ADHD primer
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The purpose of this document is to answer frequently asked questions regarding ADHD and to point the reader towards further resources on the subject.

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Definition of ADHD
Over the past centuries, the condition presently known as Attention-Deficit/Hyperactivity Disorder (ADHD) underwent many transformations in terminology and definition. Today, ADHD is defined as a persistent pattern of inattention, hyperactivity and/or impulsivity that is, on average, more frequent and severe than that observed in individuals at a comparable level of development. In addition, this behavioural pattern has led to at least some impairment in social, academic, or occupational functioning. Because almost all children will show some of the predefined characteristics at some stage in their life, one can only speak of ADHD under strict conditions, including definitions related to the duration of symptomatology (e.g. the behaviour has to manifest itself over a period of at least 6 months), severity (e.g. the behaviour has to be present in at least two domains, for instance at home and at school), and recognition of the abnormal behaviour by both the teacher and the parent. Finally, the symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g. Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder) (APA, 1994).

Are there different types of ADHD?
Yes. A ‘pure ADHD’ group is heterogeneous. ADHD can be divided into three subtypes: [1] ADHD predominantly inattentive type (i.e. individuals who primarily have problems in concentrating, focusing and sustaining their attention), [2] ADHD predominantly hyperactive-impulsive type (i.e. individuals who are mainly restless, have problems in staying still, etc.), and (3) ADHD combined type (i.e. individuals who score high on inattention as well as hyperactivity and impulsivity) (APA, 1994). It is highly likely that the behaviour or symptoms of children suffering from the predominantly inattentive type of ADHD is different from that of children with the predominantly hyperactive-impulsive type or the combined type. For instance, researchers found greater academic underachievement in children with ADHD of the predominantly inattentive type than in children with the predominantly hyperactive-impulsive type (e.g., Morgan, Hynd, Riccio, & Hall, 1996).

What is the prevalence of ADHD?
ADHD is one of the most frequently monitored developmental syndromes worldwide and is known to occur in several cultures. Prevalence estimates fluctuate between 1% and 20%, with an average of 3-5% for the general population (Barkley, 1998; Kroes et al., 2001), depending on how strictly criteria are applied, cultural differences, and the degree of consensus between caregivers, teachers, and physicians.

Do boys differ from girls in terms of ADHD symptoms?
Both in clinical and epidemiological samples, it has been found that ADHD is much more common in boys than in girls – 9 to 1 in clinical samples and 4 to 1 in the general population (Cantwell, 1996). Today, the accuracy of these estimates is being questioned. As shown recently, girls seem to have primarily attention and cognition problems and fewer of aggression/impulsivity; this latter would probably lead to an earlier referral (Abikoff et al., 2002).
Does ADHD co-occur with other disorders?
Yes. Comorbidity has been revealed to be an important consideration when dealing with a child suffering from ADHD. For example, in 50-80% of the cases, ADHD occurs simultaneously with other psychiatric or developmental problems (reviewed by Biederman, Newcorn, & Sprich, 1991; Jensen, Martin, & Cantwell, 1997), although the actual prevalence of comorbidity may vary across different types of samples, depending on whether the sample is clinical (paediatric or psychiatric) or drawn from a general population (Busch et al., 2002). The most important comorbid syndromes and/or co-occurring disorders are:

(i) Oppositional Defiant Disorder and Conduct Disorder (at school age estimates range from 40-90%)
(ii) Anxiety (in approximately 25% of the cases) and Mood Disorders (15-20%)
(iii) Learning Disabilities (20%)
(iv) Minor forms of Pervasive Developmental Disorders
(v) Gilles de la Tourette syndrome
(vi) Developmental Coordination Disorder.

Comorbidity often has consequences for the diagnostic process and can have an impact on the natural history of ADHD and on the success of treatment programs. For instance, several authors have stated that the cognitive deficits and the outcomes (e.g. drug use and driving-related accidents) for children with concurrent ADHD and Conduct Disorder are worse than those of children with ADHD or those of children with Conduct Disorders alone. Assessment and treatment of comorbid disorders are, therefore, often as important as assessment and treatment of ADHD (Prins & Ten Brink, 2000; Tannock, 1998).

