

# Sensory Dysregulation is Associated with Worse Symptom Severity in Youth with Tic Disorder

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## OBJECTIVE

- The purpose of this study was to characterize sensory dysregulation in youth with chronic tic disorder (CTD) and evaluate whether sensory dysregulation is associated with commonly co-occurring DSM-5 mental health disorders (i.e., Anxiety, OCD, and ADHD), premonitory urge, or symptom severity.

## METHODS

- Enrolled children ages 6 to 17.
- Tic severity and co-occurring DSM-5 mental health disorders were evaluated by remote video assessment.
- Sensory symptoms evaluated by child self- or parent proxy-reported questionnaires.
- Normal or dysregulated sensory phenotypes were determined through Adolescent/Adult Sensory Profile scoring system or the Sensory Profile 2 scoring system which utilize Dunn's Sensory Processing Framework (Table 1) for sensory characterization.
- Sensory profiles were considered dysregulated if they scored "More," "Much More," "Less," or "Much Less" on sensory domain.
- Relationships between sensory dysregulation and co-occurring conditions were assessed by Fisher's exact test.
- Relationships between urge severity and sensory profile and tic severity and sensory profile were assessed by Student's two-sided t-test.

**Table 1. Dunn's Sensory Processing Framework<sup>1</sup>**

		Neurological Threshold	
		High	Low
Behavioral Response	Active	Seeking (e.g., humming)	Avoidant (e.g., wearing noise canceling headphones)
	Passive	Registration (e.g., unresponsive to name call)	Sensitivity (e.g., irritated by clothing tags)

## RESULTS

**Table 2. Demographics**

Total Number of Subjects	40
Age ( $\bar{x}$ ( $\pm$ SD))	11.6 ( $\pm$ 2.8)
Sex (Male (Female))	27 (13)
Race/Ethnicity	
Hispanic white	1 (3%)
Asian	2 (5%)
Mixed Race	2 (5%)
Non-Hispanic white	35 (88%)
ADHD (n (%))	22 (55%)
OCD (n (%))	25 (63%)
Anxiety Disorder* (n (%))	26 (65%)

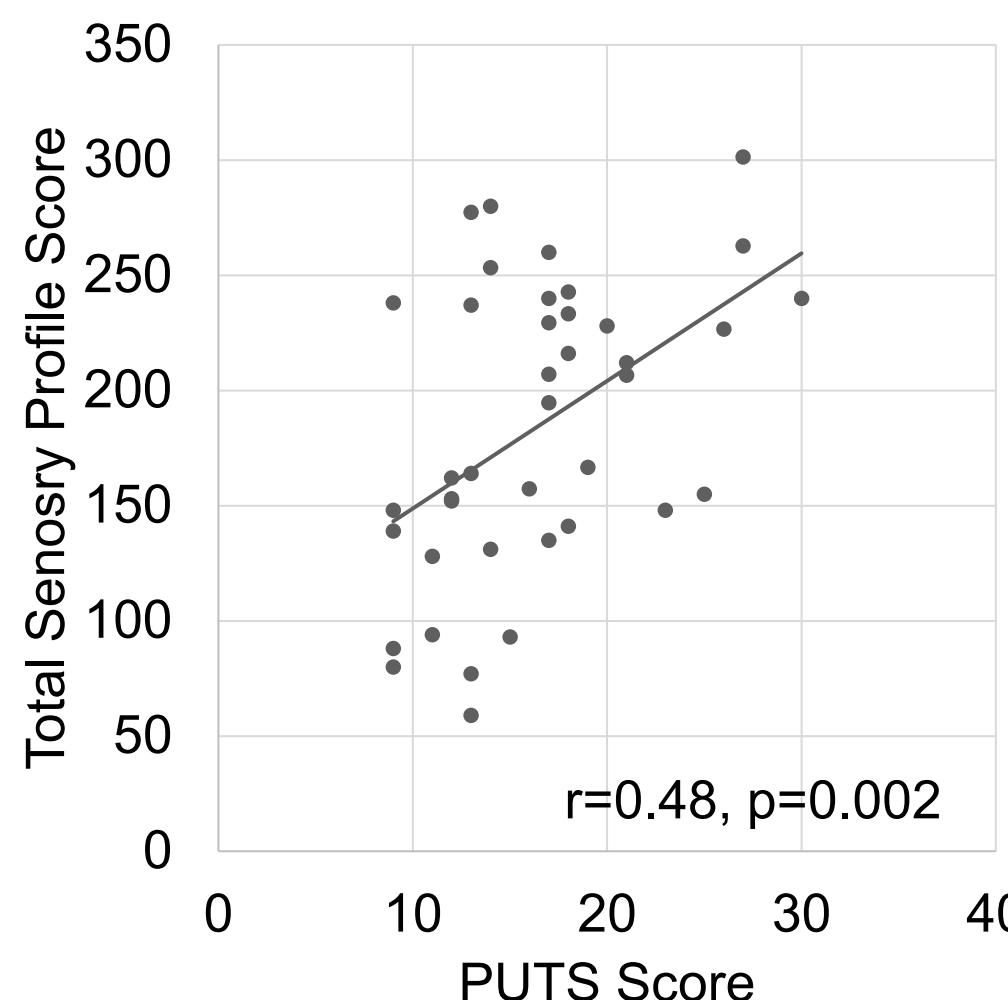
\*Anxiety Disorder includes diagnosis of general anxiety disorder, separation anxiety, and/or social phobia

