CARDIAC REACTIVITY TO STANDARDIZED SENSORY STIMULI IN ADOLESCENTS WITH AND WITHOUT ASD

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INTRODUCTION

- As many as 96% of people with ASD have sensory processing differences, which are often cited as one of the largest barriers to daily functioning.[1-3]
- Measuring autonomic reactivity and regulation to sensory stimuli is one way to objectively measure sensory dysregulation.
- The Sensory Challenge Protocol (SCP) is a standardized sensory delivery paradigm that has been used in past studies in ASD to measure autonomic responses to controlled stimuli from multiple sensory domains.[4]
- Past results from autonomic sensory research in ASD has varied, finding both hyperresponsivity and hyporesponsivity to individual stimuli.[5-8]
- An important gap in this literature is examining autonomic responses across trials, which would provide important information about orientation and adaptation patterns to sensory stimuli.

OBJECTIVES

- To measure sympathetic and parasympathetic responses to sensory stimuli using the Sensory Challenge Protocol (SCP).
- Analyses specifically focused on reactivity patterns across trials within each sensory modality to better understand how individuals with ASD react to novel and repeated sensory stimuli.

METHODS

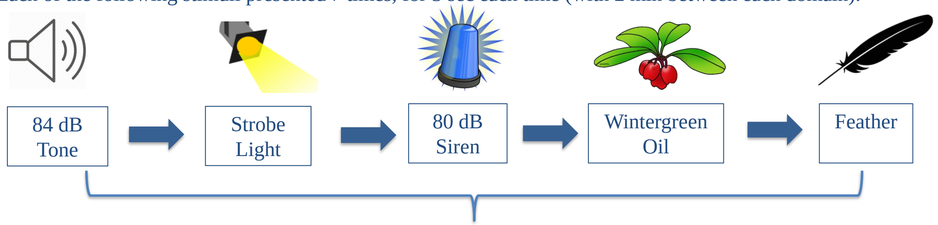
Participants

	ASD M(SD)	TD M(SD)	*F* or X^2	*p*
n	22	24		
Age	14.2 (1.4)	14.9 (1.4)	3.1	.08
Full Scale IQ	110.0 (13.2)	114.6 (13.5)	1.36	.25
Verbal IQ	114.1 (16.3)	117.8 (13.9)	.69	.41
Perform. IQ	103.5 (12.2)	108.6 (13.8)	1.82	.19
Gender (M:F)	20:2	22:2	.002	.97

- Adolescents with and without ASD, ages 12-17 years
- Diagnostic status confirmed using ADOS & ADI-R
- Groups matched on FSIQ, age, and gender
- Carefully screened for medical and psychiatric conditions and normal hearing and vision

Sensory Challenge Protocol

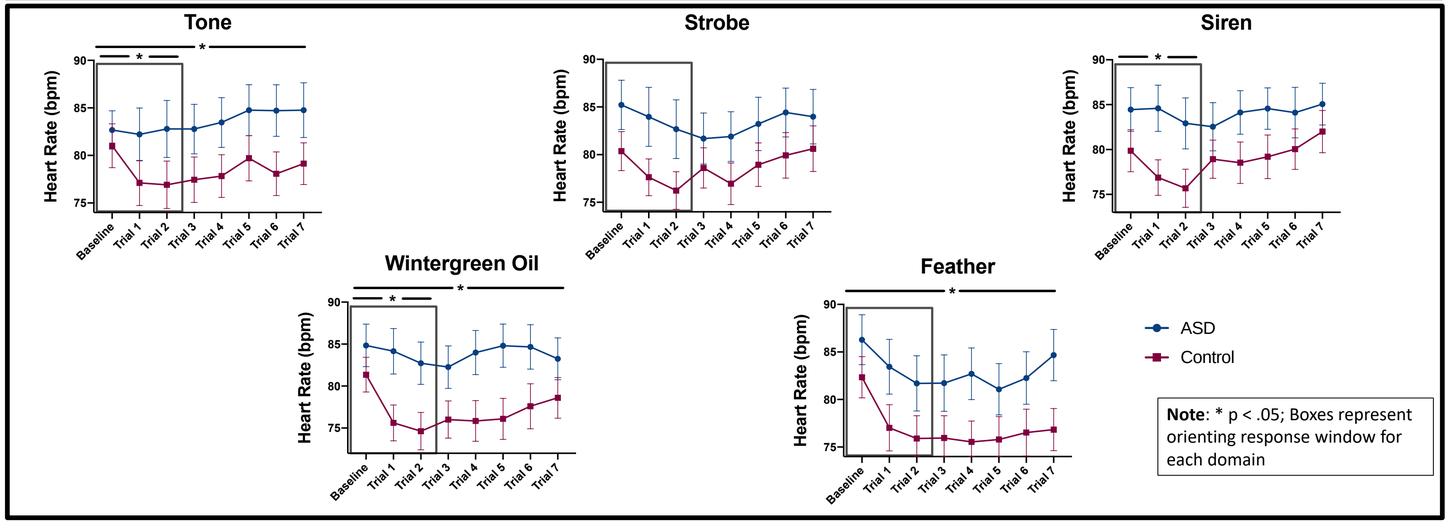
Each of the following stimuli presented 7 times, for 3 sec each time (with 2 min between each domain):



