunate that the RED studies have not received wider recognition.

Table 2. Effect size per randomised controlled RED study design[14]

RCT	Average ES	Weighted average ES
DB placebo diet design (n=2)	0.57	0.58
DBPCFC design (n=3)	1.08	1.05
Open design (n=3)	1.81	1.78

The weighted average ES has been calculated by weighting the average ES by the number of children in each study relative to the total number of children in the particular design – that is, the weighted average ES of the open design studies (see Table 1[11–13]), including 86 children (21+15+50) = 1.26*21/86+2.35*15/86+1.82*50/86 = 1.78. The average ES of all studies (n=8) is 1.2; DB = double-blind; DBPCFC = double-blind, placebo controlled food challenge; ES = effect size

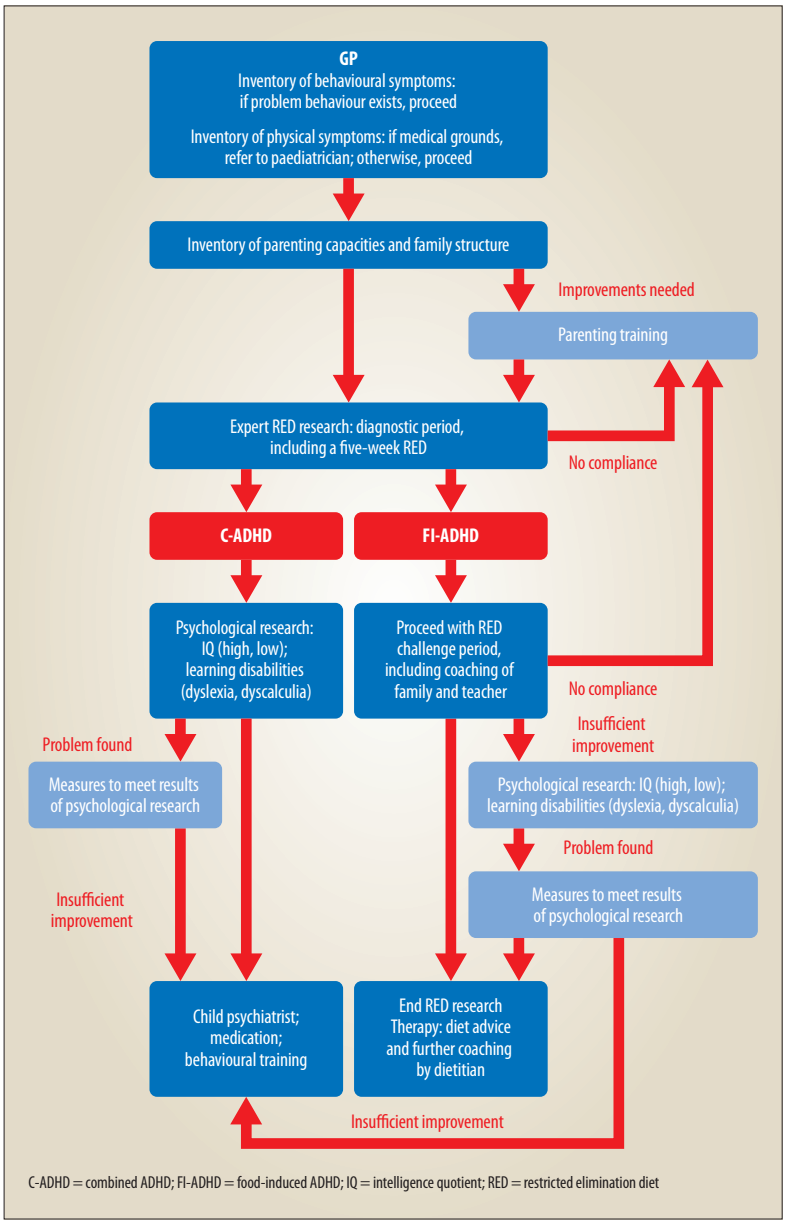

Figure 1. Algorithm for multimodal diagnosis and treatment of ADHD[14]

Conclusions

Research results provide convincing evidence for a statistically significant and clinically relevant effect of an RED on ADHD and comorbid ODD, with an

overall effect size on ADHD of 1.2 (see Table 1). Taking these results into account, and considering the limitations of the current approach to ADHD treatment (where the long-term effects of medication have been shown to be disappointing: 50% of children discontinue their medication within a two-year period, 75% still suffer from ADHD in adolescence and adulthood, and those with comorbid ODD have a worse prognosis),[1,2,23,24] a paradigm shift concerning the diagnosis and treatment of ADHD is timely, and implementation of RED research in children with parents motivated to follow a five-week RED is warranted. Interventions that may lessen ADHD symptoms and ODD have clinical potential, and RED research implementation may provide such an opportunity.

Furthermore, incorporation of RED research into the chapters on ADHD and ODD in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) is warranted, so that the definition includes a reference to a trigger in a manner that is commensurable with other DSM-5 diagnoses with similar motivations (for example, substance-induced delirium, alcohol-related disorders and cocaine-induced disorders).

Children with ADHD who respond favourably to a five-week RED may be diagnosed with food-induced ADHD (FI-ADHD) symptoms; in these cases, ADHD may be considered both a psychiatric disorder and a hypersensitivity disorder triggered by certain foods. These children are advised to enter an RED challenge period to identify the incriminated foods, eventually resulting in as wide-ranging a diet as possible.

Children with ADHD who do not respond favourably to an RED may be diagnosed with classic ADHD symptoms, and may start treatment as usual, including medication.

New algorithm and further research

In 2001, RED research was included in a basic algorithm for treatment of ADHD,[18] based on the favourable results of the randomised controlled trials into REDs that were available at that time. This algorithm has never been put into effect. Now, ten years later, additional randomised controlled trials investigating REDs have been performed, confirming and strengthening the previous study results in randomised groups of children with ADHD and ODD, thus warranting a revised algorithm for multimodal diagnosis and treatment of ADHD (see Figure 1).[14] Further research in the area is imperative, to define the mechanism of food in children with FI-ADHD symptoms and the long-term effects of an RED ■

Declaration of interest
The author is franchiser of the ADHD Research Centre.

References
1. Sibley MH, Pelham WE, Molina BS *et al.* The delinquency outcomes of boys with adhd with and without comorbidity. *J Abnorm Child Psychol* 2011; **39:** 21–32.
2. Molina BS, Hinshaw SP, Swanson JM *et al*; MTA Cooperative Group. The MTA at 8 years: prospective follow-up of children treated for combined-type ADHD in a multisite study. *J Am Acad Child Adolesc Psychiatry* 2009; **48:** 484–500.
3. Bateman B, Warner JO, Hutchinson E *et al.* The effects of a double blind, placebo controlled, artificial food colourings and benzoate preservative challenge on hyperactivity in a general population sample of preschool children. *Arch Dis Child* 2004; **89:** 506–511.
4. McCann D, Barrett A, Cooper A et al. Food additives and hyperactive behaviour in 3-year-old and 8/9-year-old children in the community: a randomised, double-blinded, placebo-controlled trial. *Lancet* 2007; **370:** 1560–1567.
5. www.nice.org.uk/CG72 (last accessed 13/01/12)
6. Egger J, Carter CM, Graham PJ, Gumley D, Soothill JF. Controlled trial of oligoantigenic treatment in the hyperkinetic syndrome. *Lancet* 1985; **1:** 540–555.
7. Kaplan BJ, McNicol J, Conte RA, Moghadam HK. Dietary replacement in preschool-aged hyperactive boys. *Pediatrics* 1989; **83:** 7–17.
8. Carter CM, Urbanowicz M, Hemsley R *et al.* Effects of a few food diet in attention deficit disorder. *Arch Dis Child* 1993; **69:** 564–568.
9. Boris M, Mandel FS. Foods and additives are common causes of the attention deficit hyperactive disorder in children. Ann Allergy 1994; 72: 462–468.
10. Schmidt MH, Möcks P, Lay B *et al.* Does oligoantigenic diet influence hyperactive/conduct-disordered children—a controlled trial. *Eur Child Adolesc Psychiatry* 1997; **6:** 88–95.
11. Schulte-Körne G, Deimel W, Gutenbrunner C *et al.* [Effect of an oligo-antigen diet on the behavior of hyperkinetic children.] [Article in German.] *Z Kinder Jugendpsychiatr Psychother* 1996; **24:** 176–183.
12. Pelsser LM, Frankena K, Toorman J *et al.* A randomised controlled trial into the effects of food on ADHD. *Eur Child Adolesc Psychiatry* 2009; **18:** 12–19.
13. Pelsser LM, Frankena K, Toorman J *et al.* Effects of a restricted elimination diet on the behaviour of children with attention-deficit hyperactivity disorder (INCA study): a randomised controlled trial. *Lancet* 2011; **377:** 494–503.
14. http://adhdenvoeding.nl/downloads/LMJ_Pelsser_Proefschrift.pdf (last accessed 13/01/12)
15. Benton D. The impact of diet on anti-social, violent and criminal behaviour. *Neurosci Biobehav Rev* 2007; **31:** 752–774.
16. Biederman J, Faraone SV. Attention-deficit hyperactivity disorder. Lancet 2005; **366:** 237–248
17. Faraone SV, Buitelaar J. Comparing the efficacy of stimulants for ADHD in children and adolescents using meta-analysis. *Eur Child Adolesc Psychiatry* 2010; **19:** 353–64.
18. Hill P, Taylor E. An auditable protocol for treating attention deficit/hyperactivity disorder. *Arch Dis Child* 2001; **84:** 404–409.
19. Brown RT, Amler RW, Freeman WS *et al*; American Academy of Pediatrics Committee on Quality Improvement; American Academy of Pediatrics Subcommittee on Attention-Deficit/Hyperactivity Disorder. Treatment of attention-deficit/hyperactivity disorder: overview of the evidence. *Pediatrics* 2005; **115:** e749–e757.
20. Steer CR. Managing attention deficit/hyperactivity disorder: unmet needs and future directions. *Arch Dis Child* 2005; **90**(Suppl 1): i19–i25.
21. Hoekstra PJ. Is there potential for the treatment of children with ADHD beyond psychostimulants? *Eur Child Adolesc Psychiatry* 2011; **20:** 431–432.
22. Romanos M, Buske-Kirschbaum A, Fölster-Holst R *et al.* Itches and scratches – is there a link between eczema, ADHD, sleep disruption and food hypersensitivity? *Allergy* 2011; **66:** 1407–1409.
23. Lansbergen MM, van Dongen-Boomsma M, Buitelaar JK, Slaats-Willemse D. ADHD and EEG-neurofeedback: a double-blind randomized placebo-controlled feasibility study. *J Neural Transm* 2011; **118:** 275–284.
24. Staller J, Faraone SV. Attention-deficit hyperactivity disorder in girls: epidemiology and management. *CNS Drugs* 2006; **20:** 107–123.

