

# Auditory Sensitivity, Habituation, and Behavioral Dysregulation in Autism Spectrum Disorder (ASD)

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## BACKGROUND

- Hypersensitivity and over-reactivity to sounds are among the most common sensory processing impairments in ASD
  - Both are associated with over-focused (“sticky”) attention<sup>1,2</sup>
- Caregiver ratings of auditory filtering and over-reactivity difficulties relate to maladaptive behavioral outcomes, including:
  - **Externalizing** problem behavior (EXT): impulsivity<sup>3</sup> and hyperactivity<sup>4</sup>
  - **Internalizing** problem behavior (INT): anxiety<sup>4</sup> and perseveration<sup>2</sup>
- It is unclear how underlying neural mechanisms of attention (i.e., **auditory sensitivity** and **habituation**) relate to INT/EXT

## METHODS

### Participants

Group	N	Age in years (M, SD)
Autistic	130	10.2 (4.4)
Non-autistic	86	11.8 (4.2)

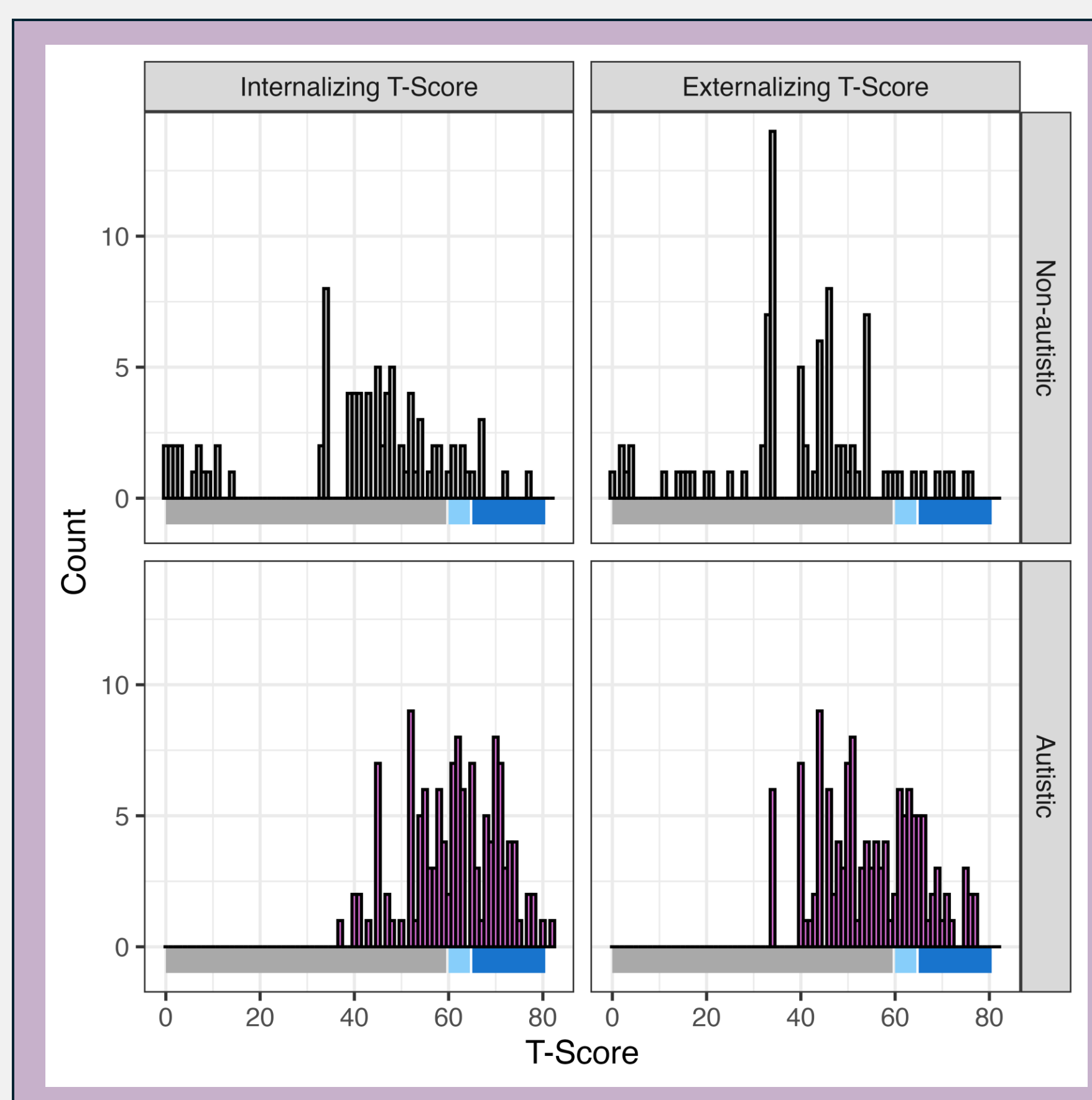
**Internalizing and Externalizing behaviors** Assessed via parent report: Child Behavior Checklist<sup>5</sup>

