

## Data supplement

**Table DS1** Completion rates for measures of outcome and symptom severity in participants with Tourette syndrome and community controls

	Tourette syndrome, <i>n</i> (%) ( <i>n</i> = 65)	Controls, <i>n</i> (%) ( <i>n</i> = 65)
Children's Global Assessment Scale	65 (100)	65 (100)
Vineland Socialization domain	58 (89.2)	65 (100)
Child Behaviour Checklist	53 (81.5)	62 (95.4)
Youth Self-Report	45 (69.2)	62 (95.4)
DSM-IV diagnoses (lifetime)	65 (100)	65 (100)
ADHD RS-IV (parent-rated)	46 (70.1)	50 (76.9)
ADHD RS-IV (proband-rated)	51 (78.5)	65 (100)
Yale Global Tic Severity Scale (parent-rated) <sup>a</sup>	64 (98.5)	–
Yale Global Tic Severity Scale (proband-rated) <sup>a</sup>	53 (81.5)	–
Yale-Brown Obsessive Compulsive Scale <sup>a</sup>	62 (95.4)	–

ADHD RS-IV, Attention-deficit hyperactivity disorder Rating Scale-IV-Home Version.  
a. The Yale Global Tic Severity Scale and Yale-Brown Obsessive Compulsive Scale were not administered to the control group, as potential control participants were excluded if they had a history of tics or obsessive-compulsive symptoms.

**Table DS2** Demographic and clinical comparison of individuals with Tourette syndrome who participated in the study with non-participants with Tourette syndrome who completed the telephone interview and community controls

	Participants with Tourette syndrome ( <i>n</i> = 65)	Non-participants with Tourette syndrome who completed the telephone interview <sup>a</sup> ( <i>n</i> = 9)	Test statistic <sup>b</sup>	<i>P</i>	Controls ( <i>n</i> = 65)	Test statistic <sup>c</sup>	<i>P</i>
Age, years: mean (s.d.)	18.1 (1.4)	17.6 (0.8)	<i>t</i> = 0.9 (d.f. = 72)	0.4	18.4 (1.7)	<i>t</i> = 1.2 (d.f. = 128)	0.2
Parent-rated current YGTSS Score, <sup>d,e</sup> mean (s.d.)	11.1 (11.7)	13.0 (11.7)	<i>t</i> = 0.5 (d.f. = 71)	0.7	–	–	–
Gender: male:female, <i>n</i>	57:8	8:1	–	1.0	57:8	$\chi^2 = 0.0$ (d.f. = 1)	1.0
Lifetime diagnosis of OCD, <sup>e,f</sup> <i>n</i> (%)	25 (38.5)	3 (33.3)	–	1.0	–	–	–
Lifetime diagnosis of ADHD, <sup>f</sup> <i>n</i> (%)	43 (66.2)	5 (55.6)	–	0.7	9 (13.8)	$\chi^2 = 37.1$ (d.f. = 1)	<b>10<sup>-9</sup></b>
Lifetime history of learning problems, <sup>f</sup> <i>n</i> (%)	27 (41.5)	5 (55.6)	–	0.5	8 (12.3)	$\chi^2 = 14.1$ (d.f. = 1)	<b>&lt;0.001</b>
<i>Psychotropic medication use, n (%)</i>							
Typical antipsychotic							
Lifetime	34 (52.3)	7 (77.8)	–	0.3	0 (0.0)	$\chi^2 = 46.0$ (d.f. = 1)	<b>10<sup>-11</sup></b>
Current	12 (18.5)	2 (22.2)	–	0.7	0 (0.0)	$\chi^2 = 13.2$ (d.f. = 1)	<b>&lt;0.001</b>
Clonidine							
Lifetime	43 (66.2)	7 (77.8)	–	0.7	0 (0.0)	$\chi^2 = 64.3$ (d.f. = 1)	<b>10<sup>-15</sup></b>
Current	8 (12.3)	2 (22.2)	–	0.6	0 (0.0)	$\chi^2 = 6.5^g$ (d.f. = 1)	<b>0.01</b>
Stimulant							
Lifetime	26 (40.0)	4 (44.4)	–	1.0	7 (10.8)	$\chi^2 = 14.6$ (d.f. = 1)	<b>10<sup>-4</sup></b>
Current	7 (10.8)	0 (0.0)	–	0.6	4 (6.2)	$\chi^2 = 0.9$ (d.f. = 1)	<b>0.3</b>
Antidepressant							
Lifetime	33 (50.8)	3 (42.9) <sup>h</sup>	–	1.0	4 (6.2)	$\chi^2 = 31.8$ (d.f. = 1)	<b>&lt;10<sup>-7</sup></b>
Current	16 (24.6)	2 (22.9)	–	1.0	1 (1.5)	$\chi^2 = 15.2$ (d.f. = 1)	<b>10<sup>-4</sup></b>
Lithium <sup>i</sup>							
Lifetime	10 (15.4)	–	–	–	0 (0.0)	$\chi^2 = 10.8$ (d.f. = 1)	<b>0.001</b>
Current	3 (4.6)	–	–	–	0 (0.0)	$\chi^2 = 1.4^g$ (d.f. = 1)	<b>0.2</b>
Minor tranquiliser and other sedatives							
Lifetime	12 (18.5)	3 (33.3)	–	0.4	3 (4.6)	$\chi^2 = 6.1$ (d.f. = 1)	<b>0.01</b>
Current	1 (1.5)	0 (0.0)	–	1.0	1 (1.5)	$\chi^2 = 0.0^g$ (d.f. = 1)	<b>1.0</b>
No medication							
Lifetime	10 (15.4)	1 (11.1)	–	1.0	51 (78.5)	$\chi^2 = 51.9$ (d.f. = 1)	<b>10<sup>-12</sup></b>
Current	34 (52.3)	5 (55.6)	–	1.0	59 (90.8)	$\chi^2 = 23.6$ (d.f. = 1)	<b>10<sup>-6</sup></b>

