

Visual Attention in Autism: The Role of Social Anxiety and Facial Context in Gaze Patterns

Robinson, L., Naples, A., and McPartland, J.

Background

- Distinct patterns of eye contact are a well-documented feature of autism, with many autistic individuals often describing direct eye contact as aversive, overstimulating, or distracting. These experiences may contribute to diminished eye contact during interpersonal interactions.
- In contrast to non-autistic individuals, prior research suggests that autistic individuals do not display an inadvertent attentional bias to look towards eyes, even when explicitly instructed not to.
- However, factors driving differences in eye contact remain unknown, and key potential contributors, such as social anxiety, have not been adequately studied.
- In the present study, we utilize eye-tracking data to investigate differences in gaze trajectory in response to direct eye cues, aiming to better understand the role of anxiety in modulating gaze behavior in autistic adults.

Methods

Participants

- Participants were 35 autistic (ASD) and 34 neurotypical (NT) adults.
- Autistic participants' diagnoses were confirmed by licensed clinicians using the Autistic Diagnostic Observation Schedule, Second Edition (ADOS-2).

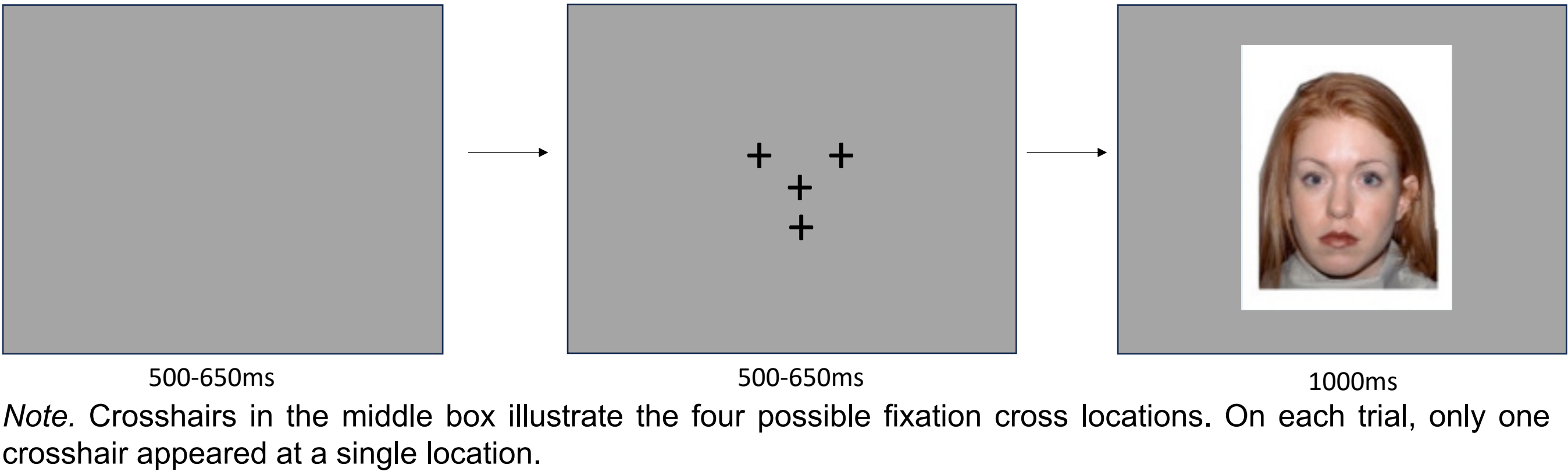
Table 1. Sample demographics

Demographics	Autism N = 35	Neurotypical N = 34
Age, Mean (SD)	27.25 (6.38)	27.50 (4.86)
Sex Assigned at Birth, n (%)		
Female	13 (37%)	17 (50%)
Male	22 (63%)	17 (50%)

Procedures

- Participants completed an eye tracking task in which a fixation cross was presented on a screen preceding a neutral face over a gray background.
- Data were collected at 500 Hz using a SR Eyelink 1000 Plus remote eye tracker.
- Fixation cross locations (FCLs) varied such that, when the neutral face appeared, participant gaze was directed to a facial feature (nose, mouth, left eye, or right eye).

Figure 1. Example of stimulus presentation and trial sequence



- Attentional disengagement was operationalized as the latency to look more than two degrees of visual angle away from the relevant facial feature.
- Median attentional disengagement times were calculated within participants and across trials for each FCL, while anxiety features were assessed using the Liebowitz Social Anxiety Scale (LSAS).

Analyses

- A mixed-effects model assessed associations between LSAS total score and diagnostic group with attentional disengagement changes.
- Pearson correlations assessed associations between LSAS total score and median latency or segment time to look away from a given facial feature.

