

= Tourette syndrome =

Tourette syndrome (also called Tourette 's syndrome , Tourette 's disorder , Gilles de la Tourette syndrome , GTS or , more commonly , simply Tourette 's or TS) is an inherited neuropsychiatric disorder with onset in childhood , characterized by multiple physical (motor) tics and at least one vocal (phonic) tic . These tics characteristically wax and wane , can be suppressed temporarily , and are preceded by a premonitory urge . Tourette 's is defined as part of a spectrum of tic disorders , which includes provisional , transient and persistent (chronic) tics .

Tourette 's was once considered a rare and bizarre syndrome , most often associated with the exclamation of obscene words or socially inappropriate and derogatory remarks (coprolalia) , but this symptom is present in only a small minority of people with Tourette 's . Tourette 's is no longer considered a rare condition , but it is not always correctly identified because most cases are mild and the severity of tics decreases for most children as they pass through adolescence . Between 0 . 4 % and 3 . 8 % of children and adolescents ages 5 to 18 may have Tourette 's ; the prevalence of other tic disorders in school age children is higher , with the more common tics of eye blinking , coughing , throat clearing , sniffing , and facial movements . Extreme Tourette 's in adulthood is a rarity , and Tourette 's does not adversely affect intelligence or life expectancy .

Genetic and environmental factors play a role in the etiology of Tourette 's , but the exact causes are unknown . In most cases , medication is unnecessary . There is no effective treatment for every case of tics , but certain medications and therapies can help when their use is warranted . Education is an important part of any treatment plan , and explanation and reassurance alone are often sufficient treatment . Comorbid conditions (co - occurring diagnoses other than Tourette 's) such as attention deficit hyperactivity disorder (ADHD) and obsessive ? compulsive disorder (OCD) are present in many patients seen in tertiary specialty clinics . These other conditions often cause more functional impairment to the individual than the tics that are the hallmark of Tourette 's ; hence , it is important to correctly identify comorbid conditions and treat them .

The eponym was bestowed by Jean - Martin Charcot (1825 ? 1893) on behalf of his resident , Georges Albert Édouard Brutus Gilles de la Tourette (1857 ? 1904) , a French physician and neurologist , who published an account of nine patients with Tourette 's in 1885 .

= = Classification = =

Tics are sudden , repetitive , nonrhythmic movements (motor tics) and utterances (phonic tics) that involve discrete muscle groups . Motor tics are movement - based tics , while phonic tics are involuntary sounds produced by moving air through the nose , mouth , or throat .

Tourette 's was classified by the fourth version of the Diagnostic and Statistical Manual of Mental Disorders (DSM - IV - TR) as one of several tic disorders " usually first diagnosed in infancy , childhood , or adolescence " according to type (motor or phonic tics) and duration (transient or chronic) . Transient tic disorders consisted of multiple motor tics , phonic tics or both , with a duration between four weeks and twelve months . Chronic tic disorder was either single or multiple , motor or phonic tics (but not both) , which were present for more than a year . Tourette 's is diagnosed when multiple motor tics , and at least one phonic tic , are present for more than a year . The fifth version of the DSM (DSM - 5) , published in May 2013 , reclassified Tourette 's and tic disorders as motor disorders listed in the neurodevelopmental disorder category , and replaced transient tic disorder with provisional tic disorder , but made few other significant changes .

Tic disorders are defined only slightly differently by the World Health Organization International Statistical Classification of Diseases and Related Health Problems , ICD - 10 ; code F95.2 is for combined vocal and multiple motor tic disorder [de la Tourette] .

Although Tourette 's is the more severe expression of the spectrum of tic disorders , most cases are mild . The severity of symptoms varies widely among people with Tourette 's , and mild cases may be undetected .

= = Characteristics = =

Tics are movements or sounds " that occur intermittently and unpredictably out of a background of normal motor activity " , having the appearance of " normal behaviors gone wrong " . The tics associated with Tourette 's change in number , frequency , severity and anatomical location . Waxing and waning ? the ongoing increase and decrease in severity and frequency of tics ? occurs differently in each individual . Tics also occur in " bouts of bouts " , which vary for each person .

