# Learning Unit VII Handouts

## (Developmental and Behavioral Pediatrics)

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Alexis L. Reyes M.D.  
Victoria C. Ang-Nolasco, M.D.
I. AN OVERVIEW OF DEVELOPMENTAL DISABILITIES

INTRODUCTION

The advent of the 1980s heralded and recognized the wave of developmental and behavioural disorders as the “new morbidities” in paediatrics. The history and evolution of more relevant and appropriate services for the developmentally disabled have paved the way for the relatively new and fast growing subspecialty of Developmental and Behavioural Paediatrics. Developmental paediatricians are advocates for individuals who have been excluded from traditional medical care like children and older individuals with disabilities and mental health disorders, as well as children and older individuals at risk for these disorders on the basis of poverty and other adverse medical conditions.

DEFINITION AND TERMINOLOGY

Developmental disabilities involve a delay, dissociation or deviance in development based on that expected for a given age level or stage of development. These three developmental processes are described as follows: Delay , a phenomenon in which milestones within a given stream are attained in a typical sequence, but a delayed rate. Delay can occur across a single stream or across several developmental domains. Deviance represents an uncustomary sequence of milestone attainment within a single stream of development. A child who is able to crawl before he or she is able to sit. Dissociation indicates differing rates of development among developmental streams.

Developmental Disabilities are also conditions characterized by physical, cognitive, psychological, sensory, adaptive, and/or communication impairments manifested during development. These impairments which originate before age 18 are expected to continue indefinitely and may constitute a substantial burden to the family and society.

In the United States, developmental disabilities has been broadly construed as an umbrella term that includes other more discretely defined disability classifications sharing some common characteristics. For example, the Administration on Developmental Disabilities (ADD) at onetime grouped within the developmental disabilities classification, mental retardation, autism, cerebral palsy, traumatic brain injury, and epilepsy, with the rationale that people with these disabilities had significant life limitations across several developmental areas. Yet, in the United States, terminology is changing to represent a broader conceptualization.

Attempts to classify developmental disabilities have also been based primarily on the specific domain of development greatly involved. Traditionally, this is represented by conditions such as Mental Retardation, Autism and Cerebral Palsy. Accardo and Capute have proposed a diagram that represents an interaction among these three primary diagnoses which depict the motor end ( Cerebral Palsy ), the cognitive end ( Mental Retardation) and communicative end ( Autistic Spectrum Disorders ) of the spectrum as the three parts of a triangle.
PREVALENCE

International Data

The average prevalence of major developmental disabilities ranges from 1 per 1000 for sensory disorders (hearing and vision) to 20-60 per 1000 for speech and language disorders. In the United States, the National Health Interview Survey on Disability revealed that approximately 3% to 4% of children 6-17 years of age were diagnosed to have intellectual disabilities or other developmental delays. In 2000, the Metropolitan Atlanta Developmental Disabilities Surveillance Program (MADDSP) found the prevalence of at least one of the five serious developmental disabilities to be 1.9%. The percentage of multiple disabilities in MADDSP was 23.1% with decreasing percentages as the number of co-existing developmental disabilities increased.

Local Data

The actual number of children with developmental disabilities in the Philippines is not available although there have been sporadic reports of data from different governmental and non-governmental agencies in the past. Our current estimates and local trends were based on tertiary hospital data where a developmental clinic or developmental evaluation resource unit is in place. A recent retrospective study of cases by Reyes and Herrin was gathered from the Division of Developmental and Behavioral Pediatrics of the Philippine General Hospital which was formerly called the Multidisciplinary Child and Adolescent Unit (MCAU) of the Department of Paediatrics and offered services at the Philippine General Hospital (PGH) Out-Patient Department from 1987 till the present time.

Over a 5 year period from 2005-2010, this study stated that yearly, there is on the average at least 1300 children and adolescents being referred for consultation at the Developmental Section. Studies of developmental disabilities in these children and adolescents have reported higher rates among males which was evident in all age groups across the five year period included in this study. The majority (78%) of the children seen were in their first decade of life and appeared to be a trend that was quite constant over the past five years despite the differences in the total number of yearly consults. The most common reason for referral was developmental delay. This indeed is a common problem in child health as observed in other countries and, as such, becomes a developmental condition most frequently evaluated at the developmental clinic.

This study concluded that the three most common developmental disabilities seen during this period in this tertiary hospital were: Global developmental Delay/Mental Retardation, Autism Spectrum Disorders and Cerebral Palsy.

A more recent local study by Diaz, Reyes and Tuazon showed that from 2008-2019, a total of 7,777 referrals were made to the Developmental Pediatrics (averaging 648 referrals per year) with an increasing trend. There were higher rates of referrals among males. Most of the
patients seen were from the 1-5-year-old age-group followed by the 6-9-year-old age-group. This is a consistent with the previous review done 2005-2010. However, there is an increasing number of early referrals (0-11 months old) being seen at the section in the latter part of the decade.

The top 3 reasons for consult include late development, comprising 29% of all the referrals. This is followed by speech delay (26%) and baseline assessment (16%) for those children with conditions that pose a risk for developmental delays like prematurity, genetic syndromes or metabolic conditions. For the total number of consults (new and old), Autism spectrum disorder (33.4%) has overtaken Global developmental delay (17.2%) and Intellectual disability (25.7%) as the top diagnosis followed by Cerebral palsy (7.2%) based on the latest data of 2019. This data is in contrast from those of the previous years and signifies the increase in the prevalence of children with Autism spectrum disorder.

II. SYSTEMS FOR DIAGNOSTIC CLASSIFICATION OF DEVELOPMENTAL AND BEHAVIORAL PROBLEMS

Diagnostic classification systems for developmental and behavioural problems in children are important in the clinical care, teaching, consultation and research in the field of developmental and behavioural paediatrics. The following are the types of diagnostic classification and their relevance to practice and research.

**DSM 5 (Diagnostic and Statistical Manual, 5th edition)** : This is recognized as the standard for diagnosing mental disorders, it is not developmentally based and provides a dichotomy and not a continuum of disorders

**ICD -10 (International Classification of Diseases 10th Edition)**

DSM-PC, Child and Adolescent Version (Diagnostic and Statistical Manual for Primary care) Although this manual emphasizes the full range of behavioural problems and provides a method for community health providers, considerable research is still needed.

III. UNDERSTANDING FREQUENTLY OCCURRING DEVELOPMENTAL DISABILITIES

A. GLOBAL DEVELOPMENTAL DELAY AND MENTAL RETARDATION

**Definition and Prevalence**

Global developmental delay (GDD) refers to a disturbance in an individual child across one or more domains and reflects difficulties in intelligence and cognition in the young child less than 5 years of age.
Mental retardation refers to a range of standardized IQ scores from 70 to 75 as the upper limit with significant limitations in adaptive abilities. As presently conceptualized, both global developmental delay and mental retardation represent predominantly clinically defined and recognized symptom complexes that are characterized by significant limitation both in intellectual functioning and in adaptive behaviour.

