



## Introduction

- Attentional flexibility (AF) is a component of executive functioning that involves shifting attention between stimuli.
- AF has been shown to be impaired in individuals with autism spectrum disorder (ASD) from infancy through adulthood (1, 2, 3).
- Anxiety is a common comorbidity of ASD (4), and anxiety can be associated with impairments in cognitive function, particularly executive functioning (including processing speed, shifting of attention, and response inhibition).
- Less is known about AF in children with ASD who are showing symptoms of anxiety.
- The Gap Overlap eye tracking task provides a quantitative way to measure AF. In prior studies, Gap Overlap was shown to differentiate infants at high risk for ASD from infants at low risk (2).
- As part of a research consortium to develop and validate reliable, objective biomarkers of ASD, the current study adapted a version of Gap Overlap for a group of school-aged children with ASD (5).

## Objectives

1. Compare AF in children with ASD and typically developing (TD) children.  
*Hypothesis:* Children with ASD will have decreased AF compared to TD children.
2. Determine how AF is related to symptoms of anxiety in children with ASD.  
*Hypothesis:* AF will be decreased in children with ASD who have higher symptoms of anxiety.

## Methods

### Participants

- Participants were enrolled in the feasibility portion of the Autism Biomarkers Consortium for Clinical Trials Study (ABC-CT) and were assessed at one timepoint.
- The ABC-CT is a longitudinal, multi-site study (Yale University, Duke University, Boston Children's Hospital, the University of Washington, and the University of California, Los Angeles) whose goal is to develop reliable and objective biomarkers of social communication in children with ASD (NIMH# 1U19MH108206-01, PI: McPartland).

Subjects	Enrolled (n)	Provided Valid ET Data (n)	Age in Years M(Range)	Full Scale IQ M(SD)
ASD	26	19	8.53 (4.42-11.33)	93.84 (16.49)
TD	26	26	6.60 (4.01-11.41)	114.08 (9.34)

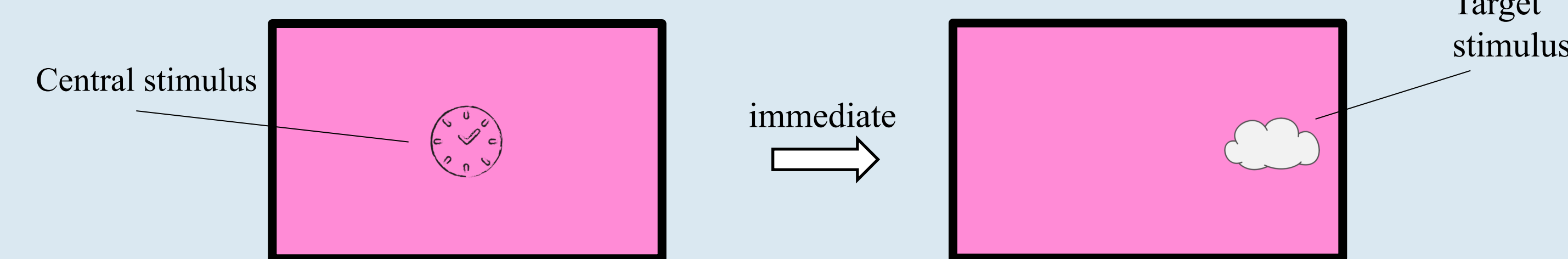
- Children completed the Differential Abilities Scale-II to measure full scale IQ.
- Caregivers completed the Behavior Assessment for Children Version 3 (BASC-3) to measure symptoms of anxiety.