Key points

- In children with attention deficit hyperactivity disorder (ADHD), a five-week restricted elimination diet (RED) may result in significant improvement of the child's behaviour, both at home and school. In RED responders, ADHD may be considered both a psychiatric and hypersensitivity disorder, with symptoms triggered by everyday foods.
- RED research results are applicable to the general paediatric ADHD population, as long as parents are motivated to follow an RED and expert supervision is available.
- Children diagnosed with food-induced ADHD symptoms following an RED should engage in follow-up to establish the incriminated foods; those with classic ADHD symptoms should start treatment as usual.
- Findings from RED research need to be implemented and incorporated into the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders,* and further research into the mechanisms of food in ADHD is warranted.

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1-2-3 Magic – a behavioural approach for ADHD?

A fraught parent–child relationship is a common factor in many childhood developmental disorders,[1] and attention deficit hyperactivity disorder (ADHD) is no exception.[2] Children with ADHD suffer frequent mood swings, display aggressive behaviour and have difficulty managing their impulses – symptoms that can be difficult to distinguish from 'normal' misbehaviour. This is exacerbated by the fact that this patient group displays a 30% maturity lag, on average, compared with their peers.[3] Discipline, then, can prove a difficult issue for parents of children with ADHD: how can they set boundaries and help their offspring understand what constitutes acceptable behaviour and what does not, while remaining sensitive to the limitations of the condition?

1-2-3 Magic, a behavioural management programme, aims to sidestep this problem by changing the behaviour of the adult, not the child. This is quite a revolutionary concept when considered in the context of ADHD, as these children are often used to be being singled out and reprimanded for their behaviour, both at home and school – a pattern which, over time, can damage the child's self-esteem and provoke further disruptive behaviour. By shifting the focus from child to parent, 1-2-3 Magic seeks to give parents an improved awareness of their own emotional responses – with the intention that, by imitating this behaviour, their children will become adept at self-managing their emotions, too.

This article gives an overview of the techniques central to 1-2-3 Magic and considers their potential efficacy for the paediatric ADHD population.

1-2-3 Magic: the basics

The basic tenets of 1-2-3 Magic are simple. Three central parenting tasks are identified: 1) controlling negative behaviour; 2) encouraging positive behaviour; and 3) strengthening the parent–child relationship. Long-term success is achieved, 1-2-3 Magic proponents claim, if – and only if – all three of these tasks are carried out simultaneously.

1-2-3 Magic states that there are two mistakes adults make when attempting to discipline children: displaying too much emotion and talking too much.[4] A child's ability to take in information is finite, and situations of heightened emotion inhibit their ability to think properly. Add ADHD to this – a condition that, by definition, inhibits the affected individual's ability to pay attention – and it is easy to see that verbose explanations merely serve to confuse and frustrate, rather than educate. As Thomas Phelan, the creator of 1-2-3 Magic, points out: 'Children can't respond to warnings if they don't hear them clearly in the first place'.[4] Disciplining a child by explaining why their behaviour is inappropriate does not tend to sink in, particularly when the adult is visibly upset: it is difficult to respond to the content of someone's words if their delivery is highly emotional. One of the key aspects of 1-2-3 Magic, then, is that discipline is delivered calmly and consistently.

These two rules – not displaying too much emotion and not talking too much – form the context within which 1-2-3 Magic may be implemented.

Controlling negative behaviour

The first step of 1-2-3 Magic involves addressing those things a child does that their parents do not want them to: 'stop' behaviours. Stop behaviours are so called because they refer to things that can be stopped immediately – for example, hitting, whining or arguing. Frequently, parental responses to these types of behaviours are those that express frustration, disappointment and anger. Not only is an emotional approach of this kind often ineffective, but the negative emotions tend to be passed on to the child, creating anxiety.

This is where the '1-2-3' comes in. Rather than shouting at a child who has misbehaved, and giving them a punishment in anger (which the parent then feels guilty about and reneges on, ruining any chances of consistency), parents are taught to look at their child and say, 'That's one'. If the child continues to misbehave after a five-second pause, the parent will say: 'That's two'. If a further five seconds pass, and the child's behaviour shows no change, the parent will say: 'That's three – time-out'. The child is then sent to 'time-out' for a pre-specified amount of time (usually one minute for every year of their life).

The thinking behind counting is that it is a consequence, rather than a punishment. By counting to three, the parent has given the child two opportunities to behave; the child has not responded, and so there will be a consequence for their behaviour. Counting only works, however, when it is delivered calmly and without emotion. Too much talking

distracts the child from the task in hand (that is, stopping the bad behaviour), and also creates guilt and anxiety. Consequently, once the time-out has finished, 1-2-3 Magic teaches that parents should make a fresh start. No lecturing, no explaining, no apologising: instead, focus should move on to a new activity. If the child behaves, the parent should praise them; if they do not, another count begins.

There are, of course, some situations where parents would not want to give their child two chances to behave – when what they have done is so bad, it needs to be stopped immediately. This is the 'automatic three'. Phelan uses an example of the child hitting their parent; in this scenario, the child is sent directly to time-out.

The key to the 1-2-3 technique is the adult's silence – not the counting. Setting boundaries and giving routine responses discourages negative behaviour and helps the child begin to learn about societal norms and expectations.

Encouraging positive behaviour

Encouraging positive behaviour concerns those things a child does not do that a parent would like them to – 'start' behaviours. These might include getting to school on time, doing homework or hanging up discarded clothes. Establishing a routine is key: parents should define the procedure for doing something (such as homework) for their children, and then rehearse that procedure with them. Once a routine has been established, children tend to follow it automatically.[4]

Start behaviours require more motivation than stop behaviours: whereas bad behaviour takes seconds to stop, initiating a task like homework or getting ready for school can take far longer. These tasks do not only have to be started, but continued and finished – a process that does not come naturally to the child with ADHD.[5] Consequently, Phelan recommends that this stage of the programme be implemented around seven to ten days after counting has been introduced, to avoid overloading the child with information.

There are seven strategies that parents can use to encourage start behaviour:

- Positive reinforcement – praising the child for co-operating or behaving well ('Thanks for doing the washing-up')
- Simple requests – businesslike, matter-of-fact requests ('I want these toys out of the kitchen before 5 pm')
- Kitchen timers – for setting a time frame ('I bet you can't tidy the kitchen in ten minutes!')
- The docking system – reducing the child's pocket money or allowance if they do not comply ('Either you take the rubbish out, or you can pay me to do it')
- Natural consequences – letting children learn by making their own mistakes (feeling cold if they forget their coat)
- Charting – rewarding good behaviour by adding a sticker (or similar) to a chart in a prominent place (for example, on the fridge)
- Counting variation – switching techniques and counting for start behaviours if they are not completed (although this should only be used for tasks that take less than two minutes).

Some everyday tasks, such as household chores, may not be enjoyable or interesting for a child; the tactics described above are designed to add incentive. By emphasising positives and focusing on tasks a child is capable of, there is no longer a need for discipline – alleviating stress for the adult, too.

Strengthening the relationship

The final stage of 1-2-3 Magic is about strengthening the parent–child relationship. The two most powerful ways to achieve this are through sympathetic listening and one-on-one fun.[4]

Sympathetic listening

Sympathetic listening means looking at the world from another person's point of view. It is objective and non-judgemental, concerned only with understanding the speaker's view – not with whether the listener finds it agreeable.[6] Listening to a child sympathetically means listening actively; this not only helps give the adult a clearer understanding of what is being said, but boosts the child's self-esteem. An added benefit is that it models desirable behaviour; listening skills are often impaired in ADHD, along with working memory.[7]

There are several techniques for active listening:

- Openers – brief comments/questions designed to elicit a response ('Oh?', 'Yeah', 'Really?')
- Non-judgemental questions – it is essential that questions are not loaded or emotional for them to be effective ('Why do you think you did that?', not 'What kind of a thing is that to do?')
- Reflecting feelings – demonstrating understanding of the speaker's descriptions by mirroring and vocalising their emotional responses ('That must have made you really cross')
- Checks or summaries – questions that clarify the listener's understanding ('So, you were upset because you wanted to be in the play?').

