

Perceived and real tic suppression ability and its relation to impulsivity

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The question has been raised whether Gilles de la Tourette syndrome (GTS) patients with comorbid Attention Deficit Hyperactivity Disorder (ADHD) may benefit less from behavioral therapy, i.e., habit reversal training and exposure with response prevention because their tic-suppression ability is limited¹. However, a recent study did not find ADHD to moderate treatment response². Findings regarding the association between ADHD symptoms and tic suppression ability have been mixed: Studies using measures of subjectively perceived ability to suppress tics found a relation to ADHD³, whereas studies using objective measures did not⁴. However, no study has compared both in one sample. We hypothesized that ADHD symptoms will affect GTS patients' subjectively perceived ability to suppress tics but not their objective ability.

Our study addresses tic suppression ability in GTS patients in relation to comorbid ADHD. Thirty-five patients (mean age 31.60 +/- 12.07 SD; 9 female) with a DSM-5 GTS diagnosis participated and gave informed written consent prior to the study that was approved by the local ethics committee. Three-minute videos of face and upper body in two conditions (free ticcing, tic suppression - no reinforcement) were scrutinized for tics by two independent tic-raters (reliability: intraclass correlation coefficients > .99, $p < .001$). Mean tic scores were calculated across raters (free: 64 ± 38.52 ; suppression: 50 ± 30.74). An inhibition potency score was calculated $[(\text{sum tics free ticcing} - \text{sum suppression}) / \text{sum tics free ticcing}]^5$. Subjective tic suppression ability was assessed with item 10 of the Premonitory Urge for Tics Scale, ADHD with the German ADHD self-rating scale (ADHD-SB)⁶. Correlations reported are Spearman's *rho* (see table 1).

Patients who scored higher on the ADHD measure, particularly impulsivity, thought that they were less able to suppress their tics successfully but correlations with inhibition potency showed that there was no association between ADHD symptoms and objective tic inhibition ability (table 1, supplementary figure 1). A non-significant correlation between self-reported

ability to suppress tics and inhibition potency ($r = .32, p = .07$) suggested that patients were only moderately good at judging their own tic inhibition ability.

Taken together, ADHD symptoms in adult GTS patients, particularly self-perceived impulsivity, affect patients' perception or judgment of how well they are able to suppress tics, while their actual ability to suppress tics for a short period of time appears to be nearly unaffected by ADHD symptoms. This study provides first insights into the discrepancy regarding tic suppression ability and ADHD symptoms in the literature^{3,4}. The results might depend on the method used to assess tic suppression.

ADHD patients have difficulties judging their own performance⁷. Our findings suggest that GTS patients who perceive themselves to be highly impulsive are self-inattentive or overcritical judging their own performance, underestimating their ability to suppress tics. This notwithstanding, recent evidence shows that a co-occurring ADHD diagnosis does not moderate treatment response to behavioral interventions, while positive participant expectancy does². Future studies might investigate whether developing a more realistic self-perception with those patients who perceive themselves to be highly impulsive could have a positive effect on therapeutic outcome.

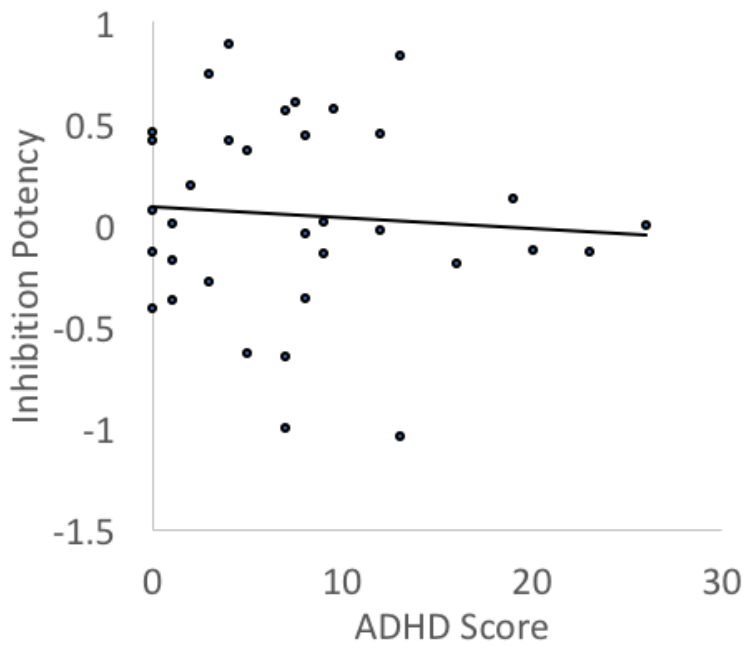
There are several limitations to the study. The sample size is small, hence, the results should be replicated in a large sample. Furthermore, the videos of tic suppression were only 3mins long, instead of a commonly used and more reliable 10mins. Long-term tic suppression might involve different processes, e.g. sustained attention or the ability to delay gratification. Moreover, we did not control for depression and anxiety.

Table 1. Clinical data of n = 35 patients with Tourette syndrome

| Name of scale | YGTSS | ADHD- | | | | Subjective | Inhibition |
|----------------------|--------------|---------------------|-------------------------------|---------------------------------|-------------------------------|------------------------------------|-------------------|
| (Possible range) | (0-50) | SB (0-54) | In-attention (0-27) | Hyper-activity (0-15) | Impul-sivity (0-12) | inhibition ability (1-4) | potency |
| Mean | 19.26 ± | 7.74 ± | 7.24 ± | 4.65 ± | 3.09 ± | 3.20 | .05 ± .48 |
| ± SD | 10.06 | 6.89 | 5.70 | 4.23 | 3.24 | ± 0.93 | (-1.04 - |
| (Range) | (8-45) | (0-44) | (0-18) | (0-15) | (0-11) | (1-4) | .89) |
| Coefficient | | | | | | <i>rho (p)</i> | <i>rho (p)</i> |
| ADHD-SB | | | | | | -.36 (.04) | -.02 (.92) |
| Inattention | | | | | | -.32 (.065) | -.16 (.35) |
| Hyperactivity | | | | | | -.28 (.11) | -.06 (.74) |
| Impulsivity | | | | | | -.39 (.02) | .01 (.95) |

YGTSS = Yale Global Tic Severity Scale; ADHD-SB = ADHD self-rating scale, subjective tic suppression ability was assessed with item 10 of the Premonitory Urge for Tic Scale.

According to the ADHD-SB, 10 patients fulfilled criteria for an ADHD diagnosis.



Supplementary FIG. 1. The figure displays a small, non-significant correlation between Inhibition Potency $[(\text{sum ties free ticcng} - \text{sum suppression}) / \text{sum ties free ticcng}]$ and severity of attention deficit hyperactivity disorder (ADHD) symptoms as measured by the ADHD self-rating scale (ADHD-SB).

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