When Comorbidity Matters: How Anxiety and Depression Shape Cognitive Functioning in Gilles de la Tourette Syndrome

Centre de Recherche de l'Institut Universitaire en Santé Mentale de Montréal
Département de Psychologie, Université du Québec à Montréal
Département de Psychologie, Université de Montréal
Département de stomatologie, Université de Montréal
Département de Sciences Humaines, Lettres et Communication, Université TÉLUQ
Groupe d'étude sur les troubles Tic, d'Accumulation Compulsive et Obsessionnel-Compulsif (GÉ- TicTacToc)

Marc E. Lavoie

Houda Soubata; Emmanuelle Mazur-Lainé; Bruno Gauthier; Pierre J. Blanchet;

Kieron P. O'Connor†; Julie B. Leclerc

CONTEXT

Common comorbidities

- In adults, up to 86% of patients have at least one comorbidity [Hirschtritt et al., 2015]
- 58% with two or more psychiatric disorders.
- Anxiety (53%) and depression (36%) are common comorbidities affecting adults with Tourette's syndrome [Abbasi et al, 2023].

Cognitive impact

- These comorbidities influence the executive functions, processing speed and memory of affected patients.

KEY PROBLEM

Heterogeneity of results

- Studies reveal mixed results on cognitive inhibition and visuospatial functions in TS patients.
- Most studies do not separate TS effects from comorbidity effects
  - Often leads to unclear interpretation of cognitive deficits
- **Research gap**
- Few studies directly compare:
  - TS with anxiety/depression
  - TS without comorbidity
  - Neurotypical controls

GOALS

- Examine how anxiety and depression influence the cognitive performance of TS patients.
- Evaluate inhibition, motor skills, visuospatial functions, and nonverbal memory in these groups.
- The study seeks to isolate the variables (inhibition, memory, motor dexterity) that effectively discriminate these comorbid groups.

METHODS AND PROCEDURES

- Participants
- Assessments

PARTICIPANTS

- **21** with Tourette syndrome AND anxiety and/or depression (TS-)
- **37** with Tourette syndrome without significant comorbidity (TS+)
- **70** Neurotypical controls
- Comorbidity diagnosis: SCID-I (anxiety, depression, ADHD, OCD).
- Paired for nonverbal IQ, age, sex and laterality.

NEUROPSYCHOLOGICAL ASSESSMENT

- **Stroop** Color–Word Test
  - Interference inhibition
- **Purdue** Pegboard
  - Fine motor dexterity
- Rey–Osterrieth **Complex Figure**
  - **V**isuospatial abilities and non-verbal memory.