1-2-3 Magic teaches that active listening is a good way of showing respect for another person and validating their opinion – pre-empting arguments that might otherwise ensue.

One-on-one fun

For discipline to work effectively, a child needs to like and respect the adult giving it out. Phelan says

that taking the time to have regular fun together is the best way of doing this. Sadly, in everyday life, play does not tend to be a priority.

Even when play is prioritised, it is not always enjoyable: often, too much emphasis is put on the idea of doing things 'as a family'. The problem with this is that enforced activities as a group can sometimes only serve to highlight the differences within a family, rather than bring them together; a group of people bring with them a group of conflicting views and desires.

To counteract this, Phelan recommends setting time aside for one-on-one fun with each individual child. This does not necessarily have to involve going out, or spending money; just making the effort to dedicate time specifically to one person is enough to make them feel valued and important.

1-2-3 Magic teaches that, while discipline is key, it should only account for about 25% of your time; the other 75% should be devoted to having fun.[4]

Is there an evidence base?

Despite the difficulties documented in measuring behavioural programmes, there are several studies that have successfully examined the efficacy of 1-2-3 Magic. The first of these is the Medicine Hat study,[8] in which 90% of parents felt that their child's behaviour (measured using the Conflict Behaviour Questionnaire [CBQ]) had improved after a two-session 1-2-3 Magic programme. Moreover, the majority of children who had fallen into the clinical range on the CBQ on first presentation fell into the 'normal' range after three months of exposure to the programme. Similarly, the Mooseheart study,[9] which used a five-item Likert scale to gauge carers' satisfaction with children's behaviour, reported a significant improvement after nine weeks of exposure to 1-2-3 Magic ($p=0.01$). Gutierrez[10] found that dysfunctional parent–child interactions were reduced at a statistically significant level in those parents who implemented the 1-2-3 Magic programme. Parents also registered significantly larger reductions on this measure at follow-up in comparison with controls.

In the UK, an audit by the University of Hertfordshire decreed 1-2-3 Magic to be 'an effective programme for increasing parenting self-efficacy'[11] – although the researchers also admit that hypotheses about this being a causal relation need to be tested and refined in the longer term. Bradley *et al*,[1] too, declare 1-2-3 Magic to be 'acceptable and reasonably effective'; in their study, parents reported their children as being less problematic and less hyperactive (although not less angry or anxious) on completion of the programme. They also perceived their children as being happier, more compliant and less difficult. However, the study also highlights the inadequacy of relying solely on parental self-report to gauge results.[1]

Key points

- Anecdotal evidence tells us that 1-2-3 Magic can be a useful behavioural management programme for children with attention deficit hyperactivity disorder (ADHD).
- Several studies have examined 1-2-3 Magic and found it to be reasonably effective, although more research is needed into its efficacy specifically for ADHD.

Specific issues in ADHD

Some situations where discipline is called for can pose specific problems in ADHD. Parents should be reminded that pharmacological treatment can cause adverse effects on appetite and sleep pattern; children taking medication may refuse a meal because it inhibits their appetite, or wander about at night because it prevents them from sleeping.[12] It would be unfair to punish a child in such a scenario, as they have no control over these impulses.

Tidying bedrooms can prove tricky, as many ADHD sufferers find it difficult to 'see' where to start or how to organise themselves. Visual representations are useful here – suggest to parents that they take a photo of the room once it has been tidied and affix it to the wall. This gives the child a template to work with, reducing stress and freeing them to focus on the task in hand.

Working memory in ADHD is akin to that of an Alzheimer's patient,[12] so counting should be restarted for each stop behaviour.

As for time-outs, the 'one minute for each year of a child's life' rule may be broken, as hyperactive children will find it extremely difficult to sit quietly for this length of time.

Conclusion

Whatever the goal, it is important to be realistic – particularly in the case of ADHD. Setting expectations too high will result in disappointment and, more often than not, prompt precisely the negative behaviour that the programme aims to tackle. Nevertheless, 1-2-3 Magic gives a structure to work with, which appears to be effective in many cases.

Perhaps the programme's greatest strength is that it recognises that the hardest part of being a parent is managing oneself – not the child. However, examination of the long-term effects of the programme on children's behaviour and parents' efficacy is warranted.[11] Further, more research is needed to quantify the effectiveness of the programme specifically for ADHD ■

Declaration of interest
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Further reading
Phelan TW. *1-2-3 Magic: Effective Discipline for Children 2–12,* 4th edn, rev ed. Glen Ellyn, IL: ParentMagic Inc, 2010.

References
1. Bradley SJ, Jadaa DA, Brody J *et al.* Brief psychoeducational parenting program: an evaluation and 1-year follow-up. *J Am Acad Child Adolesc Psychiatry* 2003; **42:** 1171–1178.
2. Barkley RA. *Attention-deficit hyperactivity disorder: a handbook for diagnosis and treatment,* 3rd edn. New York: The Guilford Press, 2006.
3. Roach KS. *Why now? How can a student be identified ADHD during high school?* Chester, VA: Chesterfield County Public Schools, 2004.
4. Phelan TW. *1-2-3 Magic: Effective Discipline for Children 2–12,* 4th edn, rev ed. Glen Ellyn, IL: ParentMagic Inc, 2010.
5. www.help4adhd.org/treatment/guides/WWK9 (last accessed 14/05/12)
6. www.beyondintractability.org/bi-essay/empathic-listening (last accessed 09/05/12)
7. McInnes A, Humphries T, Hogg-Johnson S, Tannock R. Listening comprehension and working memory are impaired in attention-deficit hyperactivity disorder irrespective of language impairment. *J Abnorm Child Psychol* 2003; **31:** 427–443.
8. www.parentmagic.com/uploads/Medicine%20Hat%20Study.pdf (last accessed 09/05/12)
9. www.parentmagic.com/uploads/Mooseheart%20Study.pdf (last accessed 10/05/12)
10. www.ncfh.org/pdfs/2k9/8828.pdf (last accessed 10/05/12)
11. Bloomfield L, Kendall S. Audit as evidence: the effectiveness of '123 magic' programmes. *Community Pract* 2010; **83:** 26–29.
12. Bilbow A, Evans H. 1-2-3 Magic Licensed Practitioner Training Course. London, March 2012.

Viewpoint

An educator's view

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What is it about 1-2-3 Magic that makes it stand out from the other behaviour management programmes I have trained in? For me, it is its simplicity and ease of use – and most importantly, that it works! It is a programme that you can understand and put into practice immediately, and the improvements that the novice practitioner can introduce are often significant, immediately reducing stress for parents, children and teachers alike.

The kick-off conversation

One of the important things to remember when trying to get children to behave is that first we need to teach them what good behaviour looks like. We need to introduce 1-2-3 Magic to them and be prepared to answer questions. This is called the 'kick-off conversation'. You may need to have this several times as children begin to familiarise themselves with the process. When you start the programme you can expect that they will test both it, and you, at some time. Most children will go with it easily, while others will offer a challenge; only a small percentage will be resistant.

The little adult assumption

My favourite part of the approach is the 'little adult assumption'. Adults tend to rely on explanations to change behaviour. At the core of this idea is the notion that children are reasonable and unselfish human beings; when they do not act as such, they are simply missing information. So, as adults, we only need to fill that gap to make a difference. To do this, we spell out the facts, believing that once the children hear them, they will alter their behaviour. Unfortunately, this rarely works.

Sometimes, an explanation may be necessary – but 1-2-3 Magic asserts that problems can often result from this approach – namely, 'Talk-Persuade-Argue-Yell-Hit syndrome'. When talking does not have an effect, parents attempt to persuade the child; should this fail, they move onto arguing, which quickly develops into a yelling match. Sadly, at this point, hitting becomes a distinct possibility – generally when adults feel overpowered and powerless, and are unable to see a way out.

The wild animal trainer

1-2-3 Magic suggests that adults think of themselves as wild animal trainers. This encourages them to look at the gentle, reward-led approaches used by trainers and to apply some of the same basic principles. By taking this approach, the adult is able to modify behaviour successfully in a relatively stress-free manner. I had the opportunity to speak to an ex-trainer of whales and dolphins in the USA and ask her about how the training was managed. She said that the trainers would stand around the tank and watch the whale. When the whale performed a trick, they would throw it a fish and jump and cheer. The rest of the time, they did nothing, but waited quietly for the desired action to be repeated. Each time the whale repeated the desired action it was rewarded. Whales are smart and they like to eat fish, so they quickly worked out what they had to do to encourage the trainers to feed them and give them attention.

Compare and contrast this with the adult's behaviour when trying to promote better behaviour. In particular, look at Talk-Persuade-Argue-Yell-Hit syndrome, and you will notice that the adult's excitement escalates as negative behaviour persists. They are feeding the children a massive amount of negative attention, which actually encourages them. The nature of attention does not matter; children are often unconsciously fulfilling a personal need – and sadly, any attention will meet that. From this, we can begin to see that we are actively rewarding and promoting negative behaviour choices.

