

**Robertson M (2016) Tourette syndrome in children and adolescents: aetiology, presentation and treatment. *BJPsych Advances*, 22: 175–175 (doi: 10.1192/apt.bp.114.014092)**

**DATA  
SUPPLEMENT**

**TABLE DS1** The effect of Tourette syndrome on the young person's quality of life (QoL)

Reference	Country	Sample size, <i>n</i>	Schedule/questionnaire	Results	Factors associated with reduced QoL
Storch <i>et al</i> , 2007	USA	59	Self-report Parent report	QoL lower in Tourette's than in healthy controls; QoL higher in Tourette's than in psychiatric controls	Tic severity; probably also OCB/OCD and ADHD
Bernard <i>et al</i> , 2009	USA	56	TACQOL	QoL relates primarily to comorbid ADHD and OCD; in ADHD inattentive symptoms associated with lower QoL	ADHD (inattention) Not tics
Cutler <i>et al</i> , 2009	UK	57	Self-report	QoL significantly lower in Tourette's than in healthy controls	Tic severity; ADHD; OCB
Pringsheim <i>et al</i> , 2009	Canada	71	Child Health Questionnaire	Tourette's significantly affected only family activities domain Comorbid ADHD & OCD reduced QoL in all domains	ADHD symptom severity was most important predictor of reduced QoL
Hao <i>et al</i> , 2010	China	1335	PedsQL 4.0	Tourette's scored lower than controls on all	Not stated
Conelea <i>et al</i> , 2011	USA	232	HRQoL	Functional impairment in Tourette's	Tic severity; comorbid psychiatric conditions
Eddy <i>et al</i> , 2011a	UK & Italy	50	YQOL-R	Reduced QoL in Tourette's	Depression; OCD; ADHD Not tic severity
Eddy <i>et al</i> , 2011b	UK & Italy	50	YQOL-R	Reduced QoL in Tourette's	Tic severity; OCD; ADHD
Yi <i>et al</i> , 2011	China	174	Subjective self-report	QoL lower in Tourette's than in healthy controls	QoL negatively related to age, course, symptom severity, total child behavioural problems; positively related to family active-cultural orientation
Cavanna <i>et al</i> , 2013	Italy	75	C&A-GTS-QoL (self-report) IRS-P (parents)	Tourette's only v. Tourette's+OCD: no group differences; differences for Total & School impairment & Home activities scores	QoL in youngsters with Tourette syndrome is more complex than in adults
Eddy <i>et al</i> , 2012	Italy	50	YQOL-R	QoL higher in Tourette's only than in Tourette's+OCD and/or ADHD	OCD and/or ADHD: lower scores on Total and Relationship domains; ADHD: lower scores on Self and Relationship domains; OCD: more widespread QoL problems

ADHD, attention-deficit hyperactivity disorder; C&A-GTS-QoL, Gilles de la Tourette Syndrome – Quality of Life Scale for Children and Adolescents; HRQoL, health-related quality of life assessment; IRS-P, Impairment Rating Scale – Parent; OCB, obsessive–compulsive behaviour; OCD, obsessive–compulsive disorder; PedsQL 4.0, Pediatric Quality of Life Inventory, version 4; TACQOL, TNO-AZL (Netherlands Organisation for Applied Scientific Research Academic Medical Centre) Questionnaires for Children's Health-Related Quality of Life; YQOL-R, Youth Quality of Life Instrument – Research Version.

Source: modified and updated from Robertson, 2011, 2012.

