Introduction

• Tourette’s syndrome is a neurodevelopmental disorder characterized by tics, which are fast, repeated but not rhythmic involuntary and suddenly appearing movements or vocalizations (APA, 2013). These symptoms are associated with significant subjective and social burden (Elmers et al., 2013). To date, neuropsychological studies have predominantly focused on deficits, however, mapping potential strengths is also key, as they may reflect relevant resilience factors.

• Previous findings (Walenski et al., 2007; Dye et al., 2016) suggested dysfunctional frontal lobe and basal ganglia processing are associated with hyperkinetic overactivity, which, in turn, results in faster procedural processing—a potential strength or resilience factor.

• While in prior studies (Walenski et al., 2007; Dye et al., 2016), pertinent associations were examined at the morphological and phonological levels, those were not considered with regard to fluency at the semantic level. Therefore, whether faster procedural processing appears at the level of word meaning, remains unclear.

AEM: The aim of this study was to explore the association between individual differences in procedural processing and verbal fluency in children with Tourette Syndrome (TS) and typically developing (TD) peers.

HYPOTHESES: The TS group, relative to the TD group,

A. would perform better (list more words) on action and phonemic fluency tasks

B. would make fewer errors on these two tasks

C. would list words with a higher verb to non-verb ratio on the phonemic fluency task

Abstract

Tourette’s Syndrome is a neurodevelopmental disorder characterized by tics, which are fast, repeated but not rhythmic involuntary and suddenly appearing movements or vocalizations (APA, 2013). These symptoms are associated with significant subjective and social burden (Elmers et al., 2013). To date, neuropsychological studies have predominantly focused on deficits, however, mapping potential strengths is also key, as they may reflect relevant resilience factors. Hence, mapping potential strengths is also key, as they may reflect relevant resilience factors. There is reason to believe that faster procedural processing, which results from hyperkinetic overactivity due to dysfunctional frontal lobe and basal ganglia processing (Walenski et al., 2007), is one such area of strength. The aim of this study was to explore the association between individual differences in procedural processing and verbal fluency in children with Tourette’s Syndrome and typically developing peers.

Participants were 42 children (9 girls) with Tourette’s Syndrome (Mₜₚₛ = 149.43, SD = 16.41 months) and age- and gender-matched typically developing controls (Mₜₚₛ = 149.38, SD = 16.48) and were normed on three types of verbal fluency tasks: words, sentences, and phonemes. We hypothesized that the Tourette Syndrome (TS) group would perform better than the typically developing (TD) group on the action and phonemic fluency tasks.

Results:

• Participants completed three types of verbal fluency tasks, following methodological guidelines developed by Mézáros et al. (2011):
  - action - to list verbs
  - semantic - list animals or grocery store products, and
  - phonemic - list words beginning with the letters 'k' or 'p'.

Procedure & Analytic plan:

• Each participant’s verbal fluency performance was audiorecorded and then 15-second-interval data were transcribed into text.

• Quality and quantity analyses were then conducted by 4 independent raters. Interrater reliability was calculated; if correlation coefficients were ρ > 0.9, the 2 raters’ results were averaged.

• Data preparation and preprocessing was followed by statistical analyses:
  - Mann Whitney U test (in case of non-normally distributed, continuous data obtained in the action fluency task)
  - independent samples t-test (in case of normally distributed, continuous data obtained in the phonemic tasks)
  - chi-square test (in case of categorical or count data obtained in the phonemic and action fluency tasks)

Methods and Materials

Participants

• 42 children (9 girls) with Tourette’s Syndrome (Mₜₚₛ = 149.43, SD = 16.41 months) and age- and gender-matched healthy controls (Mₜₚₛ = 149.38, SD = 16.98).

Experimental tasks:

• Participants completed three types of verbal fluency tasks, following methodological guidelines developed by Mézáros et al. (2011):
  - action - to list verbs
  - semantic - list animals or grocery store products, and
  - phonemic - list words beginning with the letters 'k' or 'p'.

• On the phonemic fluency task,
  - children with Tourette’s Syndrome listed words with a higher verb to non-verb ratio than controls (ρ²(1; Nₜₚₛ = 40) = 295.23; p < 0.001; ρ² = 2.24) (see Table 1).
  - children with Tourette’s Syndrome listed fewer incorrect words than controls (ρ²(1; Nₜₚₛ = 40) = 7.81; p < 0.001; ρ² = 0.59) (see Table 2).
  - children with Tourette’s Syndrome repeated fewer words than controls (ρ²(1; Nₜₚₛ = 40) = 8.19; p < 0.004; ρ² = 0.47) (see Table 3).

• There was no between-group difference in action (p = 0.632) or in phonemic (τ: fluency: p = 0.75; k: fluency: p = 0.37) fluency performance.

• There was no also between-group difference in number of errors during the action fluency task (i.e., no participant listed any incorrect words, the two groups did not differ with regard to word repetitions (p = 0.791), and the small number of perseverations (none in the TD group and 2 in the TS group) precluded formal statistical comparison.

Conclusions

• Findings partially supported the stimulating effect of faster procedural processing.

• This effect emerges when indirect factors, such as the number of words or errors, are considered.

• Results show light on a domain of strength or resilience in children with TS and thus have clinical implications, e.g., cognitive areas to capitalize upon as serving the role of potential compensatory functions and areas of performance to highlight when targeting self-esteem and evaluation.

Future Directions

• Further comprehensive studies using language and non-language-based tests are needed to broaden and deepen our understanding of procedural processing (including in TS).

• The role of executive functions in action fluency task performance should be explored.

References


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