Coprolalia (the spontaneous utterance of socially objectionable or taboo words or phrases) is the most publicized symptom of Tourette 's , but it is not required for a diagnosis of Tourette 's and only about 10 % of Tourette 's patients exhibit it . Echolalia (repeating the words of others) and palilalia (repeating one 's own words) occur in a minority of cases , while the most common initial motor and vocal tics are , respectively , eye blinking and throat clearing .

In contrast to the abnormal movements of other movement disorders (for example , choreas , dystonias , myoclonus , and dyskinesias) , the tics of Tourette 's are temporarily suppressible , nonrhythmic , and often preceded by an unwanted premonitory urge . Immediately preceding tic onset , most individuals with Tourette 's are aware of an urge , similar to the need to sneeze or scratch an itch . Individuals describe the need to tic as a buildup of tension , pressure , or energy which they consciously choose to release , as if they " had to do it " to relieve the sensation or until it feels " just right " . Examples of the premonitory urge are the feeling of having something in one 's throat , or a localized discomfort in the shoulders , leading to the need to clear one 's throat or shrug the shoulders . The actual tic may be felt as relieving this tension or sensation , similar to scratching an itch . Another example is blinking to relieve an uncomfortable sensation in the eye . These urges and sensations , preceding the expression of the movement or vocalization as a tic , are referred to as " premonitory sensory phenomena " or premonitory urges . Because of the urges that precede them , tics are described as semi @-@ voluntary or " involuntary " , rather than specifically involuntary ; they may be experienced as a voluntary , suppressible response to the unwanted premonitory urge . Published descriptions of the tics of Tourette 's identify sensory phenomena as the core symptom of the syndrome , even though they are not included in the diagnostic criteria .

While individuals with tics are sometimes able to suppress their tics for limited periods of time , doing so often results in tension or mental exhaustion . People with Tourette 's may seek a secluded spot to release their symptoms , or there may be a marked increase in tics after a period of suppression at school or at work . Some people with Tourette 's may not be aware of the premonitory urge . Children may be less aware of the premonitory urge associated with tics than are adults , but their awareness tends to increase with maturity . They may have tics for several years before becoming aware of premonitory urges . Children may suppress tics while in the doctor 's office , so they may need to be observed while they are not aware they are being watched . The ability to suppress tics varies among individuals , and may be more developed in adults than children .

Although there is no such thing as a " typical " case of Tourette syndrome , the condition follows a fairly reliable course in terms of the age of onset and the history of the severity of symptoms . Tics may appear up to the age of eighteen , but the most typical age of onset is from five to seven . A 1998 study published by Leckman and colleagues from the Yale Child Study Center showed that the ages of highest tic severity are eight to twelve (average ten) , with tics steadily declining for most patients as they pass through adolescence . The most common , first @-@ presenting tics are eye blinking , facial movements , sniffing and throat clearing . Initial tics present most frequently in midline body regions where there are many muscles , usually the head , neck and facial region . This can be contrasted with the stereotyped movements of other disorders (such as stims and stereotypies of the autism spectrum disorders) , which typically have an earlier age of onset , are more symmetrical , rhythmical and bilateral , and involve the extremities (e.g. , flapping the hands) . Tics that appear early in the course of the condition are frequently confused with other conditions , such as allergies , asthma , and vision problems : pediatricians , allergists and ophthalmologists are typically the first to see a child with tics .

Among patients whose symptoms are severe enough to warrant referral to clinics , obsessive ? compulsive disorder (OCD) and attention @-@ deficit hyperactivity disorder (ADHD) are often

associated with Tourette 's . Compulsions resembling tics are present in some individuals with OCD ; " tic @-@ related OCD " is hypothesized to be a subgroup of OCD , distinguished from non @-@ tic related OCD by the type and nature of obsessions and compulsions . Not all persons with Tourette 's have ADHD or OCD or other comorbid conditions , although in clinical populations , a high percentage of patients presenting for care do have ADHD . One author reports that a ten @-@ year overview of patient records revealed about 40 % of patients with Tourette 's have " TS @-@ only " or " pure TS " , referring to Tourette syndrome in the absence of ADHD , OCD and other disorders . Another author reports that 57 % of 656 patients presenting with tic disorders had uncomplicated tics , while 43 % had tics plus comorbid conditions . People with " full @-@ blown Tourette 's " have significant comorbid conditions in addition to tics .