RESULTS

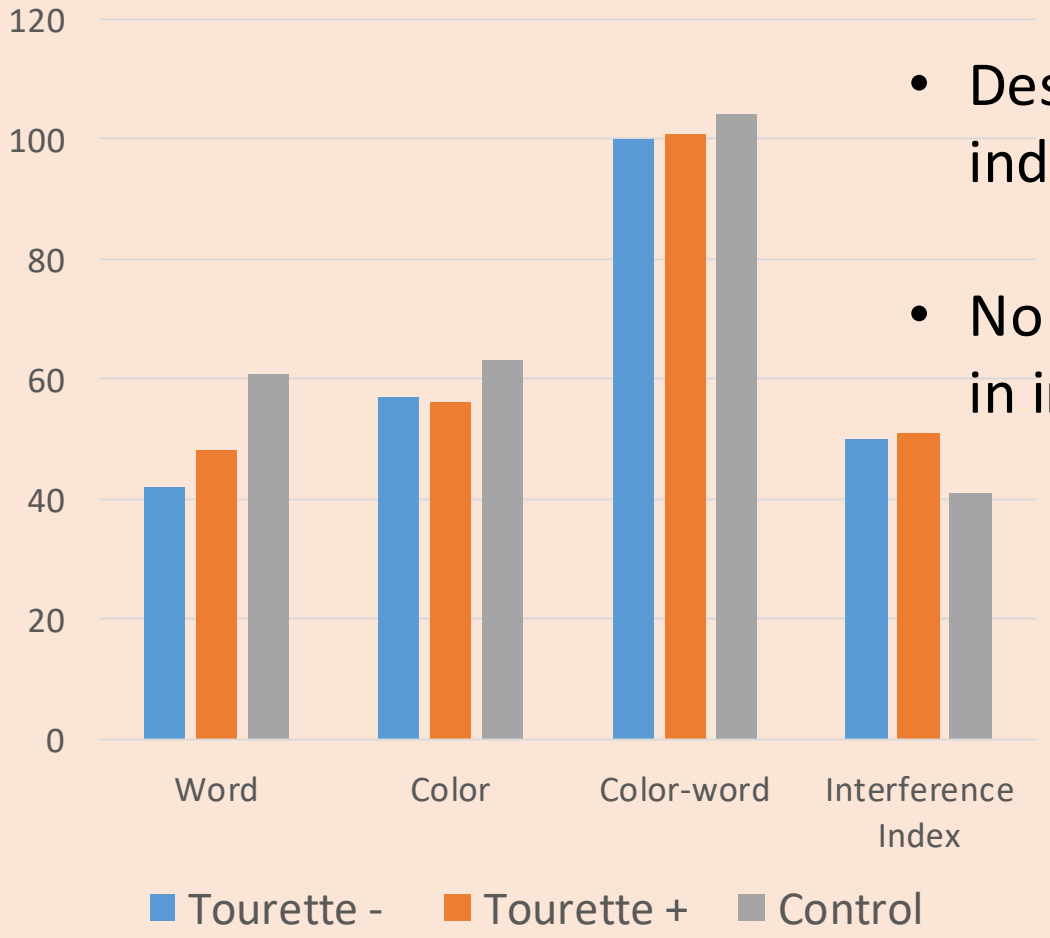
DEMOGRAPHICS AND CORE CLINICAL MEASURES

TOTAL N=128	TS–	TS+	CONTROL	COMPARISONS
Number	37	21	70	ns
Age (years)	34 ± 12	40 ± 13	36 ± 11	ns
Gender (M:F)	21:16	7:14	40:30	ns
Intelligence (Raven)	77 ± 18	64 ± 26	78 ± 21	ns
Laterality (R:L:A)	31:6:0	19:2:0	67:0:3	ns
Anxiety (BAI)	5 ± 3	**21 ± 12**	3 ± 4	TS+ > TS- = Ctrl
Depression (BDI)	4 ± 4	**20 ± 10**	4 ± 5	TS+ > TS- = Ctrl

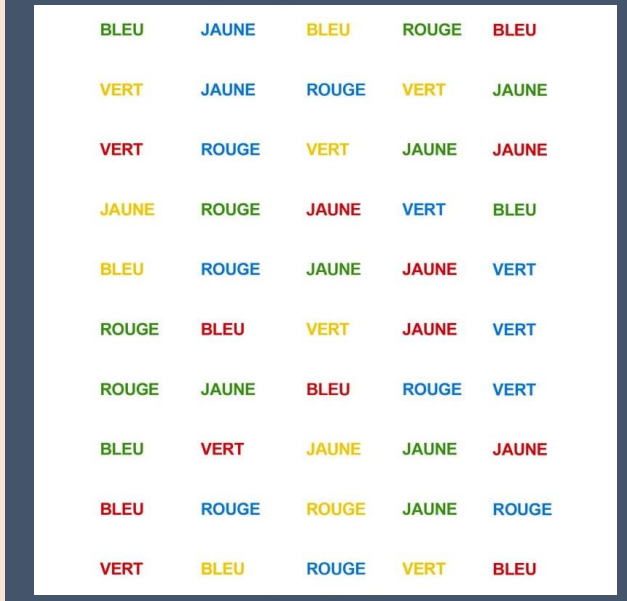
TIC SEVERITY AND GLOBAL SCORES

	TS−	TS+	T-TESTS
Tic Severity – YGTSS	18 ± 7	20 ± 7	ns
Tic Severity – TSGS	13 ± 14	16 ± 6	Ns
Global Score – YGTSS	36 ± 14	44 ± 15	Ns
Global Score – TSGS	23 ± 20	33 ± 10	ns