Results

- A mixed-effects model revealed that diagnostic group [$F(1,66)=0.09$, $p=.762$] and LSAS total score [$F(1,68)=0.62$, $p=.432$] were not associated with changes in attentional disengagement, while FCL was associated with changes in attention such that participants looked away from mouths faster than they did from eye regions [$F(3,190)=7.19$, $p<.001$].
- Additionally, a significant three-way interaction was observed between FCL, diagnostic group, and LSAS score [$F(3,192)=4.59$, $p=.004$] indicating that attentional disengagement from facial features varied across groups as a function of anxiety.

Figure 2. Time course of attentional disengagement to FCLs for face condition across participants

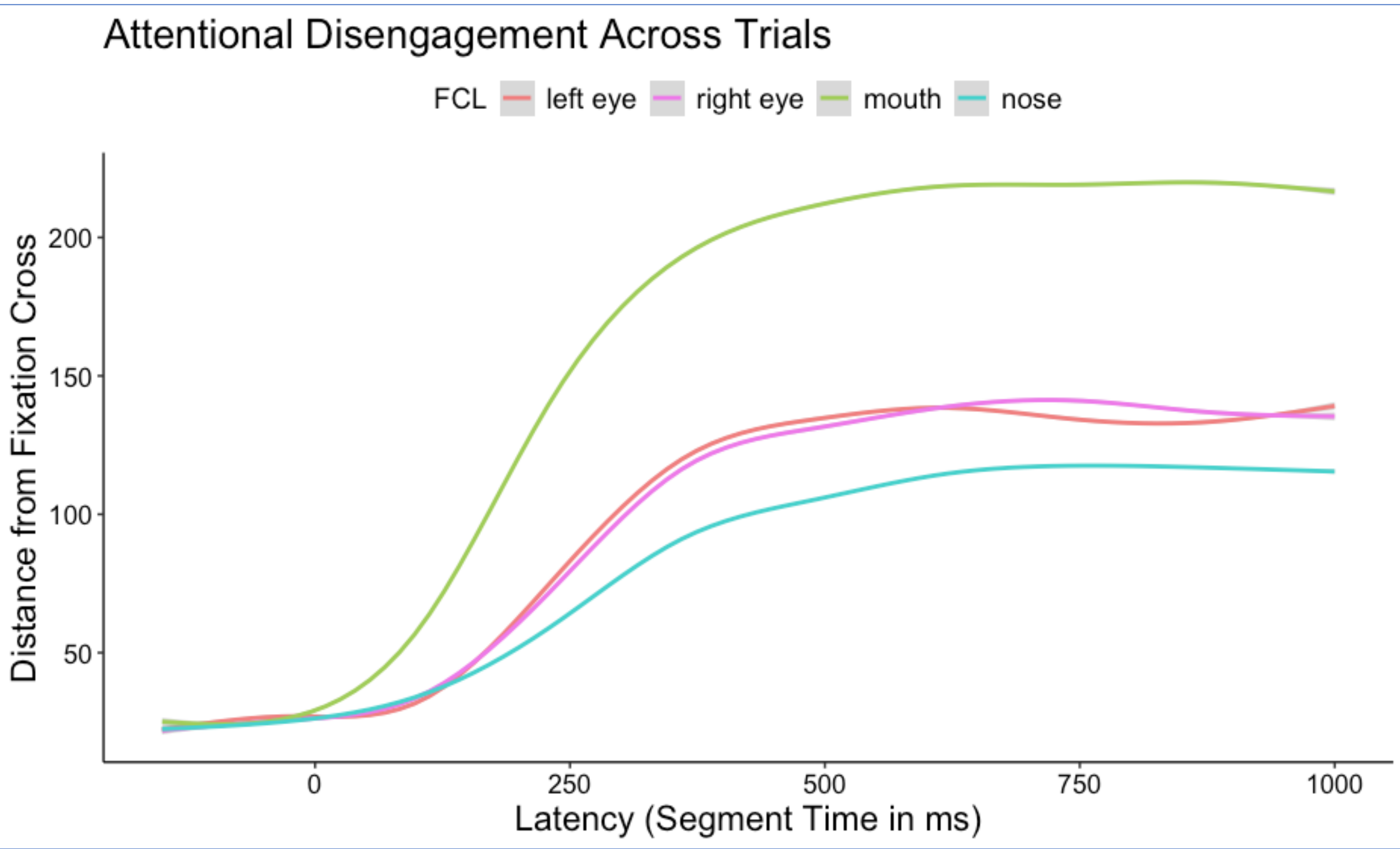
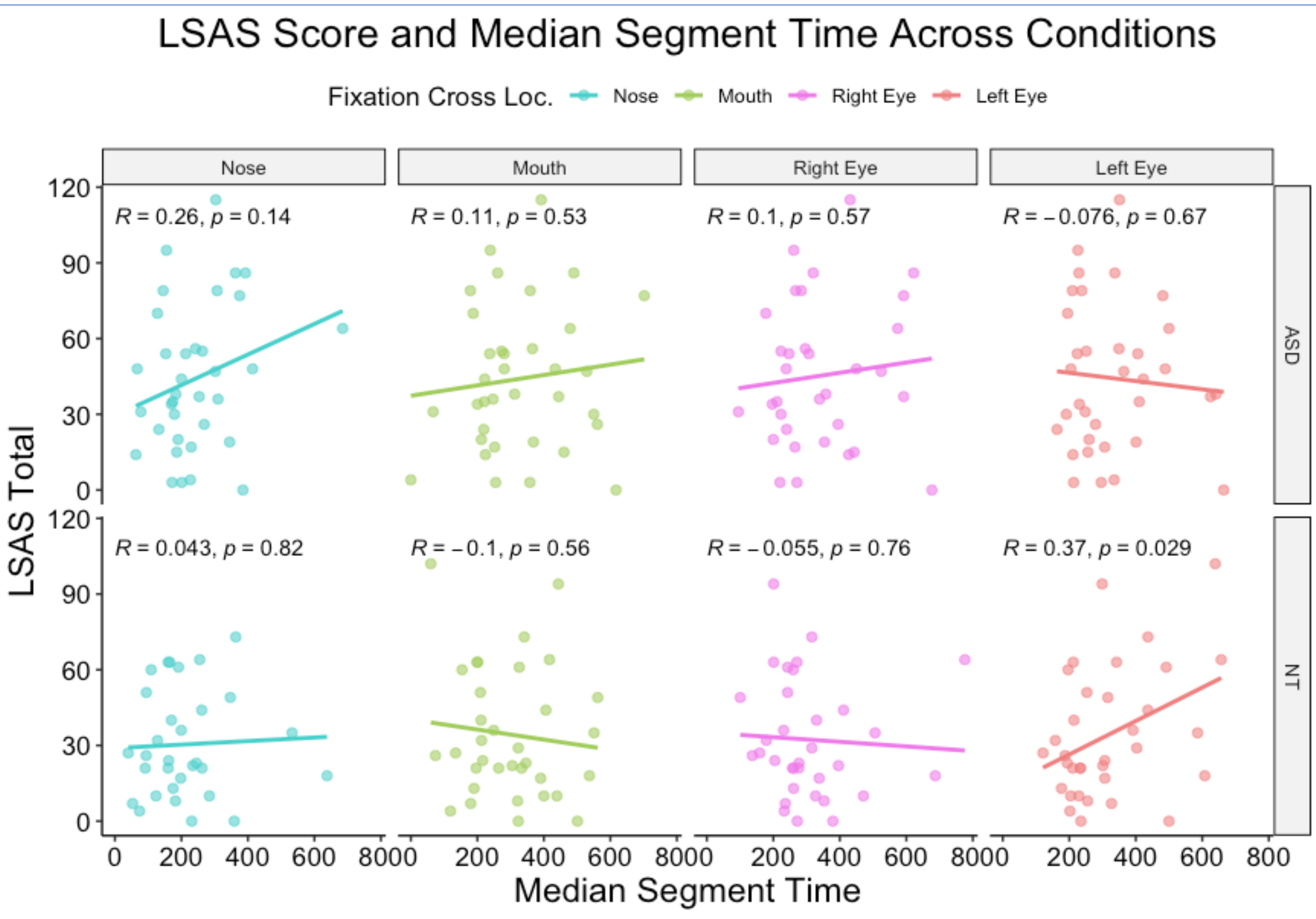


