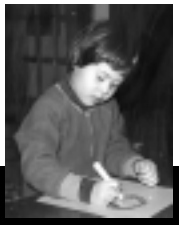
# Appendix



## Clinical Spectrum of Learning, Development and Behavior Disorders: Selected Definitions

The following learning, developmental and behavioral disorders represent a broad spectrum of cognitive, motor, perceptual and behavioral disorders. They describe a set of complex and divergent disorders whose descriptions have evolved/changed over time. The definitions used in this appendix will largely reflect the current criteria as stated in the Diagnostic and Statistical Manual of Mental Disorders IV (1994) published by the American Psychiatric Association.

### Learning Disorders (formerly Academic Skills Disorders)

The term "learning disability" covers a variety of disorders in the areas of listening, speaking, reading, math and reasoning. These disabilities interfere with a person's ability to store, process, or produce information. These difficulties are unexpected, given the person's general level of ability.[1] As well as primary difficulties with academics, a learning disability can also result in secondary problems in social and emotional areas.[2] Studies have reported that children with learning disabilities have been found to have lower self-concept, more anxiety and lower peer acceptance than normally-achieving children.[3] It has also been suggested that learning disabilities may be an under-recognized risk factor in adolescent suicide.[4] Learning disabilities are often referred to as hidden handicaps because they frequently go undetected by teachers, physicians and parents.

There are three definitions of learning disabilities worth noting. The first definition was incorporated by the National Advisory Committee on Handicapped Children in 1968 and is used in the Education for All Handicapped Children Act of 1975 (PL-142). Another definition was used by the Joint Committee on Learning Disabilities (NJCLD, 1981) and modified by the Interagency Committee on Learning Disabilities (ICLD) in 1987. The last definition is described in the Diagnostic and Statistical Manual of Mental Disorders IV published by the American Psychiatric Association. The three definitions are listed below:

**a.) The Education for All Handicapped Children Act of 1975** (PL - 142) states that "the term specific learning disability means a disorder in one or more of the basic psychological processes involved in understanding or using language, spoken or written, which may manifest itself in an imperfect ability to listen, speak, read,

**HISTORICAL DEFINITIONS OF LEARNING DISORDERS (*)**

**1861**

Early studies of aphasia by Broca (difficulty in producing or comprehending speech caused by brain damage rather than produced by deafness or simple motor deficit). Stemmed from observations of adults with acquired brain damage.

**1877**

Kussmaul proposed word blindness (loss of ability to read).

**1895-1917**

Congenital word blindness is described as a congenital defect occurring in children with an otherwise normal or undamaged brain, characterized by a disability in learning to read.

**1922-1925**

Post-Influenzal Behavior Syndrome: children were observed to have a disorder characterized by anti-social behavior, irritability, impulsiveness, emotional lability, hyperactivity and learning problems. First time that structural deficits involving certain parts of the central nervous system were related to behavioral problems. A diagnosis of structural brain damage was given to children who displayed behavioral and learning symptoms similar to those found in post-influenzal encephalitis.

*Hagw. RA, Silver AA. *Disorders of Learning in Childhood*. John Wiley and Sons, New York, 1990.

**HISTORICAL DEFINITIONS**

continued

**1928**
Strephosymbolia: five major symptom complexes: developmental alexia, writing disability, developmental word deafness, motor speech delay and developmental apraxia. These syndromes represented a delay or difficulty in establishing cerebral dominance for language function. The term for reading disability is labeled strephosymbolia.

**1929**
Congenital Auditory Imperception

**1934**
Organic Driveness: a hyperkinetic behavior disorder related to brain stem pathology.

**1941**
Developmental Lag

**1943-1947**
Brain-Injured or Damaged Child: described perceptual differences between retarded children whose history suggested pre-, peri- or postnatal brain injury and those retarded children who did not have such histories. Studies stressed the importance of perceptual functioning (auditory and visual) in the diagnosis of brain-injured children. Diagnosis of brain damage could be given based on the presence of neuro-psychological disturbance in perceptual or conceptual thinking.

**1947**
Minimally Brain-Damaged Child

**1960**
Psychoneurological Learning Disorders

**1962**
Term "Learning Disability" first defined by Kirk as a substitute for labels such as brain injured, perceptually handicapped or minimal brain dysfunction.

write, spell, or do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain function, dyslexia, and developmental aphasia. Such terms do not include children who have learning difficulties which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage".[5]

**b.) The National Joint Committee of Learning Disabilities** states that learning disabilities is a generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities, or of social skills. These disorders are intrinsic to the individual, presumed to be due to central nervous system dysfunction, and may occur across the life span. Problems in self-regulatory behavior, social perception and social interaction may exist with learning disabilities but do not in themselves constitute a learning disability. Learning disabilities may occur concomitantly with other handicapping conditions such as sensory impairment, mental retardation, social and emotional disturbances, or with socio-environmental influences such as cultural differences, insufficient or inappropriate instruction, and psychogenic factors. A learning disability may occur concomitantly with an attention deficit disorder. Although all of these handicapping conditions may cause learning problems, a learning disability is not the direct result of these conditions.[6]

**c.) The Diagnostic and Statistical Manual of Mental Disorders** (DSM IV, 1994) is a manual for psychiatric diagnoses and classification of mental disorders. The DSM IV provides a definition of a disorder and describes the parameters within which a certain diagnosis is made. Each disorder is conceptualized as a clinically significant behavioral or psychological syndrome or pattern that occurs in an individual. Each disorder is associated with distress (painful symptom) or disability (impairment in one or more important areas of functioning), or with a significantly increased risk of suffering death, pain, disability or an important loss of freedom.[7] In addition, the syndrome or pattern must be more than an expected or culturally-sanctioned response to an event.