ADHD, attention-deficit hyperactivity disorder; OCD, obsessive-compulsive disorder; YGTSS, Yale Global Tic Severity Scale.

a. Parents of five non-participants refused to complete the telephone interview, and one non-participant had died of a cerebral malignancy.

b. Comparison between participants and non-participants with Tourette syndrome.

c. Comparison between participants with Tourette syndrome and community controls.

d. The YGTSS score was calculated excluding the impairment scale (range 0–50).

e. A history of tics or obsessive-compulsive symptoms was an exclusion criterion for community controls.

f. For participants with Tourette syndrome and community controls, diagnoses are based on a consensus procedure conducted by two child psychiatrists (J.F.L. and B.S.P.); however, for non-participants with Tourette syndrome, diagnoses are based on parent report during the telephone interview.

g. With continuity correction.

h. Data were not available for two participants.

i. The telephone interview did not elicit information about lithium treatment.

Significant results are shown in bold ( $P \leq 0.05$ ).

	Parent-rated					Proband-rated				
	Worst-ever, mean (s.d.)	Current, mean (s.d.)	<i>t</i>	d.f.	<i>P</i>	Worst-ever, mean (s.d.)	Current, mean (s.d.)	<i>t</i>	d.f.	<i>P</i>
Tic severity, <sup>a,b</sup> Tourette syndrome group	29.6 (10.2)	10.9 (11.7)	12.2	61	<b>&lt; 10<sup>-17</sup></b>	24.9 (12.8)	8.4 (10.5)	10.9	52	<b>&lt; 10<sup>-14</sup></b>
ADHD symptom severity <sup>c,d</sup>										
Tourette syndrome group	28.5 (16.9)	16.8 (12.5)	6.9	43	<b>&lt; 10<sup>-7</sup></b>	19.3 (18.6)	10.4 (12.3)	5.8	50	<b>10<sup>-6</sup></b>
Controls	7.8 (12.6)	5.0 (8.8)	3.0	49	<b>&lt; 0.01</b>	17.1 (12.8)	9.7 (7.8)	7.2	64	<b>10<sup>-9</sup></b>
OCD symptom severity <sup>b,e</sup>										
Tourette syndrome group	12.9 (13.4)	6.9 (9.4)	5.3	61	<b>&lt; 10<sup>-5</sup></b>					

ADHD, attention-deficit hyperactivity disorder; OCD, obsessive-compulsive disorder.  
a. Measured with the Yale Global Tic Severity Scale, excluding the impairment scale (range 0–50).  
b. Tic and OCD symptom severity ratings were not obtained for community controls, as potential controls were excluded if they had a history of tics or obsessive-compulsive symptoms.  
c. Parent-rated: measured with the first 18 (out of 20) items of the ADHD Rating Scale–IV–Home Version, which correspond to the 18 ADHD symptoms in DSM–IV (range 0–54).  
d. Proband-rated: measured with all 20 items of the ADHD Rating Scale–IV–Home Version (range 0–60).  
e. Measured with the Yale–Brown Obsessive Compulsive Scale (range 0–40); only ratings by parents were obtained.  
Significant results are shown in bold ( $P \leq 0.05$ ).