The estimated prevalence of all developmental delays is as high as 10%. The prevalence of GDD is assumed to be similar to that of mental retardation, and the reported prevalence of mental retardation is between 1% and 3% of the population. Serious mental retardation, defined here as an intelligence quotient (IQ) less than 50 and including moderate, severe, and profound mental retardation, has an estimated prevalence of 0.3% to 0.5%. The prevalence of serious mental retardation is similar across social classes and is much more likely to have an organic basis identified than is mild mental retardation.

**Terminology**

There are numerous negative connotations associated with the term mental retardation. There is no agreement on a more preferred term at either the international or national level. Other terms that have been proposed include intellectual disability/disabilities, developmental disabilities, mentally challenged, and cognitive adaptive disability or delay. In the United Kingdom, the term learning disability is used, whereas intellectual disability is preferred in Japan and is increasingly the label of choice among the international community including the United Kingdom and more recently in the United States.

**Diagnosis and Management**

A very high index of suspicion is necessary to consider the diagnosis of mental retardation in any child. Some helpful clues include delayed speech, dysmorphic features (minor anomalies), hypotonia generally or of the extremities, general inability to do things for self and, not least, expressed concern by the parents of “slowness” or a difference in development.

There is no single algorithm that is appropriate for the medical evaluation of any child with delays however it is important to be guided by specific steps. The first and most important one in the diagnosis of mental retardation is to obtain a comprehensive patient and family history which often needs a lot of painstaking work. The gynecologic and obstetric history may reveal infertility or fetal loss and environmental factors like maternal health status during pregnancy should include questions regarding use of tobacco, alcohol and drugs (prescribed and illicit); lifestyle or other risks for sexually transmitted diseases; weight gain or loss; signs of infection; serious illness or injury; and surgery or hospitalization.

To establish a knowledgeable baseline history of the child, the physician should obtain information regarding length of pregnancy, premature onset of labor or rupture of the membranes, duration and course of labor, type of delivery and any complications. Status of the child at birth like Apgar scores should be reviewed, and birth weight, length and head
circumference measurements obtained and plotted on appropriate growth charts. The parents should be asked about any illnesses, feeding or sleeping difficulties in the newborn period and problems with sucking or swallowing, as well as the baby's general disposition.

The systems review of the child should be complete, with special attention to growth problems, history of seizures, lethargy and episodic vomiting. An appropriate developmental screening tool that is culturally appropriate and validated in the population should be used at all well-child visits to obtain information about the timing of the child's developmental milestones, any concerns by parents or caregivers and comparison of the child's developmental rate and pattern with those of siblings. Specific questions about the child's current developmental abilities should be asked at each visit.

A complete physical examination can begin with a review of growth curves since birth, if these are available. The head circumference should continue to be plotted. The examination should be thorough, with special attention to physical findings that are compatible with any risk factors obtained from the history.

The child should be examined closely for dysmorphic features or minor abnormalities, such as unusual eyebrow pattern, eyes that are widely or closely spaced, low-set ears or abnormal palmar crease patterns. Minor abnormalities are defined as defects that have unusual morphologic features without serious medical implications or untoward cosmetic appearance. Most minor abnormalities involve the face, ears, hands or feet, and are readily recognized even on cursory examination. The presence of three or more minor abnormalities in newborns is correlated with a 90 percent frequency of coexistent major abnormalities, suggesting close association with morphogenesis in utero. Thus, minor abnormalities may provide clues to developmental problems of possible prenatal origin.

Evaluation of the head, face, eyes, ears and mouth must include general assessment of visual acuity and hearing. Examination of the chest, heart, spine, abdomen, genitalia, extremities, muscles and neurologic reflexes can reveal abnormalities that may be associated with retardation.

**Classification and Initial Management**

Mental Retardation refers to substantial limitations in present functioning. The still accepted convention is to view intelligence as a distribution with the level of concern beginning at 2 standard deviations below the median IQ score of 100. In applying results from one of the widely used psychological tests, the Wechsler Intelligence Scale (WISC) for children, groups are classified into: Mild disability (or retardation): IQ 50-70, Moderate disability: IQ 35-49, Severe disability IQ 20-34 and Profound disability IQ < 20

Management begins with genetic counselling (when a cause is known), parent education, and a prompt referral to an infant intervention program or, for older children, to the public education system. Children with mental retardation should be cared for in the context of a medical home.
and receive ongoing quality physical, behavioral, dental, and mental health surveillance and treatment. The primary care provider should also promote fitness and discourage inactivity and obesity. It is important to consider the well-being of all family members and help them identify and access appropriate community and public supports when necessary, with the realization that those needs change over time. Regardless of the degree of mental retardation, parents should be encouraged to promote independence to the maximum extent possible throughout all stages of their child’s development.

Diagnostic care process and planning

The following figure shows the algorithm for the medical evaluation of children with global developmental delay and intellectual disability as suggested by the AAP.

![Graph of Diagnostic care process and planning]

Figure 1. Diagnostic process and care planning. Metabolic Metabolic test 1: blood
homocysteine, acylcarnitine profile, amino acids; urine organic acids, glycosaminoglycans, oligosaccharides, purines, pyrimidines, GAA/creatine metabolites. Metabolic test 2 based on clinical signs and symptoms. Abbreviations: FH, family history; MH, medical history; NE, neurologic examination; PE, physical and dysmorphology examination.

KEY POINTS

Caring for the patient with developmental delay and intellectual disability / mental retardation in a Medical Home

Recognize delays early through developmental screening and surveillance

Hear and listen to parental concerns

Commence the medical evaluation in a stepwise, logical manner, with the assessment and provision of early intervention and educational services as mandated by the law

Coordinate the family's access to services and referral for specialty opinion and treatment

Perform a psychosocial assessment to understand both etiology and confounding factors

Discuss with parents the reasons for or against a particular diagnostic course of action

Monitor the child over time for the evolution of a clinical phenotype to aid the diagnostic workup and to screen for emerging associated problems (especially behavioral and psychiatric issues)

Advocate for the patient and family (e.g., locate services and financial aid, obtain insurance company approval for testing)

Offer ongoing emotional support and counselling to the family

B. AUTISM SPECTRUM DISORDERS

Definition and Prevalence

Autism Spectrum Disorders (ASD) is term that describes a complex developmental disability that profoundly interferes with normal communication, social interaction, or behavior, usually before the age of 2 or 3. Autism Spectrum Disorders (ASD) Prevalence estimates vary, but autism spectrum disorders (CDC March 2020) may affect as many as 1:54 children, making it the most common childhood disorder after mental retardation. In a recent publication by Maenner et.al 2016, the best estimate of prevalence was 18.5 per 1000 (one in 54) children
age 8 years and ASD was 4.3 times as prevalent in boys as among girls. Early detection and intervention are critical since education and treatment can alter the disabling trajectory of autism.

Diagnosis and Management

Clinical Features
Autism spectrum disorders are characterized and defined clinically by the core impairments, which are present in all or nearly all affected children but are relatively infrequent in those with other conditions. However, no single specific behavior or deficit is pathognomonic for ASDs. Although not part of the diagnostic criteria, other features such as cognitive and motor deficits, behaviours often attributed to sensory integration difficulties, maladaptive behaviours, and associated medical problems have a dramatic impact on adaptive functioning and are also important aspects of the clinical presentation.

