



Children with Attention Deficit Hyperactivity Disorder: Epidemiology, Comorbidity and Assessment

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Topic

[Hyperactivity](#)

Epidemiology of ADHD

Children with Attention Deficit Hyperactivity Disorder (ADHD), characterized by developmentally excessive levels of inattention, over-activity and impulsiveness, are most frequently identified and treated in primary school. Studies worldwide identify a prevalence rate for ADHD equivalent to 5.29% (95% Confidence Interval: 5.01-5.56) of children and adolescents.¹ Rates are higher for boys than for girls, and for children under 12 years of age compared with adolescents.^{1,2} Prevalence estimates vary based on method of ascertainment, diagnostic criteria used, and whether functional impairment criteria are included.¹ Overall, estimates are remarkably similar from country to country with the exception of African and Middle Eastern countries where rates are lower compared with North America and Europe.¹

Symptoms generally interfere with academic and behaviour functioning at school, and often disrupt family and peer relationships.^{3,4} Children with ADHD use more health services and sustain more injuries than those without.^{5,6} While hyperactivity symptoms lessen in adolescence, the majority of children with ADHD continue to show some cognitive impairment, (eg. poor executive functioning, impaired working memory) relative to same-age peers through their teen years and into adulthood.^{7,8} Outcome studies identify lower rates of high school completion, earlier onset of alcohol and illicit substance use, and increased rates of cigarette smoking and driving accidents among teens with ADHD.⁹⁻¹⁴ Childhood hyperactivity is also associated with subsequent onset of other psychiatric disorders, including anxiety, conduct problems, mood disorders and suicidal behaviour and antisocial personality disorder.^{13,15-18} Adults with childhood history of ADHD have higher than expected rates of injuries and accidents, marital and employment difficulties, teen pregnancy and children born out of wedlock.^{15,17,19-21} ADHD is an important public health concern, not only for the long-term impairments facing individuals and families but also for the heavy burden on educational, health and criminal justice systems.²²⁻²⁴

Population studies identify that childhood inattention and hyperactivity are more common in single parent families, with low parent education attainment, parent unemployment,

and low family income.^{17,25,26} Evidence from family studies identify that symptoms of ADHD are highly heritable,²⁷ however, early environmental factors contribute as well. History of prenatal maternal smoking and drinking, low birth weight, and developmental problems are associated with high levels of inattention and hyperactivity.^{26,28} More recently, examination of longitudinal data from the Canadian National Longitudinal Survey of Children and Youth identified that approximately 7% of children show persistent high levels of parent reported hyperactivity from 2 years until early primary school.²⁹ Prenatal maternal smoking, maternal depression, poor parenting practices and living in a disadvantaged neighborhood in the first year of life are all associated with later childhood behaviour problems, including inattention and hyperactivity four years later.²⁹⁻³¹

Clinical identification and treatment of ADHD in North America can vary geographically, apparently reflecting differences in community practices or access to services.³²⁻³⁴ Treatment with stimulant medications for inattentive and hyperactive symptoms increased in the early to mid 1990s, and likely reflects longer periods of use with treatment extended into adolescent years as well as an increased number of girls identified and treated.³⁵⁻³⁸

Concurrent (or Comorbid) Disorders

Half to two thirds of school children identified with ADHD also have concurrent psychiatric and developmental disorders, including oppositional and aggressive behaviours, anxiety, low self esteem, tic disorders, motor problems, and learning or language disabilities.³⁹⁻⁴⁶ Sleep difficulties, including enuresis (bed-wetting), are common, with sleep-disordered breathing, a potentially correctable reason for increased inattention.^{47,48} Global impairment in children with ADHD increases with increasing numbers of concurrent disorders.^{13,49} The concurrent conditions also increase the likelihood of additional difficulties developing as children become adolescents and young adults.^{10,15,16,50-55}

Neurocognitive difficulties are an important source of impairment in children with ADHD. Areas of executive functioning and working memory as well as specific language and learning disorders are common in clinic groups.^{56,57-64} Approximately a third of children referred for psychiatric, often behaviour problems, may have previously unrecognized language difficulties.⁶⁵ Whenever possible the potential for cognitive problems requires evaluation so that appropriate academic interventions can be implemented.

ADHD in Preschoolers

Attention Deficit Hyperactivity Disorder, usually begins before children enter school. However in the preschool age group ADHD is characterized not only by impairment in attention span, excessive impulsivity and over-activity but also is frequently accompanied by severe temper tantrums, demanding, uncooperative behaviour and aggressiveness that can interfere with attendance at daycare or preschool, avoidance of family gatherings, and high family burden of care and distress.^{66,67,68} These disruptive behaviours are often the target of parental concern, and many⁶⁶ receive a diagnosis of oppositional defiant

disorder. Early identification can be helpful to address the range of developmental issues children with ADHD can have.

