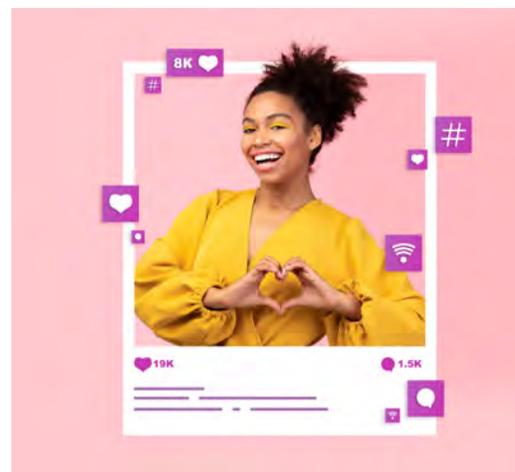




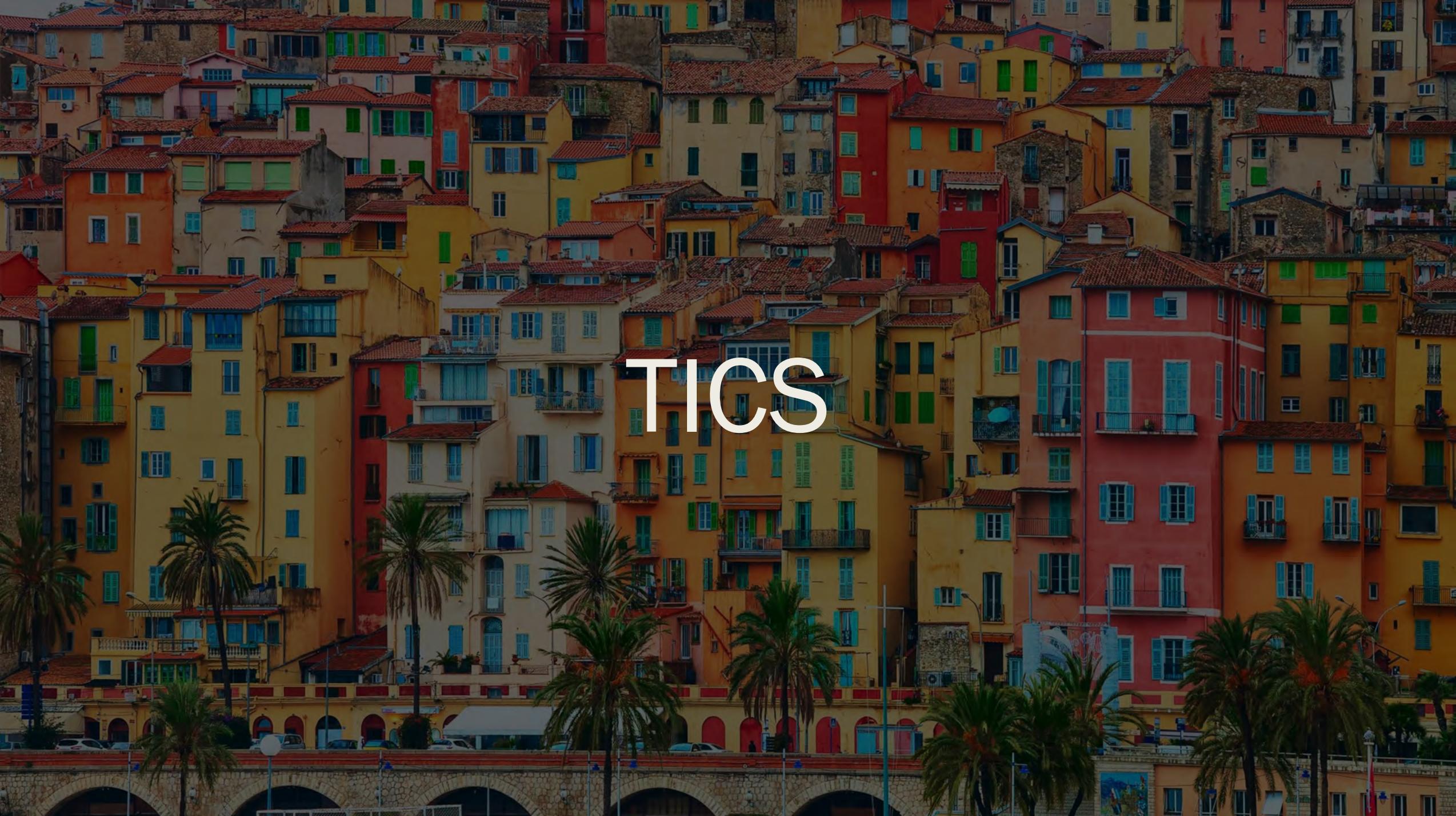
Are functional tics easy to diagnose? YES!