Core Impairments
Autism spectrum disorders are characterized by distinctive impairments in reciprocal social interaction and communication that do not simply reflect associated intellectual disability, and by the presence of a restricted, repetitive behavioural repertoire. The clinical features vary with age, developmental level/intellectual ability, and severity of the condition. There is certainly overlap between social behavior and communication, and the difficulties that children with ASDs have with nonverbal communication, imitation, and imaginative play are sometimes considered to be examples of social deficits and sometimes communication deficits. In the DSM 5, there is now a single diagnosis of autism spectrum disorder that replaces the former different subdivisions. For a diagnosis to be made, the basis of difficulties include impairments in social communication and restricted, repetitive behaviors or interests.

Social Communication/Interaction
Qualitative impairment in social interaction (relative to developmental level or mental age) is a defining feature of ASDs. As infants and toddlers, these children may not smile responsively or adopt a posture conveying anticipation and readiness or desire to be picked up. Young children with ASDs lack developmentally appropriate joint attention, which is defined as visually coordinating attention with a partner to an external focus, showing social engagement and an awareness of the partner’s mutual interest for the purpose of “commenting” rather than “requesting”. Reciprocal social behaviors such as seeking to share enjoyment with others, feeling genuine concern and offering comfort to other people, and forming caring friendships that go beyond classroom or parent-arranged interactions are absent or limited, even in older children.

The severity of language impairment ranges from profound (eg, verbal auditory agnosia) to relatively mild (eg, semantic-pragmatic deficit syndrome), and the clinical features vary with age and developmental level. Communicative speech is typically delayed or absent in children with autistic disorder, and comprehension is impaired. Nonverbal communication is also
impaired, so there is little or no attempt to compensate by using gestures or pantomime. Although children with Asperger syndrome and some with autistic disorder or PDDNOS may not be delayed in attaining early vocabulary, grammar, and articulation milestones, other aspects of language, such as pragmatics (social, context-bound, functional language use), semantics (word and sentence meaning), and prosody (volume, rhythm, intonation), are impaired. Word choice is often atypical, and these individuals have difficulty interpreting nonliteral communication such as figures of speech, humor, and irony. Children with ASDs have difficulty with imitation of other people’s actions, and there is a paucity of spontaneous (generative) symbolic play behavior relative to children with similar mental ages. Symbolic play development is correlated with language and non-language cognitive ability, but the deficit in play behavior typically exceeds what would be predicted based on these abilities. Qualitatively, the play of children with ASDs tends to be repetitive, stereotyped, and excessively focused on sensorimotor manipulation of objects rather than varied, flexible, imaginative, and creative.

**Restricted, Repetitive Behavioral Repertoire**

The behavioral repertoire in children with ASDs tends to be characterized by perseveration on narrow or atypical interests, behavioral rigidity (obsessive insistence on sameness, resistance to change, adherence to nonfunctional rituals or routines), and stereotyped movements. These behaviors tend to be less frequent and less severe in older individuals than among younger individuals. Stereotyped movements are more persistent in adolescents and adults with ASDs who also have intellectual disability. However, even in highly functioning individuals, unusual preoccupations and circumscribed interests often interfere with social interaction. The DSM 5 criteria now includes the presence of hyper or hypo reactivity to sensory input or unusual interest in sensory aspects of the environment. An ASD diagnosis includes a severity ranking-level 1, 2 or 3. The ranking is used to show how much support children need.

It is important to recognize that repetitive behaviors, including stereotyped movements and behaviors related to desire for sameness, occur in normal development and are common in individuals with other developmental disabilities or psychiatric conditions. Richler and colleagues found that repetitive sensorimotor behaviors were more common in 2-year-old children with ASDs than in typically developing controls and children with other developmental disorders, although these behaviors were relatively common in the latter group. Repetitive behaviors related to insistence on sameness were less common, and did not consistently differentiate among the 3 groups. Notably, some behaviors, such as self-injury, sensitivity to noise, and resistance to trivial changes in the environment, did not differ in prevalence or severity across the 3 groups of 2-year-olds.

**Red Flag Signs from 1 to 3 years of age include the following:**

**Social symptoms**

- Abnormal eye contact
- Limited social referencing
- Limited interest in other children
- Limited functional play
No pretend play
Limited motor imitation
Limited range of facial expressions
Limited social smile
Content to be left alone

Communication symptoms
Poor response to name (does not respond when called)
Failure to share interest (through pointing, sharing, giving and showing)
Failure to respond to communicative gestures (pointing, giving, showing)
Use of other body’s hand as a tool
Hand and finger mannerisms
Unusual sensory behaviours
Inappropriate use of objects

KEY POINTS
Caring for the Child with Autism Spectrum Disorders in a Medical Home

Recognize delays early through developmental screening and surveillance using the proper methods in the identification of children with autism. The recent algorithm from the American Academy of Pediatrics on Early Identification of Children with Autism is a very good guideline to use and includes the appropriate autism specific screening instruments like the MCHAT.

Commence the medical evaluation in a stepwise, logical manner, with the assessment and provision of effective early intervention programs since many families and service providers are faced with the difficult task of sorting through a wealth of information and research about programming approaches to work with children with ASDs.

Coordinate the family's access to organization and delivery of care which includes a referral for specialty opinion and treatment by working a a family centered perspective.

Discuss with parents the reasons for or against a particular diagnostic or therapeutic course of action
Monitor the child over time in order to screen for emerging associated problems (especially neurologic, behavioral and other psychiatric issues)

Advocate for the patient and family (e.g., locate services and financial aid, obtain insurance options if any)

Offer ongoing emotional support and counselling to the family
C. CEREBRAL PALSY

Definition and Prevalence

Cerebral palsy (CP) is the most common cause of childhood disability in Western countries with an incidence of 2 to 2.5 per 1000 live births. The term cerebral palsy (CP) is used to describe children with a cluster of clinical signs including abnormal muscle tone and movement, and associated loss of function presumed to be due to a non-progressive lesion or abnormality of the brain. While a variety of antenatal and perinatal risk factors have been identified for CP, in many individual cases the precise aetiology may be difficult if not impossible to establish.

Classification is based on the change in muscle tone, anatomic region of involvement and severity of the problem. Approximately 70 to 80% of children with CP are spastic. (18) The diagnosis of CP can be challenging, and may need to be confirmed by an experienced practitioner, ideally a developmental pediatrician, child neurologist or psychiatrist. It is important not to make the diagnosis too early in infancy, especially when the signs are not severe, as resolution of early neuromotor abnormalities does occur, particularly in premature infants. Exclusion of genetic/metabolic disorders presenting with CP-like findings is important.

Diagnosis and Management

There are three main types of cerebral palsy:

- **Spastic** CP is the most common form of CP. In this form there is too much muscle tone or tightness. Movements are stiff, especially in the legs, arms, and back.
- **Athytoid** CP affects movements of the entire body. This form involves slow, uncontrolled body movements especially when sitting, walking, and using hands. The individual usually has low muscle tone.
- **Ataxic** CP affects how coordinated a child moves. Children with ataxia are unsteady and tend to lose their balance easily.