### Auditory oddball EEG experiment

novel sounds > frequent tones



**P3 ERP amplitude** (125-450 ms)  
Index of early attention orienting



## MAIN TAKEAWAYS

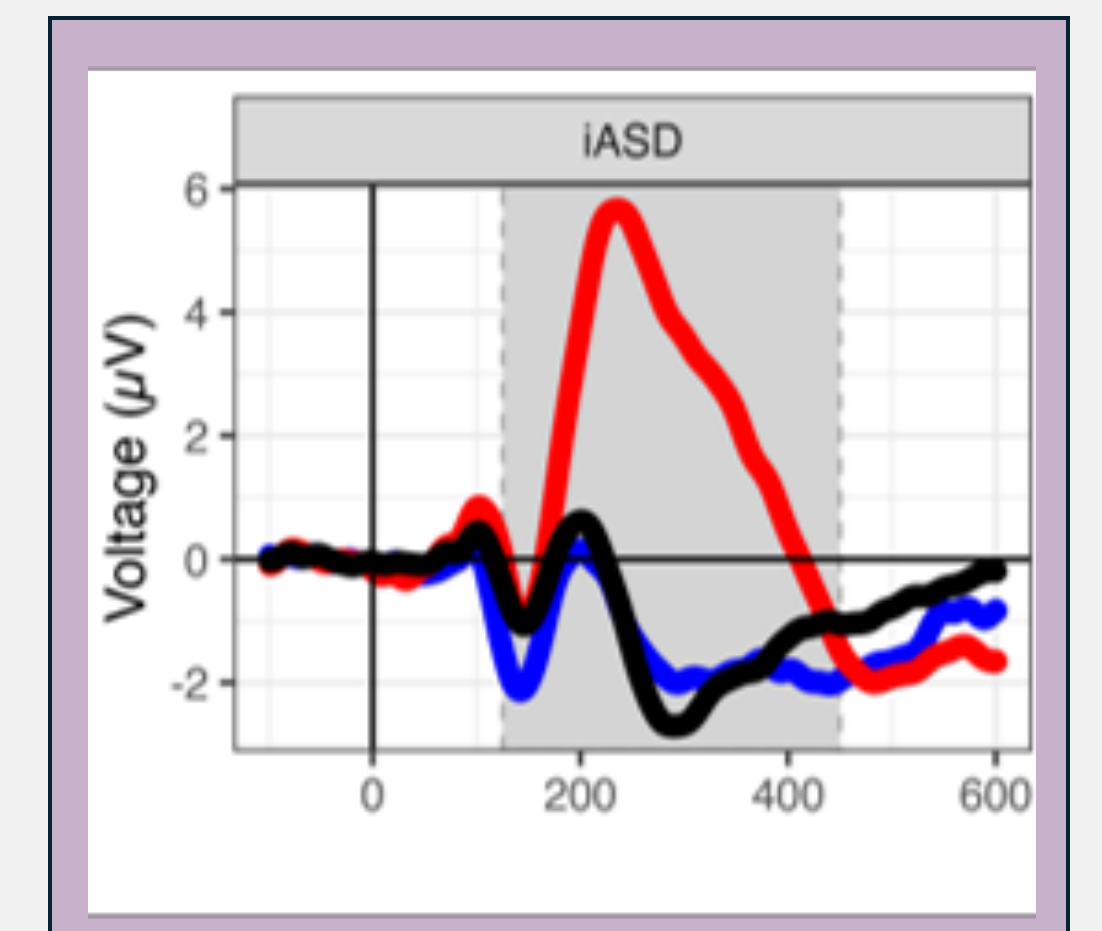
- High INT/EXT severity in ASD was associated with **sensitization** to novel sounds, representing sticky/overfocused attention
- Autistic participants high in INT/EXT also had **lower initial sensitivity** to novel sounds
- These findings offer a potential explanation for the co-occurrence of under- and over-responsiveness to sounds in individuals with ASD<sup>3,4</sup>
- The positive relationship between INT/EXT and auditory processing difficulties highlights the importance of sensory-based interventions in addressing maladaptive behaviors in ASD

