

# Paediatric tic-like presentations during the COVID-19 pandemic

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## ABSTRACT

**Background and aim** Clinical centres have seen an increase in tic-like movements during the COVID-19 pandemic. A series of children and adolescents are described.

**Methods** A retrospective chart review of 34 consecutive paediatric patients presenting with sudden onset tic-like movements, seen over 6 months.

**Results** 94% of patients were female, with an average age of sudden onset or increase of tic-like movements of 13.7 years. 44% had a previous diagnosis of tics, and 47% initially presented to an emergency department. Comorbid psychiatric and neurodevelopmental disorders were reported in 91% with 68% reporting anxiety.

**Conclusion** We highlight a dramatic presentation of sudden onset functional tic-like movements in predominantly female adolescents to help inform identification and management. There is need to research the neurobiological underpinnings and environmental exacerbating factors leading to these presentations and to explore effective therapeutic strategies.

## INTRODUCTION

Viewpoint papers have emerged internationally reporting an increase in functional tic-like movements, seemingly coincident with the COVID-19 pandemic. The patients described presented with sudden onset, often complex tic-like movements, which appear functional in nature rather than part of a chronic tic disorder (CTD) or Tourette syndrome (TS). The diagnosis of functional tic-like movements can be challenging. Criteria that differentiate functional from other movement disorders (distractibility and suggestibility) are clinical features also seen in tics.<sup>1</sup> Though pathophysiology of functional tic-like movements and tics is different, shared pathways are likely considering the overlapping features.<sup>2</sup> As medications used for tics are usually ineffective in functional tic-like movements,<sup>1</sup> it is important to differentiate the two.

The pandemic could have impacted negatively on the mental health of young people with existing mental health and/or neurodevelopmental difficulties through biopsychosocial factors including worry, illness/bereavement, loss of routine, domestic factors and social isolation.

The aim of this case series is to describe the clinical characteristics of children presenting with sudden onset or escalation of functional tic-like

## What is already known on this topic?

- ▶ During the COVID-19 pandemic, a significant increase in incidence of tics and functional tic-like episodes in children and adolescents has been reported.
- ▶ There has been a worsening of mental health in children and young people in association with the pandemic.

## What this study adds?

- ▶ A description of the demographic and clinical characteristics of children and adolescents presenting with tic-like movements during the COVID-19 pandemic.
- ▶ The patient characteristics, including clinical history, symptoms and associations highlight a need to consider diagnosis of functional movements that can mimic tics.
- ▶ We report a subgroup that presents with patterns of complex tic-like movements/sounds similar to those seen in social media videos.

movements during the COVID-19 pandemic to allow for earlier recognition and accurate diagnosis.

## METHODS

This is a retrospective case note review of children assessed between November 2020 and April 2021 in tic clinics in the UK (Evelina London Children's Hospital ELCH and Great Ormond Street Hospital (GOSH) London) and Canada (Alberta Children's in Calgary). Criteria for inclusion were: (A) Sudden onset or increase of possible tics or tic-like movements within a period of less than 5 days and (B) age 8–17 years.

A multidisciplinary team assessed children and screened for co-occurring conditions using interviews and screening questionnaires. All children were administered the Yale Global Tic Severity Scale (YGTSS) and the Children's Global Assessment Scale (CGAS). Previously diagnosed psychiatric and neurodevelopmental co-occurring conditions were recorded as reported by parents/guardians. In a subgroup of patients at Calgary and GOSH, Diagnostic and Statistical Manual of Mental Disorders-5th edition (DSM-5) criteria were used.



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**Table 1** Pointers to clinically differentiate tics from functional tic-like movements (both can coincide)

	Tics/Tourette syndrome (TS) (references)	Functional tic-like movements*
Gender	M>F 4:1 <sup>4</sup>	F>M 9:1
Age of onset tics/tic-like movements (year)	4–6 <sup>4</sup>	13.7
Anxiety	20% <sup>4</sup>	68% reported, clinically diagnosed in 50%
ASD	5%–15% <sup>3</sup>	12% reported +57% clinically suspected (50% clinically diagnosed in subset of 14 GOSH patients)
CGAS	Mean 59 (SD 7.9) <sup>4</sup>	Median 45 (range 35–75)
Waxing and waning	Often present	32%
Premonitory urge	77% <sup>4</sup>	62% †
Suppressibility	Often present	59%
Pali/echo/copro-like phenomena	Coprolalia and copropraxia in 12.4%–28% <sup>‡</sup>	77%
First tics started in head/neck/rostrocaudal presentation	90% <sup>4</sup>	62%
Yale Global Tic Severity Score	Mean 25 <sup>4</sup>	Mean 62.6 (SD 19)
Watching videos of 'tics' on social media	Unknown	77%

\*Based on 34 patients presenting with functional tic-like movement to specialist tic clinics (1 October 2020–30 April 2021) in London, UK and Calgary, Canada.