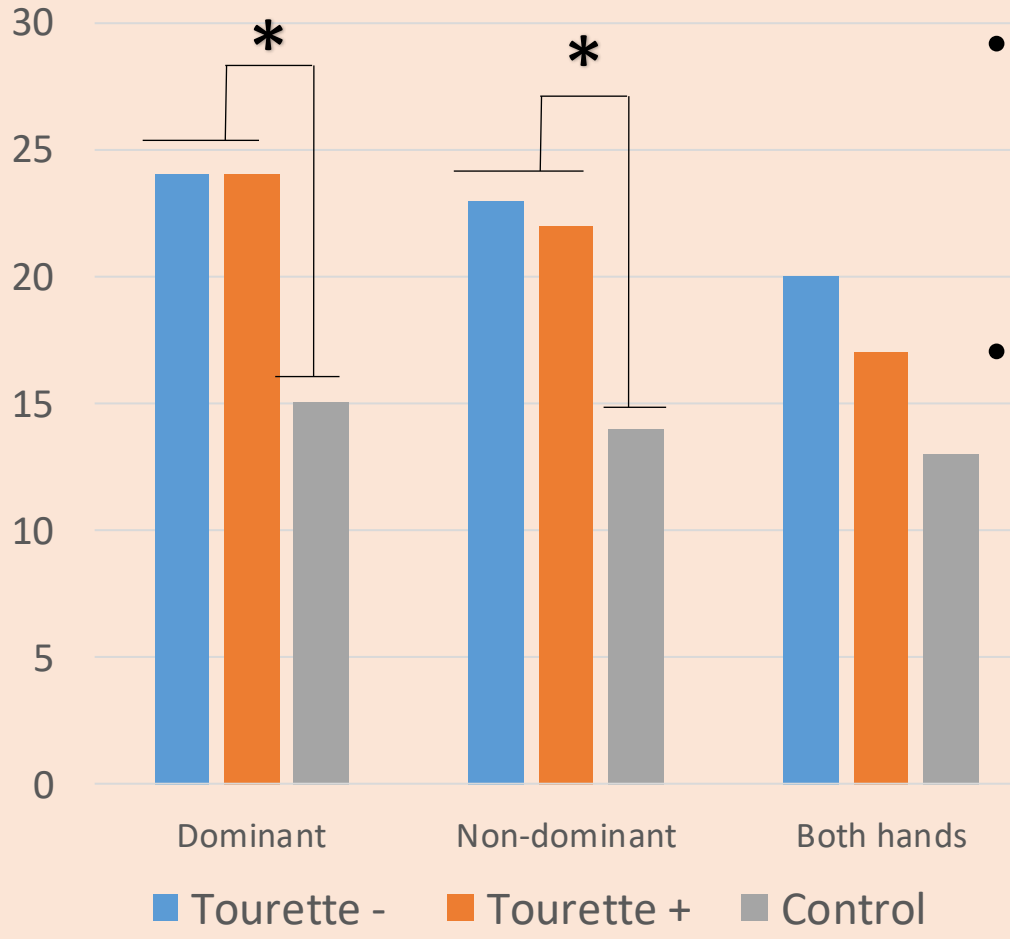
STROOP TEST



- Despite a larger interference index for both clinical groups.
- No significant group differences in interference inhibition.