Cerebral palsy is also described by how many body parts are affected:

- **Diplegia** primarily involves the legs. Children with diplegia may need to use a walker, especially when they are beginning to walk, and orthotics (braces) on their legs.
- **Hemiplegia** means that half of the body is affected.
- **Quadruplegia** is the most severe form and involves all extremities, sometimes including facial muscles. Often children with quadriplegia use a wheelchair.

Red Flag Signs

Poor head control beyond 4 months of age
Hands do not cross or each out to the midline after three months old
Persistent fisting of the hand or hands beyond 6 months of age
A definite hand dominance is present before 18 months of age
With early and on-going treatment the effects of cerebral palsy can be reduced. Children with CP will learn to compensate for the difficulty in moving their bodies. Although children with CP receive treatment from a variety of professionals, their primary interventionists are physical therapists and occupational therapists. Children with CP often need support in school and may receive services from a special educator or resource room teacher. Often, they benefit from assistive technology and adapted equipment.

**KEY POINTS**

Caring for the Child with Cerebral Palsy in a Medical Home

Recognize delays early through developmental screening and by being aware of the risk factors associated with cerebral palsy and by incorporating neuromotor screening tests into routine developmental surveillance as well as sensory screening in the care plan for all newly diagnosed children.

Commence the medical evaluation in a stepwise, logical manner, with the assessment and provision of a prompt referral for early intervention services for all children with alterations in motor development without waiting for diagnostic confirmation of cerebral palsy. After a definitive diagnosis of cerebral palsy is made, begin co-management with a multidisciplinary neuromotor team and schedule regular chronic condition management visits in addition to a regular preventive care.

Coordinate the family's access to organization and delivery of care which includes a referral for specialty opinion like a geneticist or pediatric neurologist in the presence of dysmorphic features, positive family history or any atypical clinical characteristics.

Discuss and partner with parents in the pursuit of a diagnosis and the implications of the condition in their family life.

Monitor the child over time and manage spasticity using a “ladder approach” starting with the least invasive interventions and adding treatments as needed. Maintain vigilance for emerging associated co morbidities like seizures, cognitive, nutritional problems or other psychiatric issues for older adolescents.

Advocate for the patient and family (e.g., appropriate educational and therapeutic strategies including physical, occupational and speech therapy, nursing, adaptive and assistive devices. Offer ongoing emotional support and counselling to the family and be a sensitive and useful resource for families in their exploration of complementary and alternative interventions. Begin planning for transition to adulthood with the child and family as early as possible but no later than 12 years of age.
D. ATTENTION DEFICIT/HYPERACTIVITY DISORDER (ADHD)

Definition and Prevalence

The DSM 5 is the medical classification system for Attention Deficit Hyperactivity Disorder (ADHD) which is the most common neurobehavioral disorder of childhood. According to a previous national parent survey, 7.2% of school-aged children in the US (4.1 M) had a current ADHD diagnosis in 2007 and rates have increased throughout the past decade. Boys are more frequently identified as displaying ADHD than girls. The search for the etiology of ADHD has been guided in part by the observation that all medications that improve ADHD symptoms affect the dopamine (DA) and/or nor epinephrine systems. Genetics likewise plays a role as it has now long been appreciated that ADHD is familial and highly heritable. Heritability is estimated at 65-90% but does not follow classic Mendelian inheritance. ADHD is either caused by genes that are yet to be identified or by many genes that play a small part individually. Non genetic factors like toxins such as Fetal alcohol exposure, maternal cigarette smoking, elevated lead levels, and other stresses that may result in an altered neurochemical milieu that affects the efficiency of gene or brain function.

Diagnosis and Management

ADHD is the most extensively researched childhood psychiatric/developmental disorder but controversy surrounds the appropriate diagnosis of this condition due to the increasing and variable prevalence and lack of an objective diagnostic test. The national survey data from 2016 indicate that 9.4% of children in the US 2 to 17 years have ever had an ADHD diagnosis. Boys are more than twice as likely as girls to receive a diagnosis of ADHD. Learning and language problems are common comorbid conditions with ADHD.

Diagnostic practices vary widely between settings, practitioners and professional disciplines. The American Academy of Paediatrics (AAP) 2019 published new clinical practice guidelines (CPG) for ADHD in school age children. This currently updated the 2011 CPG and addressed the evaluation, diagnosis and treatment from 4 to 18 years of age. They recommend that the primary care clinician should 1) initiate an evaluation in a child who presents with ADHD symptoms or characteristics, academic underachievement or behaviour problems 2) obtain evidence from the classroom teacher and school personnel 3) utilize the DSM 5 criteria. However, care beyond 18 years of age was not studied for this guideline. This guideline is now accompanied by supplemental information like a process of care algorithm and an article on systemic barriers to the care of children and adolescents with ADHD.

Characteristics of ADHD include a short attention span, (especially for activities that require sustained attention and concentration); impulsivity, distractibility, over activity, a low frustration tolerance, and disorganization. Children with attention problems who are hyperactive are often identified in the preschool years, but children who are primarily inattentive may not be identified until they begin school when sustained attention to school
work is expected. Children may have difficulty following classroom rules and teacher instructions or completing assignments. Often they will be disorganized and tend to misplace or lose things. Adolescents may also have difficulty with managing time, completing long-term assignments, and planning. Some children will have difficulty in social situations because they are not able read subtle social cues. As a result maintaining friends maybe difficult. ADHD frequently occurs with other disabilities, such as learning disabilities, emotional disorders, such as depression, and behavior problems (conduct disorder, oppositional behaviour).

The DSM5 criteria define 4 dimensions of ADHD in children. These are:

ADHD, primarily of the inattentive presentation
ADHD, primarily of the hyperactive-impulsive presentation
ADHD, primarily of the combined presentation
ADHD other specified and unspecified ADHD

Toddlers with the hyperactive/impulsive type may be constantly physically active, running in circles, and climbing on furniture, whereas adolescents with this type may engage in risky behaviors and sports. Preschoolers with the inattentive type may have difficulty attending to the reading of a picture book, whereas adolescents may have difficulty finishing homework and performing required tasks. It is important to consider developmental age when deciding whether the level of inattentiveness and/or hyperactivity is abnormal. A child with the cognitive level of a 5 year old, although he may be twice that age, usually has the activity level and attention span of a 5 year old.