The DSM IV states that "learning disorders are diagnosed when the individual achievement on individually administered, standardized tests in reading, mathematics, or written expression is substantially below that expected for age, schooling, and level of intelligence. The learning problems significantly interfere with academic achievement or activities of daily living that require reading, mathematical, or writing skills... Substantially below is usually defined as a discrepancy of more than two standard deviations between achievement and I.Q. (p.46)."[8] However, a smaller discrepancy (between one and two standard deviations) is sometimes used when another disorder or a general medical compromises the I.Q test.

The specific learning disorders listed in the DSM IV are expressive language

disorder, mixed receptive-expressive language disorder, phonological disorder, reading disorder, mathematics disorder, disorder of written expression, and learning disorder not otherwise specified.

## Developmental Delays

### Mental Retardation (MR)

The essential feature of mental retardation (MR), which affects nearly 1% of the population, is a significantly sub-average general intellectual functioning that is accompanied by a significant limitation in daily adaptive functioning.[9] Both of these factors must be present for a diagnosis of mental retardation. General intellectual functioning is usually defined by I.Q. and is obtained by administering one or more standardized, individually administered intelligence tests such as the Weschler Intelligence Scale (children and adults), Stanford-Binet, etc. In order to be diagnosed as mentally retarded an individual must have an I.Q. of 70 or below, which is two standard deviations below the mean (average I.Q. is from 90-110). There are four different ranges of mental retardation that reflect the level of intellectual impairment. The classifications are mild mental retardation (I.Q. 50 to 70 and the largest segment of MR - 85%), moderate mental retardation (I.Q. 35 to 50), severe mental retardation (I.Q. 20 to 35), and profound mental retardation (I.Q. below 20). The onset of mental retardation must occur before an individual is 18 years old. In addition, according to the DSM IV, individuals with MR are three to four times more likely than the general population to have another mental disorder.

"Mental retardation has many different etiologies and may be seen as a final common pathway of various pathological processes that effect the functioning of the central nervous system (p.39)."[10] Mental retardation may be associated with a general medical condition (e.g., Down's syndrome). According to the DSM IV, etiological factors may be primarily biological, psychosocial, a combination of both, or unknown. DSM IV current estimates are that for approximately 30% - 40% of mental retardation the cause is unknown, approximately 5% is from heredity (inborn errors of metabolism such as Tay-Sachs, single-gene abnormalities such as tuberous sclerosis, and chromosomal aberrations such as fragile x syndrome), approximately 30% results from alterations of embryonic development including chromosomal changes or prenatal damage due to toxins (maternal alcohol consumption, infections), approximately 10% is due to pregnancy and prenatal problems (fetal malnutrition, prematurity, hypoxia, trauma, viral and other infections), approximately 5% is due to general medical conditions acquired in infancy or childhood (infections, poisoning {lead}, and trauma, and approximately 15% to 20% is due to environmental influences and other mental disorders (deprivation of nurturance and of social, linguistic, and other stimulation and severe mental disorders such as autism).

**HISTORICAL DEFINITIONS**

continued

**1962-1963**

Minimal Brain Dysfunction (MBD): represented a syndrome of childhood and/or behavioral problems stemming from some form of common but unknown brain dysfunction. Included in the MBD diagnosis were children whose basic symptoms were neuropsychological even though no other evidence of damage to the brain was reported by history of clinical observation.

**1964**

Developmental Dyslexia

**1967-1968**

Specific Learning Disabilities defined

**1969**

First citation of specific "Learning Disabilities" (Public Law 91-230).

**1971**

Psycholinguistic Learning Disabilities

**1977**

Learning Disabilities (Public Law 94-142).

**1980**

Specific Developmental Disorders (Diagnostic and Statistical Manual of Mental Disorders -DSM-, Third Edition). Describes disorders that are characterized by inadequate development of specific academic, language, speech, and motor skills not due to physical or neurologic disorders, a pervasive developmental delay, mental retardation, or educational deficits.

It is usually problems in adaptive functioning (communication, self-care, health, safety) and/or personal independence, rather than low I.Q., that identify an individual as mentally retarded. Examples of such difficulties may include problems handling personal finances, obtaining and keeping employment, managing issues related to hygiene, health, and safety, and/or living independently (shopping, cleaning, etc.). Of course, as with any other disorder, the severity of difficulties and different personality and behavioral features associated with mental retardation are on a continuum. For example, some individuals with mental retardation are passive and/or dependent, while others may be aggressive and/or impulsive. Also an individual with mental retardation may be capable of limited employment, but have difficulties living independently, while another individual with mental retardation may be able to live independently with outside supports but not be capable of employment without supervision.