### References:

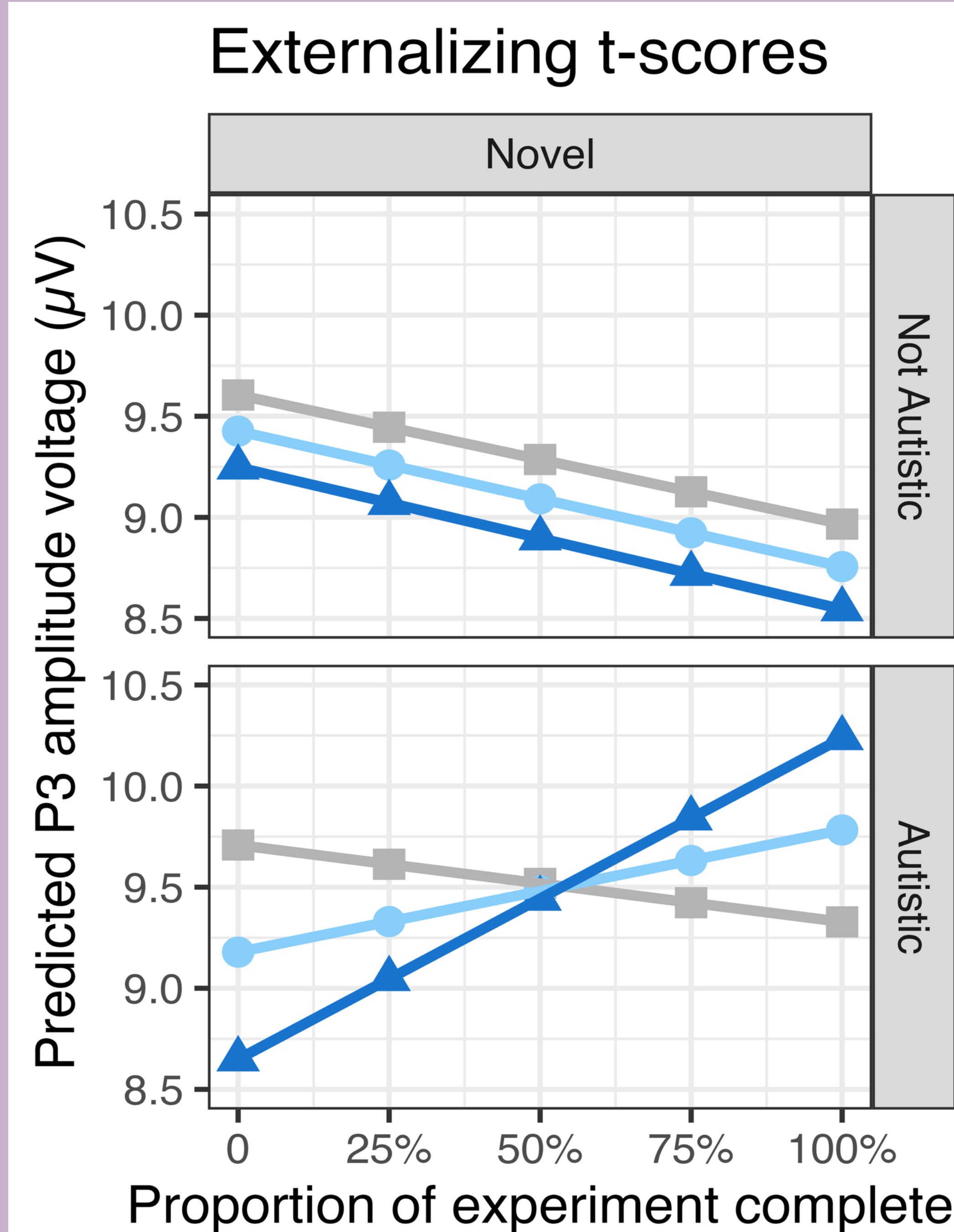
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## OBJECTIVES