= = Causes = =

The exact cause of Tourette 's is unknown , but it is well established that both genetic and environmental factors are involved . Genetic epidemiology studies have shown that the overwhelming majority of cases of Tourette 's are inherited , although the exact mode of inheritance is not yet known and no gene has been identified . In other cases , tics are associated with disorders other than Tourette 's , a phenomenon known as tourettism .

A person with Tourette 's has about a 50 % chance of passing the gene (s) to one of his or her children , but Tourette 's is a condition of variable expression and incomplete penetrance . Thus , not everyone who inherits the genetic vulnerability will show symptoms ; even close family members may show different severities of symptoms , or no symptoms at all . The gene (s) may express as Tourette 's , as a milder tic disorder (provisional or chronic tics) , or as obsessive ? compulsive symptoms without tics . Only a minority of the children who inherit the gene (s) have symptoms severe enough to require medical attention . Gender appears to have a role in the expression of the genetic vulnerability : males are more likely than females to express tics .

Non @-@ genetic , environmental , post @-@ infectious , or psychosocial factors ? while not causing Tourette 's ? can influence its severity . Autoimmune processes may affect tic onset and exacerbation in some cases . In 1998 , a team at the US National Institute of Mental Health proposed a hypothesis based on observation of 50 children that both obsessive ? compulsive disorder (OCD) and tic disorders may arise in a subset of children as a result of a poststreptococcal autoimmune process . Children who meet five diagnostic criteria are classified , according to the hypothesis , as having Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal infections (PANDAS) . This contentious hypothesis is the focus of clinical and laboratory research , but remains unproven .

Some forms of OCD may be genetically linked to Tourette 's . A subset of OCD is thought to be etiologically related to Tourette 's and may be a different expression of the same factors that are important for the expression of tics . The genetic relationship of ADHD to Tourette syndrome , however , has not been fully established .

= = Pathophysiology = =

The exact mechanism affecting the inherited vulnerability to Tourette 's has not been established , and the precise etiology is unknown . Tics are believed to result from dysfunction in cortical and subcortical regions , the thalamus , basal ganglia and frontal cortex . Neuroanatomic models implicate failures in circuits connecting the brain 's cortex and subcortex , and imaging techniques implicate the basal ganglia and frontal cortex .

= = Diagnosis = =

According to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM @-@ 5) , Tourette ? s may be diagnosed when a person exhibits both multiple motor and one or more vocal tics over the period of a year ; the motor and vocal tics need not be concurrent . The

onset must have occurred before the age of 18 , and cannot be attributed to the effects of another condition or substance (such as cocaine) . Hence , other medical conditions that include tics or tic @-@ like movements ? such as autism or other causes of tourettism ? must be ruled out before conferring a Tourette 's diagnosis . Since 2000 , the DSM has recognized that clinicians see patients who meet all the other criteria for Tourette 's , but do not have distress or impairment .

There are no specific medical or screening tests that can be used in diagnosing Tourette 's ; it is frequently misdiagnosed or underdiagnosed , partly because of the wide expression of severity , ranging from mild (the majority of cases) or moderate , to severe (the rare , but more widely recognized and publicized cases) . Coughing , eye blinking , and tics that mimic unrelated conditions such as asthma are commonly misdiagnosed .

The diagnosis is made based on observation of the individual 's symptoms and family history , and after ruling out secondary causes of tic disorders . In patients with a typical onset and a family history of tics or obsessive ? compulsive disorder , a basic physical and neurological examination may be sufficient .