Diagnostic Criteria

DSM 5 Criteria for ADHD

1. Inattention: Six or more symptoms of inattention for children up to age 16 years or 5 or more for adolescents 17 years ad older and adults; symptoms of inattention present for at least 6 months to a point that is disruptive and inappropriate for developmental level:

Often does not give close attention to details or makes careless mistakes in schoolwork, work, or other activities
Often has trouble holding attention on tasks or play activities
Often does not seem to listen when spoken to directly
Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (loses focus, sidetracked)
Often has trouble organizing activities
Often avoids, dislikes, or doesn't want to do things that take a lot of mental effort for a long period of time (such as schoolwork or homework)
Often loses things needed for tasks and activities (e.g. toys, school materials, pencils, books, or tools, wallets, keys, paperwork, eyeglasses, mobile phones)
Is often easily distracted
Is often forgetful in daily activities

2. **Hyperactivity-impulsivity**: Six or more symptoms of hyperactivity-impulsivity for children up to 16 years, five or more for adolescents age 17 years or older and adults; symptoms have been present for at least 6 months to an extent that is disruptive and inappropriate for developmental level:

- Often fidgets with hands or feet or squirms in seat
- Often gets up from seat when remaining in seat is expected
- Often runs about or climbs when and where it is not appropriate (adolescents or adults may feel very restless)
- Often has trouble playing or enjoying leisure activities quietly
- Is often "on the go" or often acts as if "driven by a motor"
- Often talks excessively
- Often blurts out answers before questions have been finished
- Often has trouble waiting one's turn
- Often interrupts or intrudes on others (e.g., butts into conversations or games)

I. Some symptoms that cause impairment were present before age 12 years.

II. Some impairment from the symptoms is present in two or more settings (e.g. at school/work and at home).

III. There must be clear evidence of significant impairment in social, school, or work functioning.

IV. Symptoms are not better explained by another mental disorder e.g. Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

*Based on these criteria, three kinds (presentations) of ADHD are identified:*

Combined presentation: if enough symptoms of both criteria 1 and 2 are met for the past 6 months
Predominantly Inattentive presentation: if enough symptoms of criterion 1 is met but not criterion 2 for the past six months
Predominantly Hyperactive-Impulsive Type Presentation: if enough symptoms of Criterion 2 is met but not Criterion 1 were present for the past six months

Usually two major presentations of ADHD are present in school-age children. The first is the combined presentation that involves attention deficit and hyperactivity. The second is the non-hyperactive, or inattentive subtypes. In preschool children there are those who have symptoms of excessive restlessness and impulsivity that interfere with function; some of these children are inattentive but others are not. Unlike school-age children, preschool children with
significant inattention in the absence of hyperactivity and inattention is not generally seen. The younger the child, the greater the caution.

As a first-line intervention, it is best to refer the parents of the child exhibiting symptoms of hyperactivity for counselling in behaviour management. This is a strategy that does not require a definitive diagnosis of ADHD immediately, yet guides the family to appropriate intervention as a first effective step. When evidence-based behavioural approaches prove ineffective, pharmacologic treatment should then be considered in children ages 4 years and up, he said. This second line of treatment — pharmacologic agents — should generally be reserved for those children with ADHD who experience moderate to severe symptoms for nine months or more and who have not benefitted or responded adequately to behavioural therapy.

New practice guidelines released by the AAP in 2019 support this approach and now give a specific recommendation to the treatment of preschool children. A number of special circumstances support the recommendation to initiate ADHD treatment in preschool-aged children (ages 4–5 years) with behavioural therapy alone first. These circumstances indicate that many children (ages 4–5 years) experience improvements in symptoms with behaviour therapy alone, and the overall evidence for behaviour therapy in preschool-aged children is strong. Behavioural programs for children 4 to 5 years of age typically run in the form of group parent-training programs. In addition, programs such as Head Start and Children and Adults With Attention Deficit Hyperactivity Disorder (CHADD) or the website www.chadd.org might provide some behavioural supports.

Managing ADHD requires the collaborative efforts of teachers, physicians, and family members. In addition to taking carefully monitored medication, most children with ADHD respond positively when instructions are clear and simple. They often need written instructions and reminders of what is expected. Breaking tasks into smaller pieces is also helpful. Behaviour management techniques that are used consistently by all adults help prevent disruptive behaviour.

Classroom accommodations such as limited homework assignments, alternative or untimed tests can also be beneficial. Some children may benefit from on-going counselling to help them understand and control their frustration, and to improve their social skills. Counselling also provides emotional support.

KEY POINTS
Caring for the Child with Attention Deficit Hyperactivity Disorder in a Medical Home

Recognize the need to evaluate a child after regular developmental screening and surveillance who have inattention, hyperactivity, impulsivity, low school achievement for the child’s IQ, and/or behavior problems.
Commence the medical evaluation in a stepwise, logical manner, with the assessment and provision of early intervention and appropriate placement in educational programs as mandated by the law.

Coordinate the family's access to services and referral for specialty opinion and treatment.

Perform a psychosocial assessment to understand both multiple etiologies and confounding factors.

Discuss with parents the reasons for or against a particular diagnostic course of action.

Monitor the child over time to screen for emerging associated problems like depression, anxiety, oppositional and defiant disorders, learning and language disorders, and tics and sleeping disorders that might underlie or accompany the symptoms of ADHD.

Advocate for the patient and family regarding the best options to use (behavioural, pharmacological or both).

Offer ongoing emotional support and counselling to the family.
### IV. DEVELOPMENTAL MILESTONES

For a quick review on developmental milestones, the following tables are adapted from the American Academy of Pediatrics.

