

Proposed Cut-off Values for the Multidimensional Anxiety Scale for Children (MASC-2), Children’s Depression Inventory (CDI-2) and Conners 3 Parent Assessment Report (Conners 3) in Children with Tic Disorders



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BACKGROUND AND OBJECTIVES

- Psychiatric comorbidities such as **anxiety, depression, attention-deficit hyperactivity disorder (ADHD), obsessive-compulsive disorder** frequently co-exist in children with Tourette syndrome and chronic tic disorders.
- The **MASC-2, CDI-2** and **Conners 3** are screening instruments for **anxiety, depression** and **ADHD** in children and youth.
- A very elevated T-score (**T-score 70+**) suggests a high probability of clinically important symptoms in general pediatric populations.
- It is not clear whether the proposed cut-off values to indicate very elevated T-scores in the general population should be used in patients with tic disorders to identify clinically important symptoms.
- The aim of our study was to evaluate whether proposed **cut-off** values used for the MASC-2, CDI-2 and Conners 3 and in the general pediatric population are valid also in children with TS, PMTD, PVTD and PTD.

METHODS

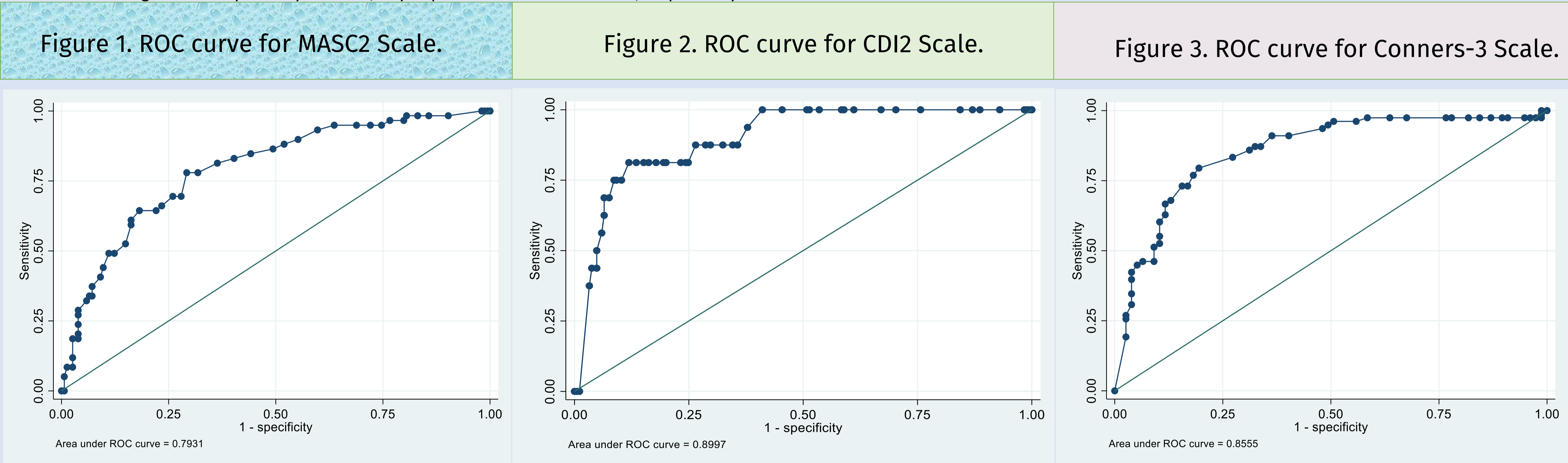
- We conducted a **Receiver Operating Characteristic (ROC) Curve Analysis** for the MASC-2, CDI-2 and Conners 3 in a cohort of children with tic disorders from the **Child Tic Registry of the University of Calgary**.
- We used in our analysis the **MASC-2 Total Score**, the **CDI-2 Total Score** and the **Conners 3 Global Index Total**.
- **263** children with a confirmed tic disorder diagnosis were included in the registry, with a mean age of 10.77 ± 4.95, and 58 females (22%).
- The **empirical cut-point** value was defined as the one which sensitivity and specificity are the closest to the value of the area under the ROC curve.
- We complemented our analysis with the detailed report of **sensitivity** and **specificity** to select the best cut-point for screening purposes in this population. For this purpose, we used details on sensitivity/specificity for each cutpoint.

RESULTS

Table 1. Basic characteristics of the sample and results of the ROC and cut-point analysis for MASC-2, CDI-2 and Conners 3.

Variable	Anxiety MASC-2 Total Score	Depression CDI-2 Total Score	ADHD Conners-3 Global Index Total
N of children that filled out the scale	213	212	155
Mean T Score in entire sample	58.16	57.95	67.72
Diagnosis of the corresponding disorder**	59 (27.7%)	16 (7.5%)	78 (50.3%)
ROC area (SE, 95% CI)	0.79 (0.03, 0.73-0.96)	0.90 (0.03, 0.83-0.97)	0.86 (0.03, 0.79-0.92)
Empirical optimal cut-point (sensitivity, specificity)	58.5 (78%, 71%)	74.5 (81%, 88%)	66.5 (79%, 81%)
Detailed cut-point (sensitivity, specificity)	59 (78%, 71%)	64 (87.5%, 73.5%)	66 (83.3%, 72.7%)

MASC - Multidimensional Anxiety Scale for Children Second Edition™ (MASC 2™), CDI-2 - Children's Depression Inventory 2™, SE – standard error, CI – confidence interval,  
\*\* diagnosis of any anxiety disorder, any depressive disorder or ADHD, respectively



CONCLUSIONS

While in the general population a cut-point T-score of 70 is used to identify very elevated scores, the suggested cut-points to identify clinically important symptoms of anxiety, depression and ADHD in children with tics are **lower**, suggesting that screening tools for psychiatric symptoms should be adapted for this group of patients.