## Pervasive Developmental Disorders (PDDs)

PDDs are characterized by severe and pervasive impairments in several areas of development including reciprocal social interactions, communication skills, and/or the presence of stereotyped behavior. The impairments are deviant from the individual's developmental level or mental age. These disorders may present differently for each individual and they are on a continuum of severity. The disorders, according to the DSM IV, are Autistic Disorder, Asperger's Disorder, Rett's Disorder, Childhood Disintegrative Disorder, and Pervasive Developmental Disorder not Otherwise Specified (used when the criteria are not met for a specific PDD). These disorders are described briefly below:

### Autism

Autism prevalence rates are estimated to be 2 per 1,000 individuals, with males four to five times more likely to be autistic.[11] [12] Autism is a disorder of socialization, as it involves severe impairments in an individual's ability to relate to others in a reciprocal manner.[13] In addition to problems in social and emotional reciprocity, individuals with autism also have deficits in communication skills and often exhibit repetitive and purposeless behaviors such as motor mannerisms (rocking back and forth). In most cases Autism is apparent from very early childhood and is often accompanied by mental retardation (75%).[14] Leo Kanner first described autism in 1943. It probably is the most researched disorder of early childhood. Autism is sometimes referred to as early infantile autism, childhood autism, or Kanner's autism.[15]

According to the DSM IV, individuals with autism have markedly abnormal or impaired development in three areas: social interactions, communications skills, and a restricted repertoire of activity and interests with stereotyped patterns of behaviors, interests, and activities. In order to be diagnosed with autism an individual must have a total of six problems in the above-mentioned areas, with at least two problems in social interactions, at least one problem in communication skills, and one problem with repetitive and stereotyped behaviors.

The impairments in social interactions are gross and sustained. According to the DSM IV, they are evidenced by marked impairment in the use of multiple nonverbal gestures (eye-to-eye gaze, facial expression, body postures, and ability to regulate social interactions), failure to develop peer relationships appropriate to developmental age, lack of spontaneous seeking to share enjoyment, interests, or achievements, and lack of social and emotional reciprocity. The impairments in communication are evidenced by delay in, or lack of, the development of spoken language (not accompanied by attempts to compensate through other ways of communication like gestures or mime), impairment in the ability to initiate speech if an individual does speak, stereotyped and repetitive use of language, and a lack of varied and spontaneous make believe play or social imitative play appropriate to developmental level. The repetitive and stereotyped behavior is evidenced by preoccupation with one or more stereotyped and restricted patterns of interest that are abnormal either in intensity or focus, inflexible adherence to specific, nonfunctional routines or rituals, stereotyped and repetitive motor mannerisms (hand or finger flapping or twisting, complex body movements).[16]

According to the DSM IV, rates of the disorder are 4 to 5 times higher in males but females are more likely to have more severe mental retardation. The onset of autism is prior to three years of age typically with no periods of normal development. Also, there may be

abnormalities in the development of cognitive skills. However, usually the development of cognitive skills is uneven, regardless of the general level of intelligence.

Manifestations of the disorder vary greatly depending on the developmental level and chronological age of the individual, and they may change over time. For example, infants may exhibit a failure to cuddle or failure to respond to their parents' voices, whereas a young child may cling to an adult or essentially treat the adult as if they were not there. An autistic person does have the capacity for insight, and although impaired in one area, he or she may have the cognitive and communicative ability to hold a responsible job.[17]

According to the DSM IV, those with autism may exhibit a range of behavioral symptoms including hyperactivity, short attention span, impassivity, aggressiveness, self-injurious behaviors and temper tantrums. Also, additional symptoms may include odd responses to sensory stimulation (high threshold for pain, oversensitivity to

sound or being touched). Those with autism may have eating disorders (limiting food intake to particular foods), sleep disorders, abnormalities in mood or affect (giggling or weeping for no reason), and/or lack a sense of danger or fear. Finally, autism is sometimes observed in association with neurological or other general medical conditions (encephalitis, phenylkentouria, tuberous sclerosis, fragile X syndrome, anoxia during birth, maternal rubella).

### Asperger's Syndrome

Prevalence rates of Asperger's syndrome are estimated to be from 1 to 3 per 1000 school-age children, with boys appearing to out number girls by 5:1 to 15:1.[18] Hans Asperger first described Asperger's syndrome in 1944. It received its status as a syndrome in 1981.[19] In contrast to autism, Asperger described a condition he was observing as more of a personality style that gave individuals the appearance of being eccentric or loners.[20] He described a cluster of individuals, labeled as autistic, who had normal I.Q.s, less delayed speech problems, more motor deficits and later onset. All his initial cases were male. Asperger's syndrome is currently a separate mental health disorder at the higher functioning end of the autistic continuum.