	Tourette syndrome	Controls	Controlling for a lifetime diagnosis of ADHD					
	Mean (s.d.)	Mean (s.d.)	<i>F</i>	d.f.	<i>P</i>	<i>F</i>	d.f.	<i>P</i>
CGAS								
Consensus score	56.4 (12.1)	70.4 (12.3)	39.4	1, 126	<b>10<sup>-8</sup></b>	9.4	1, 125	<b>&lt; 0.01</b>
Vineland								
Socialization domain standard score	84.5 (23.8)	101.1 (14.7)	19.8	1, 119	<b>&lt; 10<sup>-4</sup></b>	5.7	1, 118	<b>0.02</b>
CBCL, t-scores								
Activities <sup>a</sup>	44.5 (6.7)	47.1 (8.2)	2.8	1, 104	0.1	2.8	1, 103	0.1
Social <sup>a</sup>	42.5 (10.0)	51.2 (6.2)	27.2	1, 94	<b>10<sup>-6</sup></b>	11.3	1, 93	<b>0.001</b>
School <sup>a</sup>	40.7 (9.2)	50.2 (5.8)	38.4	1, 106	<b>10<sup>-8</sup></b>	13.8	1, 105	<b>&lt; 0.001</b>
Withdrawn	57.7 (9.0)	52.8 (6.4)	8.9	1, 111	<b>&lt; 0.01</b>	3.7	1, 110	0.06
Somatic complaints	57.8 (9.6)	55.0 (8.4)	2.0	1, 111	0.2	0.2	1, 110	0.7
Anxious/depressed	59.8 (9.5)	53.0 (5.4)	21.5	1, 111	<b>10<sup>-5</sup></b>	7.8	1, 110	<b>0.01</b>
Social problems	59.9 (9.7)	52.4 (5.1)	25.4	1, 111	<b>&lt; 10<sup>-5</sup></b>	8.3	1, 110	<b>0.01</b>
Thought problems	61.7 (10.9)	52.7 (6.0)	27.8	1, 111	<b>10<sup>-6</sup></b>	13.1	1, 110	<b>&lt; 0.001</b>
Attention problems	63.7 (11.2)	52.8 (6.1)	38.8	1, 111	<b>10<sup>-8</sup></b>	11.4	1, 110	<b>0.001</b>
Delinquent behaviour	56.3 (9.5)	52.7 (4.6)	5.1	1, 111	<b>0.03</b>	0.2	1, 110	0.6
Aggressive behaviour	58.3 (11.7)	51.9 (4.5)	13.2	1, 111	<b>&lt; 0.001</b>	3.3	1, 110	0.07
Internalising	56.9 (12.9)	47.4 (11.0)	15.7	1, 111	<b>10<sup>-4</sup></b>	5.5	1, 110	<b>0.02</b>
Externalising	54.1 (14.1)	45.2 (9.6)	13.8	1, 111	<b>&lt; 0.001</b>	2.4	1, 110	0.1
Total problems	58.0 (13.7)	45.3 (11.4)	26.2	1, 111	<b>10<sup>-6</sup></b>	7.6	1, 110	<b>0.01</b>
YSR, t-scores								
Activities <sup>a</sup>	45.0 (7.8)	49.6 (6.3)	13.9	1, 88	<b>&lt; 0.001</b>	11.9	1, 87	<b>0.001</b>
Social <sup>a</sup>	46.8 (8.1)	51.1 (6.9)	6.6	1, 84	<b>0.01</b>	2.2	1, 83	0.1
Withdrawn	53.5 (5.8)	53.7 (6.1)	0.2	1, 103	0.7	<0.01	1, 102	1.0
Somatic complaints	55.3 (6.8)	53.2 (5.9)	2.0	1, 103	0.2	0.2	1, 102	0.6
Anxious/depressed	56.2 (9.2)	55.3 (8.3)	0.2	1, 103	0.7	0.3	1, 102	0.6
Social problems	54.6 (7.4)	53.6 (6.0)	0.6	1, 103	0.4	0.2	1, 102	0.7
Thought problems	56.2 (8.7)	53.2 (5.9)	3.6	1, 103	0.06	2.7	1, 102	0.1
Attention problems	58.3 (9.8)	54.8 (6.2)	4.6	1, 103	<b>0.03</b>	0.7	1, 102	0.4
Delinquent behaviour	55.6 (7.0)	53.9 (5.4)	2.3	1, 103	0.1	0.8	1, 102	0.4
Aggressive behaviour	55.9 (9.0)	53.2 (4.8)	3.5	1, 103	0.06	0.6	1, 102	0.4
Internalising	50.0 (13.1)	49.7 (11.4)	0.01	1, 103	0.9	0.001	1, 102	1.0
Externalising	52.0 (12.0)	50.1 (8.1)	0.9	1, 103	0.4	10 <sup>-5</sup>	1, 102	1.0
Total problems	51.6 (13.6)	49.4 (9.9)	0.6	1, 103	0.4	0.01	1, 102	0.9