Will my child “grow out of” ADHD?
In contrast to earlier beliefs, follow-up studies have consistently documented ADHD symptoms as persisting throughout adolescence and young adulthood. Although relatively little is known about ADHD children as young adults, the information that does exist suggests that at least 60% of the children with ADHD will continue to have symptoms of ADHD as they grow up (Barkley, 1996). The problems that adults have to face as a consequence of earlier ADHD symptoms in childhood range from residual ADHD symptoms that impair home or work adjustment, to depression, substance abuse, low self-esteem, accident proneness, and anti-social personality (Weiss & Trokenberg Hechtman, 1993; Wender, Reimherr, & Wood, 1981).

What causes ADHD?
Today, it is still not completely clear what exactly causes ADHD. However, it is believed that no single factor can explain all cases of the clinical syndrome ‘ADHD’ and that more likely an interaction of several factors (e.g. biological and environmental and psychological) leads to ADHD (Tannock, 1998; Weiss, 1996).

Can ADHD be inherited?
If there is a genetic component in ADHD, the syndrome should be more prevalent among biological relatives of a child with ADHD than among relatives of control subjects. Over the past decades, several studies have reported that ADHD is diagnosed at least 5 times more often among the relatives of ADHD children than among other families. In addition, high rates of disorders or syndromes, such as behavioural disorders (like conduct disorder and oppositional defiant disorder), anxiety disorders, and mood disorders, were found among first-degree relatives of individuals suffering from ADHD (e.g., Biederman et al., 1986). Also, twin and adoption studies support the hypothesis that there is a genetic component in ADHD, even after controlling for environmental factors (e.g., Morrison & Stewart, 1971; Van der Oord, Boomsma, & Verhulst, 1994). However, caution in interpreting these results is warranted, for several reasons. For one, ADHD is found to occur simultaneously with other psychiatric or developmental problems in 50-80% of the cases. Comings et al. (2000) reported that some of these co-occurring disorders or syndromes also have a genetic component. Therefore, in children with both ADHD and other disabilities or syndromes, the genetic effects may be due to the presence of the co-occurring symptoms in the group and not so much due to ADHD. However, after controlling for comorbidity, consistent evidence still points toward an increased prevalence of both childhood and adulthood ADHD in first-degree and second-degree relatives of ADHD probands, a relation that applies to both males and females (reviewed by Faraone & Biederman, 1994).
Is there a neurobiological basis for ADHD?
Yes. In the case of ADHD, imaging techniques point toward differences between individuals with ADHD and without ADHD in terms of the structure and functioning of specific parts of the brain (e.g. prefrontal cortex, caudate nucleus, corpus callosum, basal ganglia, and cerebellum). Caution in the interpretation of the neuroanatomical evidence is, however, still warranted, because of sample bias (e.g. small sample sizes, sex differences, limited data on neuropsychological characteristics and handedness of the participants), inconsistencies in findings for both normal controls and children with ADHD, etc.

Cognitive deficits in ADHD?
In school-aged children, cognitive deficits are hypothesised as being a core part of ADHD symptomatology and are thought to play a major role in the difficult adaptation of children suffering from this disorder (Seidman, Biederman, Faraone, Weber, & Ouellette, 1997). As a group, these children tend to exhibit sub-average or a relatively poor performance on various classical cognitive tests measuring both input-related and output-related information processes. For example, a deficiency was found in sustained attention or vigilance, as observed by an increased variability in test performance and a decreased accuracy (Barkley, 1998). In addition, children with ADHD had a poorer performance on several aspects of executive functioning (such as organisation and complex problem solving), non-verbal working memory, internalisation of speech, self-monitoring and self-regulation (e.g., Barkley, 1998; Perugini, Harvey, Lovejoy, Sandstrom, & Webb, 2000).

