EEG Indices of Sensory Gating Are Associated with Atypical Perceptual Modulation and Interoception

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BACKGROUND

- Sensory gating is the process of filtering out repeated sensory stimuli to prioritize attentional resources towards the most relevant sensory information in one's environment (Grunwald, 2003)
- Compared to typically developing (TD) individuals, those with ASD exhibit reduced sensory gating to repeated auditory stimuli using validated EEG tasks (Williams et al., in press)
- It is possible that atypical sensory gating is a basic mechanism that contributes to ASD symptoms relevant to atypical perception of external stimuli (e.g., sights, sounds) and internal stimuli (i.e., interoceptive senses)
- The objective of this study to better understand the clinical significance of auditory sensory gating by correlating with theoretically related clinical measures

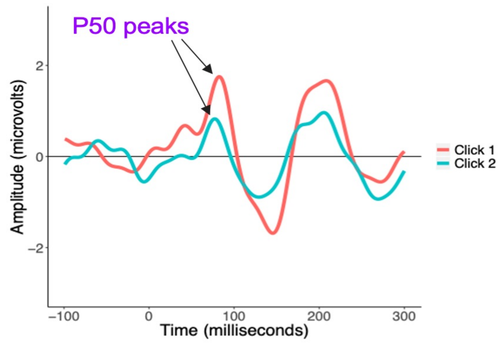
METHOD

- Preliminary data was collected in 19 typically developing adults (18-40 years old) with no history of psychiatric diagnosis
- Sensory gating was assessed using a validated P50 EEG task (Wan et al., 2007) that administered two auditory clicks spaced 500ms apart
- The auditory P50 event-related potential (ERP) was examined at central electrodes over posterior scalp, corresponding to brain areas associated with pre-attentive processes
- Sensory gating was calculated as: $P50\ Gating\ Ratio = \frac{Click\ 2\ amplitude}{Click\ 1\ amplitude}$ with the assumption that higher P50 Gating Ratios (reduced difference between Click 1 and Click 2 amplitude) represent reduced sensory gating (see Figure 1)
- P50 Gating Ratios were correlated with the following questionnaires:

1) The Broader Autism Phenotype Questionnaire (BAPQ; Hurley et al., 2007), which includes items such as "I prefer to be alone rather than with others"
2) The Perceptual Modulation subscale of the Sensory Gating Inventory (SGI; Hetrick et al., 2012), which includes items such as "At times I have feelings of being flooded by sounds"
3) The Interoceptive Sensory Questionnaire (ISQ) (Fiene et al., 2018), which includes items such as "I am confused about my bodily sensations"

RESULTS

Figure 1. The figure to the right illustrates the P50 Sensory Gating ERP, defined as the difference between the most positive going peak and the preceding trough between 50-100ms after stimulus exposure, averaged across the 75 trials. Greater reductions between Click 1 and Click 2 averaged across trials are thought to represent superior sensory gating ability.



- There was a marginal relationship between P50 gating ratios and the BAPQ, but the relationship was nonsignificant (r=.294, p=.118, one-tailed)
- P50 gating ratios were significantly correlated with the Perceptual Modulation subscale of the SGI (r=0.42, p=.035, one-tailed) (Figure 2a)
- P50 gating ratios were also significantly correlated with interoceptive awareness (r=0.40, p=.049, one-tailed) (Figure 2b)

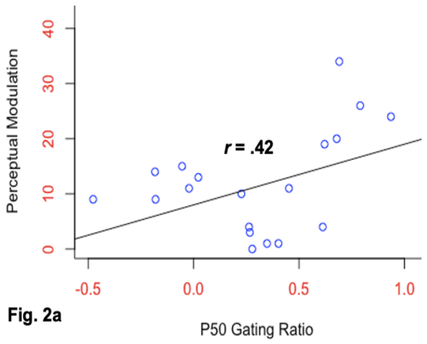


Fig. 2a

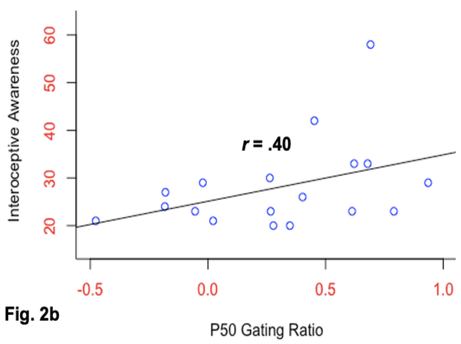


Fig. 2b

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CONCLUSION

- Reduced sensory gating to auditory stimuli is associated with real-world difficulties modulating and accurately perceiving external and internal stimuli
- The findings establish the clinical relevance of an EEG index of sensory processing by linking variability in P50 sensory gating ratios with clinical symptoms related to atypical interoception and sensory sensitivities that are common in ASD
- Data collection is ongoing and will include adults with ASD matched on age and sex to compare P50 gating ratios between diagnosis groups

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