**TABLE DS2** Comorbid disorders and coexistent psychopathology in young people with Tourette syndrome

	Incidence	Aetiology/possible associations	Comments	Further information
<i>Comorbid disorders</i>				
Attention-deficit hyperactivity disorder	Most common: 21–90%; Mean: 60%	Genetic in a subgroup	Also common in clinic, community and epidemiological studies	Robertson & Eapen, 1992; Walkup <i>et al</i> , 1999; Freeman <i>et al</i> , 2000; Robertson, 2006a
Obsessive–compulsive behaviours/disorder	Common: 27–32% in clinics	Integral part of Tourette's; share genetic influences	OCB is egosyntonic; OCD is egodystonic	Freeman <i>et al</i> , 2000; Robertson, 2000
Autism spectrum disorders	6–11%	Genetic in a subgroup; also probably non-specific & there may be general neurodevelopmental problems		Robertson, 2011
Self-injurious behaviour	30%	Difficult to treat	Mild SIB related to OCB, severe related to impulsivity; mild & severe related to tic severity	Robertson <i>et al</i> , 1989; Mathews <i>et al</i> , 2004
Non-obscene socially inappropriate behaviour	Common (30–60%)	Possibly related to impulsivity, ADHD or conduct disorder; not related to OCB/OCD	One-third have social difficulties as a result of NOSI	Kurlan <i>et al</i> , 1996
<i>Coexistent psychopathology</i>				
Depression	13–76%	Multifactorial; not genetic	Depression more common in Tourette's than in healthy controls	Robertson, 2006b
Anxiety	Common (range 19–80%)	Secondary to having Tourette's; some suggest anxiety pre-dates tics		Robertson, 2003
Personality disorders	Common (64%)	Probably related to childhood ADHD, ODD, conduct disorder	Whole spectrum of personality disorders: not restricted to OCPD	Robertson <i>et al</i> , 1997
Dysphoria	Fairly common with almost all antipsychotics	Side-effect of anti-Tourette's medication	May require antidepressant and discontinuation of anti-Tourette's medication	Robertson, 2000, 2003
School phobia/separation anxiety	Not common, but noted	May be side-effect of anti-Tourette's medication	May require treatment and discontinuation of anti-Tourette's medication	Robertson, 2000, 2003
Rage or explosive outbursts	20%	Associated with ADHD, tic severity, lower age at tic onset, prenatal exposure to tobacco		Chen <i>et al</i> , 2013
Sleep problems	Very common: 75%	Night terrors, insomnia, nightmares, sleep-walking, sleep-talking/walking, nocturnal enuresis, bruxism		Robertson <i>et al</i> , 1988
Cognitive dulling/drowsiness	32% (some studies)	Side-effect of anti-Tourette's medication	Patients on antipsychotics had lower IQ on WAIS/WISC	Robertson <i>et al</i> , 1988, Robertson, 2000
Dyslexia, dyspraxia, reading difficulties	6%			Lees <i>et al</i> , 1984
Schizophrenia	Very rare	Co-occurs by chance		Few isolated case reports
Examinations: IQ (WAIS/WISC) MSE Neurological EEG CT scans		Average IQ: 100 None psychotic Normal in 67% n.a.d. in 63–74% n.a.d. in 97%	Focal dystonia, chorea, mild dysdiadochokinesia, tonic torticollis, spasmodic dysphonia, cavum septum pellucidum cavities (in headbangers)	Lees <i>et al</i> , 1984; Robertson <i>et al</i> , 1988
Total comorbidity and/or psychopathology	88–90%	Mixed	Figures same in clinical and epidemiological studies	Freeman <i>et al</i> , 2000; Khalifa & von Knorring, 2003, 2005

ADHD, attention-deficit hyperactivity disorder; CT, computed tomography; EEG, electroencephalogram; MSE, mental state examination; n.a.d., nothing abnormal detected; NOSI, non-obscene socially inappropriate behaviour; OCB, obsessive–compulsive behaviour; OCD, obsessive–compulsive disorder; OCPD, obsessive–compulsive personality disorder; ODD, oppositional defiant disorder; SIB, self-injurious behaviour; WAIS, Wechsler Adult Intelligence Scale; WISC, Wechsler Intelligence Scale for Children. Source: modified and updated from Robertson, 2011, 2012.