There is no requirement that other comorbid conditions (such as ADHD or OCD) be present , but if a physician believes that there may be another condition present that could explain tics , tests may be ordered as necessary to rule out that condition . An example of this is when diagnostic confusion between tics and seizure activity exists , which would call for an EEG , or if there are symptoms that indicate an MRI to rule out brain abnormalities . TSH levels can be measured to rule out hypothyroidism , which can be a cause of tics . Brain imaging studies are not usually warranted . In teenagers and adults presenting with a sudden onset of tics and other behavioral symptoms , a urine drug screen for cocaine and stimulants might be necessary . If a family history of liver disease is present , serum copper and ceruloplasmin levels can rule out Wilson 's disease . Most cases are diagnosed by merely observing a history of tics .

Secondary causes of tics (not related to inherited Tourette syndrome) are commonly referred to as tourettism . Dystonias , choreas , other genetic conditions , and secondary causes of tics should be ruled out in the differential diagnosis for Tourette syndrome . Other conditions that may manifest tics or stereotyped movements include developmental disorders , autism spectrum disorders , and stereotypic movement disorder ; Sydenham 's chorea ; idiopathic dystonia ; and genetic conditions such as Huntington 's disease , neuroacanthocytosis , Hallervorden @-@ Spatz syndrome , Duchenne muscular dystrophy , Wilson 's disease , and tuberous sclerosis . Other possibilities include chromosomal disorders such as Down syndrome , Klinefelter syndrome , XYY syndrome and fragile X syndrome . Acquired causes of tics include drug @-@ induced tics , head trauma , encephalitis , stroke , and carbon monoxide poisoning . The symptoms of Lesch @-@ Nyhan syndrome may also be confused with Tourette syndrome . Most of these conditions are rarer than tic disorders , and a thorough history and examination may be enough to rule them out , without medical or screening tests .

= = Screening = =

Although not all people with Tourette 's have comorbid conditions , most Tourette 's patients presenting for clinical care at specialty referral centers may exhibit symptoms of other conditions along with their motor and phonic tics . Associated conditions include attention @-@ deficit hyperactivity disorder (ADD or ADHD) , obsessive ? compulsive disorder (OCD) , learning disabilities and sleep disorders . Disruptive behaviors , impaired functioning , or cognitive impairment in patients with comorbid Tourette 's and ADHD may be accounted for by the comorbid ADHD , highlighting the importance of identifying and treating comorbid conditions . Disruption from tics is commonly overshadowed by comorbid conditions that present greater interference to the child . Tic disorders in the absence of ADHD do not appear to be associated with disruptive behavior or functional impairment , while impairment in school , family , or peer relations is greater in patients who have more comorbid conditions and often determines whether therapy is needed .

Because comorbid conditions such as OCD and ADHD can be more impairing than tics , these conditions are included in an evaluation of patients presenting with tics . " It is critical to note that the

comorbid conditions may determine functional status more strongly than the tic disorder , " according to Samuel Zinner , MD . The initial assessment of a patient referred for a tic disorder should include a thorough evaluation , including a family history of tics , ADHD , obsessive ? compulsive symptoms , and other chronic medical , psychiatric and neurological conditions . Children and adolescents with TS who have learning difficulties are candidates for psychoeducational testing , particularly if the child also has ADHD . Undiagnosed comorbid conditions may result in functional impairment , and it is necessary to identify and treat these conditions to improve functioning . Complications may include depression , sleep problems , social discomfort and self @-@ injury .

= = Management = =

The treatment of Tourette 's focuses on identifying and helping the individual manage the most troubling or impairing symptoms . Most cases of Tourette 's are mild , and do not require pharmacological treatment ; instead , psychobehavioral therapy , education , and reassurance may be sufficient . Treatments , where warranted , can be divided into those that target tics and comorbid conditions , which , when present , are often a larger source of impairment than the tics themselves . Not all people with tics have comorbid conditions , but when those conditions are present , they often take treatment priority .

There is no cure for Tourette 's and no medication that works universally for all individuals without significant adverse effects . Knowledge , education and understanding are uppermost in management plans for tic disorders . The management of the symptoms of Tourette 's may include pharmacological , behavioral and psychological therapies . While pharmacological intervention is reserved for more severe symptoms , other treatments (such as supportive psychotherapy or cognitive behavioral therapy) may help to avoid or ameliorate depression and social isolation , and to improve family support . Educating a patient , family , and surrounding community (such as friends , school , and church) is a key treatment strategy , and may be all that is required in mild cases .