Examples of current theories that relate cognitive functioning and ADHD are (1) Barkley’s disinhibition theory, (2) the theory of a time perception deficit in ADHD, and (3) the cognitive-energetic model. Barkley’s disinhibition theory states that the construct of impulsiveness (i.e. poor behavioural inhibition) is a central deficit in ADHD. Children suffering from the disorder fail to inhibit or delay a behavioural response, which secondarily causes the observed deficits in executive functioning and motor output (Barkley, 1998; Barkley, Edwards, Laneri, Fletcher, & Metevia, 2001). Another theory concerning a cognitive deficit in ADHD is associated with time perception. Several authors have stated that a deficit in time estimation or an altered sense of time may explain several problems related to ADHD, such as problems with waiting, delaying responses, and with delaying gratification (e.g., Rubia et al., 2001; Smith, Taylor, Rogers, Newman, & Rubia, 2002; Sonuga-Barke, Saxton, & Hall, 1998). A third theory is the cognitive-energetic model of information processing. This model states that the fundamental problem in ADHD is not so much a structural cognitive limitation (as stated in, for instance, Barkley’s model) but more an energetic limitation, and that the key symptoms of ADHD (i.e. poor attention capacity, restlessness, and a lack of impulse control) are mainly caused by state factors, such as boredom, time-on-task, reward, and external control (e.g., Borcherding et al., 1988; Borger & Van der Meere, 2000). The outcome of empirical research on this issue has been less consistent than expected.

How to diagnose ADHD?
It is still very difficult to reliably diagnose ADHD; for one because the main clusters of symptoms (inattention, hyperactivity, impulsive behaviour) are human traits that can be observed in the behavioural pattern of every individual during his/her lifespan. However, individuals suffering from ADHD display this natural behaviour in a more extreme manner and their behaviour often leads to impediments in daily functioning. Another point worth mentioning here is that there is no objective instrument presently available that is sensitive and specific enough to support a diagnosis of ADHD with a 100% certainty.

Presently, the diagnosis is often made by a clinician after a systematic evaluation of data collected by use of objective tests, interviews with caregivers and teachers, and outcomes of scientific studies. Relevant information collected by the clinicians in order to diagnose ADHD is for instance:

- Extended systematic evaluation of the ADHD criteria by including data from both the caregivers as well as the teacher of the child. Multiple informers (e.g. teachers as well as parents) are required for several reasons. First, caregivers are believed to overestimate externalising behaviour in their children, while teachers are able to compare the behaviour of the child with the norm. Secondly, when a child only reveals overactivity, impulsiveness, or attention problems in one situation, it may be that the behaviour can be explained by some factor other than ADHD (e.g. an unstructured, chaotic environment).
- Testing for the pervasiveness of the behavioural characteristics, in which it is claimed that the devia-
tions in behaviour are present in more than 1 situation over a period of more than 6 months.

• Evaluation of comorbidity (such as learning disorders, Conduct Disorder, affective disorders, tic disorders). As mentioned earlier, in a high percentage of cases, children with ADHD have co-occurring syndromes or disorders, which could lead to specific characteristics. Comorbidity often has consequences for the diagnostic process and can have an influence on the natural history of the disorder and on the success of treatment programs. Assessment and treatment of comorbid disorders is often equally as important as that of ADHD (Prins & Ten Brink, 2000; Tannock, 1998).

• Collection of data about the development and current functioning of the child. Because ADHD is a developmental syndrome, it is necessary to obtain not only information concerning behaviour in the past, but also medical data (such as head trauma, diseases), family history of ADHD, etc. In addition, certain disorders or disabilities can cause a behavioural pattern similar to that of ADHD. After treating these disorders it is assumed the behaviour of the child will change. Therefore, it is necessary to control for these factors when diagnosing ADHD.

• Does the ADHD symptomatology lead to dysfunction at school, home, or socially? And to what extent is the family affected by ADHD?

It takes, thereby, time and experience to diagnose ADHD, and the diagnosis is still uncertain. Finally, the diagnosis of ‘ADHD’ can be both liberating and restricting for a child, its caregivers, and the social environment. Therefore, clinicians should be cautious in making this diagnosis, and it should only be made as a guide for interventional strategies.

How to treat ADHD?

After diagnosing ADHD, the clinician has to choose the most optimal treatment for the child suffering from ADHD. Unfortunately, none of the existing therapies for treating ADHD make the syndrome disappear completely and forever. The goal of the therapies currently available is to decrease the seriousness of symptomatology, in order to improve the child’s functioning at school and at home. Treatment can include several elements, e.g. pharmacological and non-pharmacological therapy, psychological interventions (e.g. giving caregivers and educators additional insight into the cause, seriousness, outcome, and treatment of ADHD) behavioural therapy, and training of social interactions. Frequently, several of these elements are successfully combined while treating the child with ADHD.