## Methods Continued

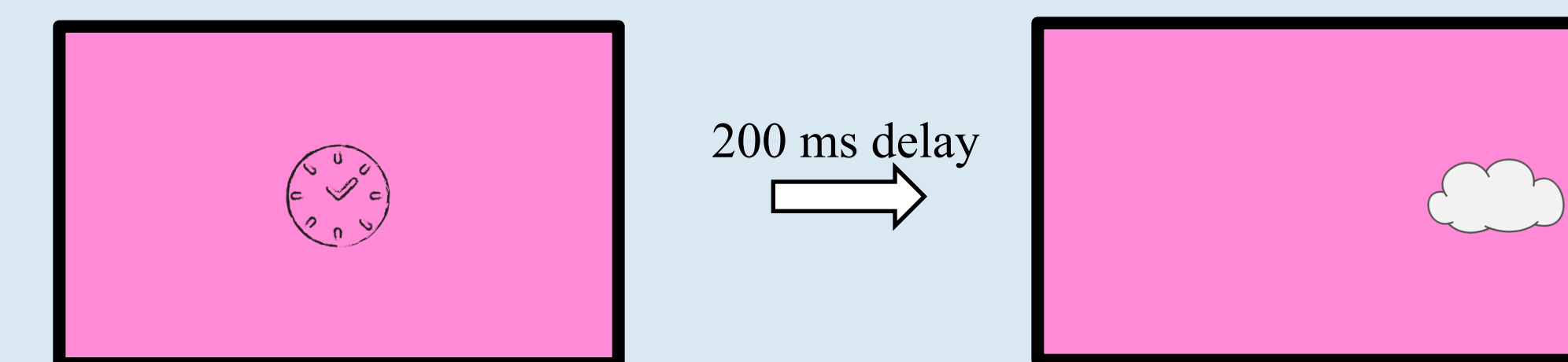
### Eye tracking: Gap-Overlap

- Participants viewed a central stimulus with an animated peripheral (target) stimulus as eye movements were recorded using an SR EyeLink 1000 Plus eye tracker.
- The principal dependent variable was average reaction-time (RT) of the first fixation toward the target. RT was log-transformed to normalize the spread of distribution.
- Data was considered valid if the participant was looking at the central stimulus for at least 75% before the target stimulus appeared.

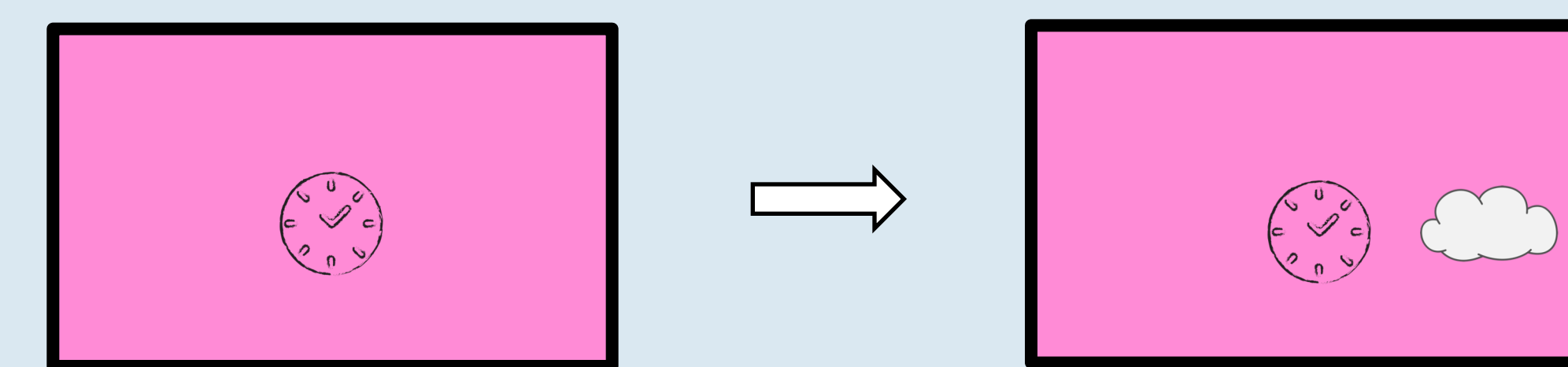
### Baseline Condition:



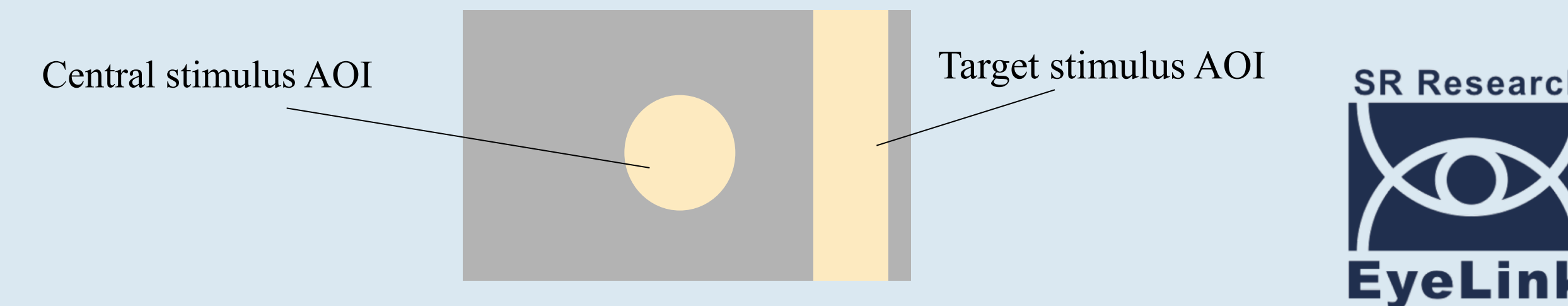
### Gap Condition:



### Overlap Condition:

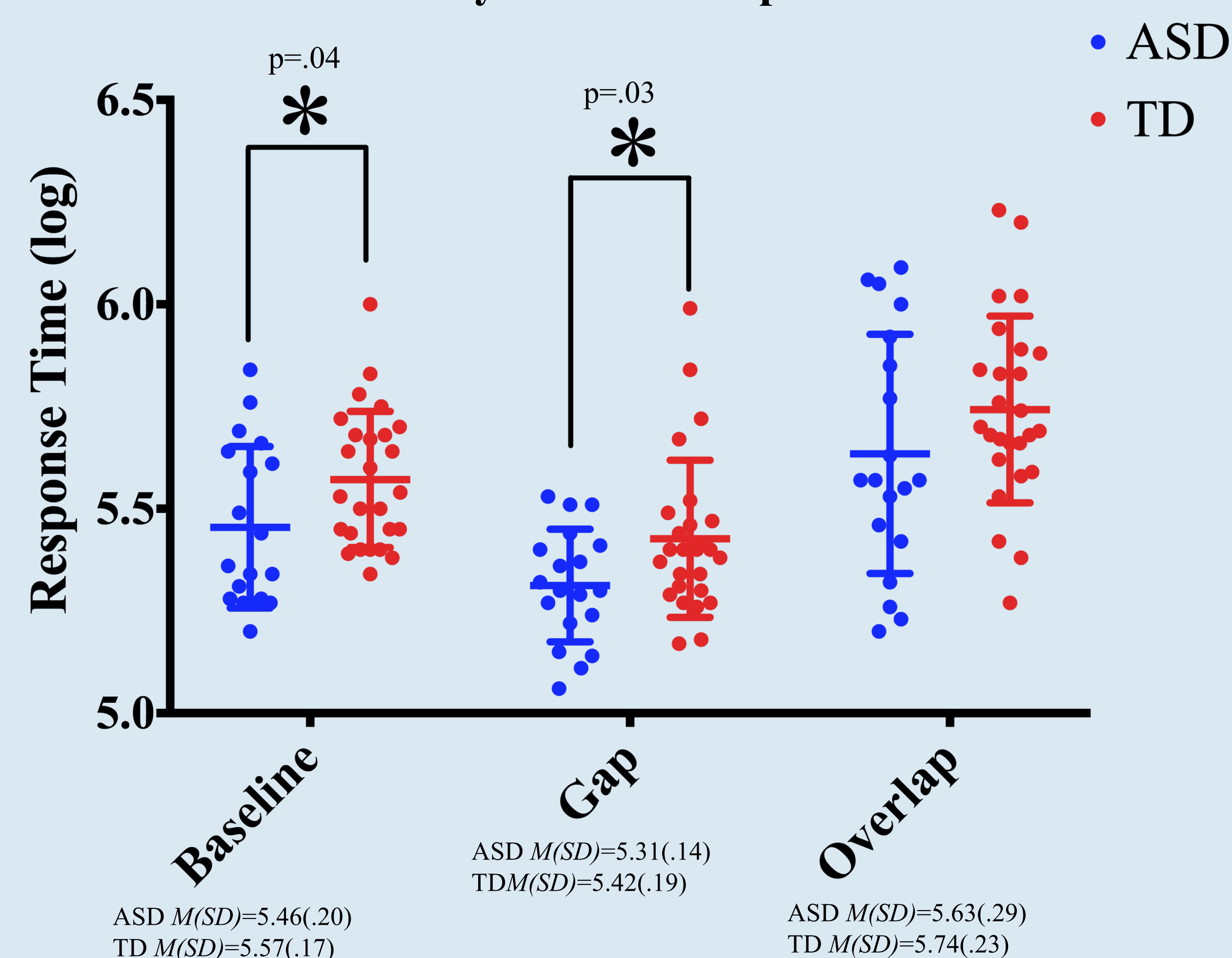


### AOIs:



## Results: Objective 