<table>
<thead>
<tr>
<th>AGE</th>
<th>GROSS MOTOR</th>
<th>FINE MOTOR</th>
<th>SELF-HELP</th>
<th>PROBLEM-SOLVING</th>
<th>SOCIAL/EMOTIONAL</th>
<th>RECEPTIVE LANGUAGE</th>
<th>EXPRESSIVE LANGUAGE</th>
</tr>
</thead>
</table>
| 1 month | - Chin up in prone position  
- Turns head in supine position                                                    | - Hands fist in near face                                                | - Sucks well                                                                | - Gazes at black-and-white objects  
- Follows face                                                                 | - Discriminates mother’s voice  
- Cries out of distress                                                      | - Startles to voice/sound                                                   | - Throaty noises                                                                 |
| 2 months| - Chest up in prone position  
- Holds body when held in sitting position                                       | - Hands unfist 50% of the time                                            | - Opens mouth at sight of breast or bottle                                 | - Visual threat present  
- Follows large, highly contrast ing objects  
- Recognizes mother                                                             | - Reciprocal smiling  
- Responds to adult voice and smile                                            | - Alerts to voice/sound                                                     | - Coos  
- Social smile (6 weeks)  
- Vowel-like noises                                                              |
| 3 months| - Prop on forearms in prone position  
- Rolls to side                                                                   | - Hands unfist 50% of the time                                            | - Brings hands to mouth                                                    | - Reaches for face  
- Follows objects in circle (in supine position)  
- Regards toys                                                                 | - Expression of disgust (sour  
- taste, loud sound)  
- Visually follows person who is moving across a room                          | - Regards speaker                                                           | - Chuckles  
- Vocalizes when talked to                                                   |
| 4 months| - Sits with trunk support  
- No head lag when pulled to sit  
- Prop on wrists  
- Rolls front to back                                                           | - Hands held predominately open                                           | - Briefly holds breast or bottle                                           | - Mouths objects  
- Stares longer at novel faces than familiar  
- Shakes rattle  
- Reaches for ring/rattle                                                        | - Smiles spontaneously at pleasurable sight/sound                            | - Orient head in direction of a voice                                          | - Laughs out loud  
- Vocalizes when alone                                                         |
| 5 months| - Sits with pelvic support  
- Rolls back to front  
- Puts arms out front when falling  
- Sits with arms supporting trunk                                                 | - Palmar grasps cube  
- Transfers objects: hand-mouth-hand  
- Reaches/grasps dangling ring                                                 | - Gums/mouths pure food                                                    | - Turns head to look for dropped spoon  
- Regards pellet or small cracker                                               | - Recognizes caregiver visually  
- Forms attachment relationship to caregiver                                    | - Begins to respond to name                                                   | - Says “Ah-goo”  
- Razes, squeals  
- Expresses anger with sounds other than crying                                  |
| 6 months| - Sits momentarily propped on hands  
- Pivots in prone  
- In prone position, bears weight on one hand                                    | - Transfers hand-hand  
- Takes pellet  
- Takes second cube and holds on to first  
- Reaches with one hand                                                        | - Feeds self crackers  
- Places hands on bottle                                                        | - Touches reflecion and vocalizes  
- Removes cloth on face  
- Bangs and shakes toys                                                          | - Stranger anxiety (familiar versus unfamiliar people)                       | - Stops momentarily to “no”  
- Gestures for “up”                                                              | - Replicaudate balance with consonants  
- Listens, then vocalizes when adult stops  
- Smiles/vocalizes to mirror                                                   |
| 7 months| - Bounces when held  
- Sits without support steadily  
- Lateral protection  
- Puts arms out to sides for balance                                            | - Radial-palmar grasp                                                     | - Refuses excess food                                                       | - Explores different aspects of toy  
- Observes cube in each hand  
- Finds partially hidden object                                                 | - Looks from object to parent and back when wanting help (eg, with wind-up toy) | - Looks toward familiar object when named                                       | - Increasing variety of syllables                                                  |
| 8 months| - Gets into sitting position  
- Commando crawls  
- Pulls to sitting/kneeling position                                              | - Bangs spoon after demonstration  
- Scissor grasp of cube  
- Takes cube out of cup  
- Pulls out large peg                                                           | - Holds bottle  
- Finger feeds Cheerio® or string beans                                          | - Seeks object after it falls silently to the floor                           | - Responds to “Come here”  
- Looks for family members, “Where’s mama? ... etc.”                          | - Approaches                                                                 | - Says “Dada” (nonspecific)  
- echolalia (8 to 30 months)  
- Shakes head for “no”                                                           |
<table>
<thead>
<tr>
<th>AGE</th>
<th>GROSS MOTOR</th>
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<th>EXPRESSIVE LANGUAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 months</td>
<td>&quot;Standson feet and hands&quot;</td>
<td>Radial-digital grasp of cube</td>
<td>Bites, chews cookie</td>
<td>Inspects bell rings bell</td>
<td>Uses sounds to get attention</td>
<td>Enjoysgesture games</td>
<td>Says &quot;Mama&quot; (nonspecific)</td>
</tr>
<tr>
<td></td>
<td>&quot;Begins creeping&quot;</td>
<td>Bangs two cubes together</td>
<td></td>
<td>Pulses string to obtain ring</td>
<td>Separation anxiety</td>
<td>Orientsto name well</td>
<td>Nonrepetitive babble</td>
</tr>
<tr>
<td></td>
<td>&quot;Pulls to stand&quot;</td>
<td></td>
<td></td>
<td></td>
<td>Follows apoint, &quot;Oh look at...&quot;</td>
<td></td>
<td>Imitates sounds</td>
</tr>
<tr>
<td></td>
<td>&quot;Bear walks (all four limbs straight)&quot;</td>
<td></td>
<td></td>
<td></td>
<td>Recognizes familiar people visually</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Creeps well</td>
<td>Clumsy release of cube</td>
<td>Drinks from cup held for child</td>
<td>Uncovers toy under cloth</td>
<td>Experiences fear</td>
<td>Enjoys peek-a-boo</td>
<td>Says &quot;Dada&quot; (specific)</td>
</tr>
<tr>
<td>10 months</td>
<td>Cruises around furniture using two hands</td>
<td>Inferior pincer grasp of pellet</td>
<td>Pokes at pellet in bottle</td>
<td>Pokes at pellet in cup</td>
<td>Looks preferentially when name is called</td>
<td>Waves &quot;bye-bye&quot; back</td>
<td>Waves &quot;bye-bye&quot;</td>
</tr>
<tr>
<td></td>
<td>Stands with one hand held</td>
<td>Isolates index finger and pokes</td>
<td></td>
<td>Tries to put cube in cup, but may not be able to let go</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Walks with two hands held</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Pivots in sitting position</td>
<td>Throws objects</td>
<td>Cooperates with dressing</td>
<td>Finds toy under cup</td>
<td>Gives objects to adult for action after demonstration</td>
<td>Stops activity when told &quot;no&quot;</td>
<td>Says first word</td>
</tr>
<tr>
<td>11 months</td>
<td>Cruises furniture using one hand</td>
<td>Stirs with spoon</td>
<td></td>
<td>Looks at pictures in book</td>
<td>(lets adult know she or she needs help)</td>
<td>Bounces to music</td>
<td>Vocalizes to songs</td>
</tr>
<tr>
<td></td>
<td>Stands for a few seconds</td>
<td></td>
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<tr>
<td></td>
<td>Walks with one hand held</td>
<td></td>
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<tr>
<td></td>
<td>Stands well with arms high, legs spread</td>
<td>Scribbles after demonstration</td>
<td>Finger feeds part of meal</td>
<td>Rattles spoon in cup</td>
<td>Shows objects to parent to share interest</td>
<td>Follows one-step command with gesture</td>
<td>Points to get desired object (proto-imperative pointing)</td>
</tr>
<tr>
<td>12 months</td>
<td>Posterior protection</td>
<td>Fine pincer grasp of pellet</td>
<td>Takes off hat</td>
<td>Lifts box lid to find toy</td>
<td>Points to get desired object (proto-imperative pointing)</td>
<td>Recognizes names of two objects and looks when named</td>
<td>Uses several gestures with vocalizing (eg, waving, reaching)</td>
</tr>
<tr>
<td></td>
<td>Independent steps</td>
<td>Holds crayon</td>
<td>Attempts tower of two cubes</td>
<td></td>
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<tr>
<td></td>
<td>Walks with arms high and out (high guard)</td>
<td>Attempts to release pellet in bottle</td>
<td>Drinks from cup with some spilling</td>
<td>Dangles ring by string</td>
<td>Shows desire to please caregiver</td>
<td>Makes appropriately when asked, &quot;Where's the ball?&quot;</td>
<td>Uses three words</td>
</tr>
<tr>
<td>13 months</td>
<td></td>
<td></td>
<td></td>
<td>Reaches around clear barrier to obtain object</td>
<td>Solitary play</td>
<td></td>
<td>Immature jargoning: inflection without real words</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unwraps toy in cloth</td>
<td>Functional play</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stands without pulling up</td>
<td>Imitates back and forth scribble</td>
<td>Removes socks/shoes</td>
<td>Points at object to express interest (proto-declarative pointing)</td>
<td>Points at object to express interest (proto-declarative pointing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 months</td>
<td>Falls by collapse</td>
<td>Adds third cube to a two-cube tower</td>
<td>Chews well</td>
<td>Purposive exploration of toys through trial and error</td>
<td>Purposeful exploration of toys through trial and error</td>
<td></td>
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<tr>
<td></td>
<td>Walks well</td>
<td>Puts round peg in and out of hole</td>
<td>Puts spoon in mouth (turns over)</td>
<td></td>
<td></td>
<td></td>
<td>Names one object</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Points at object to express interest (proto-declarative pointing)</td>
</tr>
<tr>
<td></td>
<td>Stoops to pick up toy</td>
<td>Builds three-to four-cube tower</td>
<td>Removes socks/</td>