You do not have to keep rewarding positive choices for long before you will see behavioural changes. I have seen the behaviour of a difficult class turn around in a morning, with the technique affecting well over 80% of the children, with the other 20% joining in shortly after. There is the occasional child who hangs on to the negative behaviour for an extended period, and they may need specific interventions; however, 1-2-3 Magic is still the glue holding the class together.

Conclusion

This is a very short overview, and can only offer a limited taste of what the programme covers. Without a doubt, though, if you are having difficulties with young children, this is the approach to use. You can join the ranks of the parents and teachers around the world who have improved their relationships and life chances for their children – and, in many cases, for themselves ■

Declaration of interest
None declared.

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When appearances can deceive: final diagnoses in a child psychiatric unit

The high prevalence of attention deficit hyperactivity disorder (ADHD)[1] and the attention this diagnosis has received in the media and in popular culture[2] has led to a situation where parents, teachers and social workers quite frequently recognise apparent symptoms of ADHD, despite being less familiar with symptoms of lesser-known diagnoses. As a result, it is not surprising that a very large number of referrals are made with the aim of investigating the possibility of ADHD.[3]

In our personal experience at an outpatient child psychiatric unit in Cyprus, we have found that many of these referrals eventually lead to entirely different diagnoses that are unrelated to ADHD.

While the co-morbidities of ADHD have been thoroughly investigated,[4] the extent to which presentation of ADHD-like symptoms actually maps out to alternative diagnoses that exclude ADHD altogether has not been studied as extensively. This is a question of some importance. A misdiagnosis of ADHD when, in fact, an altogether different disorder is present could lead to inappropriate clinical interventions – to the detriment of patient welfare.

With this in mind, the purpose of this study was to investigate the extent to which presenting symptoms of inattentiveness, hyperactivity or impulsivity actually map out to ADHD once the clinical assessment has been completed – and, if not, to investigate whether distinct clusters of ADHD-like symptoms differentially predict alternative diagnoses.

Table 1. Final diagnoses of children (n=53) presenting with ADHD-like symptoms

Final diagnoses	n	%
ADHD	29	55
Learning difficulties	17	32
Victim of abuse	10	19
Autism spectrum	7	13
Conduct disorder	6	11
Anxiety/phobia	6	11
Oppositional defiant disorder	5	9
Language impairment	4	8
Enuresis	3	6
Mental retardation	3	6
Obsessive compulsive disorder	2	4
Depression	2	4
Bereavement	2	4
Sleep disorders	1	2
Total number of diagnoses	**97**	
Average number of diagnoses per child	**1.83**	

NB Most children had co-morbidities – 34% received one diagnosis, 47% received two and 17% received three or more

Methods and measures

Patient records from a child psychiatric unit in Cyprus, collected over a period of 12 months, were investigated to identify cases where at least one of the three ADHD-associated symptom categories – inattentiveness, hyperactivity or impulsivity – were included in the initial referral note.

Fifty-three cases (47 boys), with a mean age of 9.77 years (range 4–17 years), were identified for inclusion in the study. Each patient record was then explored to extract information pertaining to the variables being measured. Specifically, presenting symptoms were assessed by studying the initial, prediagnostic referral note. Referral notes summarise the information provided by the person who made the referral – for example, a parent, social worker, educational psychologist or similar.

From the referral notes, the two main ADHD symptom categories – inattentive and hyperactive/impulsive – were coded as separate binary variables (0=symptom category not mentioned, 1=symptom category mentioned). As would be expected, some cases presented with only inattentive symptoms, others presented with only hyperactive/impulsive symptoms, while a few patients presented with both types of symptom. Consequently, based on this information, a new categorical variable was constructed with three values, as follows: inattentive symptoms only; hyperactive/impulsive symptoms only; and combined symptoms.

Beyond the referral note, each patient record was also explored to ascertain the final diagnosis (or diagnoses) made by the child psychiatrist or clinical psychologist responsible for the case. Each

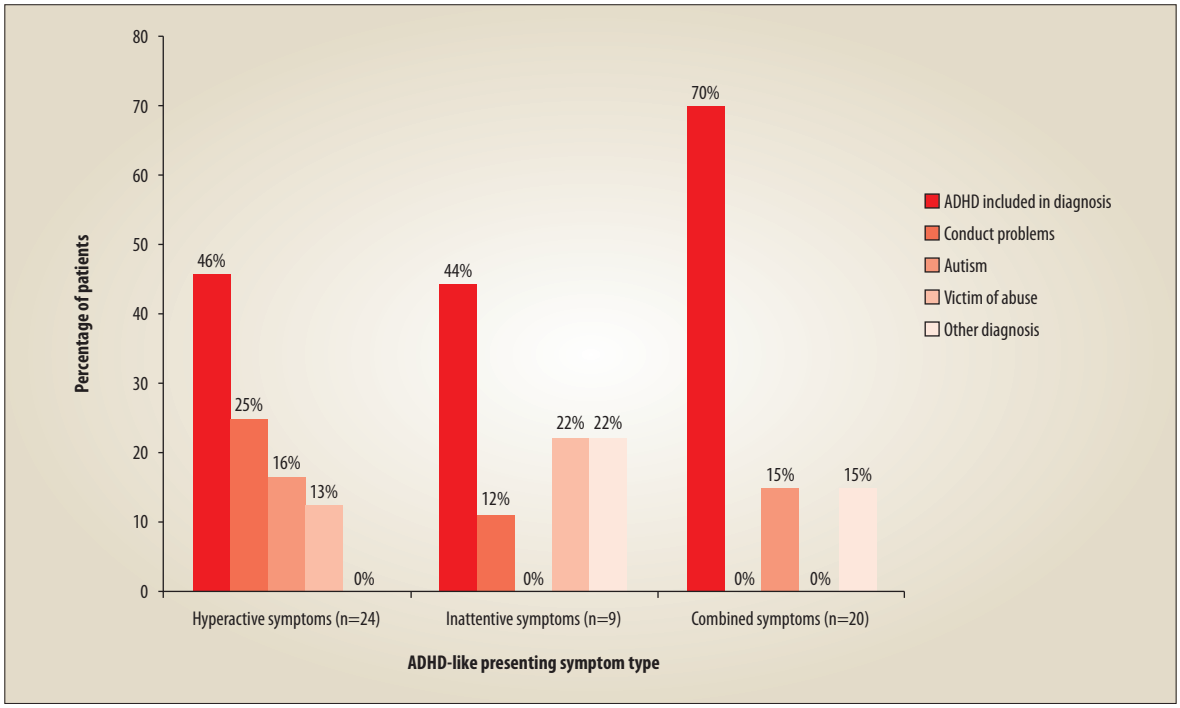


Figure 1. Cross-tabulations between ADHD-like presenting symptom type and final clinical diagnosis

distinct diagnosis was separately coded as a binary variable (0=diagnosis not present, 1=diagnosis present). Diagnoses in our clinic are made in line with *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) criteria[5] following an in-depth assessment of the child and the family context through interviews and psychometric testing.

Analysis and results

In total, 14 different diagnoses were found in this sample of 53 children (see Table 1).

It should be noted that most diagnoses found in the sample were of Axis I as defined in the DSM-IV (for example, ADHD, conduct disorder, autism); one diagnosis refers to an Axis II disorder (mental retardation); and bereavement and abuse were coded as Axis IV issues of clinical concern. However, for the purposes of this analysis, all diagnoses were considered together, to explore underlying co-morbidity patterns without taking into account which axis each diagnosis would normally be classified under. What was instead prioritised for the purpose of analysis was the principal diagnosis of each case – that is, the diagnosis seen by the clinical team as being the main focus of clinical concern.

It is worth observing that a final diagnosis of ADHD was confirmed in only 29 children (55%). This included cases of comorbid ADHD, such as ADHD with conduct disorder, or ADHD with learning difficulties. Beyond classifying these as 'ADHD co-morbidity' no further analysis was conducted on these cases, since the purpose of this study is not to unpack the issue of ADHD co-morbidity, but rather to understand clinical situations where apparent ADHD symptomatology maps out on to entirely different diagnoses. The remaining 45% of cases indeed belonged in this category – namely, they presented with a diagnosis or co-morbidity pattern that excluded ADHD altogether.

Finally, it is also worth noting that the majority of children displayed some sort of co-morbidity: 18 children (34%) received one diagnosis; 25 children (47%) received two diagnoses; and nine children (17%) received three or more diagnoses. Only one child did not receive any diagnosis.

Given that the aim was to study the extent to which ADHD-like symptoms map out to alternative diagnoses that do not include ADHD (as opposed to ADHD co-morbidities), the data relating to the final diagnoses of the 53 children participating in the sample were clustered around the principal diagnosis. Any case that included ADHD in the diagnosis was labelled as 'ADHD co-morbidity'.

