



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.

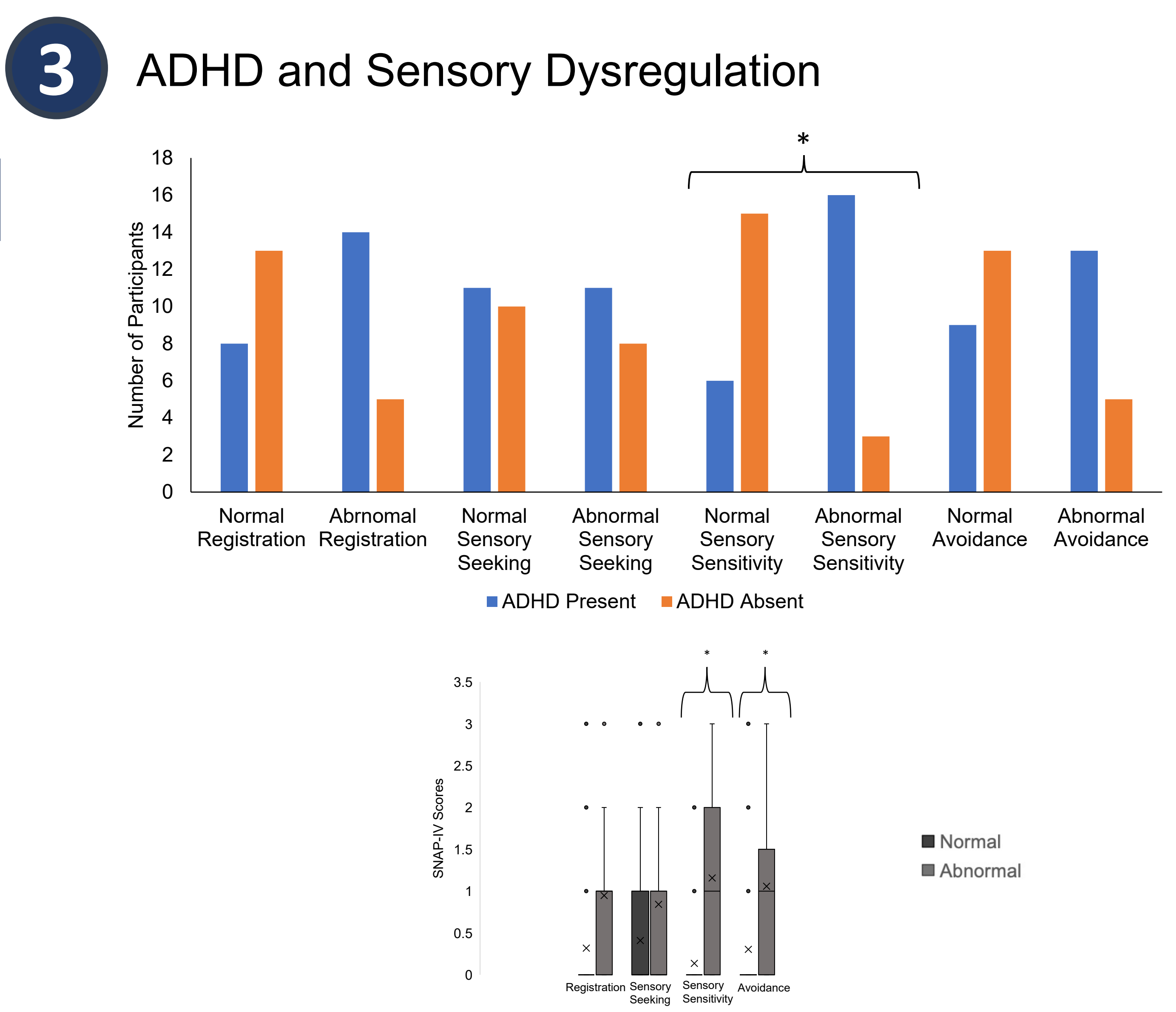
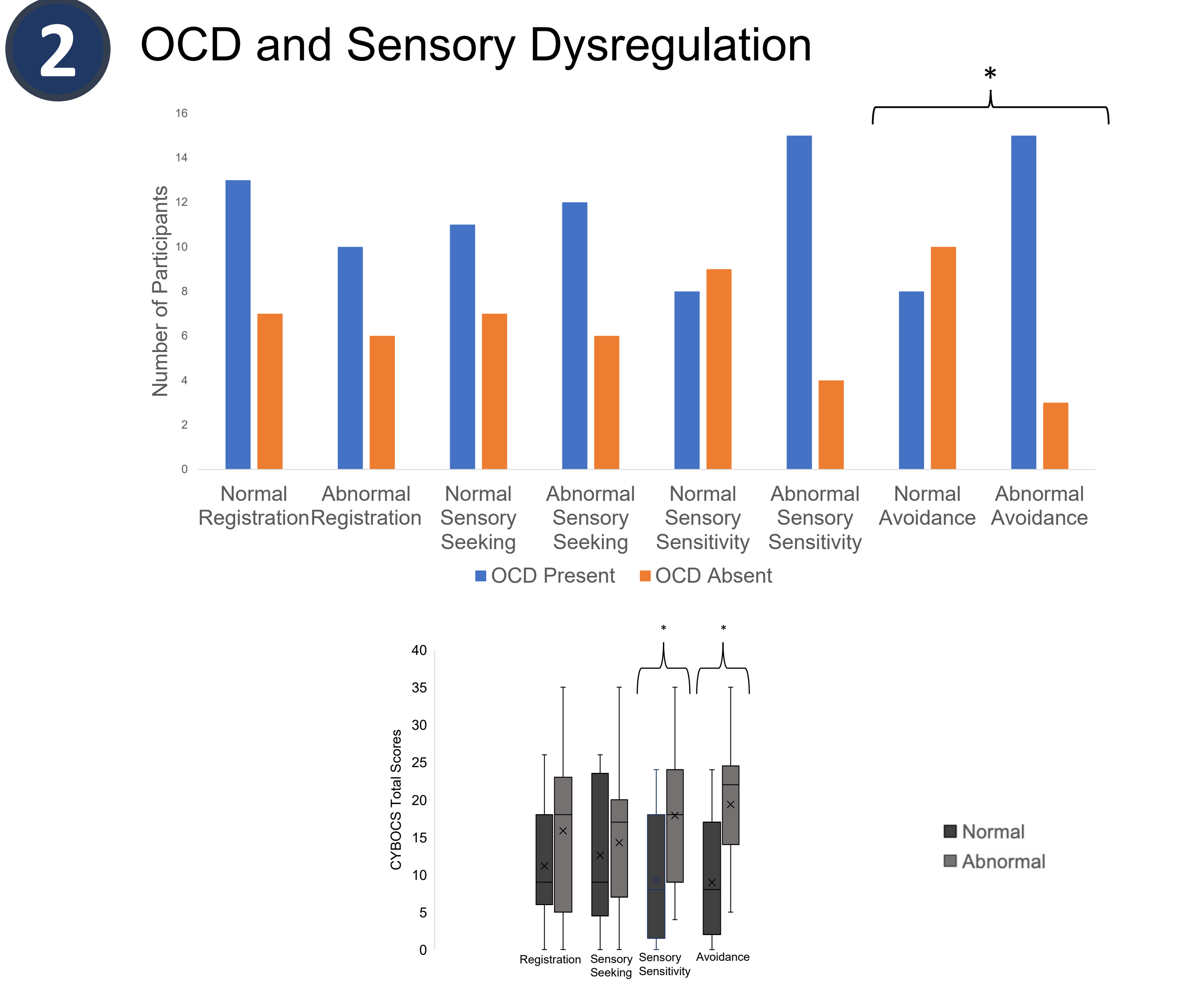
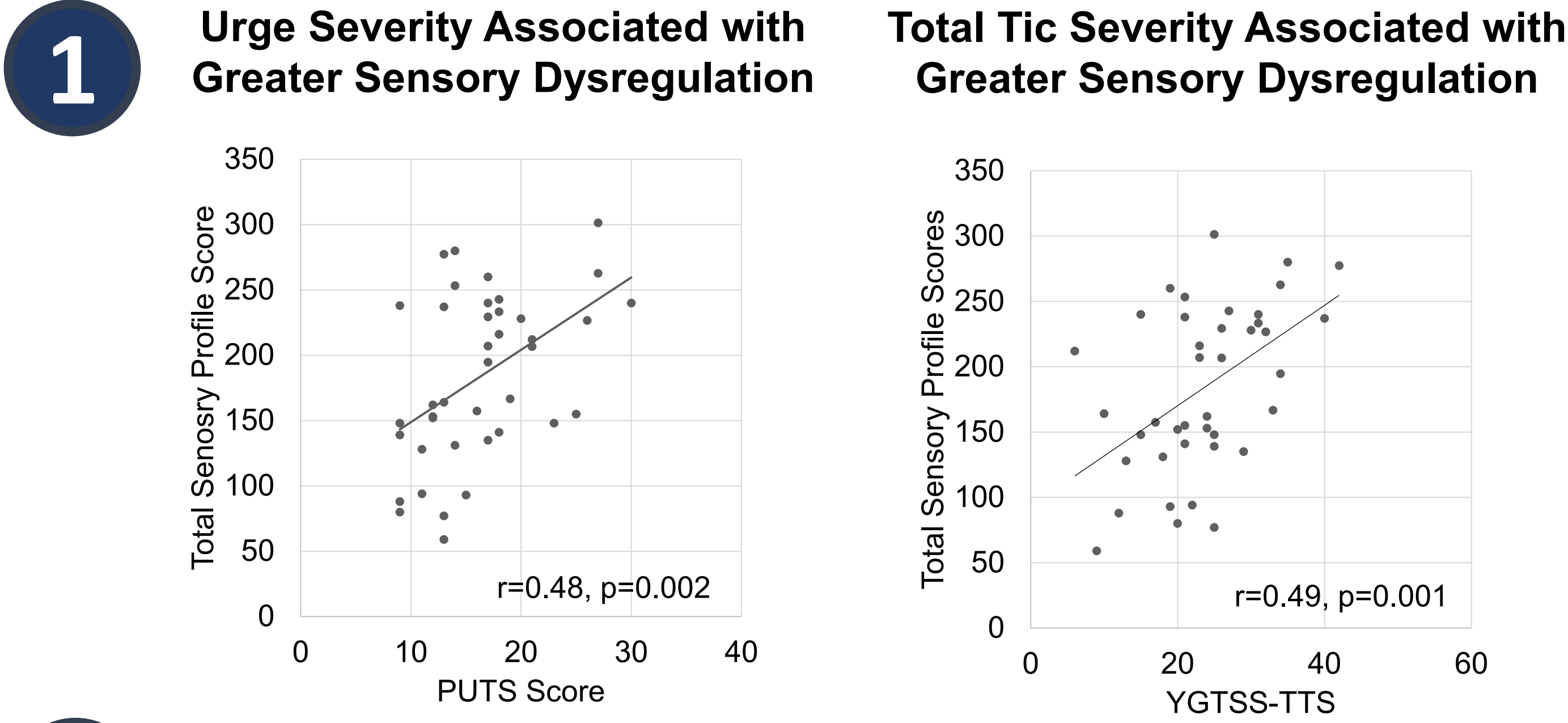
Table 1. Dunn's Sensory Processing Framework ¹		
	Neurological Threshold	
	High	Low
	Active	Avoidant
Behavioral Response	Seeking (e.g., humming)	(e.g., wearing noise canceling headphones)
	Registration (e.g., unresponsive to name call)	Sensitivity (e.g., irritated by clothing tags)
	Passive	

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%)



- 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; YGTSS-TTS), $r = 0.49$, $p = 0.001$.
- Participants with **OCD were more likely to have dysregulated sensory avoidance ($n = 15$) compared to those without OCD ($n = 2$, $p = 0.007$).**
- Presence of **OCD was not associated with the other dysregulated profiles**: sensory registration ($p = 1.00$), sensory seeking ($p = 0.5$), and sensory sensitivity ($p = 0.06$).
- Compared to participants with normal sensory avoidance and sensory sensitivity, participants with dysregulated sensory avoidance and sensitivity had greater symptom severity of **OCD** (avoidance: $t(38) = 2.02$, $p < 0.001$; sensitivity: $t(37) = 2.03$, $p = 0.002$).

- 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.

¹Dunn, Winnie (2014). *Sensory Profile 2: User's Manual*. Psych Corp: Bloomington, MN.