<td>Points at object to express interest (proto-declarative pointing)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>15 months</td>
<td>Creeps up stairs</td>
<td>Places 10 cubes in cup</td>
<td>shoes</td>
<td>Purposeful exploration of toys through trial and error</td>
<td></td>
<td></td>
<td>Mature jargoning with real words</td>
</tr>
<tr>
<td></td>
<td>Runs stiff-legged</td>
<td>Releases pellet into bottle</td>
<td>Chews well</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Walks carrying toy</td>
<td></td>
<td>Puts spoon in mouth</td>
<td></td>
<td></td>
<td></td>
<td>Points to one body part</td>
</tr>
<tr>
<td></td>
<td>Climbs on furniture</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>Points to one object of three when named</td>
</tr>
<tr>
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<td></td>
<td>Gets object from another room upon demand</td>
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<td></td>
<td></td>
<td>Uses three to five words</td>
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<td></td>
<td></td>
<td>Mature jargoning with real words</td>
</tr>
<tr>
<td>AGE</td>
<td>GROSS MOTOR</td>
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<td>EXPRESSIVE LANGUAGE</td>
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<tr>
<td></td>
<td>Stands on one foot with slight</td>
<td>Puts several round pegs in board</td>
<td>Picks up and drinks from cup</td>
<td>Dumps pail out without demonstration</td>
<td>Kisses by touching lips to skin</td>
<td>Understands simple commands, “Bring to</td>
<td>Uses 5 to 10 words</td>
</tr>
<tr>
<td></td>
<td>support</td>
<td>with urging</td>
<td>scribbles spontaneously</td>
<td></td>
<td>Periodically visually relates</td>
<td>mommy”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Walks backwards</td>
<td>Fetches and carries objects</td>
<td>(same room)</td>
<td></td>
<td>caregiver</td>
<td>Points to one picture when named</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Walks up stairs with one hand held</td>
<td></td>
<td></td>
<td></td>
<td>Self-conscious; embarrassed</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>when aware of people observing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 months</td>
<td>Creeps down stairs</td>
<td>Makes four-cube tower</td>
<td>Removes garment</td>
<td>Matches pairs of objects</td>
<td>Passes M-CHAT</td>
<td>Points to two of three objects when named</td>
<td>Uses 10 to 25 words</td>
</tr>
<tr>
<td></td>
<td>Runs well</td>
<td>Crudely imitates vertical stroke</td>
<td>Gets onto adult chair unaided</td>
<td>Replaces circle in form board after</td>
<td>Engages in pretend play with</td>
<td>Points to three body parts</td>
<td>Uses giant words (all gone, stop that)</td>
</tr>
<tr>
<td></td>
<td>Seats self in small chair</td>
<td></td>
<td>Moves about house without adult</td>
<td>it has been turned around</td>
<td>other people (e.g. tea party, birthday</td>
<td>Points to self</td>
<td>Imitates environmental sounds (e.g. animals)</td>
</tr>
<tr>
<td></td>
<td>Throws ball while standing</td>
<td></td>
<td></td>
<td>(usually with trial and error)</td>
<td>party)</td>
<td>Understands “mine”</td>
<td>Names one picture on demand</td>
</tr>
<tr>
<td></td>
<td>Squats in play</td>
<td>Completes round peg board without</td>
<td>Places only edible in mouth</td>
<td>Deduces location of hidden</td>
<td>Begins to have thoughts about feelings</td>
<td>Points to three pictures</td>
<td></td>
</tr>
<tr>
<td>18 months</td>
<td>Carries large object</td>
<td>without urging</td>
<td>Feeds self with spoon entire meal</td>
<td>object</td>
<td>Engages in tea party with stuffed</td>
<td>Begins to understand her/him/me</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Walks downstairs with one hand held</td>
<td>Makes five-to-six-cube tower</td>
<td></td>
<td>Places square in form board</td>
<td>animals</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Completes square peg board</td>
<td></td>
<td></td>
<td>Kisses with pucker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 months</td>
<td>Walks up stairs holding rail, putting both feet on each step</td>
<td>Closes box with lid</td>
<td>Uses spoon well</td>
<td>Completes form board</td>
<td>Watches other children intensively</td>
<td>Points to two to five pictures when named</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kicks ball with demonstration</td>
<td>Imitates vertical line</td>
<td>Drinks from cup well</td>
<td></td>
<td>Begins to show defiant behavior</td>
<td>Points to five to six body parts</td>
<td>Uses 25 to 50 words</td>
</tr>
<tr>
<td></td>
<td>Walks with one foot on walking board</td>
<td>Imitates circular scribble</td>
<td>Uncaps zippers</td>
<td></td>
<td></td>
<td>Points to four pieces of clothing named</td>
<td>Adds for more</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Puts shoes on partway</td>
<td></td>
<td></td>
<td></td>
<td>Adds one to two words/week</td>
</tr>
<tr>
<td>22 months</td>
<td>Walks down stairs holding rail, both feet on each step</td>
<td>Makes a single-line “train” of cubes</td>
<td>Opens door using knob</td>
<td>Sorts objects</td>
<td>Parallel play</td>
<td>Follows two-step command</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kicks ball without</td>
<td>Imitates circle</td>
<td>Sucks through a straw</td>
<td>_matches objects to pictures</td>
<td>Begins to mask emotions for social</td>
<td>Understands me/you</td>
<td></td>
</tr>
<tr>
<td></td>
<td>demonstration</td>
<td>Imitates horizontal line</td>
<td>Takes off clothes without buttons</td>
<td>Shows use of familiar objects</td>
<td>etiquette</td>
<td>Points to 5 to 10 pictures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Throws overhand</td>
<td></td>
<td>Pulls pants</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 months</td>
<td>Jumps from bottom step with one foot leading</td>
<td>Strings large beads awkwardly</td>
<td>Holds self and verbalizes toilet</td>
<td>Matches shapes</td>
<td>Reduction in separation anxiety</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Walks on toes after</td>
<td>Unscrews jar lid</td>
<td>needs</td>
<td>Matches colors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>demonstration</td>
<td>Turns paper pages (often several at once)</td>
<td>Pulls pants up with assistance</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Walks backward 10 steps</td>
<td></td>
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<td></td>
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<tr>
<td>28 months</td>
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<tr>
<td>AGE</td>
<td>GROSS MOTOR</td>
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<td>SELF-HELP</td>
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<tr>
<td>30 months</td>
<td>Walks up stairs with rail, alternating feet</td>
<td>Makes eight-cube tower</td>
<td>Washes hands</td>
<td>Replaces circle in form board after it has been turned around (little or no trial and error)</td>
<td>Imitates adult activities (eg, sweeping, talking on phone)</td>
<td>Follows two prepositions: “put block in…on box”</td>
<td>Echolalia and jargoning gone</td>
</tr>
<tr>
<td></td>
<td>Jumps in place</td>
<td>Makes a “train” of cubes and includes a stack</td>
<td>Puts things away</td>
<td></td>
<td></td>
<td>Names objects by use</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stands with both feet on balance beam</td>
<td>Brushes teeth with assistance</td>
<td>Points to small details in pictures</td>
<td></td>
<td></td>
<td>Refers to self with correct pronoun</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Walks with one foot on balance beam</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Recites parts of well-known story/fill in words</td>
<td></td>
</tr>
<tr>
<td>33 months</td>
<td>Walks swinging arms opposite of legs (synchronous gait)</td>
<td>Makes 9- to 10-cube tower</td>
<td>Toilet trained</td>
<td>Points to self in photos</td>
<td>Begins to take turns</td>
<td>Gives first and last name</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Puts six square pegs in pegboard</td>
<td>Puts on coat unassisted</td>
<td>Points to body parts based on function (“What do you hear with?”)</td>
<td>Tries to help with household tasks</td>
<td>Counts to 3</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Imitates cross</td>
<td></td>
<td></td>
<td></td>
<td>Begins to use past tense</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Enjoys being read to (short books)</td>
<td></td>
</tr>
<tr>
<td>3 years</td>
<td>Balances on one foot for 3 seconds</td>
<td>Copies circle</td>
<td>Independent eating</td>
<td>Draws a two- to three-part person</td>
<td>Starts to share with/without prompt</td>
<td>Uses 200+ words</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Goes up stairs, alternating feet, no rail</td>
<td>Cuts with scissors: side-to-side (awkwardly)</td>
<td>Pours liquid from one container to another</td>
<td>Understands long/short, big/small, more/less</td>
<td>Fears imaginary things</td>
<td>Three-word sentences</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pedals tricycle</td>
<td>Strings small beads well</td>
<td>Puts on shoes without laces</td>
<td>Knows own gender</td>
<td>Imaginative play</td>
<td>Uses pronouns correctly</td>
<td></td>
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<tr>
<td></td>
<td>Walks heel to toe</td>
<td>Imitates bridge of cubes</td>
<td>Unbuttons</td>
<td>Knows own age</td>
<td>Uses words to describe what someone else is thinking (“Mom thought I was asleep”)</td>
<td>75% intelligibility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Catches ball with stiff arms</td>
<td></td>
<td>Matches letters/numerals</td>
<td></td>
<td></td>
<td>Uses plurals</td>
<td></td>
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<td></td>
<td></td>
<td>Names body parts by use</td>
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<td></td>
<td></td>
<td></td>
<td>Asks to be read to</td>
<td></td>
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<tr>
<td>4 years</td>
<td>Balances on one foot 4 to 8 seconds</td>
<td>Copies square</td>
<td>Goes to toilet alone</td>
<td>Draws a four- to six-part person</td>
<td>Deception: interested in “tricking” others and concerned about being tricked by others</td>
<td>Uses 300 to 1,000 words</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hops on one foot two to three times</td>
<td>Cuts 5-inch circle</td>
<td>Wipes after bowel movement</td>
<td>Can give amounts usually less than 5</td>
<td>Correlates analogies: “dad/boy: mother/???/ice/cold: fire/???”</td>
<td>Tells stories</td>
<td></td>
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<tr>
<td></td>
<td>Standing broad jump 1 to 2 feet</td>
<td>Uses tongs to transfer</td>
<td>Washes face/hands</td>
<td>Ceiling/up, floor/???</td>
<td></td>
<td>100% intelligibility</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gallops</td>
<td>Writes part of first name</td>
<td>Brushes teeth alone</td>
<td>Points to five to six colors</td>
<td></td>
<td>Uses “feeling” words</td>
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<tr>
<td></td>
<td>Throws ball overhand 10 feet</td>
<td>Imitates gate with cubes</td>
<td>Buttons</td>
<td>Points to letters/numerals when named</td>
<td></td>
<td>Uses words that tell about time</td>
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<tr>
<td></td>
<td>Catches bounced ball (4½ yrs)</td>
<td></td>
<td>Uses fork well</td>
<td></td>
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</tbody>
</table>
## Developmental Milestones