ADHD, attention deficit hyperactivity disorder.  
a. Competence subscales.  
Significant results are shown in bold ( $P \leq 0.05$ ).

**Table DS5** Comparison of psychosocial outcomes in participants with both Tourette syndrome and attention-deficit hyperactivity disorder (ADHD), participants with Tourette syndrome without ADHD and community controls

	Tourette syndrome with ADHD (n = 43)	Tourette syndrome without ADHD (n = 22)	Controls (n = 65)	Tourette syndrome with ADHD v. Tourette syndrome without ADHD			Tourette syndrome with ADHD v. controls			Tourette syndrome without ADHD v. controls		
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	F	d.f.	P	F	d.f.	P	F	d.f.	P
CGAS Consensus score	51.6 (9.0)	65.6 (12.4)	70.4 (12.3)	27.7	1, 60	<b>&lt;10<sup>-5</sup></b>	66.7	1, 103	<b>10<sup>-12</sup></b>	2.1	1, 82	0.2
Vineland Socialization domain standard score	79.3 (24.8)	95.1 (18.0)	101.1 (14.7)	5.5	1, 53	<b>0.02</b>	26.6	1, 99	<b>10<sup>-6</sup></b>	2.2	1, 79	0.1
CBCL, t-score												
Activities <sup>a</sup>	45.1 (6.1)	43.6 (7.5)	47.1 (8.2)	0.4	1, 43	0.5	0.4	1, 83	0.5	3.4	1, 75	0.07
Social <sup>a</sup>	39.9 (10.5)	46.2 (8.3)	51.2 (6.2)	5.1	1, 37	<b>0.03</b>	38.2	1, 76	<b>&lt;10<sup>-7</sup></b>	7.1	1, 68	<b>0.01</b>
School <sup>a</sup>	38.1 (7.8)	45.2 (10.0)	50.2 (5.8)	5.5	1, 46	<b>0.02</b>	79.3	1, 86	<b>10<sup>-13</sup></b>	7.0	1, 73	<b>0.01</b>
Withdrawn	58.7 (9.1)	56.0 (8.8)	52.8 (6.4)	0.7	1, 48	0.4	10.3	1, 90	<b>&lt;0.01</b>	2.4	1, 77	0.1
Somatic complaints	59.3 (9.4)	55.5 (9.6)	55.0 (8.4)	2.0	1, 48	0.2	4.6	1, 90	<b>0.04</b>	0.04	1, 77	0.8
Anxious/depressed	62.1 (9.7)	56.1 (7.9)	53.0 (5.4)	5.8	1, 48	<b>0.02</b>	32.7	1, 90	<b>10<sup>-7</sup></b>	3.1	1, 77	0.08
Social problems	62.1 (9.4)	56.1 (9.2)	52.4 (5.1)	5.6	1, 48	<b>0.02</b>	42.4	1, 90	<b>&lt;10<sup>-8</sup></b>	4.5	1, 77	<b>0.04</b>
Thought problems	63.8 (10.5)	58.2 (10.7)	52.7 (6.0)	4.0	1, 48	<b>0.05</b>	37.1	1, 90	<b>&lt;10<sup>-7</sup></b>	7.6	1, 77	<b>0.01</b>
Attention problems	67.7 (11.5)	57.1 (7.1)	52.8 (6.1)	16.7	1, 48	<b>&lt;0.001</b>	64.5	1, 90	<b>&lt;10<sup>-11</sup></b>	5.8	1, 77	<b>0.02</b>