†This study lacks qualitative data, and we can thus not differentiate the types of urges in this series from those described in patients with chronic tic disorders/TS.

‡In TS without comorbidity, coprolalia was seen in 10% and copropraxia in 2.4%. In TS with comorbidity, this was 21% and 7%, respectively (5).

ASD, autism spectrum disorder; CGAS, Children's Global Assessment Scale; F, female; M, male.

Statistical analysis was performed with SPSS V.25. Frequencies and percentages were used for categorical variables; depending on their distribution, mean and SD or median and range were used for dimensional variables.

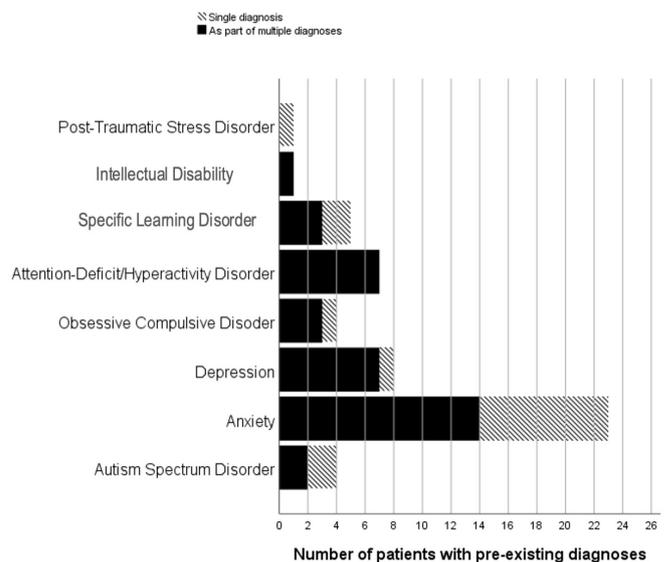
## RESULTS

A total of 34 children were evaluated with most participants being female (94%) and Caucasian (79%). The average age at presentation was 13.7 (SD 2), respectively, 13 (SD 2.5) and 14 (SD 1.6) years for patients with (44%) and without (56%) previous tic diagnosis.

Table 1 shows the differences between patient and clinical characteristics seen in this case series, compared with frequencies previously described in CTD/TS research. In this series, there is a high female preponderance, late age of onset, low prevalence of wax-and-wane pattern and high prevalence of pali/echo/coprophomena compared with CTDs/TS.

The YGTSS total tic severity score is high in this series compared with previous tic research. The perceived severity is also indicated by the high proportion of these patients (47%) who presented to the emergency department with abnormal movements, 44% (7/16) of them receiving acute medication. Another indication of the impact of these movements is shown through the low mean CGAS of 45 (range 35–75) in this series.

Psychiatric and neurodevelopmental comorbidities were reported in 91%, depicted in figure 1. In this series anxiety was



**Figure 1** Pre-existing psychiatric and neurodevelopmental comorbidities of 34 patients presenting with functional tic-like movements to specialist tic clinics (1 October 2020–30 April 2021). Permission for the reuse of this figure was granted by MD and SB.

the most common comorbidity, reported in 68% and diagnosed in clinic in 50%. Depression was reported in 24%.

There were high rates of clinical diagnoses of Attention Deficit Hyperactivity Disorder (ADHD) (57%) and autism spectrum disorder (ASD) (50%) in 14 GOSH patients. A family history of tics was reported in 29% of patients.

In only 15% of cases there was a reported past positive COVID-19 test either in the patient or in their first-degree family members. None reported being medically unwell with COVID-19.