<table>
<thead>
<tr>
<th>AGE</th>
<th>GROSS MOTOR</th>
<th>FINE MOTOR</th>
<th>SELF-HELP</th>
<th>PROBLEM-SOLVING</th>
<th>SOCIAL/EMOTIONAL</th>
<th>RECEPTIVE LANGUAGE</th>
<th>EXPRESSIVE LANGUAGE</th>
</tr>
</thead>
</table>
| 5 years | - Walks down stairs with rail, alternating feet  
- Balances on one foot > 8 seconds  
- Hops on one foot 15 times  
- Skips  
- Running broad jump 2 to 3 feet  
- Walks backward heel-toe  
- Jumps backward | - Copies triangle  
- Puts paper clip on paper  
- Can use clothespins to transfer small objects  
- Cuts with scissors  
- Writes first name  
- Builds stairs from model | - Spreads with knife  
- Independent dressing  
- Bathes independently | - Draws an 8- to 10-part person  
- Greets amounts (<10)  
- Identifies coins  
- Names letters/numerals out of order  
- Rote counts to 10  
- Names 10 colors  
- Uses letter names as sounds to invent spelling  
- Knows sounds of consonants and short vowels by end of kindergarten  
- Reads 25 words | - Has group of friends  
- Apologizes for mistakes  
- Responds verbally to good fortune of others | - Knows right and left on self  
- Points to different one in a series  
- Understands “er” endings (eg, batter, skater)  
- Understands adjectives: busy, long, thin, pointed  
- Enjoys rhyming words and alliterations  
- Produces words that rhyme  
- Points correctly to “side,” “middle,” “corner” | - Repeats six- to eight-word sentence  
- Defines simple words  
- Uses 2,000 words  
- Knows telephone number  
- Responds to “why” questions  
- Retells story with clear beginning, middle, end |
| 6 years | - Tandem walks  
- Builds stairs from memory  
- Draws diamond  
- Writes first and last name  
- Creates and writes short sentences  
- Forms letters with down- and counterclockwise strokes  
- Copies drawing of flag | - Ties shoes  
- Combs hair  
- Looks both ways at street  
- Remembers to bring belongings | - Draws a 12- to 14-part person  
- Number concepts to 20  
- Simple addition/subtraction  
- Understands seasons  
- Sounds out regularly spelled words  
- Reads 250 words by end of first grade | - Has best friend of same sex  
- Can tell which words do not belong in a group | - Asks what unfamiliar words mean  
- Plays board games  
- Distinguishes fantasy from reality  
- Wants to be like friends and please them  
- Enjoys school | - Repeats 8- to 10-word sentences  
- Describes events in order  
- Knows days of week  
- 100,000 word vocabulary |

[http://pedsinreview.aappublications.org/content/37/1/25](http://pedsinreview.aappublications.org/content/37/1/25)

### V. ADDITIONAL RESOURCES:

[https://developingchild.harvard.edu/](https://developingchild.harvard.edu/)