Most of the remaining cases formed three diagnostic clusters: 'conduct problems' (including oppositional defiant disorder and conduct disorder);

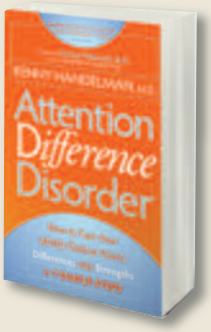
Key points

- Although a large number of attention deficit hyperactivity disorder (ADHD) referrals are made, many of these eventually lead to entirely different and unrelated diagnoses.
- The extent to which ADHD-like presenting symptoms actually map out to alternative diagnoses has not been studied in full.
- In a study on an outpatient child psychiatric ward in Cyprus, only 55% of referrals for ADHD-like symptoms led to a diagnosis of ADHD. An ADHD diagnosis was most prevalent among children with combined-type ADHD symptoms.
- Caution should be applied when assessing children for ADHD – particularly in those who display solely inattentive or hyperactive symptoms – and alternative diagnoses considered.

Attention *Difference* Disorder

Handelman K. New York: Morgan James, 2011; 230 pages, £22.95

This book aims to dismiss myths surrounding childhood attention deficit hyperactivity disorder (ADHD) by questioning the premise that the condition is a deficit; Handelman prefers the term 'difference'. He argues that thinking of ADHD in these terms acknowledges that affected children can often concentrate at length on a particular issue, while struggling with others. This line of reasoning is compelling, although it does bring to mind personal experiences with people who have been very clear that ADHD is a deficit that blights their life.



Content: ★★
Teaching: ★★
Reference: ★★
Illustrations: ★★
Readability: ★★

The only thing that makes it impossible to fully recommend it is that it is more suited to a US market

Subtitled 'How to Turn Your ADHD Child or Teen's Differences into Strengths in 7 Simple Steps', the book covers all aspects of ADHD – from assessment and diagnosis, through parenting, school and academic strategies, to medication and alternative treatment.

Published and written in the USA, the book has a strong emphasis on the *Diagnostic and Statistical Manual of Mental Disorders,* and refers to US-specific practices and cultural references. Further, it does not necessarily inform a parent about European support structures; in the UK, for example, it would be common for an educational psychologist to be involved – both during inital assessment, and possibly later, too.

Having said that, there are some principles (such as teachers not 'diagnosing' children) that are pertinent in any country. The graphic representations of the neurological effects of ADHD are particularly useful. The book is set out in chapters and uses jargon-free language.

The section on alternative remedies is likely to polarise professionals. For some, this is a legitimate route to explore; for others, it is at best a placebo, and at worst, undermines legitimate pharmacological and behavioural interventions. That being said, the author acknowledges this and includes heavy caveats.

In all, this book has a lot to commend it. It is written in a straightforward manner and is aimed squarely at parents. There is a breadth of approach that means that it is almost a one-stop-shop for information about the condition. The only thing that makes it impossible to fully recommend it is that it is more suited to a US market. Nonetheless, as a supplementary read, this book can easily be recommended ■

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'autism' (including co-morbidities of autism with language impairment and learning difficulties); and 'victim of abuse'. The few cases that did not fit into these categories (for example, anxiety or bereavement) were grouped under 'other'. These diagnostic categories were then cross-tabulated against the ADHD-like presenting symptom type. Figure 1 reveals how different profiles of ADHD-like presenting symptoms are associated with different clusters of final diagnoses.

More specifically, it was found that an ADHD-related diagnosis was most likely in children presenting with combined symptoms (70% of these cases were diagnosed with ADHD), whereas among children presenting with only inattentive or hyperactive/impulsive symptoms, the majority did not receive an ADHD diagnosis (46% of inattentive-type and 44% of hyperactive/impulsive-type children were found to have ADHD). Furthermore, 'conduct problems' as a main diagnosis was the second most frequent outcome in children presenting with hyperactive/impulsive symptoms, while a main diagnosis of 'victim of abuse' was the second most frequent outcome in children who presented with inattentive symptoms.

Finally, several children with autism were found to present with the full range of ADHD-like symptoms, even though they did not actually suffer from ADHD. We emphasise at this point that co-morbid cases of ADHD and autism were classified under 'ADHD co-morbidities' at an earlier stage of the analysis; therefore, cases mentioned here are only those that initially presented with ADHD-like symptoms, but ultimately were found to be clear cases of autism without ADHD.

Implications

The study suggests that extra caution should be applied when diagnosing children who present with partial ADHD-like symptoms (that is, only inattentive or only hyperactive), as at least half of these cases will not result in an ADHD diagnosis. Even in cases where children present with the full range of ADHD-like symptoms, diagnoses unrelated to ADHD may still arise in a minority.

Alternative diagnoses of conduct problems, autism or abuse are particularly likely, and should receive priority consideration from clinicians ■

Declaration of interest
The authors declare that there is no conflict of interest.

References
1. Rowland AS, Lesesne CA, Abramowitz AJ. The epidemiology of attention-deficit/hyperactivity disorder: a public health view. *Ment Retard Dev Disabil Res Rev* 2002; **8:** 162–170.
2. Singh I. ADHD, culture and education. *Early Child Dev Care* 2008; **178:** 347–361.
3. Sciutto MJ, Nolfi CJ, Bluhm C. Effects of child gender and symptom type on referrals for adhd by elementary school teachers. *J Emot Behav Disord* 2004; **12:** 247–253.
4. Brown TE. *ADHD Co-morbidities: Handbook for ADHD Complications in Children and Adults.* Washington DC: American Psychiatric Press, 2009.
5. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders,* 4th edn. Washington DC: APA, 1994.

HADD (Republic of Ireland)

The **HADD Family Support Group** has been in existence for more than 30 years. Our mission is to make life better for persons with ADHD and their families. We are based in Dublin and operate throughout the Republic of Ireland.

HADD is a registered charity (No. 13614) that is run entirely by volunteers.

About HADD

HADD operates a phone line and website, both of which provide information, advice and support to people with ADHD, as well as their families, carers, teachers and medical practitioners. The charity also produces publications about ADHD and distributes information and resources to people who need them, as well as talks and information evenings for parents, groups and organisations, to help change attitudes towards and practice surrounding ADHD. Finally, HADD runs solution-focused brief therapy groups. These use a person-centred, strength-based approach, along with peer support, to develop positive practical solutions to problems.

HADD works hard to raise awareness of ADHD and contributes to research into the condition.

HADD is a member of the Spectrum Alliance, INCADDS and ADHD Europe.

Publications available via HADD

There are several publications available from the HADD website (www.hadd.ie).

The ***A to Zee of ADHD*** includes a guide to getting assessed, advice about treatment options and a list of services in Ireland.

The ***3rd Level Guide for Students with ADHD*** was published to make it easier for those with ADHD to access college education.

ADHD and Education: A Resource for Teachers provides school staff with information on ADHD, and redresses the absence of a widely available written resource for schools on this subject.

HADD's vision for a better future

HADD's vision for a better future is one where:

- ADHD is recognised as a genetic condition caused by a different balance of chemicals in the brain, affecting children and adults throughout their lives
- ADHD is recognised as requiring timely diagnosis, as well as an integrated package of treatment and support designed to meet the needs of the individual, co-ordinated by a medical professional who builds up rapport and trust over time
- Information and support for people with ADHD and their families is widely available
- Awareness and understanding among educators, employers and institutions means that school, work and institutional environments are adapted to meet the needs of the individual with ADHD
- ADHD is accepted as a difference, rather than a disorder, with many positive aspects
- All professionals and organisations involved work together to make life better for people with ADHD ■

Events

ADHD Awareness Week

7–14 October 2012

HADD organised an ADHD Awareness Week to tie in with global awareness events that took place throughout the month of October. We were delighted to welcome Greg LeMond, three times winner of the Tour de France, who gave a series of talks and interviews throughout the week. Greg shared a personal account of his own experience of ADHD, as well as taking part in a cycle fundraiser to raise vital funds for HADD. Please refer to our website for further details

'Coping with ADHD and Adolescence' parenting course

Thursdays, 20 September–24 October 2012, 7:30–9:00 pm

HADD recently ran a course for parents and carers of children and young people with ADHD, which was presented by Professor Carol Fitzpatrick, Child and Adolescent Psychiatrist, and Stephanie Mahony, HADD. Contact HADD to enquire about future courses

Solution-Focused Brief Therapy

Various dates

Contact HADD for further details

HADD Family Support Group,
Carmichael Centre for Voluntary Groups,
Carmichael House,
North Brunswick Street,
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Charity Registration No. 13614

hadd
Family Support Group

David Delany PhD
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Executive function as a candidate cognitive endophenotype

Attention deficit hyperactivity disorder (ADHD) is characterised by severe inattention, hyperactivity and impulsivity; autism spectrum disorder (ASD), in contrast, is characterised by social deficits, communication difficulties, stereotyped or repetitive behaviours and interests, and cognitive delays. ASD comprises three pervasive developmental disorders (PDDs); autism, Asperger's syndrome, and PDD not otherwise specified.

Although the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) prohibits diagnosis of ADHD in individuals with a PDD, these disorders frequently co-occur. A recent meta-review found ADHD to be present in 30–80% of children with ASD, while ASD is present in 20–50% of children diagnosed with ADHD.[1] Familial and twin inheritance studies suggest a shared genetic aetiology for ADHD and ASD.[2]

Endophenotypes

An endophenotype is a vulnerability trait, intermediate between genotype and phenotype. Conventional psychiatric diagnostic categories comprise phenotypic symptom clusters shaped by necessarily subjective clinical consensus. In contrast, the endophenotype is conceived of as a heritable and quantifiable characteristic that potentially offers more objective clinical categories.