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- Professor, University of Calgary
- Program Lead, Tourette and Pediatric Movement Disorders
- #1 fan of Dr. Davide Martino



Functional tics can be distinguished from tics based on (in order of importance):

1. Age of onset
2. Symptom evolution over time
3. Phenomenology
4. Co-morbidity
5. Sex



TICS

1. Tics: Age of onset

Tic disorders begin in early childhood

Calgary Tic Disorders Registry (n=270)

- *Clinic-based registry*
- *Mean reported age of onset 6.4 years (95% CI 6.1,6.8) in children with TS/tic disorders*
- *93% had onset before the age of 11*

EMTICS study

- *259 unaffected first-degree relatives of people diagnosed with a tic disorder, ages 3-10 years, observed for a mean of 1.6 years for new onset of tics*
- *61 new tic onsets observed during the follow-up time*
- *Mean age at onset 6.8 years (SD 1.9)*

2. Tics: Symptom Evolution

In early childhood (age 4-6), tics begin one tic at a time, lasting weeks to months

First tic: simple motor tic of the face

Vocal tics: one year after motor tics

Tics evolve over a period of years from simple to complex

By age 10, may have several different simple and complex tics concurrently with waxing and waning severity

Peak symptom severity between age 10-12

Mean age at first specialist consultation: 10.5 years (95% CI 10.1, 10.9)

Slow course of symptom evolution reflected in 4 year time span between onset (6 years) and need for specialist consultation (10 years)

3. Tics: Phenomenology

- Simple tics predominate
- Follow rostrocaudal distribution
- Calgary Tic Disorder Registry
- YGTSS inventory captured at first consultation visit (n=180, mean age 10.5 years)
- Most common motor tics
 - *Simple eye blinking 56%*
 - *Simple head jerks/movements 51%*
 - *Simple eye movements 47%*
 - *Simple mouth movements 45%*
- Most common vocal tics
 - *Throat clearing 42%*
 - *Sniffing 26%*
- Most common complex tics
 - *Tic-related compulsive behaviours 19%*
 - *Hand movements 17%*
 - *Syllables 12%*
 - *Echolalia 12%*
- Of note: coprolalia 6%
- During clinical evaluation, there is a noticeable decrease in tic frequency during the neurological examination

4. Tics: Comorbidity

Several large clinical and epidemiological studies have confirmed most common comorbidities in TS are ADHD and OCD, each occurring in approximately 40-50%, with higher rates in clinical samples