Figure 3. Regressions between LSAS total score and median attentional disengagement time from FCLs



Results, cont.

- Increased anxiety was associated with longer latency to disengage gaze from the left-eye in the NT group ($r=0.37$, $p=.029$) but not in ASD ($r=-0.07$, $p=.67$), whereas this pattern was not identified in the right eye.
- Additionally, in the ASD group, non-significant trends suggested that increased anxiety was associated with longer latency to disengage from some uninformative facial regions, such as the nose ($r=0.26$, $p=.14$) and the mouth ($r=0.11$, $p=.53$).

Conclusions

- We identified that all participants disengaged more rapidly from socially uninformative facial regions, such as the mouth or nose, compared to the eyes.
- In the ASD group, social anxiety differentially predicted disengagement from uninformative face regions. These findings did not support a baseline difference in visual attention to the eyes in autistic individuals but suggested that increased anxiety delayed attentional disengagement; this may suggest that anxiety heightens attention to salient information contained in the eyes.
- Given that NT adults typically demonstrate a left-eye gaze bias when cued to look at the eyes, our finding that increased anxiety relates to enhanced left-eye viewing exclusively in the NT group may highlight distinct socially relevant gaze patterns in ASD.
- Ongoing analyses will explore how sensory and social characteristics relate to attentional disengagement and whether increased anxiety is associated with a bias toward looking to the eyes when attention is initially directed elsewhere.

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