Medication is available to help when symptoms interfere with functioning . The classes of medication with the most proven efficacy in treating tics ? typical and atypical neuroleptics including risperidone (trade name Risperdal) , ziprasidone (Geodon) , haloperidol (Haldol) , pimozide (Orap) and fluphenazine (Prolixin) ? can have long @-@ term and short @-@ term adverse effects . The antihypertensive agents clonidine (trade name Catapres) and guanfacine (Tenex) are also used to treat tics ; studies show variable efficacy , but a lower side effect profile than the neuroleptics . Stimulants and other medications may be useful in treating ADHD when it co @-@ occurs with tic disorders . Drugs from several other classes of medications can be used when stimulant trials fail , including guanfacine (trade name Tenex) , atomoxetine (Strattera) and tricyclic antidepressants . Clomipramine (Anafranil) , a tricyclic , and SSRIs ? a class of antidepressants including fluoxetine (Prozac) , sertraline (Zoloft) , and fluvoxamine (Luvox) ? may be prescribed when a Tourette 's patient also has symptoms of obsessive ? compulsive disorder . Several other medications have been tried , but evidence to support their use is unconvincing .

Because children with tics often present to physicians when their tics are most severe , and because of the waxing and waning nature of tics , it is recommended that medication not be started immediately or changed often . Frequently , the tics subside with explanation , reassurance , understanding of the condition and a supportive environment . When medication is used , the goal is not to eliminate symptoms : it should be used at the lowest possible dose that manages symptoms without adverse effects , given that these may be more disturbing than the symptoms for which they were prescribed .

Cognitive behavioral therapy (CBT) is a useful treatment when OCD is present , and there is increasing evidence supporting the use of habit reversal (HRT) in the treatment of tics . There is evidence that HRT reduces tic severity , but there are methodological limitations in the studies , and a need for more trained specialists and better large @-@ scale studies .

Relaxation techniques , such as exercise , yoga or meditation , may be useful in relieving the stress that may aggravate tics , but the majority of behavioral interventions (such as relaxation training and biofeedback , with the exception of habit reversal) have not been systematically evaluated and are not empirically supported therapies for Tourette 's . Deep brain stimulation has been used to treat adults with severe Tourette 's that does not respond to conventional treatment , but it is regarded as an invasive , experimental procedure that is unlikely to become widespread .

= = Prognosis = =

Tourette syndrome is a spectrum disorder ? its severity ranges over a spectrum from mild to severe . The majority of cases are mild and require no treatment . In these cases , the impact of symptoms on the individual may be mild , to the extent that casual observers might not know of their condition . The overall prognosis is positive , but a minority of children with Tourette syndrome have severe symptoms that persist into adulthood . A study of 46 subjects at 19 years of age found that the symptoms of 80 % had minimum to mild impact on their overall functioning , and that the other 20 % experienced at least a moderate impact on their overall functioning . The rare minority of severe cases can inhibit or prevent individuals from holding a job or having a fulfilling social life . In a follow up study of thirty one adults with Tourette 's , all patients completed high school , 52 % finished at least two years of college , and 71 % were full time employed or were pursuing higher education .

Regardless of symptom severity , individuals with Tourette 's have a normal life span . Although the symptoms may be lifelong and chronic for some , the condition is not degenerative or life threatening . Intelligence is normal in those with Tourette 's , although there may be learning disabilities . Severity of tics early in life does not predict tic severity in later life , and prognosis is generally favorable , although there is no reliable means of predicting the outcome for a particular individual . The gene or genes associated with Tourette 's have not been identified , and there is no potential " cure " . A higher rate of migraines than the general population and sleep disturbances are reported .