1: Tomchek & Dunn (2007). *Am J Occup Ther*. **2:** Ben-Sasson, Hen, Fluss, Cermak, Engel-Yeger, & Gal (2009). *J Autism Dev Disord*. **3**: Schoen, Miller, Brett-Green, & Hepburn (2008). *Res Autism Spect Dis*. **4:** McIntosh, Miller, Shyu, & Hagerman (1999). *Dev Med Child Neurol*. **5:** Schoen, Miller, Brett-Green, & Nielsen (2009). *Fr Integ Neuro*. **6:** Schoen, Miller, Brett-Green, & Hepburn (2008). *Res Autism Spect Dis*. **7:** Schaaf, Benevides, Leiby, & Sendecki (2015). *J Autism Dev Disord*. **8:** McCormick, Hessl, Macari, Ozonoff, Green, & Rogers (2014). *Autism Res*.

RESULTS

- Group x trial repeated measures ANOVA used to examine overall cardiac reactivity and orienting responses, across all sensory domains and within each domain.
- **Considering all trials and all sensory domains**: Group x trial interaction (p<.001) → individuals with ASD are overall less reactive to repeated sensory stimuli.
- **Considering only baseline and the first two sensory trials in each domain**: Group x trial interaction (p<.001) → decreased or absent cardiac orienting response to novel stimuli in ASD.
- ***A priori* analyses within each domain**: Group x trial interactions for responses across all trials on Tone, Wintergreen, and Feather (p's <.05) and for orienting responses to initial stimuli for Tone, Wintergreen, and Siren (p's <.05).
- No significant effects were found for electrodermal activity or respiratory sinus arrhythmia.



CLINICAL IMPLICATIONS & RECOMMENDATIONS

- This study is the first to examine autonomic orienting responses in adolescents with ASD to several, carefully-presented sensory stimuli.
- Overall, these results suggest that adolescents with ASD may be underresponding to several sensory modalities and attending less to basic sensory stimuli.

Clinically, this may present as:

- Reduced orienting response to sound (e.g., name being called)
- Not noticing sensations like cold, pain, touch, need to use toilet
- Compensating by seeking out sensation (e.g., humming to self, crashing into furniture, spinning)
- If not noticing early, low-level sensory stimuli, stimuli will often escalate before noticed→ a defensive response to more intensive sensory stimuli (e.g., not hearing mother giving initial instruction and then finally hearing when mother is yelling)

Intervention considerations:

- Psychoeducation with caregivers about the connection between sensory registration and attentional/affective processes
- Getting at eye-level with a child and calmly getting their attention before giving a command
- Using predictable, visual cues as much as possible
- Provide fidgets, sensory cushions, headphones with music
- Use prevention strategies to keep child safe, particularly if they tend to not notice pain as quickly as other children

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