According to the DSM IV, to be diagnosed with Asperger's syndrome an individual must present with severe and sustained impairment in social interaction and the development of restricted, repetitive patterns of behavior, interest and activities. Those diagnosed with Asperger's syndrome may have problems with empathy and modulation of social interactions. Difficulties in social interactions (not age-appropriate) may become more apparent at school age, along with the development of a fascination with unusual topics and learning vast amounts of factual information about them.[21] Also, motor delays or motor clumsiness may be observed in the preschool period. According to the DSM IV, the condition must cause clinically significant impairment in social, occupational or other areas of functioning. In addition, those diagnosed with Asperger's syndrome show no clinically significant delays in language, cognitive development, or age-appropriate self-help skills, adaptive behaviors and curiosity about the environment. Asperger's syndrome strictly represents problems in social interactions.

The DSM IV reports that there appears to be an increased frequency of Asperger's syndrome among family members of individuals who have the disorder. Research has suggested a rather significant genetic component, with at least 50% of affected cases having a close relative with Asperger's.[22]

Asperger's syndrome is sometimes referred to as a social learning disability.[23] An adult or child with Asperger's syndrome would commonly exhibit the following essential symptoms: a) poor social interactions as evidenced by: a paucity of empathy; naive, inappropriate, one-sided social interaction; little ability to form friendships; lack of appreciation of social cues, and consequent social

isolation; b) poor nonverbal communication (limited use of gesture, clumsy/gauche body language; limited facial expression; inappropriate expression; peculiar, stiff gaze); c) absorption/preoccupation limited/narrow topics or with interests such as weather, facts about TV, etc., which are learned in a rote fashion and reflect poor understanding, conveying the impression of eccentricity. Associated features include a) some language issues such as delayed development; superficially perfect expressive language; formal, pedantic language; odd prosody; peculiar voice characterizations; impairment of comprehension including misinterpretations of literal/implied meanings and b) clumsy ill-coordinated movements and postures.[24]

Until this decade adults and children with Asperger's syndrome did not come to the attention of mental health professionals, since they were regarded as odd and even aloof, not perceived as having a diagnosable mental disorder, or given some other diagnosis such as obsessive-compulsive, learning disabled, etc. It is easy to understand how proficient verbal skills, adequate I.Q., and a solitary life could easily mask the marked social problems of an adult with Asperger's syndrome. Children were even less likely to be diagnosed with Asperger's syndrome as the nature of the social and emotional problems (delayed developmental milestones such as marriage and family) associated with Asperger's syndrome made it more likely that they would not be identified until adulthood. With the advancements in the understanding of Asperger's syndrome, more individuals are now not only being appropriately diagnosed, but are also being identified earlier.

### Rett's Disorder

According to the DSM IV, this disorder is much less common than autism and has been reported only in females. The essential feature of Rett's Disorder is the development of multiple specific deficits following a period of normal functioning after birth. Those with Rett's have an apparently normal prenatal and perinatal development with normal psychomotor development through the first 5 months after birth. However, in the first or second year of life, and after a period of normal development, there is regression in development, which is distinctive and significant. The disorder is usually diagnosed prior to age 4. The developmental regression is evidenced by a deceleration of head growth between five and 48 months, loss of previously acquired purposeful hand movements between five and 30 months with the development of stereotyped hand movements (hand-wringing or hand washing), loss of social engagement rather early (although often social interaction develops later), appearance of poorly coordinated gait or trunk movements, and severely impaired expressive and receptive language development with severe psychomotor retardation.

The DSM IV reports the duration of the disorder is lifelong and the loss of skills is usually persistent and progressive. Recovery is very limited,

although some individuals may make modest developmental gains. Rett's Disorder is usually associated with severe or profound mental retardation.

### Childhood Disintegrative Disorder (CDD)

According to the DSM IV, cases of CDD appear to be very rare, more common in males, and are usually associated with severe mental retardation. The essential feature of childhood disintegrative disorder is a regression in multiple areas of functioning after at least two years of apparently normal development as evidenced by the presence of age-appropriate verbal and non-verbal communication, social relationships, play and adaptive behavior. After the first two years (but before age ten) there is a clinically significant loss of previously acquired skills in at least two of these areas: expressive or receptive language, social skills or adaptive behavior, bowel or bladder control, play, or motor skills. Individuals with this disorder demonstrate social problems (failure to develop peer relationships and lack of social or emotional reciprocity), communication problems (delay or lack of spoken language, inability to initiate or sustain a conversation, stereotyped and repetitive use of language, lack of varied make believe play), and behavioral problems (restricted, repetitive, and stereotyped patterns of behavior, interests, and activities, including motor stereotypes and mannerisms) usually observed in autism.

The DSM IV reports that in most cases, the onset of this disorder is between ages three and four. Onset may be insidious or abrupt. Signs can include increased activity levels, irritability, and anxiety followed by a loss of speech and other skills. The disorder is lifelong. Limited improvement is unlikely, but may occur. Although it appears likely that the condition is the result of an insult to developing nervous system, no precise mechanism has been identified.

## Behavioral Disorders

The DSM IV classifies two childhood behavioral disorders, Conduct Disorder and Oppositional Defiant Disorder. Attention Deficit Hyperactivity Disorder (formerly called Attention Deficit Disorder), whose symptoms may include both behavioral and cognitive problems, is also described below.