ADHD and ASD are complex, multifactorial and clinically heterogeneous conditions associated with a wide range of genetic and environmental modifying factors.[3,4] By facilitating the delineation of more homogenous clinical subgroups, the endophenotype approach raises the prospect of simplifying this complexity and expediting the elucidation of disease mechanisms and treatment development.

Studies suggest a shared genetic aetiology for ADHD and ASD

The endophenotype approach also offers a framework for organising the burgeoning insights from genetics and neuroscience that promise to transform our understanding of psychiatric illnesses. This is potentially significant, since there is growing evidence that DSM-IV diagnostic categories do not accord well with findings from genetics and neuroscience.[5] Moreover, endophenotypes constitute promising targets for clinical interventions that have the potential to outperform approaches that target surface symptoms.

A promising cognitive endophenotype in this regard is executive function.

Executive function

Executive function is an umbrella term used to refer to a triad of 'higher level' processes: inhibitory control, working memory and cognitive flexibility.[6] Inhibitory control is the ability to override impulses, resist urges and temptations; working memory refers to the ability to hold and manipulate information over short periods of time; while mental flexibility is the capacity to switch between different mental sets or perspectives.

Executive function impairments are common to a remarkably wide range of psychiatric disorders and are strongly predictive of social, academic and occupational functional outcomes.[7]

Executive function in ADHD and ASD

In ADHD, executive function deficits negatively impact upon functioning across the age range. In preschool children who are at risk of developing ADHD, poor executive function at five years predicts symptoms of inattention at the age of six.[8] For children and adolescents with ADHD, the presence of two or more executive function deficits is a stronger predictor of impaired academic functioning than socioeconomic status, learning disabilities or intelligence quotient (IQ).[3] In adults, executive function deficits appear to underpin the inattentive/disorganised symptoms predictive of poor functional outcomes in ADHD.[9]

Deficits in several executive functions have been observed in children with ADHD, including problems with resisting distractor interference and response inhibition,[10] mental set-shifting[11] and working memory updating[12] – processes that rely heavily on fronto-striatal and fronto-cortical brain networks.

These neurocognitive deficits are associated with lower grey matter volume in the prefrontal

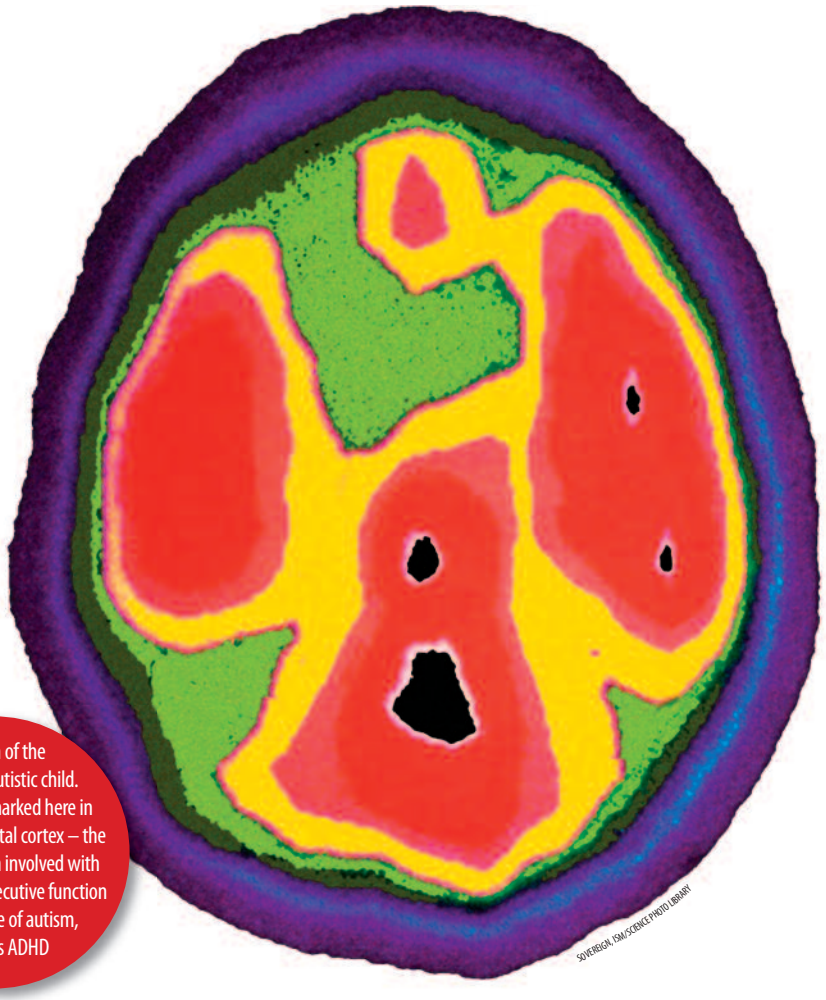
cortex (a brain region involved in the control of attention and executive function), as well as delays in cortical maturation in children with ADHD, relative to normally developing peers.[13]

ASD is also strongly associated with executive function deficits,[14] including inhibitory control of prepotent responses, mental flexibility and planning.[15] These executive function deficits have been related to the clinical characteristics of ASD, such as repetitive stereotyped behaviours, perseveration and obsessionality, and the neuroanatomy of the fronto-striatal pathways that subserve them.[16]

Executive functioning is not immutable

A growing body of research supports the idea that appropriately designed computerised adaptive training interventions can improve selected executive functions in both clinical and non-clinical populations. Executive function components targeted in recent research include working memory capacity and updating.[17]

An early study by Klingberg *et al*[18] found that six weeks of adaptive working memory capacity training resulted in significantly reduced symptom severity in young children with ADHD, as well as generalised improvements in fluid intelligence.



PET scan of the brain of an autistic child. Low activity (marked here in black) in the frontal cortex – the area of the brain involved with attention and executive function – is indicative of autism, as well as ADHD

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Adaptive updating interventions have proved especially popular research targets. Such tasks involve presenting the player with a serial stream of stimuli, where they must respond if the current item matches one that appeared n images ago; where n is an integer that typically starts at 1 and grows progressively higher as the player progresses. Performance on such n-back tasks is correlated with fluid intelligence;[19] it is impaired in ADHD,[20] but apparently spared in ASD.[21]

For example, Jaeggi *et al*[17] used a complex, adaptive dual-updating task that required individuals to track independent auditory-verbal and visuospatial sequences. They reported large improvements in working memory – and, significantly, dose-dependent far-transfer gains in fluid intelligence.

In the wake of the publication of the Jaeggi study,[17] a profusion of dual-n-back programs have been developed. A useful list of free apps for a range of devices can be found online.[22]

Pilot study of integrated executive function training in ASD

In collaboration with the charity aspire (The Asperger Syndrome Association of Ireland), we investigated whether integrated executive function training could improve executive function in a sample of young children and adolescents with ASD. Thirty-eight young children and adolescents with high-functioning ASD (mean age=12.8 years, mean standard error=0.6) volunteered to play our integrated executive function game online, under parental supervision at home, for 15 minutes a day, five days a week, for six weeks. We employed a double-blind placebo controlled design, with 21 participants randomly assigned to the high-dose (experimental) game, and the remaining 17 assigned to the low-dose (control) game. We predicted that executive function training would significantly improve non-trained measures of executive function, such as short-term memory (as measured using the forward digit-span task), working memory capacity (backward digit-span task), and mental flexibility (Wisconsin Card Sorting Test).

The integrated executive function game is designed to adaptively and parametrically train Miyake's[6] triad of executive functions: working memory updating, mental flexibility and response inhibition. At the lowest level of difficulty, players are required to track and mentally update images presented sequentially within a highlighted box (see Figure 1). The matching rule is that if the current image matches the previous image (that is, one-back) the player must click on the target

image. Points were awarded for correct target detection (and subtracted for incorrect responses), and bonus points were gained when successive targets were correctly detected. At the start of an n-back level, the distractor images in the other quadrants are invisible. However, as the player advances they become progressively more salient. Players must learn to ignore these distractors (that is, exercise response inhibition) to progress through the level. Additionally, as players move through successive difficulty levels, the likelihood that the location of the target image will randomly change quadrant increases. This random location jumping is intended to train mental flexibility.

As the player progresses, they begin to encounter dual n-back levels where they must contend with two independent highlighted target image streams simultaneously. These levels are intended to train divided attention. The first dual n-back level is one-back, but later levels increase the difficulty.

In summary, mental updating (n-back tracking), response inhibition (distractor suppression) and mental flexibility (location jumping), as well as divided attention, are parametrically trained.

In the low-dose game, participants played at the lowest difficulty level of the high-dose game.

Results

Training resulted in a significant improvement in forward digit span in both low- ($Z=2.52$, $p<0.05$, $r=0.43$) and high-dose executive function training conditions ($Z=2.39$, $p<0.05$, $r=0.37$). Crucially, we only observed a significant improvement in reverse digit span in the high-dose training group ($Z=2.19$, $p<0.05$, $r=0.34$) compared with the low-dose group ($Z=0.83$, $p=0.41$, $r=0.14$). This dose-dependent finding is of interest, since backward span correlates with fluid IQ.[23] However, despite gains in working memory, executive function training did not significantly improve mental flexibility in either dose group.