Seventy-seven per cent of patients reported watching videos of 'tics' on social media, mostly prior to onset of symptoms. Fourteen participants presented with a characteristic pattern of movements almost identical to those seen in social media videos, including at least two of the following: thumping chest, slapping own and/or parents' head, clapping hands, whistling, head nod and copro-, pali- or echolalia. In 56% of cases, there were other people in the environment with presentation of tics/tic-like movements.

## DISCUSSION

Functional tic-like movements, based on previous case series with adults, have been characterised by a female preponderance, late age of onset, lack of premonitory urge, suppressibility and wax-and-wane pattern with an absence of a family history of tics.<sup>1</sup> In this paediatric sample, these patterns were similar, with some exceptions. There is a high percentage of copro-phenomena compared with other studies. Premonitory urge and suppressibility are still common. This study lacks qualitative data, and we can thus not differentiate the types of urges in this series from those described in patients with CTDs. Family history of tics is also common in this series. Along with previous history of tics in 44%, this points towards an overlapping phenomenon between tics and functional tic-like movements. This is unsurprising given the overlap of pathophysiological features as well as the common prevalence of psychiatric and neurodevelopmental comorbidities in both disorders.<sup>3</sup> The particularly high prevalence of anxiety

and ASD in this case series suggest that these are associated with functional tic-like movements.

What has contributed to or caused such a sudden increase in presentation of functional tic-like movements? Factors such as social isolation, difficulty with adjusting to online schooling and loss of routine in relation to the pandemic have been proposed. Unrecognised and unsupported ASD and/or ADHD can lead to increased anxiety in everyday life, which can be compounded by pandemic-related stress.

Social media apps promoting the sharing of videos of tic-like movements could play a part in the escalation of sudden onset movements. Mechanisms for this 'imitation' phenomena could include echophenomena with suggestibility and some sort of neurological mimicry. Peer support and a sense of belonging gained by watching or posting videos of tics were reported in some cases, which may inadvertently reinforce symptoms. Underlying neurobiological and genetic factors are likely to interact. An international collaboration has been proposed to further explore potential mechanisms.

Once a diagnosis of functional tic-like movements is made, management may include psychoeducation with an integration of neurological and mental healthcare. It is important to ensure children and families understand the diagnosis and the usefulness of psychological support and intervention when necessary. The aims of management should be to prevent adverse impact on socialisation, education and emotional functioning in the context of the pandemic. Psychoeducation and general well-being support can result in a dramatic resolution of symptoms. The long-term prognosis of functional neurological presentations is not yet known.

As a small case series, this study has inevitable limitations. One limitation is that psychiatric and neurodevelopmental comorbidities were reported and not diagnosed in all cases. Furthermore, only tertiary specialist centres were involved, and cases might not be representative of the wider UK experience.

## CONCLUSION

This case series highlights a group of predominantly teenage girls presenting with sudden onset functional tic-like movements. This may be one of the less well-recognised increased mental health presentations temporally associated with the COVID-19

pandemic, most likely resulting from multiple biopsychosocial factors that are yet to be fully identified. The role of social media, neurogenetic vulnerability and neurodevelopmental factors will be a subject of further research. Elucidation of the potential mechanisms involved in the emergence of this presentation will aim to inform future management options.

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**Data availability statement** Data may be obtained from a third party and are not publicly available. Anonymised tables with data of 34 patients is available at specific request from TH via tammy.hedderly@gstt.nhs.uk.

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## REFERENCES

- 1 Ganos C, Martino D, Espay AJ, *et al.* Tics and functional tic-like movements: can we tell them apart? *Neurology* 2019;93:750–8.
- 2 Voon V, Cavanna AE, Coburn K, *et al.* Functional neuroanatomy and neurophysiology of functional neurological disorders (conversion disorder). *J Neuropsychiatry Clin Neurosci* 2016;28:168–90.
- 3 Burd L, Li Q, Kerbeshian J, *et al.* Tourette syndrome and comorbid pervasive developmental disorders. *J Child Neurol* 2009;24:170–5.
- 4 Specht MW, Woods DW, Piacentini J, *et al.* Clinical characteristics of children and adolescents with a primary tic disorder. *J Dev Phys Disabil* 2011;23:15–31.
- 5 Freeman RD, Zinner SH, Müller-Vahl KR, *et al.* Coprophenomena in Tourette syndrome. *Dev Med Child Neurol* 2009;51:218–27.