### Attention Deficit Hyperactivity Disorder (ADHD)

Attention Deficit Hyperactivity Disorder (ADHD) is the most commonly diagnosed childhood psychiatric disorder in the United States.[25] Prevalence rates vary from less than 1% to as much as 14% of the school-age population depending on the study.[26] Subsequent studies using more sophisticated methods report prevalence rates of 6.7% to 9.5%.[27] The DSM IV reports that prevalence rates are from 3%-5% of school age children with prevalence data on adolescence and adults more limited. The disorder is more frequently diagnosed in males than

in females, with male-to-female ratios ranging from 4:1 to 9:1, depending on the setting (general population or clinics). It is very difficult to diagnosis ADHD in children younger than four or five years old because children that young are not often in situations that require sustained attention. Also, it is a little more difficult to distinguish age-inappropriate play from that of a normal overactive toddler. Therefore, ADHD is usually diagnosed in school-aged children between the ages of six and nine. In addition, more than 70% of children diagnosed with ADHD symptoms will continue to have difficulties throughout adolescence and adulthood.[28]

There are three subtypes of ADHD. The first is Attention Deficit Hyperactivity Disorder, Combined Type, which includes six or more symptoms of inattention and six or more symptoms of hyperactivity-impulsiveness. Second is Attention Deficit Hyperactivity Disorder, Predominantly Inattentive Type, which includes six or more symptoms of inattention but fewer than six symptoms of hyperactivity-impulsiveness. Finally, there is Attention Deficit Hyperactivity Disorder, Predominantly Hyperactive-Impulsive Type, which includes six or more symptoms of hyperactivity-impulsiveness but less than six of inattention.

According to the DSM IV, the essential feature of Attention Deficit Hyperactivity Disorder is a persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequent and severe than is typically observed in individuals at a comparable level of development. The current diagnostic criteria requires the demonstration of at least 6 symptoms of either inattention or hyperactivity - impulsivity that were present before the age of seven years (although many individuals are diagnosed after the symptoms have been present for a number of years). In addition, symptoms must have persisted for more than six months, manifested in two or more settings (school, home, work), and impair developmentally appropriate academic, social, or occupational functioning.[29] The symptoms usually get worse in situations that require sustained attention (class, homework) and may be absent or minimal when the person is in a one-to-one situation, under strict control, or in a novel or especially interesting situation.

The DSM IV states that inattention is demonstrated by failing to give close attention to details or making careless mistakes in school work or other activities. Inattention is also demonstrated by having difficulty sustaining attention in tasks, play or activity (homework or paperwork) and/or finding it difficult to follow through on instructions or persist with tasks until they are completed. Other examples of inattention include not listening, difficulty with organization, being easily distracted by extraneous stimuli (car honking, background conversation), and/or being frequently forgetful in daily activities (missing appointments, forgetting to bring lunch). In social situations, changing the flow or content of the conversation, not keeping focused

on the conversation, and/or not following the rules of games or activities may evidence inattention.

The DSM IV states that hyperactivity is evidenced by fidgeting (squirming in one's seat or leaving one's seat when one is expected to remain seated), excessive running or climbing in situations where it is inappropriate, and/or difficulty playing or engaging in leisure activities. Hyperactivity may also be demonstrated by talking excessively and/or always appearing to be in motion. As expected, the symptoms of hyperactivity vary with an individual's age and developmental level. For example, a toddler or preschooler with ADHD may be constantly on the go as demonstrated by "getting into everything", darting back and forth, running through the house, or jumping on furniture. School-aged children with ADHD, however, may have difficulty staying in their seat or sitting still.

Impulsivity may look like impatience as evidenced by difficulty delaying responses, blurting out answers before the questions have been completed, difficulty awaiting one's turn, commenting out of turn, failing to listen to directions, grabbing objects or touching things they are not supposed to, or clowning around. Impulsivity may result in accidents (knocking over objects, running into people, grabbing something hot) or in more potentially dangerous situations (running into traffic).

The concept of Attention Deficit Hyperactivity Disorder (ADHD) came from studies of brain damage where the sequelae of an insult to the brain might include inattention, hyperactivity and impulsivity.[30] However, by the 1960s it became clear that in the large majority of cases ADHD revealed no evidence of any brain damage, but rather of the brain not functioning the way it should. Over time, the concept of ADHD has undergone many changes. The DSM - II published in 1968 first described the disorder as a "hyperkinetic reaction to childhood" and focused on excessive motor activity.[31] The DSM - III published in 1980 focused on attention and concentration and the distinction between inattention without hyperactivity (ADD/noH) and ADD with hyperactivity (ADD/H). It also described symptoms in three areas (inattention, impulsivity, and motor hyperactivity). The DSM - III - R eliminated the distinction between inattention, impulsivity, and motor hyperactivity, and required the presence of 8 out of 14 symptoms.