1

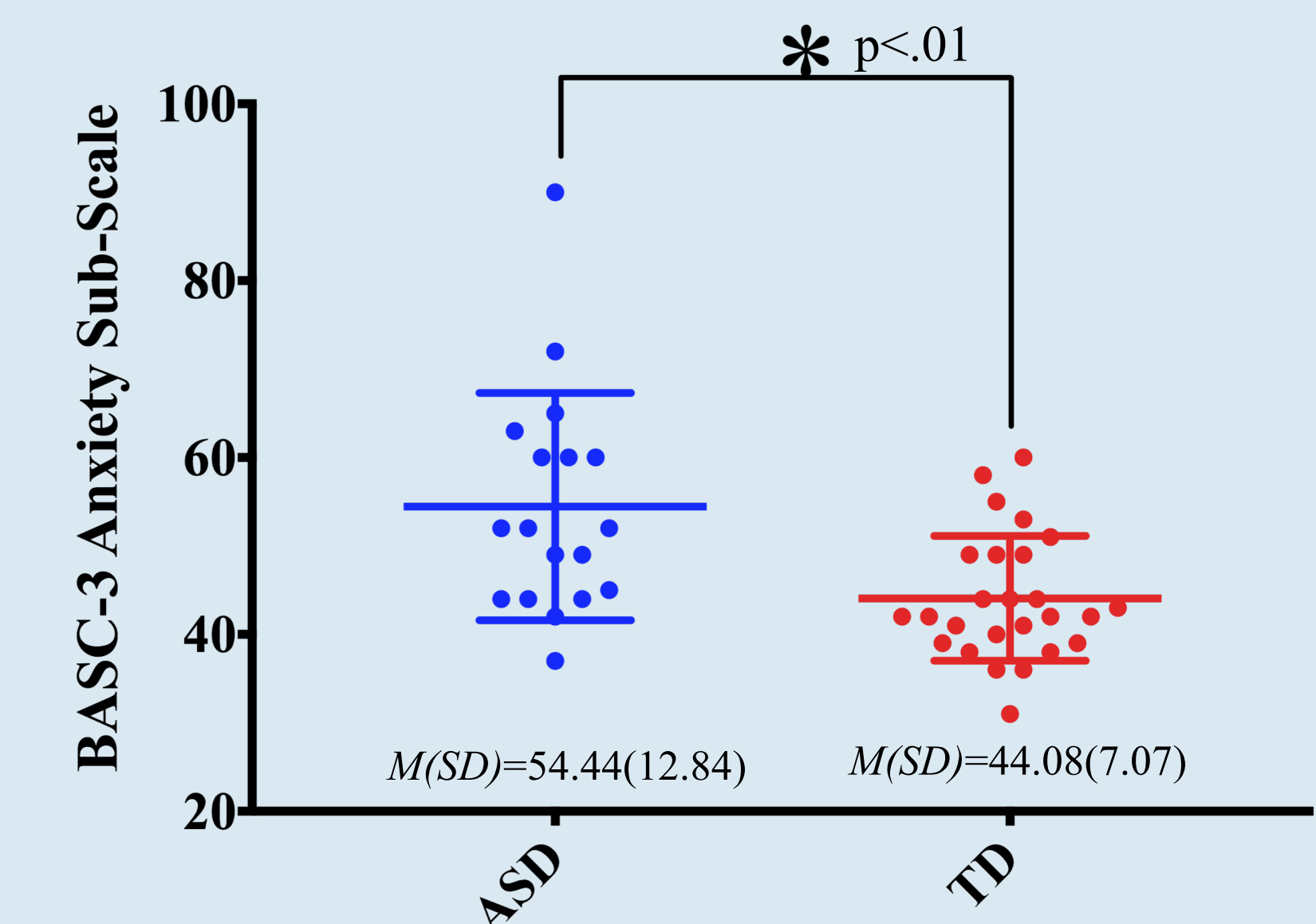
### Attentional Flexibility Across Groups and Conditions