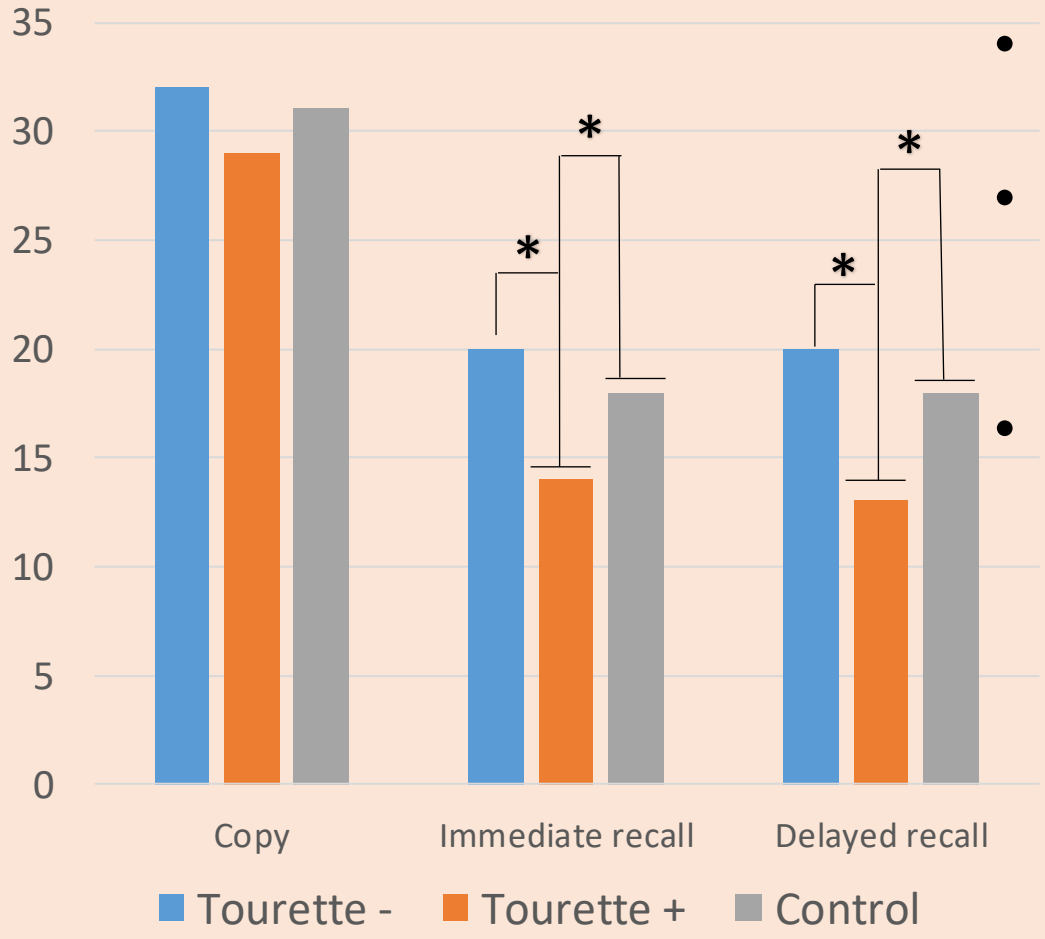
PURDUE PEGBOARD



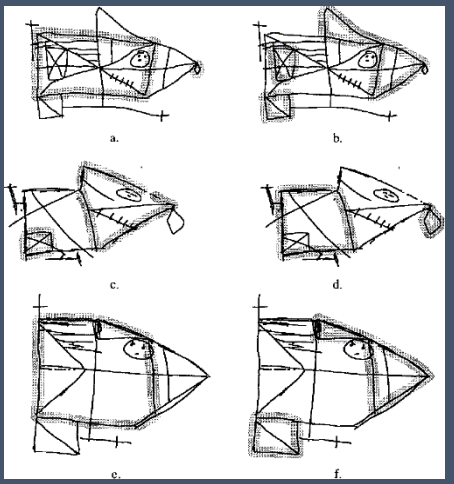
- Both TS groups results revealed more pegs placed in all conditions.
- Both TS groups showed superior motor dexterity compared to controls.

Repeated measures ANCOVA (Rx as covariables)
Group effect [F(2, 124) = 7.58, p < 0.001]
Group x condition [F(2.51, 156.07) = 2.93, p < 0.05]