During the past decade, there has been an increase in the diagnosis and treatment of ADHD.[32] Stimulants have been used to treat hyperactivity and inattention since the 1930s even though prior to the 1960s hyperactivity and attention deficits were rarely noticed or treated as a medical condition. [33] [34] Stimulants work by increasing the production of dopamine and norepinephrine, two of the brain's neurotransmitters (messengers). The medications increase nervous system alertness, thereby improving attention and reducing restlessness.[35]

The use of stimulants to treat hyperactivity and attention deficits began to increase dramatically after the

Food and Drug Administration (FDA) approved Ritalin for use in children with behavioral problems in 1961. Since 1971 the use of Ritalin has doubled every 4 to 7 years.[36] It has been estimated that in 1975, 150,000 children in the United States were being prescribed drugs to reduce their hyperactivity.[37] By the late 1980s Ritalin was regularly used by about 1 million children in the United States.[38] It is estimated that the use of Ritalin has increased from 2.5 times to 5 times between 1990 and 1995.[39] The production of Ritalin has increased seven fold in the past eight years, with 90% of it consumed in the United States. [40] Although other medications, such as Cylert and Dexedrine, are used to treat ADHD, currently Ritalin is prescribed as a treatment for ADHD in about 90% of all cases.[41] The U.S. Drug Enforcement Administration estimates that by the year 2000, 15% of school age children or an estimated 8 million children will use Ritalin.[42]

### Conduct Disorder

According to the DSM IV, the essential feature of a conduct disorder is a repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate social norms or rules are violated. These behaviors must have been present during the past 12 months, with at least one present in the past six months. In addition, the behaviors must demonstrate clinically significant impairment in social, academic, or occupational functioning in a variety of settings (home, school, work). The onset of this disorder may occur as early as five or six years, but it usually diagnosed in late childhood or early adolescence. The earlier the onset, the worse the prognosis. Onset is rare after the age of sixteen. The disorder is not diagnosed in individuals over eighteen, as those over eighteen usually meet the criteria for an antisocial personality disorder.

According to the DSM IV, the prevalence of the disorder appears to have increased over the last decades and may be higher in urban than in rural settings. Prevalence rates for males under eighteen range from 6% to 16% and for females from 2% to 9%. There are two subtypes of this disorder, each of which can occur at a different level of severity (mild, moderate, or severe). In addition, the nature, developmental course, and prognosis of the conduct problem differ for the two subtypes. The first subtype, Childhood-Onset Type**,** occurs before the age of ten and the individual must exhibit one of the conduct problems presented below. Individuals diagnosed with this type frequently display physical aggression towards others, have disturbed

peer relationships, and are usually male. The second sub-type, Adolescent-Onset Type, is characterized by the absence of any symptoms before the age of ten years. These individuals are less likely to exhibit aggressive behaviors, tend to have more normal peer relationships, and are less likely to have these problems continue in adulthood. The ratio of males to females is lower for this subtype.

The DSM IV reports that the problematic behaviors of this disorder fall into four main categories: aggression toward people or animals, destruction of property, deceitfulness or theft, and/or serious violations of rules. The aggressiveness must cause or threaten to cause physical harm to other people or animals. Examples of aggression include bullying, threatening or intimidating others, initiating physical fights, and/or using a weapon that can cause serious physical harm to others (bat, knife, gun, etc.). Additional examples of aggression include being physically cruel to people or animals, stealing while confronting a victim (mugging, extortion, robbery, armed robbery), and/or forcing someone into sexual activity. The physical violence may take the form of rape, assault, or in rare cases homicide.

According to the DSM IV, examples of destruction of property include deliberately setting fires with the intention of causing serious damage or deliberately destroying other's property (not including fire-setting). Deceitfulness or theft includes breaking into someone else's house, building, or car, lying to get goods or favors to avoid obligations ("conning" others), and/or stealing items without confronting the victims (shoplifting, forgery). Examples of serious violations of rules include staying out at night despite parental prohibitions (before age 13), running away from home at least twice, and being truant at school (before age 13).

Children with a conduct disorder seem to have little empathy (little guilt or remorse) for others and may frequently misperceive the intentions of others as hostile or threatening. In addition, those with a conduct disorder may have a lower than average I.Q. and may be more likely to use illegal drugs, have an earlier onset of sexual activity, have difficulty with academics (i.e. a learning disorder, ADHD), and may have lower self-esteem (higher suicide rates and attempts).

### Oppositional Defiant Disorder

According to the DSM IV, prevalence rates of ODD are estimated to be from 2% to 16%, with males diagnosed more often before puberty and males and females diagnosed at the same rate after puberty. According the DSM IV, the essential feature of oppositional defiant disorder is a recurrent pattern of negativistic, defiant, disobedient, and hostile behavior toward authority figures that persists for at least 6 months. Negative and defiant behaviors include persistent stubbornness, resistance to directions, and unwillingness to compromise or negotiate with adults or other children. Defiance may include deliberate or persistent testing of limits, usually by

ignoring, arguing, or blaming others for misdeeds. Hostility is evidenced by deliberately trying to annoy others or by verbal aggression. Onset of this disorder is usually before eight and no later than early adolescence. Onset is usually gradual, occurring over months and years. Also, symptoms tend to first emerge in the home, with individuals the child knows well, and the number of symptoms seems to increase with age.