**Table 3. Sensory Profile of Participants**

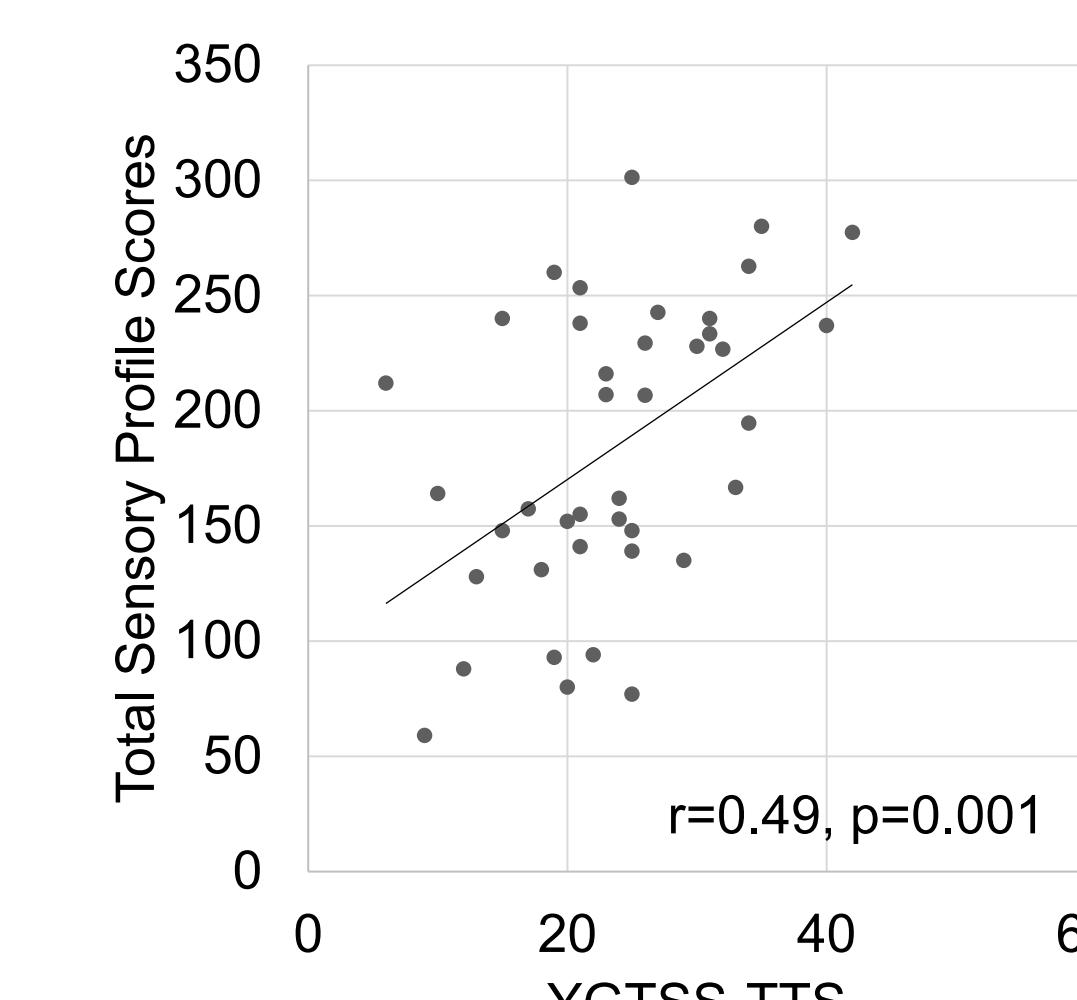
Sensory Profile	Normal (n (%))	Dysregulated (n (%))
Registration	21 (53%)	19 (48%)
Sensory Seeking	21 (53%)	19 (48%)
Sensory Sensitivity	21 (53%)	19 (48%)
Sensory Avoidance	23 (57%)	17 (43%)
Any Sensory Domain	9 (23%)	31 (77%)