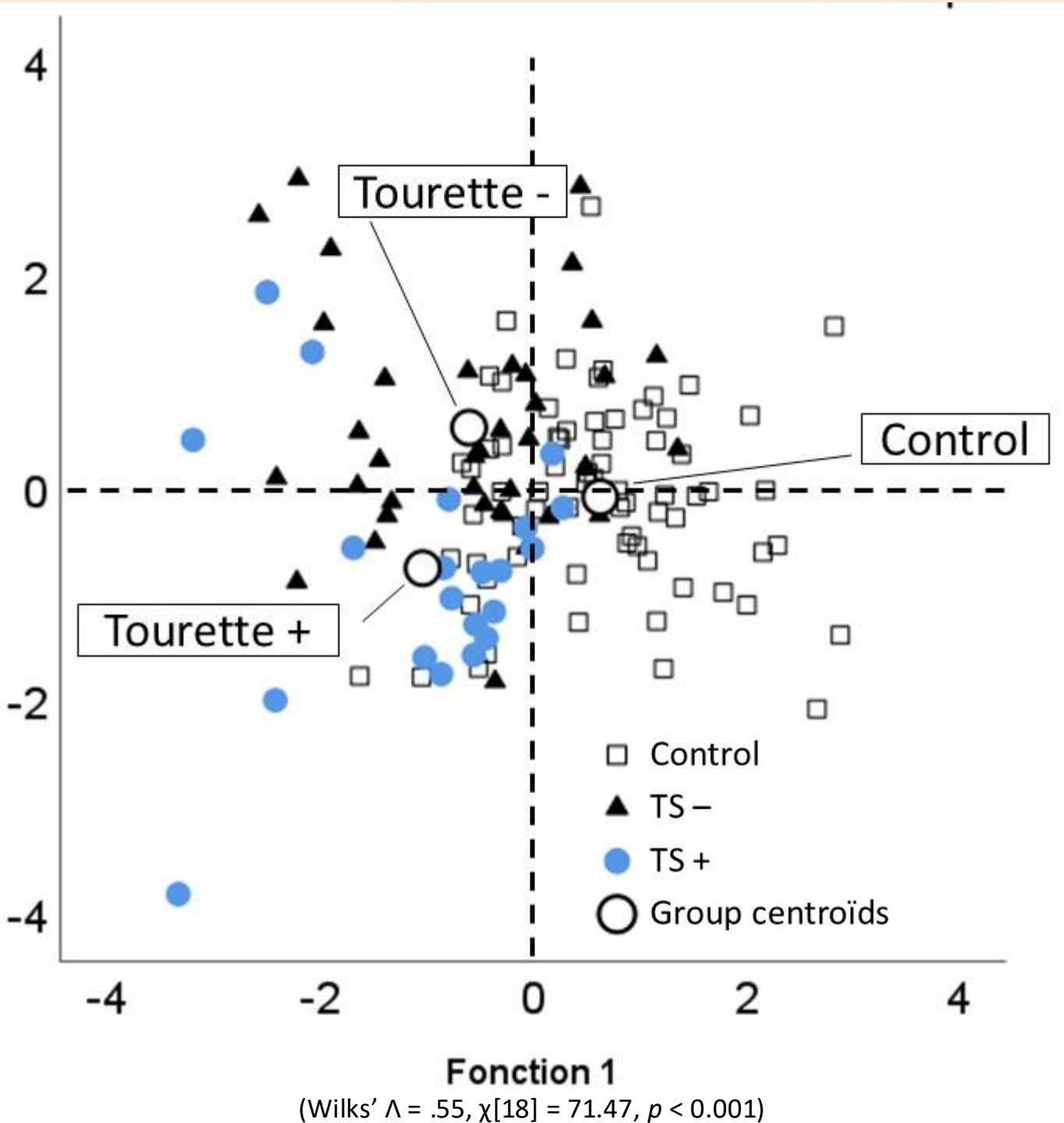
REY-OSTERRIETH COMPLEX FIGURE



- TS showed normative results in the copy condition.
- TS+ with comorbidity showed a reduced recall (immediate and delayed).
- TS – without comorbidity showed comparable ROCF performance than controls