The DSM IV states that in order to be diagnosed with oppositional defiant disorder a child must exhibit at least four of the following behaviors: losing temper, arguing with adults, actively defying or refusing to comply with the requests or rules of adults, deliberately doing things that will annoy others, blaming others for their own mistakes or misbehaviors, being easily annoyed by others, being angry and resentful, or being spiteful or vindictive. Behaviors must occur more frequently than is typical in those of comparable age or developmental level and must lead to significant impairment in social, academic, or occupational functioning. Children with this disorder often have low self-esteem, mood lability, low frustration tolerance, inappropriate language (swearing), and use of alcohol and drugs. ADHD and learning disorders also tend to be associated with this disorder.

1 Cramer SC, Ellis E. Learning disabilities: Lifelong issues. Paul H. Brookes Publishing Company, Inc., Baltimore, 1996.

2 Cramer SC, Ellis E. Learning disabilities: Lifelong issues. Paul H. Brookes Publishing Company, Inc., Baltimore, 1996.

3 Dyson LL. The experiences of families of children with learning disabilities: Parental stress, family functioning, and sibling concept. Journal of Learning Disabilities 29(3):280-286, 1996.

4 McBride HEA, Siegel LS. Learning disabilities and adolescent suicide. Journal of Learning Disabilities 30(6):652-659, 1997)

5 U.S. Office of Special Education. 42 Fed. Reg. 65,083 Definition and Criteria for defining Students as Learning Disabled. Washington D.C. U.S. Government Printing Office,1977.

6 Lyon GR. The state of research. In Cramer SC, Ellis E (eds). Learning disabilities: Lifelong issues. Paul H. Brookes Publishing Company, Inc., Baltimore; 1996.

7 American Psychiatric Association. Diagnostic and Statistical Manual, Fourth Edition. Washington, DC. 1994.

8 American Psychiatric Association. Diagnostic and Statistical Manual, Fourth Edition. Washington, DC. 1994.

9 American Psychiatric Association. Diagnostic and Statistical Manual, Fourth Edition. Washington, DC. 1994.

10 American Psychiatric Association. Diagnostic and Statistical Manual, Fourth Edition. Washington, DC. 1994.

11 Centers for Disease Control and Prevention, National Center for Environmental Health, Division of Birth Defects and Disability and Health, Developmental Disabilities Branch. http://www.cdc.gov/nech/programs/CDDH/dd/ddautism.htm.

12 American Psychiatric Association. Diagnostic and Statistical Manual, Fourth Edition. Washington, DC. 1994.

13 Klin A, Volkmar FR. Autism and Asperger's syndrome. Yale University Child Study Center. July/August 8-9, 1994.

14 American Psychiatric Association. Diagnostic and Statistical Manual, Fourth Edition. Washington, DC. 1994.

15 Klin A, Volkmar FR. Autism and Asperger's Syndrome. Yale University Child Study Center.July/August 8-9, 1994.

16 American Psychiatric Association. Diagnostic and Statistical Manual, Fourth Edition. Washington, DC. 1994.

17 American Psychiatric Association. Diagnostic and Statistical Manual, Fourth Edition. Washington, DC. 1994.

18 Gillberg C, Gillberg IC. Asberger's syndrome: Some epidemiological Considerations. Journal of Child Psychiatry, 30:631-638. 1989.

19 Klin A, Volkmar FR. Autism and Asperger's syndrome. Yale University Child Study Center. July/August 8-9, 1994.

20 Klin A, Volkmar FR. Autism and Asperger's syndrome. Yale University Child Study Center. July/August 8-9, 1994.

21 Klin A, Volkmar FR. Autism and Asperger's syndrome. Yale University Child Study Center. July/August 8-9, 1994.

22 Wing (1981) in Gillberg C, Gillberg IC. Asberger's syndrome: Some epidemiological considerations. Journal of Child Psychiatry, 30:631-638. 1989.

23 Klin A, Volkmar FR. Autism and Asperger's syndrome. Yale University Child Study Center. July/August 8-9, 1994.

24 Klin A, Volkmar FR. Autism and Asperger's syndrome. Yale University Child Study Center. July/August 8-9, 1994.

25 DeGrandpre R. Ritalin Nation. Norton: New York, 1999

26 Fletcher JM, Shaywitz BA. Attention-deficit/ Hyperactivity disorder. In Cramer SC, Ellis E (eds). Learning disabilities: Lifelong issues. Paul H. Brookes Publishing Company, Inc. 1996. Pgs. 265-276.

27 Shaywitz SE, Shaywitz BA. Unlocking learning disabilities: The neurological basis. In Cramer SC, Ellis E (eds.) Learning disabilities: Lifelong issues. Paul H. Brookes Publising Company, Inc. 1996. Pgs. 255-260.

28 Inteli-Health, Inc. Attention deficit hyperactivity disorder. Johns Hopkins Health, 1998. http:// www.intelhealth.com

29 American Psychiatric Association. Diagnostic and Statistical Manual, Fourth Edition. Washington, DC. 1994.

30 Kavale KA, Forness SR. Covariance in learning disability and behavior disorders: An examination of classification and placement issues. Advances in Learning and Behavioral Disabilities. 12 (1-42) 1998.

