Autistic Adults Display Enhanced Neural Response to Emotional Faces Compared to Those with Schizophrenia and Neurotypical Development

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Background

- Autism (AT) and schizophrenia (SZ) are both characterized by differences in social cognition and behavior compared to neurotypical (NT) development.[1]
- These conditions are hypothesized to have common neurobiological features, however, event-related potential (ERP) studies of social-emotional processing in these populations have yielded mixed results.[2]
- The Late Positive Potential (LPP) ERP is an index of sustained and motivated attention to salient stimuli.[3,4]
- Individuals with SZ demonstrate attenuated LPP amplitudes to emotionally valenced stimuli, although effect sizes are small.[5]
- Few studies have examined the LPP in autistic individuals,[6] and no study to date has compared the LPP across AT, SZ, and NT.

Aim

- Examine LPP amplitude in response to happy and fearful facial expressions in AT, SZ, and NT adults using a gaze-contingent paradigm. We predicted that the AT and SZ groups would demonstrate attenuated neural response to emotional faces compared to the NT group.

Method

Participants

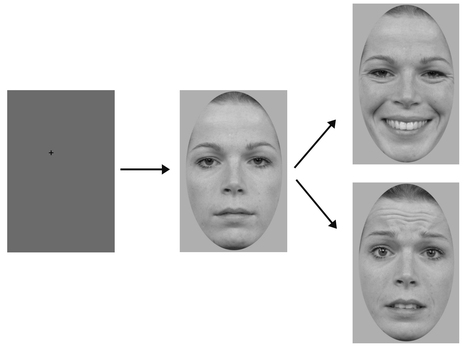
Group	N (N Male)	Mean Age (SD)	FSIQ (SD)
NT	31 (18)	26.24 (5.92)	114.76 (14.49)
AT	25 (20)	24.69 (5.69)	103.96 (18.01)
SZ	12 (11)	24.86 (5.30)	95.82 (10.10)

Behavioral Data

- Autism diagnoses were confirmed using the Autism Diagnostic Observation Schedule 2nd edition (ADOS-2).
- Schizophrenia diagnoses were confirmed via the positive and Negative Syndrome Scale for Schizophrenia (PANSS).
- All participants had FSIQ≥70 as measured by the Wechsler Abbreviated Scale of Intelligence Second Edition (WASI-II).

Gaze-contingent Paradigm

- At the start of each trial, a crosshair was presented.
- Once participants fixated on the crosshair for 500ms, a neutral face appeared.
- After participants looked at the eyes of the neutral face for 500ms, it displayed an emotional expression (happy or fearful) for 1000ms.
- Thus, participants were fixating on the eye-region when the emotional face appeared.