## References to Tables DS1 and DS2

- Bernard BA, Stebbins GT, Siegel S, et al (2009) Determinants of quality of life in children with Gilles de la Tourette syndrome. *Movement Disorders*, **24**: 1070–1073.
- Cavanna AE, Luoni C, Selvini C, et al (2013) Disease-specific quality of life in young patients with Tourette syndrome. *Pediatric Neurology*, **48**: 111–114.
- Chen K, Budman CL, Diego Herrera L, et al (2013) Prevalence and clinical correlates of explosive outbursts in Tourette Syndrome. *Psychiatry Research*, **205**: 269–275.
- Conelea CA, Woods DW, Zinner SH, et al (2011) Exploring the impact of chronic tic disorders on youth: results from the Tourette Syndrome Impact Survey. *Child Psychiatry and Human Development*, **42**: 219–242.
- Cutler D, Murphy T, Gilmour J, et al (2009) The quality of life of young people with Tourette syndrome. *Child: Care, Health and Development*, **35**: 496–504.
- Eddy CM, Cavanna AE, Gulisano M, et al (2011a) Clinical correlates of quality of life in Tourette syndrome. *Movement Disorders*, **2**: 735–738.
- Eddy CM, Rizzo R, Gulisano M, et al (2011b) Quality of life in young people with Tourette syndrome: a controlled study. *Journal of Neurology*, **258**: 291–301.
- Eddy CM, Cavanna AE, Gulisano M, et al (2012) The effects of comorbid obsessive-compulsive disorder and attention-deficit hyperactivity disorder on quality of life in Tourette syndrome. *Journal of Neuropsychiatry and Clinical Neuroscience*, **24**: 458–462.
- Freeman RD, Fast DK, Burd L, et al (2000) An international perspective on Tourette syndrome: selected findings from 3,500 individuals in 22 countries. *Developmental Medicine and Child Neurology*, **42**: 436–447.
- Hao Y, Tian Q, Lu Y, Chai Y, et al (2010) Psychometric properties of the Chinese version of the Pediatric Quality of Life Inventory 4.0 generic core scales. *Quality of Life Research*, **19**: 1229–1233.
- Khalifa N, von Knorring AL (2003) Prevalence of tic disorders and Tourette syndrome in a Swedish school population. *Developmental Medicine and Child Neurology*, **45**: 315–319.
- Khalifa N, von Knorring AL (2005) Tourette syndrome and other tic disorders in a total population of children: clinical assessment and background. *Acta Paediatrica*, **94**: 1608–1614.
- Kurlan R, Daragjati C, Como P, et al (1996) Non-obscene complex socially inappropriate behavior in Tourette's syndrome. *Journal of Neuropsychiatry and Clinical Neurosciences*, **8**: 311–317.
- Lees AJ, Robertson M, Trimble MR, et al (1984) A clinical study of Gilles de la Tourette syndrome in the United Kingdom. *Journal of Neurology, Neurosurgery and Psychiatry*, **47**: 1–8.
- Mathews CA, Waller J, Glidden D, et al (2004) Self injurious behaviour in Tourette syndrome: correlates with impulsivity and impulse control. *Journal of Neurology, Neurosurgery and Psychiatry*, **75**: 1149–1155.
- Pringsheim T, Lang A, Kurlan R, et al (2009) Understanding disability in Tourette syndrome. *Developmental Medicine and Child Neurology*, **51**: 468–472.
- Robertson MM (2000) Tourette syndrome, associated conditions and the complexities of treatment. *Brain*, **123**: 425–462.
- Robertson MM (2003) The heterogeneous psychopathology of Tourette syndrome. In *Mental and Behavioral Dysfunction in Movement Disorders* (eds MA Bedard, Y Agid, S Chouinard, et al), pp. 443–466. Humana Press.
- Robertson MM (2006a) Attention deficit hyperactivity disorder, tics and Tourette's syndrome: the relationship and treatment implications. A commentary. *European Child and Adolescent Psychiatry*, **15**: 1–11.
- Robertson MM (2006b) Tourette syndrome and affective disorders: an update. *Journal of Psychosomatic Research*, **61**: 349–358.
- Robertson MM (2011) Gilles de la Tourette syndrome: the complexities of phenotype and treatment. *British Journal of Hospital Medicine*, **72**: 100–107.
- Robertson MM (2012) The Gilles de la Tourette syndrome: the current status. *Archives of Disease in Childhood: Education & Practice*, **97** (5): 166–175.
- Robertson MM, Eapen V (1992) Pharmacologic controversy of CNS stimulants in Gilles de la Tourette's syndrome. *Clinical Neuropharmacology*, **15**: 408–425.
- Robertson MM, Trimble MR, Lees AJ (1988) The psychopathology of the Gilles de la Tourette syndrome: a phenomenological analysis. *British Journal of Psychiatry*, **152**: 383–390.
- Robertson MM, Trimble MR, Lees AJ (1989) Self-injurious behaviour and the Gilles de la Tourette syndrome: a clinical study and review of the literature. *Psychological Medicine*, **19**: 611–625.
- Robertson MM, Banerjee S, Fox Hiley PJ, et al (1997) Personality disorder and psychopathology in Tourette's syndrome: a controlled study. *British Journal of Psychiatry*, **171**: 283–286.
- Storch EA, Merlo LJ, Lack C, et al (2007) Quality of life in youth with Tourette's syndrome and chronic tic disorder. *Journal of Clinical Child and Adolescent Psychology*, **36**: 217–227.
- Walkup JT, Kahn S, Sehuerholz L (1999) Phenomenology and natural history of tic-related ADHD and learning disability. In *Tourette Syndrome: Developmental Psychopathology and Clinical Care* (eds JS Leckman, DJF Cohen), pp 63–79. John Wiley & Sons.
- Yi MJ, Sun ZY, Ran N, et al (2011) Subjective quality of life in children with Tourette syndrome [article in Chinese]. *Chinese Journal of Contemporary Pediatrics*, **13**: 732–735.