Several studies have demonstrated that the condition in most children improves with maturity . Tics may be at their highest severity at the time that they are diagnosed , and often improve with understanding of the condition by individuals and their families and friends . The statistical age of highest tic severity is typically between eight and twelve , with most individuals experiencing steadily declining tic severity as they pass through adolescence . One study showed no correlation with tic severity and the onset of puberty , in contrast with the popular belief that tics increase at puberty . In many cases , a complete remission of tic symptoms occurs after adolescence . However , a study using videotape to record tics in adults found that , although tics diminished in comparison with childhood , and all measures of tic severity improved by adulthood , 90 % of adults still had tics . Half of the adults who considered themselves tic free still displayed evidence of tics .

Many people with TS may not realize they have tics ; because tics are more commonly expressed in private , TS may go unrecognized or undetected . It is not uncommon for the parents of affected children to be unaware that they , too , may have had tics as children . Because Tourette 's tends to subside with maturity , and because milder cases of Tourette 's are now more likely to be recognized , the first realization that a parent had tics as a child may not come until their offspring is diagnosed . It is not uncommon for several members of a family to be diagnosed together , as parents bringing children to a physician for an evaluation of tics become aware that they , too , had tics as a child .

Children with Tourette 's may suffer socially if their tics are viewed as " bizarre " . If a child has disabling tics , or tics that interfere with social or academic functioning , supportive psychotherapy or school accommodations can be helpful . Because comorbid conditions (such as ADHD or OCD) can cause greater impact on overall functioning than tics , a thorough evaluation for comorbidity is called for when symptoms and impairment warrant .

A supportive environment and family generally gives those with Tourette 's the skills to manage the disorder . People with Tourette 's may learn to camouflage socially inappropriate tics or to channel

the energy of their tics into a functional endeavor . Accomplished musicians , athletes , public speakers , and professionals from all walks of life are found among people with Tourette 's . Outcomes in adulthood are associated more with the perceived significance of having severe tics as a child than with the actual severity of the tics . A person who was misunderstood , punished , or teased at home or at school will fare worse than children who enjoyed an understanding and supportive environment .

= = Epidemiology = =

The tics of Tourette syndrome begin in childhood and tend to remit or subside with maturity ; thus , a diagnosis may no longer be warranted for many adults , and observed prevalence rates are higher among children than adults . As children pass through adolescence , about one @-@ quarter become tic @-@ free , almost one @-@ half see their tics diminish to a minimal or mild level , and less than one @-@ quarter have persistent tics . Only 5 to 14 % of adults experience worse tics in adulthood than in childhood .

Tourette syndrome is found among all social , racial and ethnic groups and has been reported in all parts of the world ; it is three to four times more frequent among males than among females . The reported prevalence of TS varies " according to the source , age , and sex of the sample ; the ascertainment procedures ; and diagnostic system " from a low of .05 % in a 1993 study to a high of 2 @. @ 9 % in a 1998 study .

Up to 1 % of the overall population experiences tic disorders , including chronic tics and transient tics of childhood . Chronic tics affect 5 % of children , and transient tics affect up to 20 % . Robertson (2011) suggests that the prevalence of Tourette syndrome alone in the general population is also 1 % , with a range reported between .4 % and 3 @. @ 8 % for children ages 5 to 18 . Singer (2011) states the prevalence of TS in the overall population at any time is .1 % for impairing cases and .6 % for all cases , while Bloch and colleagues (2011) state the overall prevalence as between .3 and 1 % . According to Lombroso and Scahill (2008) , the emerging consensus is that .1 to 1 % of children have Tourette 's , with several studies supporting a tighter range of .6 to .8 % . Bloch and Leckman (2009) and Swain (2007) report a range of prevalence in children of .4 to .6 % , Knight et al . (2012) estimate .77 % in children , and Du et al . (2010) report that 1 to 3 % of Western school @-@ age children have Tourette 's . Prevalence rates in special education populations are higher . Using year 2000 census data , a prevalence range of .1 to 1 % yields an estimate of 53 @, @ 000 ? 530 @, @ 000 school @-@ age children with Tourette 's in the US , and a prevalence estimate of .1 % means that in 2001 about 553 @, @ 000 people in the UK age 5 or older would have Tourette 's . Most cases would be mild and almost unrecognizable in older individuals .