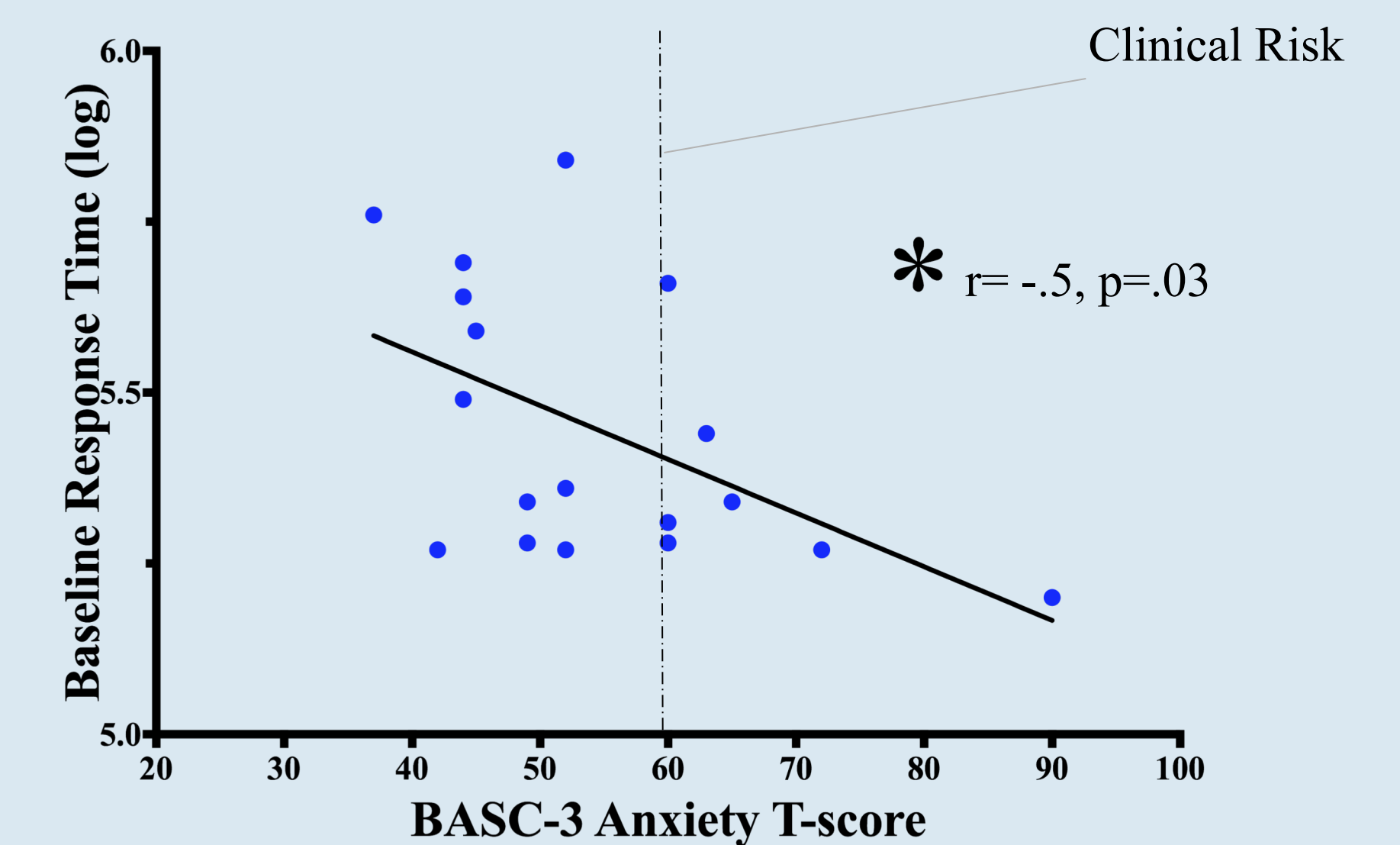
*Results:* In baseline and gap conditions, ASD children had increased AF compared to TD children.

## Results: Objective 2

### Symptoms of Anxiety in ASD and TD Groups



### Correlation of AF & Anxiety Symptoms ASD Group (Baseline Condition)



*Results:* Increased AF was related to higher symptoms of anxiety in children with ASD.

## Conclusions and Considerations

- Despite previous findings of decreased AF in individuals with ASD, this study of school-aged ASD children displayed increased AF.
- Once initial systems of visual attention are employed, shifting to a new stimulus is facilitated by temporal differences in presentation of stimuli, as shown in the RT during gap and baseline conditions in the ASD group.
- No differences were found between groups in the overlap condition, perhaps because children in both groups were challenged by competing stimuli.
- Increased AF in children with ASD showing symptoms of anxiety may be related to aspects of hypervigilance to one's environment.
- It is possible that heightened AF in this ASD cohort (as indicated by greater attention to competing information), represents a strength that directly impacts or relates to their overall cognitive abilities (which are in the typical range).
- Future studies will examine this domain in children with comorbid intellectual disability.

## References

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