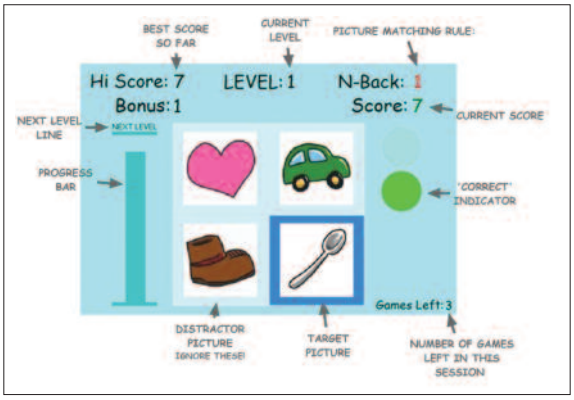

Figure 1. A screenshot of the integrated executive function training game

These findings suggest that executive function training can significantly improve working memory capacity in ASD. Working memory is an executive function that is impaired in ADHD.

Interestingly, we found a significant link between the number of games played and the level attained within the game for high- and low-dose participants combined ($rs=0.39$, $p<0.05$, two-tailed), suggesting that motivated play is important. Another observation was the relatively low overall level of attainment (average level attained=3.52, standard deviation=0.97) by participants in the high-dose conditions. This could be significant, as there is a known dose-dependent effect of training on far-transfer effects.[17] One potential explanation is that the difficulty gradient of the game may have been too shallow – in other words, advancement to more challenging levels may not have been feasible within the allocated time. Another factor that may have limited attainment and transfer effects was the relatively short training session duration of 15 minutes.

Key points

- Executive function skills are high-level cognitive capacities underpinning successful cognitive and affective development.
- Executive function is a candidate biomarker (or endophenotype) implicated in a number of neurodevelopmental childhood disorders, including attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD).
- Executive function skills are not immutable; rather, evidence suggests that executive function components like working memory and inhibitory control can be significantly improved using well-designed, adaptive 'serious' games.
- There is evidence that executive function training generalises to improvements in fluid intelligence and academic performance.
- Cognitive training offers exciting possibilities for designing effective clinical 'functional cures' and prophylactic prodromal interventions for otherwise intractable psychiatric conditions, like ADHD and ASD.

Summary

Cognitive endophenotypes are known to drive functional outcomes in many psychiatric conditions. A growing body of evidence supports the idea that neurocognitive deficits can be successfully remediated by using targeted computerised cognitive training. Although additional research is required, these effects appear to be both stable and generalisable to non-trained tasks.

Together, these findings raise the intriguing possibility of personalised 'functional cures' for a range of recalcitrant psychiatric disorders. Adaptive neurocognitive training tools may enable clinicians to mould a child's neurodevelopmental

trajectory to increase the spontaneous recovery rate – or, potentially, prevent the development of a clinical syndrome in prodromal children.

The importance of these developments cannot be overstated: despite the heavy use of psychiatric medications, there is little evidence that the overall morbidity or mortality of mental disorders has dropped appreciably in past decades.[5] A new generation of training interventions targeting fundamental endophenotypes, rather than surface symptoms, constitutes the vanguard of a conceptual and practical revolution in psychiatry that looks set to transform this dismal record ■

Declaration of interest
The authors are co-founders of Neurosynergy Games Ltd, a company founded with the aim of developing computerised brain fitness and training tools. David Delany is the chief developer of the executive function training tool used in the autism spectrum disorder study described in this article.

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References

1. Rommelse NN, Geurts HM, Franke B, Buitelaar JK, Hartman CA. A review on cognitive and brain endophenotypes that may be common in autism spectrum disorder and attention-deficit/hyperactivity disorder and facilitate the search for pleiotropic genes. *Neurosci Biobehav Rev* 2011; **35:** 1363–1396.
2. Rommelse NN, Franke B, Geurts HM, Hartman CA, Buitelaar JK. Shared heritability of attention-deficit/hyperactivity disorder and autism spectrum disorder. *Eur Child Adolesc Psychiatry* 2010; **19:** 281–295.
3. Biederman J, Monuteaux MC, Doyle AE *et al.* Impact of executive function deficits and attention-deficit/hyperactivity disorder (ADHD) on academic outcomes in children. *J Consult Clin Psychol* 2004; **72:** 757–766.
4. Salmond CH, Vargha-Khadem F, Gadian DG, de Haan M, Baldeweg T. Heterogeneity in the patterns of neural abnormality in autistic spectrum disorders: evidence from ERP and MRI. *Cortex* 2007; **43:** 686–699.
5. Insel TR, Wang PS. Rethinking mental illness. *JAMA* 2010; **303:** 1970–1971.
6. Miyake A, Friedman NP, Emerson MJ *et al.* The unity and diversity of executive functions and their contributions to complex "Frontal Lobe" tasks: a latent variable analysis. *Cogn Psychol* 2000; **41:** 49–100.
7. Royall DR, Lauterbach EC, Cummings JL *et al.* Executive control function: a review of its promise and challenges for clinical research. A report from the Committee on Research of the American Neuropsychiatric Association. *J Neuropsychiatry Clin Neurosci* 2002; **14:** 377–405.
8. Brocki KC, Eninger L, Thorell LB, Bohlin G. Interrelations between executive function and symptoms of hyperactivity/impulsivity and inattention in preschoolers: a two year longitudinal study. *J Abnorm Child Psychol* 2010; **38:** 163–171.
9. Stavro GM, Ettenhofer ML, Nigg JT. Executive functions and adaptive functioning in young adult attention-deficit/hyperactivity disorder. *J Int Neuropsychol Soc* 2007; **13:** 324–334.
10. Barkley RA. Behavioral inhibition, sustained attention, and executive functions: constructing a unifying theory of ADHD. *Psychol Bull* 1997; **121:** 65–94.
11. Nigg JT, Blaskey LG, Huang-Pollock CL, Rappley MD. Neuropsychological executive functions and DSM-IV ADHD subtypes. *J Am Acad Child Adolesc Psychiatry* 2002; **41:** 59–66.
12. Keage HA, Clark CR, Hermens DF *et al.* ERP indices of working memory updating in AD/HD: differential aspects of development, subtype, and medication. *J Clin Neurophysiol* 2008; **25:** 32–41.
13. Shaw P, Eckstrand K, Sharp W *et al.* Attention-deficit/hyperactivity disorder is characterized by a delay in cortical maturation. *Proc Natl Acad Sci U S A* 2007; **104:** 19649–19654.
14. Kenworthy L, Black DO, Harrison B, della Rosa A, Wallace GL. Are executive control functions related to autism symptoms in high-functioning children? *Child Neuropsychol* 2009; **15:** 425–440.
15. Hill EL. Evaluating the theory of executive dysfunction in autism. *Developmental Review* 2004; **24:** 189–233.
16. Schmitz N, Rubia K, Daly E *et al.* Neural correlates of executive function in autistic spectrum disorders. *Biol Psychiatry* 2006; **59:** 7–16.
17. Jaeggi SM, Buschkuehl M, Jonides J, Perrig WJ. Improving fluid intelligence with training on working memory. *Proc Natl Acad Sci U S A* 2008; **105:** 6829–6833.
18. Klingberg T, Forssberg H, Westerberg H. Training of working memory in children with ADHD. *J Clin Exp Neuropsychol* 2002; **24:** 781–791.
19. van Leeuwen M, van den Berg SM, Hoekstra RA, Boomsma DI. Endophenotypes for intelligence in children and adolescents. *Intelligence* 2007; **35:** 369–380.
20. Ehlis AC, Bähne CG, Jacob CP, Herrmann MJ, Fallgatter AJ. Reduced lateral prefrontal activation in adult patients with attention-deficit/hyperactivity disorder (ADHD) during a working memory task: a functional near-infrared spectroscopy (fNIRS) study. *J Psychiatr Res* 2008; **42:** 1060–1067.
21. Koshino H, Carpenter PA, Minshew NJ *et al.* Functional connectivity in an fMRI working memory task in high-functioning autism. *Neuroimage* 2005; **24:** 810–821.
22. www.limitlessmindset.com/blog-a-articles/cognitive-ability-development/450-free-dual-n-back-games-for-your-mac-pc-android-and-iphone.html (last accessed 11/09/12)
23. Engle RW, Tuholski SW, Laughlin JE, Conway AR. Working memory, short-term memory, and general fluid intelligence: a latent-variable approach. *J Exp Psychol Gen* 1999; **128:** 309–331.

Giftedness and ADHD

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For practising clinicians and educators, the evaluation of a bright individual for attention deficit hyperactivity disorder (ADHD) can be fraught with difficulties. Many gifted people with ADHD gravitate towards the average, with their intellectual ability pulling them in one direction and their learning or concentration difficulties pulling them in the other – a phenomenon often referred to as a 'dual diagnosis'.[1] In others, coexisting conditions and/or the ability to 'hyperfocus' on interesting subjects can mask the underlying diagnosis. This article aims to help clarify some of the key difficulties surrounding giftedness in ADHD.

It has been well documented that ADHD can affect children and adults from across the intelligence quotient (IQ) spectrum.[2] The increased recognition of ADHD in schools in the UK in recent years[3] has meant that most of those children with more obvious presentations of ADHD are now being recognised. Thus, it is important that children who are gifted and talented, or whose presentation and difficulties might not be so obvious, also receive appropriate help.