31 Kavale KA, Forness SR. Covariance in learning disability and behavior disorders: An examination of classification and placement issues. Advances in Learning and Behavioral Disabilities. 12 (1-42) 1998.

32 Gibbs N. The age of Ritalin. Time Magazine 152(22), November, 1998. http://cgi.pathfinder.com/time/ magazine/1998/dom/981130/cove1.html.

33 DeGrandpre R. Ritalin Nation. Norton: New York, 1999.

34 Inteli-Health, Inc. Attention deficit hyperactivity disorder. Johns Hopkins Health, 1998. http:// www.intelhealth.com

35 Inteli-Health, Inc. Attention deficit hyperactivity disorder. Johns Hopkins Health, 1998. http:// www.intelhealth.com

36 Inteli-Health, Inc. Attention deficit hyperactivity disorder. Johns Hopkins Health, 1998. http:// www.intelhealth.com

37 DeGrandpre R. Ritalin Nation. Norton: New York, 1999.

38 DeGrandpre R. Ritalin Nation. Norton: New York, 1999.

39 Inteli-Health, Inc. Attention deficit hyperactivity disorder. Johns Hopkins Health, 1998. http:// www.intelhealth.com

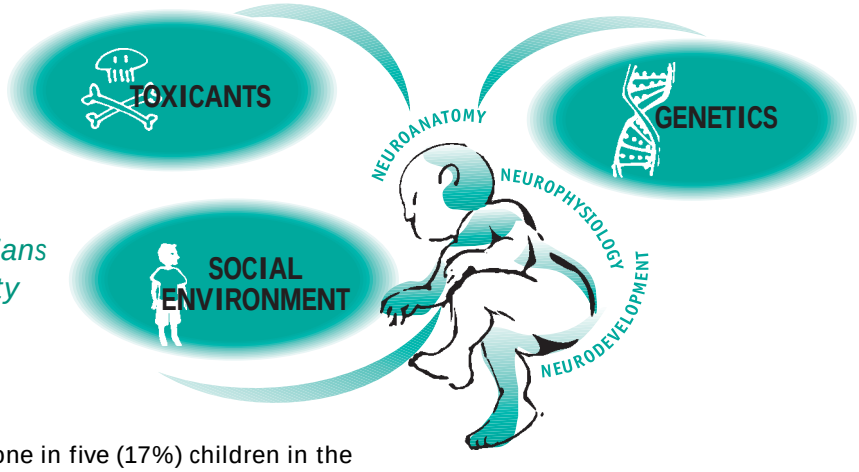
40 Gibbs N. The age of Ritalin. Time Magazine 152(22), November, 1998. http://cgi.pathfinder.com/time/ magazine/1998/dom/981130/cove1.html.

41 DeGrandpre R. Ritalin Nation. Norton: New York, 1999.

42 DeGrandpre R. Ritalin Nation. Norton: New York, 1999.

# In Harm's Way:

## Toxic Threats to Child Development




A REPORT BY

*Greater Boston Physicians for Social Responsibility*

**Prepared for a Joint Project with Clean Water Fund**

**Release date: May 2000**

*Human development takes place within complex physical, genetic, social and cultural environments.*

*The role of toxic chemicals deserves special scrutiny because it is a* ***preventable*** *cause of harm.*

Nearly one in five (17%) children in the United States has been diagnosed with one or more developmental, learning or behavioral disability. There is a growing consensus that disorders including Attention Deficit Hyperactivity Disorder (ADHD) and autism are increasing in frequency. These disorders have widespread societal impacts, from health and education costs to the repercussions of criminal behavior. Research demonstrates that pervasive substances such as mercury, lead, PCBs, dioxins, pesticides, and others, are toxic to the developing child's brain (neurotoxic.)

Human exposure to neurotoxic substances is global. Tests on humans show that these chemicals now reside in our bones and other organs, blood, breast milk, sperm, fatty tissue and urine. As our knowledge about the toxicity of these chemicals has increased, the "safe" threshold of exposure has been continuously revised downward.

Human development takes place within complex physical, genetic, social and cultural environments. This report examines the contribution of toxic chemicals to developmental, learning and behavioral disabilities.

**Included in the report are:**

- A "primer" on normal brain development, and how toxic chemicals can alter that development
- The spectrum of developmental disabilities and their multiple causes, including genetics and gene-environment interactions
- Profiles of known and suspected developmental neurotoxicants
- The scope of the chemical problem
- And much more including charts, graphs, illustrations and "spotlight" features on such things as community activism around autism and others

**Don't miss this groundbreaking new report with a wealth of information for parents, educators, scientists, advocates, public health and public policy professionals.**

This report has been prepared as part of a joint education project with Clean Water Fund. Funding has been provided by the John Merck Fund, the Jessie B. Cox Charitable Trust, the W. Alton Jones Foundation, the Mitchell Kapor Foundation and the Alida R. Messinger Charitable Lead Trust.

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