Delinquent behaviour	58.6 (10.9)	52.6 (4.6)	52.7 (4.6)	3.5	1, 48	0.07	10.1	1, 90	<b>&lt;0.01</b>	0.1	1, 77	0.8
Aggressive behaviour	60.9 (12.6)	53.9 (8.8)	51.9 (4.5)	3.5	1, 48	0.07	21.4	1, 90	<b>10<sup>-5</sup></b>	1.4	1, 77	0.2
Internalising	60.2 (11.3)	51.5 (13.9)	47.4 (11.0)	6.9	1, 48	<b>0.01</b>	26.1	1, 90	<b>&lt;10<sup>-5</sup></b>	1.2	1, 77	0.3
Externalising	58.6 (13.2)	46.7 (12.5)	45.2 (9.6)	9.4	1, 48	<b>&lt;0.01</b>	27.9	1, 90	<b>10<sup>-6</sup></b>	0.1	1, 77	0.7
Total problems	62.7 (10.8)	50.3 (14.6)	45.3 (11.4)	13.5	1, 48	<b>0.001</b>	46.6	1, 90	<b>10<sup>-9</sup></b>	1.8	1, 77	0.2
YSR, t-scores												
Activities <sup>a</sup>	45.3 (8.3)	44.6 (7.0)	49.6 (6.3)	<0.1	1, 34	0.9	10.3	1, 72	<b>&lt;0.01</b>	9.3	1, 63	<b>&lt;0.01</b>
Social <sup>a</sup>	45.6 (8.2)	48.9 (7.7)	51.1 (6.9)	1.9	1, 28	0.2	8.6	1, 71	<b>0.01</b>	1.1	1, 62	0.3
Withdrawn	53.9 (6.3)	52.9 (4.9)	53.7 (6.1)	0.01	1, 40	0.9	0.1	1, 84	0.8	0.1	1, 75	0.8
Somatic complaints	56.0 (7.2)	54.2 (6.3)	53.2 (5.9)	1.0	1, 40	0.3	3.1	1, 84	0.08	0.01	1, 75	0.9
Anxious/depressed	56.4 (9.2)	55.9 (9.5)	55.3 (8.3)	0.1	1, 40	0.8	0.2	1, 84	0.6	0.1	1, 75	0.8
Social problems	55.7 (7.5)	53.7 (7.5)	53.6 (6.0)	1.2	1, 40	0.3	1.6	1, 84	0.2	<0.01	1, 75	1.0
Thought problems	56.5 (8.4)	55.8 (9.8)	53.2 (5.9)	<0.1	1, 40	0.9	3.8	1, 84	0.06	2.0	1, 75	0.2
Attention problems	60.2 (10.4)	55.4 (8.4)	54.8 (6.2)	2.5	1, 40	0.1	9.4	1, 84	<b>&lt;0.01</b>	0.1	1, 75	0.7
Delinquent behaviour	56.9 (7.9)	53.7 (5.1)	53.9 (5.4)	2.4	1, 40	0.1	5.0	1, 84	<b>0.03</b>	0.1	1, 75	0.8
Aggressive behaviour	57.6 (10.4)	53.3 (5.9)	53.2 (4.8)	2.9	1, 40	0.1	7.2	1, 84	<b>0.01</b>	0.1	1, 75	0.8
Internalising	50.7 (13.3)	48.9 (13.2)	49.7 (11.4)	0.3	1, 40	0.6	0.1	1, 84	0.8	0.3	1, 75	0.6
Externalising	54.5 (12.2)	48.3 (11.1)	50.1 (8.1)	4.3	1, 40	<b>0.04</b>	4.4	1, 84	<b>0.04</b>	1.4	1, 75	0.2
Total problems	53.7 (13.6)	48.5 (13.3)	49.4 (9.9)	2.3	1, 40	0.1	2.5	1, 84	0.1	0.4	1, 75	0.5

CGAS, Children's Global Assessment Scale; CBCL, Child Behaviour Checklist; YSR, Youth Self-Report.

a. Competence subscales.

Significant results are shown in bold ( $P \leq 0.05$ ).