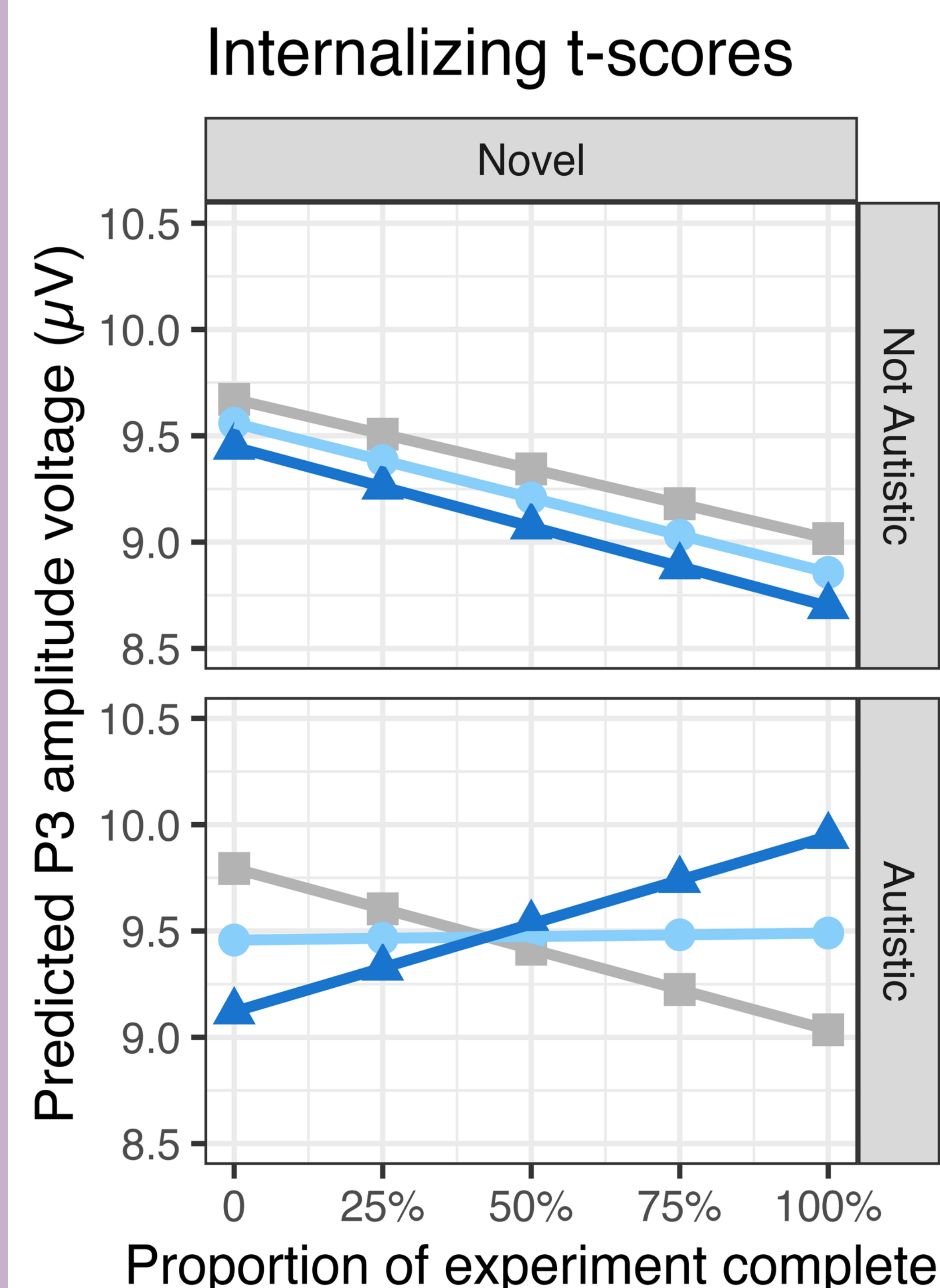
1. Use neural attention responses (P3) as objective markers to clarify the relationship between auditory processing and behavioral outcomes in ASD
2. Examine whether heightened neural sensitivity and slower habituation to sounds predict higher INT/EXT severity



## RESULTS



**Figure 1. Predicted P3 amplitude across task progression as a function of EXT severity.** Autistic participants show divergent neural adaptation to novel sounds based on EXT severity ( $F(1, 71850) = 6.70, p = .045$ ). Autistic participants high in EXT severity showed **lower initial sensitivity** to novel sounds but exhibited **sensitization** to these sounds over time. Non-autistic participants showed adaptive habituation responses regardless of EXT severity.



**Figure 2. Predicted P3 amplitude across task progression as a function of INT severity.** Autistic participants show divergent neural adaptation to novel sounds based on INT severity ( $F(1, 71850) = 4.17, p = .041$ ). Similar to the effects of EXT, **higher INT severity was associated with lower initial sensitivity and increased sensitization** to novel sounds. Non-autistic participants showed adaptive habituation responses regardless of INT severity.

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