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### Urge Severity Associated with Greater Sensory Dysregulation



### Total Tic Severity Associated with Greater Sensory Dysregulation

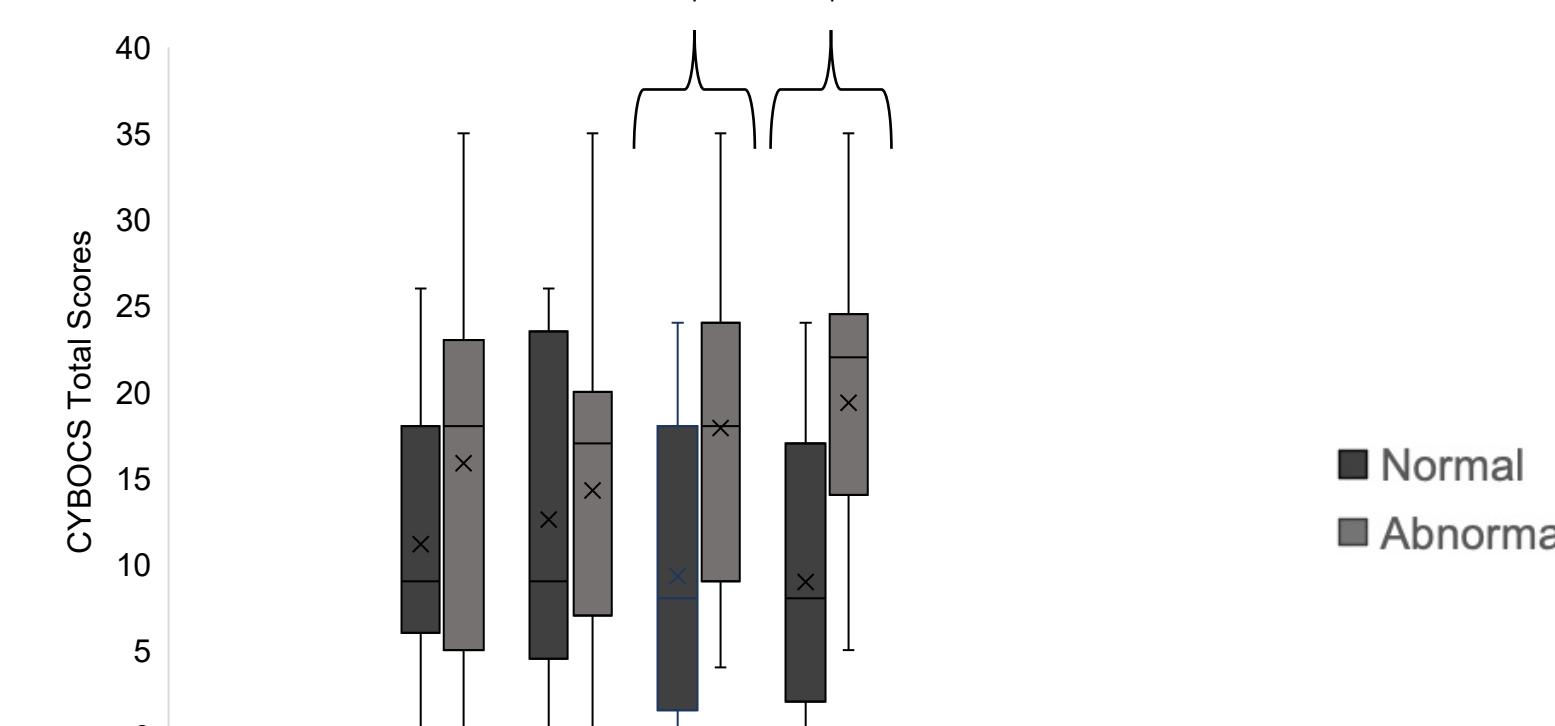
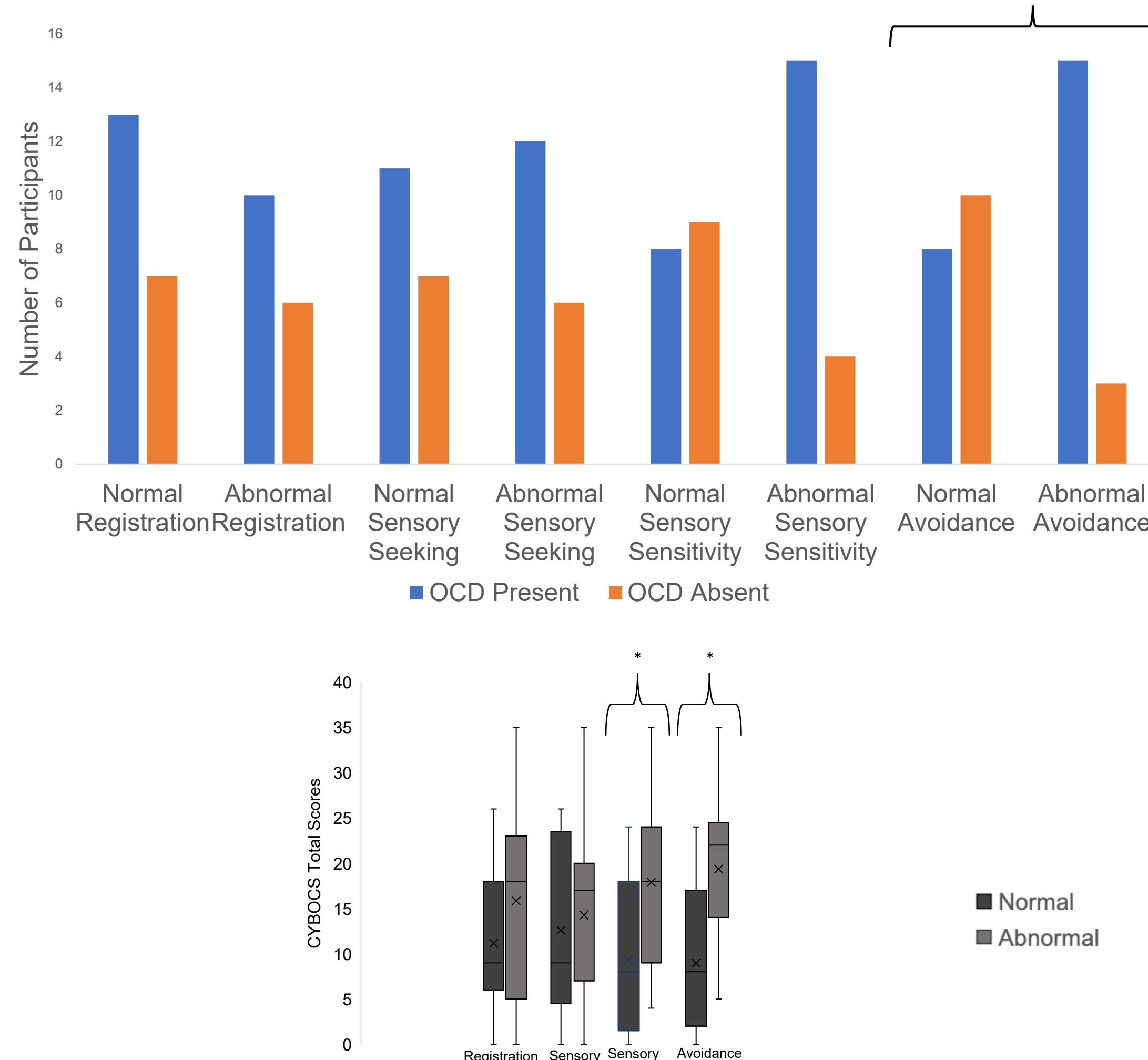