Medication

Treatment of ADHD by use of medication is successful in mediating several aspects of behaviour in 80-90% of the children suffering from ADHD; e.g. with regard to concentration abilities, activity levels, impulsive behaviour, aggressiveness, and school performance and learning. A disadvantage of this type of treatment is, however, that the positive effects of medication disappear when the use of medication is stopped. In addition, most medications can have at least minor side effects, such as heart palpitations, agitation, nausea, a decreased appetite, weight loss, and sleeping problems.

Psychological intervention for the caregiver

For caregivers, it is often extremely difficult to raise a child suffering from ADHD. Because of the child’s behaviour, it is often difficult for the caregiver to stay calm and positive. This is unfortunate, for research has shown that children with ADHD profit most from an environment that always reacts in a positive manner when the child displays positive and correct behaviour. Caregivers may benefit from psychological interventions provided individually or within a group. The main goal of psychological interventions is to provide the caregiver with skills that can be implemented in daily family life.

Psychological interventions designed for caregivers serve a number of purposes, e.g.:

• For one, the therapist provides the caregiver with correct and detailed information about ADHD [e.g. about the prognosis, causes, and what to be expected of the child]. This is called psycho-education.

• Furthermore, the caregiver is taught how to create a predictable, structured environment for the child, in order to inculcate various coping skills, suitable study habits and a sense of discipline and responsibility into children. The caregiver is, for instance, taught that it is necessary to be consistent in his/her
reactions towards the child. It is important to explain to the child what is allowed and what is not, and what the consequences of his or her actions are. The same rule holds at all times; the child is consistently punished or awarded immediately after doing something wrong or right. If a reward or punishment is delayed, the child will be unable to comprehend why. In line with this, research has revealed that ADHD children react positively to a so-called ‘response-cost’ principle. This is a method in which ADHD children gain points when they act correctly and lose points when they do something wrong. If the child collects a certain amount of points, he or she can exchange these points for a predefined reward (e.g. a trip to the zoo or cinema).

**Psychological intervention for the teacher**

It is of extreme importance that the teacher of the child suffering from ADHD cooperates with the therapist and the caregiver. The teacher is taught how to create a predictable, structured environment for the child, in order to inculcate into him/her various coping skills, suitable study habits and a sense of discipline and responsibility. A frequently used method is the ‘daily report card’. The teacher is asked to report on this card how a child has functioned within the classroom during a predefined teaching period (e.g. during the entire day, during the morning or the afternoon). Scoring can be done on, for instance: the ability to sit still, the ability to listen to other children or the teacher, the ability to finish school work, quality of school work, punctuality. At the end of the day, the child takes the report card home. The child is awarded or punished for his or her performance at school that day (e.g. the child is allowed to play a computer game for 30 minutes or receives points) asked to introduce a high level of structure into the classroom, by use of a so-called ‘classroom management’. Introducing ‘time out periods’, seating the ADHD child in the front row of the classroom, and asking the child to do the tasks that demand attention in the early part of the day, etc. have also been proven effective. By doing this, the child is less distracted and able to perform better.

**Psychological intervention for the child**

One of the major problems of children suffering from ADHD, is their impulsive behaviour (i.e. they frequently act before thinking). Also, these children are often unstructured, and have difficulties in planning their activities. It is, therefore, important that the child learns to control his or her own behaviour and to think first before acting. A method frequently used in this respect is ‘Stop-Think-Do’. During group or individual sessions, the child learns to act according to a sequel of five pre-defined steps. In step 1, the child has to identify what the main problem is or work out what he or she has been asked to do. In step 2, the child has to think of several possible solutions. In step 3, the child has to select the most optimal solution from all the solutions considered during step 2. In step 4, the child has to think through which actions are necessary to carry out the most optimal solution chosen during step 3 and he or she has to try them out. In step 5, the child has to decide whether the solution selected in step 3 was the right one (i.e. evaluation).

**Internet sites for Teachers and Parents**

- www.chadd.org
- www.adders.org
- http://www.additudemag.com/
- http://www.adhdnews.com/
- www.addwarehouse.com
References