Tourette syndrome was once thought to be rare : in 1972 , the US National Institutes of Health (NIH) believed there were fewer than 100 cases in the United States , and a 1973 registry reported only 485 cases worldwide . However , multiple studies published since 2000 have consistently demonstrated that the prevalence is much higher than previously thought . Discrepancies across current and prior prevalence estimates come from several factors : ascertainment bias in earlier samples drawn from clinically referred cases , assessment methods that may fail to detect milder cases , and differences in diagnostic criteria and thresholds . There were few broad @-@ based community studies published before 2000 and until the 1980s , most epidemiological studies of Tourette syndrome were based on individuals referred to tertiary care or specialty clinics . Individuals with mild symptoms may not seek treatment and physicians may not confer an official diagnosis of TS on children out of concern for stigmatization ; children with milder symptoms are unlikely to be referred to specialty clinics , so prevalence studies have an inherent bias towards more severe cases . Studies of Tourette syndrome are vulnerable to error because tics vary in intensity and expression , are often intermittent , and are not always recognized by clinicians , patients , family members , friends or teachers ; approximately 20 % of persons with Tourette syndrome do not recognize that they have tics . Newer studies ? recognizing that tics may often be undiagnosed and hard to detect ? use direct classroom observation and multiple informants (parent

, teacher , and trained observers) , and therefore record more cases than older studies relying on referrals . As the diagnostic threshold and assessment methodology have moved towards recognition of milder cases , the result is an increase in estimated prevalence .

Tourette 's is associated with several comorbid conditions , or co @-@ occurring diagnoses , which are often the major source of impairment for an affected child . Most individuals with tics do not seek medical attention , so epidemiological studies of TS " reflect a strong ascertainment bias " , but among those who do warrant medical attention , the majority have other conditions , and up to 50 % have ADHD or OCD . One author reports that a ten @-@ year overview of patient records revealed about 40 % of patients with Tourette 's have " TS @-@ only " or " pure TS " , referring to Tourette syndrome in the absence of ADHD , OCD and other disorders . In children with tics , the additional presence of ADHD is associated with functional impairment , disruptive behavior , and tic severity . Other comorbid conditions include self @-@ injurious behaviors (SIB) , anxiety , depression , personality disorders , oppositional defiant disorder , and conduct disorders .

= = History and research directions = =

The first presentation of Tourette syndrome is thought to be in the book , *Malleus Maleficarum* (" Witch 's hammer ") by Jakob Sprenger and Heinrich Kraemer , published in the late 15th century and describing a priest whose tics were " believed to be related to possession by the devil " . A French doctor , Jean Marc Gaspard Itard , reported the first case of Tourette syndrome in 1825 , describing Marquise de Dampierre , an important woman of nobility in her time . Jean @-@ Martin Charcot , an influential French physician , assigned his resident Georges Albert Édouard Brutus Gilles de la Tourette , a French physician and neurologist , to study patients at the Salpêtrière Hospital , with the goal of defining an illness distinct from hysteria and from chorea .

In 1885 , Gilles de la Tourette published an account in *Study of a Nervous Affliction* describing nine persons with " convulsive tic disorder " , concluding that a new clinical category should be defined . The eponym was later bestowed by Charcot after and on behalf of Gilles de la Tourette .

Little progress was made over the next century in explaining or treating tics , and a psychogenic view prevailed well into the 20th century . The possibility that movement disorders , including Tourette syndrome , might have an organic origin was raised when an encephalitis epidemic from 1918 ? 1926 led to a subsequent epidemic of tic disorders .

During the 1960s and 1970s , as the beneficial effects of haloperidol (Haldol) on tics became known , the psychoanalytic approach to Tourette syndrome was questioned . The turning point came in 1965 , when Arthur K. Shapiro ? described as " the father of modern tic disorder research " ? treated a Tourette ? s patient with haloperidol , and published a paper criticizing the psychoanalytic approach .

