Transdiagnostic Relationships Among Social Communication and Neural Responses to Dynamic Stimuli


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Background

- Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by social impairment, restricted and repetitive behaviors, and atypical response to sensory information.
- Schizophrenia (SCZ) is a thought disorder marked by delusions, hallucinations, speech, disorganized motor skills and negative symptoms (APA, 2013).
- Individuals with SCZ also experience deficits in social communication and social interactions similar to those with ASD (Abdi, Sharma, 2004).
- In order to examine social communication impairments across disorders, self-report and clinician-report assessments can be utilized.
- The electroencephalogram (EEG) can be used to explore possible neural similarities between these disorders.
- Previous research has revealed that the latency of the N170 in response to facial stimuli is longer in adults with ASD than typically developing (TD) adults (McPartland et al., 2004).
- The purpose of this study was to explore self- and clinician-report measures of social communication in relation to brain response to social stimuli across diagnoses.

Current Study:

- This study investigated the relationships among self-report and clinician-rated measures of social communication and the N170 across adults with ASD, SCZ, and typically developing (TD) controls.

Methods

EEG and ET Data Acquisition and Collection:
- EEG was recorded at 1000 Hz with a 128-channel HydroCel Geodesic Sensor net.
- ET data was collected using an Eyelink-1000 remote camera system.

Event-related Potential (ERP) Analysis
- N170 (150-300ms) was extracted from electrodes over left and right occipital temporal regions (see Figure 2).
- Data were filtered at 0.1 to 30Hz and segmented from 100 to 500ms relative to stimulus onset.
- Results with eye movements greater than 1.5 degrees of visual angle were excluded.

Results

A series of correlations were run between ADOS-2 Mod 4 Algorithm Total, SRS-2 T-scores and N170 for participants across the three diagnostic categories.

A marginally significant negative correlation was found between the N170 amplitude to averted gaze and SRS-2 social cognition T-score, $r = -0.29$, $p = 0.06$, such that stronger response to averted gaze was associated with greater social communication impairment.

There were no significant correlations between the N170 latency to direct and averted gaze contingent tasks, the SRS-2 T-scores, and the ADOS-2. There was a marginally significant negative correlation between the ADOS-2 algorithm total and the N170 amplitude to direct gaze, $r = -0.29$, $p = 0.06$, suggesting that stronger response to direct gaze was associated with more social communication impairments.

Discussion

- We explored the association between social functioning and brain responses to dynamic social stimuli in individuals with ASD, SCZ, and TD controls.
- Results suggest that the ADOS-2 and SRS-2 measure distinct aspects of social communication associated with differential patterns of brain response to gaze-related stimuli, the former being associated with direct gaze and the latter being associated with averted gaze.
- We found that increased scores of social impairment correlated with a larger N170 amplitude (stronger response) when looking at eyes that shifted to averted gaze.
- Response to averted gaze may reflect interpretation of social stimuli (e.g., as a sign of rejection or disinterest) and is thus more influenced by factors captured by the SRS-2, such as social motivation and cognition.
- In contrast, neural response to direct gaze may be more associated with observable gaze-related behaviors as measured by the ADOS-2.

This suggests the importance of measuring social communication in a comprehensive fashion, utilizing multi-informant ratings across multiple measures.

Limitations:

- The sample size utilized in this study was small.
- The three diagnostic groups were not matched on IQ; future research must address the potential influence of cognitive ability on the processes under study.

References


Funding Sources

CTSA Grant Number UL1 TR000139 (McPartland), NIH 1R15 MH107426 (McPartland, Sripriya), NIH 1K23 MH086705 (McPartland), NIH R21 MH096330 (McPartland), Autism Speaks Translational Postdoctoral Fellowship (Napier), Waterman Foundation 1167-1684 (McPartland), Patterson Trust 13-003209 (McPartland), NIH R01 MH101717 (McPartland), Brain and Behavior Research Foundation NARSAD Young Investigator Award (Foss-Feig).

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