- Total sensory profile score (Short Sensory Profile 2; SSP2, and Adolescent/Adult Sensory Profile; AASP) in youth with CTD had a statistically significant positive linear relationship with urge severity (Premonitory Urge in Tics Scale; PUTS),  $r = 0.48$ ,  $p = 0.002$ .

- Total tic severity (Short Sensory Profile 2; SSP2, and Adolescent/Adult Sensory Profile; AASP) in youth with CTD had a statistically significant positive linear relationship with total tic severity score (Yale Global Tic Severity Scale-Total Tic Severity; YTGSS-TTS),  $r = 0.49$ ,  $p = 0.001$ .

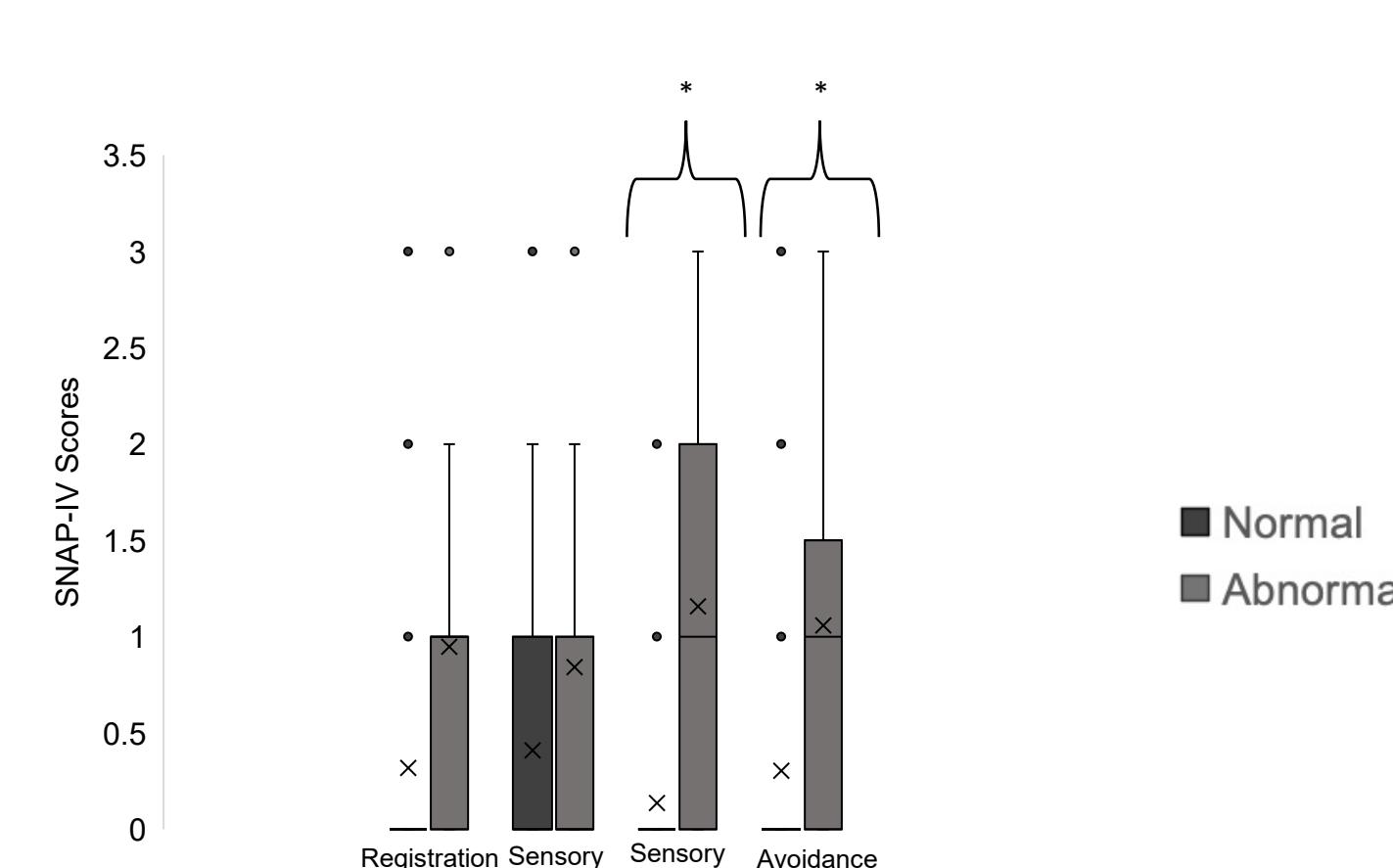
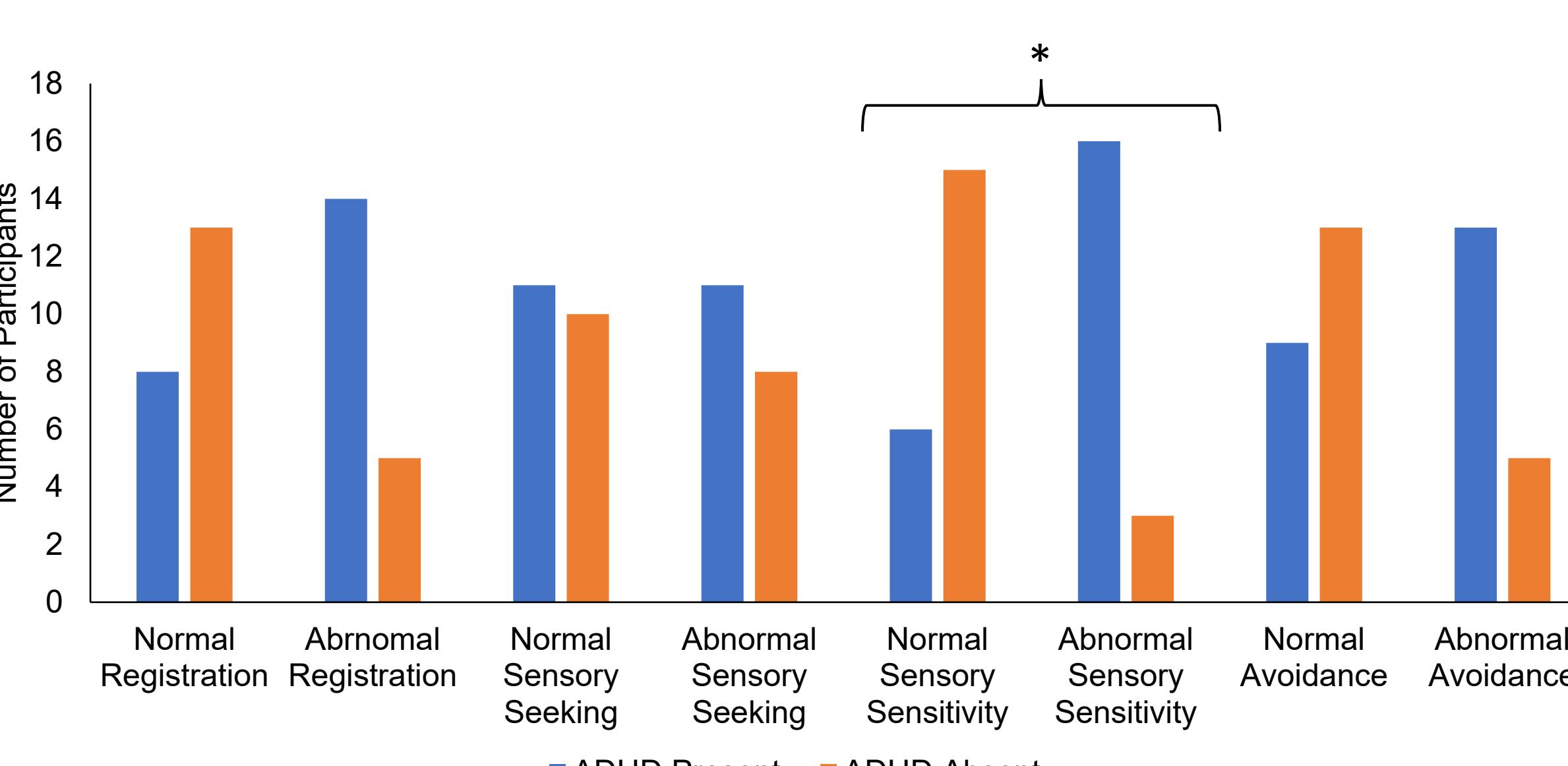
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### OCD and Sensory Dysregulation