The key additional issues practising clinicians should consider in the assessment and management of gifted and talented individuals with possible ADHD and associated difficulties are discussed below.

Intelligence and ADHD

Clinicians should be aware that although gifted children with ADHD may not initially appear to be struggling as much as the more obviously behaviourally challenging children in a classroom, very frequently that is because their symptoms are less evident. Such children are gifted and talented on one hand, and have the ability to achieve well above the average; on the other hand, they can feel as though they have 'brakes' or 'anchors' on in that their concentration problems prevent them from achieving to their potential. These children may appear academically to be about average in the class, or sometimes even above. However, they are nevertheless underachieving relative to their ability and may well be struggling in specific academic areas – commonly, with

immaturity, low self-esteem and demotivation, poor social skills and anxiety. Clinical experience shows that gifted children with ADHD are frequently more aware of their difficulties than are other children.

Children who are gifted and talented but also suffer from ADHD often cope reasonably well in the early years at school and may, indeed, progress quite well until secondary school. However, the discrepancy between their innate ability and their lack of achievement eventually becomes more apparent, and a diagnosis may be considered.

Hyperfocus

Many intellectually able children are able to hyperfocus on things that they find interesting, but have great difficulty with tasks they perceive as being boring or mundane, or where they cannot see the point. Sometimes, the diagnosis is overlooked because of this. The traditional educational view – that if a child can focus on something interesting, then if he tries harder, he should be able to focus on anything – is simply not true with these children. This tendency is often likened to a 'faulty on/off switch':[4] the harder the child tries to cope with more mundane things, the lower their self-esteem becomes.

Many intellectually able children are able to hyperfocus

Recognising strengths and weaknesses

The functioning of many gifted children and adults with ADHD is somewhat like a mountain range, with very high peaks, as well as valleys or troughs of underachievement to abilities through impaired concentration, learning difficulties, immaturity or social inadequacy.

Gifted children can have poor social skills, low self-esteem and find it hard to motivate themselves. They may present with pronounced immaturity, being verbally or emotionally impulsive; alternatively, demoralisation and low self-esteem may be the most obvious presentation. This is particularly the case in girls who are dreamy and inattentive; they can become extremely anxious or depressed, and may even self-harm. While children with all forms of ADHD may be gifted, it is the inattentive group who are most at risk of not being considered for a possible diagnosis. This group frequently fade away at school, but are seen as average without their dual diagnosis recognised. Such students are often placed in the private school sector by their concerned parents, where 'scaffolding' may protect them academically for many years. However, they usually eventually underachieve to their potential, and/or their self-esteem and motivation become problematic.

Misdiagnosis

Research has shown that gifted children spend at least a quarter to one-half of classroom time waiting for others to catch up.[1] Thus, if they are have ADHD and are in an inappropriate schooling situation where their brightness is not being recognised, they will become bored, inattentive and impulsive. Gifted children can have very strong views and well-defined ideas of right and wrong, and can be very intense; this can lead to their being misperceived as oppositional. Their boredom, low self-esteem and demotivation can also lead to them being inappropriately diagnosed as having depression (although this may coexist with ADHD). A very careful assessment needs to be made as to whether the child's ability to concentrate on mundane tasks is discrepant to their intellectual ability.[1] It is also necessary to ascertain whether or not the school environment is appropriate, whether the giftedness or brightness is being recognised by the school authorities and whether appropriate intellectual and other supports have been put in place.

Defining giftedness

Giftedness refers to intellectual ability that is significantly higher than average. This is not something that has been learnt, like a skill, but generally inherited and innate.

There are general IQ tests that will detect gifted abilities. In particular, the Wechsler range of tests is recommended. These grade an IQ score of over 130 as gifted, of over 145 as exceptionally gifted and over 152 as profoundly gifted. The verbal comprehension and perceptual reasoning subtests, which measure an individual's ability to understand verbal information and solve non-verbal problems, are considered good indicators of giftedness: they are able to assess verbal abstract reasoning as well as visual reasoning. The working memory and processing speed indexes are less well correlated with giftedness.[5]

Silverman explains giftedness as follows: 'If we say that all people look at the world through a lens, with some lenses cloudy or distorted, some clear, and some magnified, we might say that gifted individuals view the world through a microscope lens and the highly gifted view it through an electron microscope. They see ordinary things in very different ways and often see what others simply cannot see'.[5]

In England, the Department for Education (formerly known as the Department for Children, Schools and Families) identifies gifted learners as those who have particular abilities in one or more curriculum subjects, and talented learners as those who have particular abilities in the creative arts

(such as music, art and design, drama or dance) and physical education.[6]

IQ scores and validity

IQ scores must not be regarded as being set in stone for children with ADHD – particularly gifted children – as there is evidence that they underachieve on IQ tests relative to their potential.[7] This appears to be because of their relatively weak concentration, their poor concept of time (which becomes problematic in time-managed tests) and their impulsive response style, among other factors. It is important not to over-interpret the differences in subtest scores as they are frequently scattered in gifted children, nor to over-interpret any differences between verbal and performance IQ scores.

The Gifted Development Centre in Denver, Colarado, has conducted research[5] that has led to the development of extended norms in the Wechsler Intelligence Scale for Children for those with high abilities.[8] These were developed because previous standards were not seen as accurate, and there was not enough statistical validation in the high end of the IQ range. Thus, there are two difficulties in assessing gifted children with ADHD: first, IQ scores may well be an inherent underestimate of the child's ability, due to their weak concentration, impulsive response style and poor time management; and second, the current data may not be accurate enough for those in the higher IQ range.[8]

This is particularly important in the clinical assessment of gifted children with ADHD, as the IQ scores they present with may put them more into the high-average range, and thus the discrepancy between the child's innate ability and their achievements may not be fully recognised unless careful further questioning is undertaken.

Clinical assessment

It is helpful for clinicians to obtain a cognitive evaluation of all children and adults who are assessed for ADHD. Sometimes, screening results are available through schools, but at other times, cognitive evaluations may have been performed either through the school or independently. Care should be taken to interpret the cognitive evaluation appropriately. Clinicians must also be aware of dual diagnoses, and of the masking effect of giftedness on other neurodevelopmental difficulties – as well as the discrepancies that can occur within the child with the ability to hyperfocus.

The frequent and significant discrepancy between a child's high intellectual ability and their damaged self-esteem, social skills and motivation often occurs earlier than in other children with ADHD, or in children with emotional and behavioural difficulties. Placing such children in the private school sector sometimes masks their difficulties. Education-only strategies may sustain the child for a period of time until things worsen again. As with any child with ADHD, there may also be autistic spectrum disorder, developmental or co-ordination problems; these children may find handwriting boring, preferring to speak instead, as they lose concentration when writing. They may also have mood instability issues.

Gifted children may progress moderately satisfactorily through the early years of primary school and, sometimes, do not get into difficulties until well into secondary school, or even at university.

Summary

Clinicians must be aware of the concept of dual diagnoses, and the fact that giftedness can mask ADHD symptoms in children and adults. Such people may well have other coexisting difficulties. A careful specialist evaluation is essential.

The type of educational support that has previously been available to gifted individuals with ADHD must be reassessed. A cognitive assessment should be considered as part of any evaluation. Care must be taken to avoid labelling children as having ADHD without assessment of their giftedness being recognised. However, it is clearly important to ensure that a diagnosis of ADHD is made where appropriate, so that these children receive the most effective support. ■

Declaration of interest
Dr Kewley has lectured at and attended meetings sponsored by Shire.

References
1. Webb JT, Amend ER, Webb NE *et al. Misdiagnosis and Dual Diagnoses of Gifted Children and Adults: ADHD, Bipolar, OCD, Asperger's, Depression, and Other Disorders*. Scottsdale, AZ: Great Potential Press, 2004.
2. Kewley GD. *Attention Deficit Hyperactivity Disorder: Recognition, Reality and Resolution*. East Lansing, MI: LAC Press, 1999.
3. www.nice.org.uk/CG72 (last accessed 01/10/12)
4. Kewley GD. *Attention deficit hyperactivity disorder: What can teachers do?*, 3rd edn. Oxford, New York: Routledge, 2011.
5. Silverman L. Who are the gifted using the new WISC-IV? Second National Symposium on Assessing Gifted Learners. Van Nuys, CA, 2009.
6. http://webarchive.nationalarchives.gov.uk/20110202093118/http://nationalstrategies.standards.dcsf.gov.uk/downloader/1648d3e4d655082cee6c30164ae8d496.pdf (last accessed 02/08/12)
7. www.ccl-cca.ca/pdfs/JARL/Jarl-Vol3Article9.pdf (last accessed 01/10/12)
8. www.pearsonassessments.com/NR/rdonlyres/C1C19227-BC79-46D9-B43C-8E4A114F7E1F/0/WISCIV_TechReport_7.pdf (last accessed 02/08/12)

Key points

- Giftedness refers to intellectual ability that is significantly higher than average. This is not something that has been learnt, but that is inherited and innate.
- Clinical experience shows that gifted children with attention deficit hyperactivity disorder (ADHD) are frequently more aware of their difficulties than other children are.
- Clinicians must be aware of the concept of dual diagnoses, and the fact that giftedness can mask ADHD symptoms in children and adults.

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