Anxiety Disorders 35%

Mood disorders 30%

Disruptive Behaviour Disorders 30%

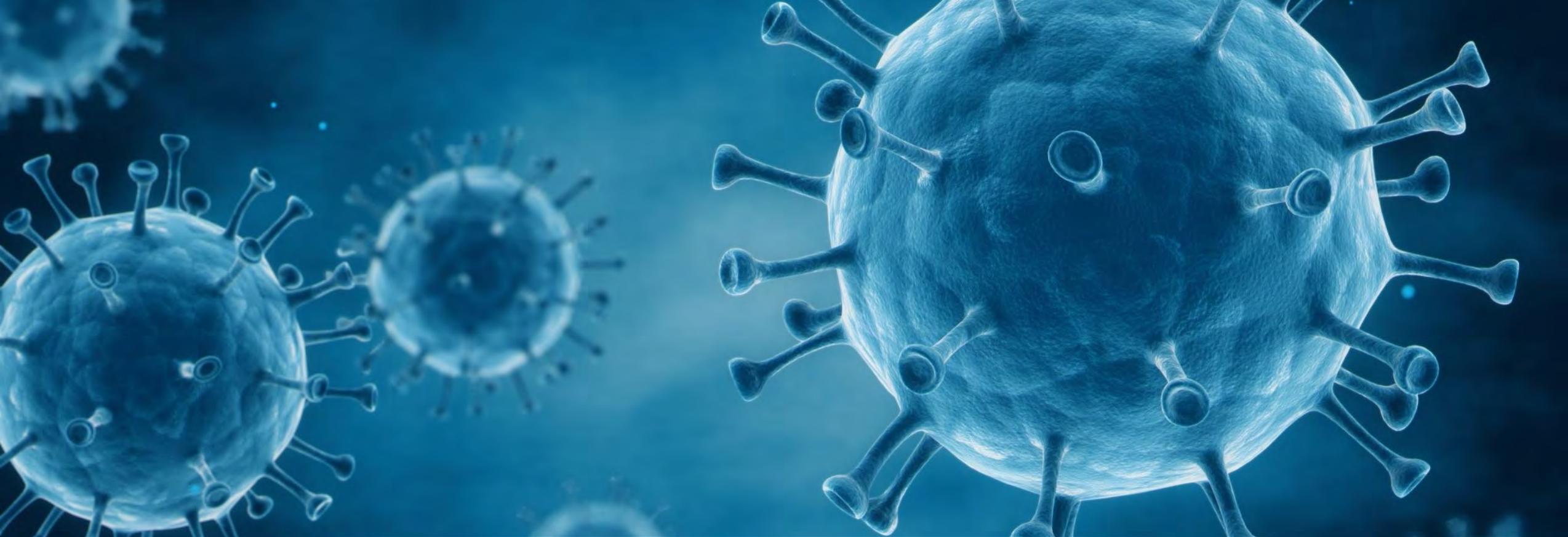
5. Tics: Sex

Population-based epidemiological studies in school aged children demonstrate predominance of males affected by tic disorders

Systematic review and meta-analysis of 13 studies using a school-based clinical assessment for TS (n=30,177 participants)

- 8 studies provided breakdown by sex
- Prevalence in boys 1.06%
- Prevalence in girls 0.25%
- Meta-regression $p < 0.0001$

Male predominance demonstrated in other tic disorder categories



FUNCTIONAL TIC-LIKE BEHAVIOURS

During the pandemic era

1. Functional Tics: Age of onset

Hull and Parnes 2021: 6 patients from USA

- 14.2 years

Paulus et al 2021: 13 patients from Germany

- 16.5 years

Han et al 2022: 22 patients from Australia

- 13.8 years

Buts et al 2021: 34 patients from UK and Canada

- 13.7 years

Pringsheim et al: 20 patients from Canada

- 13.9 years

2. Functional Tics: Symptom Evolution

Rapid onset and progression of both motor and vocal tic-like behaviours, from simple to complex, over days to weeks

Symptom severity prompting urgent assessment, emergency room visits, or hospital admission

In Calgary: age of onset 13.9 years, age at first specialist consultation 14.3 years – 4 months compared to 4 years in patients with TS

YGTSS Total Tic Score at first specialist consultation 33.3 vs 18.4 in patients with TS

3. Functional Tics: Phenomenology

Predominance of complex motor and vocal tics

In Calgary

- Complex vocal tics involving repetition of random words or phrases, often context dependent and socially inappropriate: 90%
- Repetition of curses, obscene, offensive or derogatory statements: 55%
- Complex arm/hand movements (clapping, pointing, sign language, throwing objects): 65%
- Complex arm/hand movements which cause self injury (hitting chest, head or thighs) or hitting other people (most often parents): 70%
- Persistent or increased tic frequency during the neurological examination

Similar phenomenology noted between cases and between samples from USA, UK, Australia and Germany

Similar phenomenology to popular social media influencers

4. Functional Tics: Comorbidity

Most common comorbid disorders identified are anxiety and mood disorders (50-90%)

Many with history of trauma or major concurrent psychosocial stressors in addition to the pandemic

Many undiagnosed and untreated for anxiety or mood disorders at the time of functional tic diagnosis

Consistent across US, UK, Australian and Canadian samples

5. Functional Tics: Sex

Hull and Parnes 2021 (USA)

- 100% female

Paulus et al 2021 (Germany)

- 38% female

Han et al 2022 (Australia)

- 100% female

Buts et al 2021 (UK and Canada)

- 94% female

Pringsheim et al 2021 (Canada)

- 95% female

Based on five fundamental clinical characteristics clinicians can distinguish functional tics from TS

These criteria could be operationalized and tested to see how they perform against expert clinical diagnosis

Because of strong social influences clinicians need to pay attention to what is happening in popular culture as this will likely affect symptom expression moving forward

Challenges include how to categorize patients with functional tics who have a past history consistent with TS/CTD diagnosis and a more recent deterioration compatible with functional tics

Presence and history of other FND symptoms also important to consider, as well as mental health discourses circulating on social media