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### ADHD and Sensory Dysregulation



- Participants with ADHD were more likely to have dysregulated sensory sensitivity ( $n = 16$ ) compared to those without ADHD ( $n = 3$ ,  $p < 0.001$ ).

- After correcting for multiple comparisons, presence of ADHD was not associated with the other dysregulated profiles: sensory registration ( $p = 0.03$ ), sensory avoidance ( $p = 0.03$ ), and sensory seeking ( $p = 0.76$ ).

- Compared to participants with normal sensory avoidance and sensory sensitivity, participants with dysregulated sensory avoidance and sensitivity had greater symptom severity of ADHD (avoidance:  $t(38) = 2.02$ ,  $p = 0.01$ ; sensitivity:  $t(38) = 2.02$ ,  $p < 0.001$ ).

## CONCLUSIONS

- Our study revealed that youth with CTD, particularly those with co-occurring neuropsychiatric conditions, report sensory dysregulation in various domains with nearly 80% of participants reporting dysregulation in at least one sensory domain.
- These sensory symptoms should be explored thoroughly during clinical visits, particularly in patients with co-occurring conditions who have an increased likelihood of demonstrating sensory dysregulation.
- Therapies targeting sensory dysregulation warrant exploration in the tic disorder population.
- Further study of sensory dysregulation may provide important insights into the underlying urge-tic relationship, which may offer an avenue for potential CTD therapies in the future.