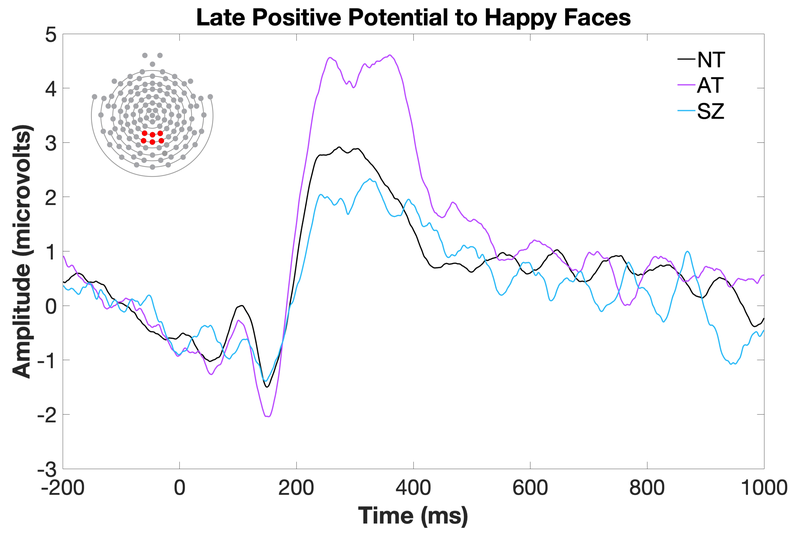
Method

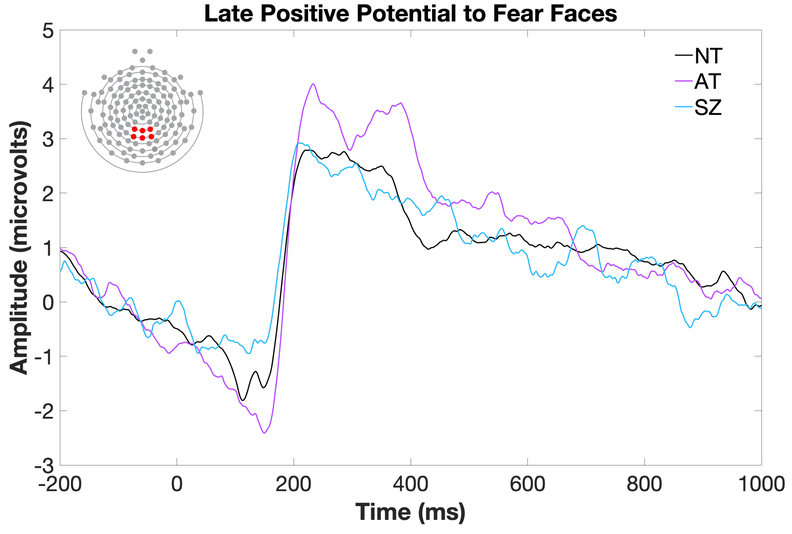
EEG and Eye-tracking Data Collection and Processing

- EEG was recorded at 1000 Hz with a 128-channel Hydrocel Geodesic Sensor net.
- Simultaneous eye-tracking data were recorded using SR-Eyelink at 500Hz while participants viewed the gaze-contingent paradigm.
- EEG data reduction was conducted in ERPLAB. Data were re-referenced to the average of left and right mastoids, filtered with a Butterworth filter from .1 Hz to 30 Hz, and artifact detection was performed.
- The LPP was scored as mean activity between 300-1000ms after emotional face onset at centro-parietal electrode sites.

Results

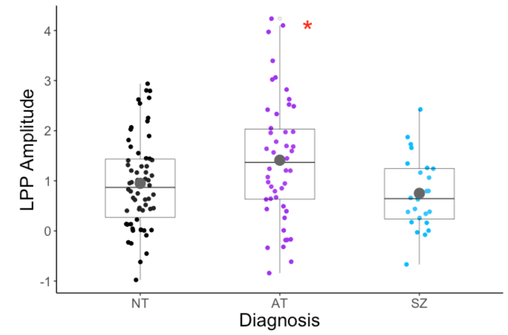
- A two-way ANOVA was conducted to examine the effect of group (NT, AT, SZ) and facial expression (happy, fearful) on LPP amplitude.





Results

- Overall LPP amplitude significantly differed by group ($F(2,130)=4.427$, $p<.05$) with larger LPP amplitude in the AT group compared to NT and SZ groups (p's<.05).
- No significant differences in LPP amplitude by facial expression or the interaction of group and expression (p's>.4).



Conclusions

- In contrast to previous literature,[7] autistic adults demonstrated increased motivated attention to emotional facial expressions compared to neurotypical adults and adults with schizophrenia. Adults with schizophrenia did not differ in LPP amplitude from the NT group.
- Previous social neuroscience studies have used passive viewing paradigms and found attenuated processing of social stimuli in autism, despite autistic individuals qualitatively reporting hypersensitivity to eye contact.[8] The current gaze-contingent paradigm required participants to look to the eye-region before a facial expression was introduced.
- The current results align with the theory that autistic individuals may experience amygdala-related hyperarousal when making eye-contact.[9]
- Future studies should continue to evaluate the role of hyperarousal in social-emotional processing in autistic individuals.

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Funding Sources

NIMH R01 MH100173 (McPartland), NIMH R21 MH091309 (McPartland) Autism Speaks Translational Postdoctoral Fellowship (Naples), Waterloo Foundation1167-1684 (McPartland), Patterson Trust13-002909 (McPartland), NIMH R03MH079908 (McPartland), NARSAD Atherton Young Investigator Award (McPartland), NIMH R01 MH100173 (McPartland), CTSA Grant Number UL1 RR024139 (McPartland)

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