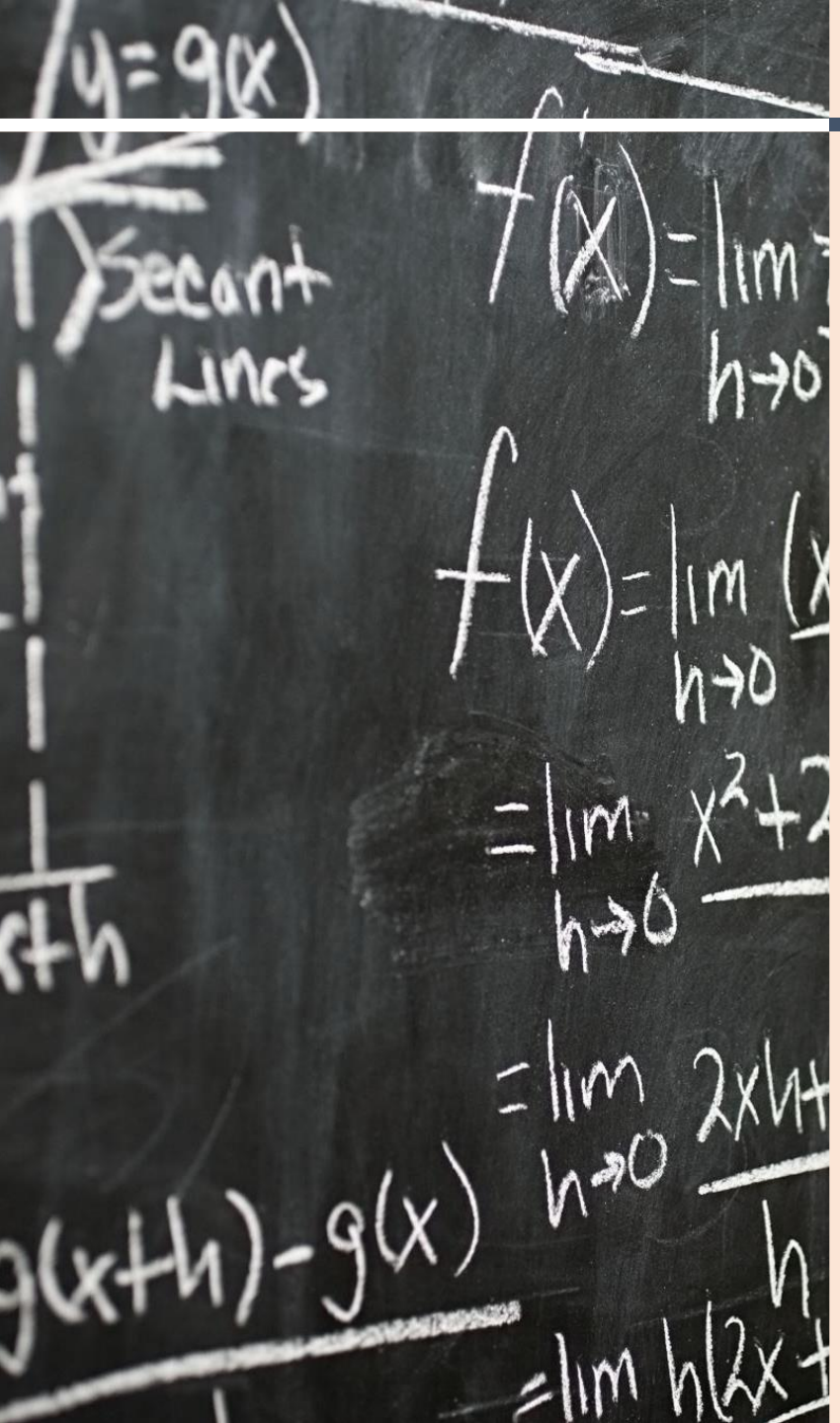


Repeated measures ANCOVA (Rx as covariables)
Group main effect [F(2, 125) = 7.37, p < 0.001, ηp2 = 0.11]
Group by condition [*F*(2.80, 175.15) = 2.24, *p* = 0.09, η_{p2} = 0.04]



DISCRIMINANT ANALYSIS

- **Function 1** (*x-axis*) discriminated controls from TS groups (motor and processing speed)
  - 72.4% of the variance
- **Function 2** (*y-axis*) discriminated TS+ from TS− and controls (visuospatial and memory variables)
  - 28% of the variance
- Overall classification accuracy: 67%



CONCLUSION

- **Inhibition** appears preserved in adult TS, regardless of comorbidity.
- Normal or superior **motor** dexterity in TS + and TS -
- Anxiety and depression selectively exacerbate visuospatial and **memory** deficits in TS.
- So, yes… Comorbidity matters but not equally in all dimensions.
- Clinical and research assessments must explicitly consider affective comorbidities.

Thanks for your attention

JOURNAL OF CLINICAL AND EXPERIMENTAL NEUROPSYCHOLOGY
https://doi.org/10.1080/13803395.2026.2681009

Inhibition, motor dexterity, and non-verbal memory in Gilles de la Tourette syndrome: the impact of anxiety and depression

Houda Soubata[a,b], Emmanuelle Mazur-Lainé[a,b], Julie B. Leclerc[a,c,d,e], Bruno Gauthier[b,e], Pierre J. Blanchet[a,f], Kieron P. O'Connor[a,e,g†] and Marc E. Lavoie[a,e,g,h]

JOURNAL OF CLINICAL AND EXPERIMENTAL NEUROPSYCHOLOGY
https://doi.org/10.1080/13803395.2026.2681009

The Canadian Institute for Health Research (operating grant #**57936** The impact of comorbidity on cognition and behaviour in adults and children with Gilles de la Tourette Syndrome) funded the current research to M. Lavoie, K. O'Connor, and P. Blanchet.