Assessment of ADHD in School-Age Children

Among primary school children, concerns about learning style and behaviour difficulties are often brought to the parents' attention by classroom teachers. Educators generally anticipate that by senior kindergarten and grade 1, children should be able to follow classroom routines, follow simple instructions, play cooperatively with peers, and remain focused for 15 to 20 minutes at a time on academic tasks. Concerns raised by teachers, especially experienced ones, provide important details about a child's academic and social functioning.

The formal diagnosis of ADHD reflects pervasive and detrimental levels of inattention, distractibility, overactivity and impulsiveness. The child's symptoms must be developmentally excessive and cause impaired functioning, most often in academic or social skills, peer or family relationships. Difficulties generally have been present since preschool, although is not always recognized. The troublesome behaviours are present in more than one context, at home, at school or in the community, for example on outings to the park or to a grocery store.

There are two sets of formal diagnostic rules used in Canada, DSM IV TR (Diagnostic and Statistical Manual, Fourth Edition, Text Revised) and ICD-10 (International Classification of Disorders, Tenth Edition). The DSM IV Diagnosis of Attention Deficit/Hyperactivity Disorder (ADHD) reflects consensus understanding of the diagnosis largely from the United States. There are three subtypes of ADHD, primarily inattentive type, where the child shows six of nine prescribed inattentive symptoms, primarily hyperactive-impulsive type, where the child shows six out of nine hyperactive-impulsive symptoms, and combined type, where the child shows high levels of both types of symptoms (see Chart 1 for diagnostic symptoms). The ICD-10 diagnosis of Hyperkinetic Disorder is used more often by physicians who do not practice in North America. There is a great deal of overlap in the underlying concept, with the ICD-10 Hyperkinetic Disorder identifying a smaller group of children who must meet criteria for both high levels of activity as well as inattention and distractibility. However, when aspects of overall clinical picture are taken into account, children with ADHD, especially those with combined type, show similar impairments in functioning and need for intervention as those with Hyperkinetic Disorder.⁶⁹

The clinical assessment of a child with ADHD is best done by a health professional familiar with pediatric mental health and psychosocial assessments. Since young children frequently respond to stressful circumstances with increased levels of activity and distractibility as well as difficulties in learning and social relationships, assessments of developmental, family and social contexts are required to identify alternative explanations for the impairing symptoms where appropriate. Physical contributions such as poor sleep, or chronic medical conditions should also be evaluated as explanations for or contributors to the child's difficulties. Ideally, the clinician can obtain information about the child social and academic functioning from more than one informant who

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knows the child in different situations, for example, the child's parent and a teacher. Self-report surveys for parents and teachers are widely used to elicit information about specific child's behaviours in the home or school settings, respectively.⁴ In addition, a detailed clinical interview with the parents of younger children, and, for older children, with the child or youth him/herself, is essential. Reviewing school reports over several years is also helpful to provide a longitudinal perspective from several teachers. An important aspect of the assessment includes identification of concurrent disorders, including learning and language disorders, as reviewed in the section above. Psychosocial or developmental concerns should also be identified as they may complicate treatment of the ADHD and impact the long-term prognosis.

Chart 1: DSM IV TR^a Criteria for Attention Deficit Hyperactivity Disorder

- A. Either (1) or (2):
- Inattention*
1. six or more of the following symptoms of *inattention* have persisted for at least 6 months to a degree that is maladaptive and is inconsistent with developmental level:
 - a. often fails to give close attention to details or makes careless mistakes
 - b. often has difficulty sustaining attention in tasks or play activities
 - c. often does not seem to listen when spoken to directly
 - d. often does not follow through on instructions and fails to finish schoolwork, chores or duties (not due to oppositional behaviour or failure to understand instructions)
 - e. often has difficulty organizing tasks and activities
 - f. often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort
 - g. often loses things necessary for tasks or activities (e.g. toys, school assignments, pencils, books or tools)
 - h. is often easily distracted by extraneous stimuli
 - i. is often forgetful in daily activities
 2. six or more of the following symptoms of *hyperactivity-impulsivity* have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

Hyperactivity

 - a. often fidgets with hands or feet or squirms in seat
 - b. often leaves seat in classroom or in other situations where remaining seated is expected
 - c. often runs about or climbs excessively in situations in which it is inappropriate
 - d. often has difficulty playing or engaging in leisure activities quietly
 - e. is often “on the go” or often acts as if “driven by a motor”
 - f. often talks excessively

Impulsivity

 - g. often blurts out answers before questions have been completed
 - h. often has difficulty awaiting turn
 - i. often interrupts or intrudes on others (eg. butts into conversations or games)
- B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years.
- C. Some impairment from the symptoms is present in two or more settings (eg. at school and home).
- D. There must be clear evidence of clinically significant impairment in social, academic or occupational functioning.
- E. 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 (eg. Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

^a American Psychiatric Association. *Diagnostic and statistical manual of mental disorders Text Revision (DSM-IV-TR)*. 4th Ed. Washington, DC: American Psychiatric Publishing, Inc., 2000.

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