Since the 1990s , a more neutral view of Tourette 's has emerged , in which biological vulnerability and adverse environmental events are seen to interact . In 2000 , the American Psychiatric Association published the DSM @-@ IV @-@ TR , revising the text of DSM @-@ IV to no longer require that symptoms of tic disorders cause distress or impair functioning , recognizing that clinicians often see patients who meet all the other criteria for Tourette 's , but do not have distress or impairment .

Findings since 1999 have advanced TS science in the areas of genetics , neuroimaging , neurophysiology , and neuropathology . Questions remain regarding how best to classify Tourette syndrome , and how closely Tourette 's is related to other movement disorders or psychiatric disorders . Good epidemiologic data is still lacking , and available treatments are not risk free and not always well tolerated . High @-@ profile media coverage focuses on treatments that do not have established safety or efficacy , such as deep brain stimulation , and alternative therapies involving unstudied efficacy and side effects are pursued by many parents .

= = Society and culture = =

Not everyone with Tourette 's wants treatment or a " cure " , especially if that means they may "

lose " something else in the process . Researchers Leckman and Cohen , and former US Tourette Syndrome Association (TSA) national board member Kathryn Taubert , believe that there may be latent advantages associated with an individual 's genetic vulnerability to developing Tourette syndrome , such as a heightened awareness and increased attention to detail and surroundings that may have adaptive value . There is evidence to support the clinical lore that children with " TS @-@ only " (Tourette 's in the absence of comorbid conditions) are unusually gifted : neuropsychological studies have identified advantages in children with TS @-@ only . Children with TS @-@ only are faster than the average for their age group on timed tests of motor coordination .

Notable individuals with Tourette syndrome are found in all walks of life , including musicians , athletes , media figures , teachers , physicians and authors . The best @-@ known example of a person who may have used obsessive ? compulsive traits to advantage is Samuel Johnson , the 18th @-@ century English man of letters , who likely had Tourette syndrome as evidenced by the writings of James Boswell . Johnson wrote A Dictionary of the English Language in 1747 , and was a prolific writer , poet , and critic . Tim Howard , described by the Chicago Tribune as the " rarest of creatures ? an American soccer hero " and by the TSA as the " most notable individual with Tourette Syndrome around the world " says that his neurological makeup gave him an enhanced perception and an ability to hyper @-@ focus that contributed to his success on the field .

Although it has been speculated that Mozart had Tourette 's , no Tourette 's expert or organization has presented credible evidence to support such a conclusion , and there are problems with the arguments supporting the diagnosis : tics are not transferred to the written form , as is supposed with Mozart 's scatological writings ; the medical history in retrospect is not thorough ; side effects due to other conditions may be misinterpreted ; " it is not proven whether written documents can account for the existence of a vocal tic " and " the evidence of motor tics in Mozart 's life is doubtful " . Mozart :

Kammer T. " Mozart in the neurological department ? who has the tic ? " (PDF) . Front Neurol Neurosci . 2007 ; 22 : 184 ? 92 . PMID 17495512 doi : 10 @. @ 1159 / 0000102880 Retrieved on February 7 , 2012 .

Ashoori A , Jankovic J. " Mozart 's movements and behaviour : a case of Tourette 's syndrome ? " J Neurol Neurosurg Psychiatry . 2007 Nov ; 78 (11) : 1171 ? 5 doi : 10 @. @ 1136 / jnnp.2007.114520 PMID 17940168 .

Sacks O. " Tourette 's syndrome and creativity " . BMJ . 1992 Dec 19 ? 26 ; 305 (6868) : 1515 ? 6 @. @ doi : 10 @. @ 1136 / bmj.305.6868.1515 PMID 1286364

Pre @-@ dating Gilles de la Tourette 's 1885 publication , likely portrayals of TS or tic disorders in fictional literature are Mr. Pancks in Little Dorritt by Charles Dickens and Nikolai Levin in Anna Karenina by Leo Tolstoy . The entertainment industry has been criticized for depicting those with Tourette syndrome as social misfits whose only tic is coprolalia , which has furthered stigmatization and the public 's misunderstanding of those with Tourette 's . The coprolalic symptoms of Tourette 's are also fodder for radio and television talk shows in the US and in the British media .