Background
The Autism Biomarkers Consortium for Clinical Trials (ABC-CT) aims to identify and validate biomarkers. Gaze patterns toward social scenes found between children with Autism Spectrum Disorder (ASD) and typically developing (TD) individuals.

Executive Function (EF) deficits, common in ASD, often impact daily living skills and may also contribute to the core socio-communicative deficits of ASD.1, 4

The current study evaluates the impact of EF on eye-tracking (ET) outcomes using the Activity Monitoring paradigm.

Hypotheses
1. Looking at heads (%Head) and the scene overall (%Total) would be correlated with parent-rated EF ability
2. Children with ASD would look at heads less than TD children
3. After controlling for IQ and diagnosis group, EF would have an effect on %Head

Methods
Participants
223 children ages 6 to 11 (N_{ASD} = 159, N_{TD} = 64) participated in the ABC-CT Main Study (Table 1).

Table 1. Participant characterization means and standard deviations. Asterisks indicate significant group differences.

Analysis
Dependent variables: percent of time spent looking at actresses’ heads (%Head), the background or distractor objects (%Background), the shared activity (%Activity), and ratio of valid looking time (%Total) (Figure 3)

Trial inclusion criteria: valid data > 50%, calibration error < 2.5°

Boxplots of 5 subscales. Data was collected from five sites (BCH, Duke, UW, UCLA, and the Data Coordinating Core).

Procedure
Data was collected from five sites (BCH, Duke, UW, UCLA, Yale) at three time points. (Figure 1)

• An Eyelink 1000 Plus 500 Hz was used to track gaze

Activity Monitoring (AM) Paradigm
One of six paradigms in full ET battery

• 20 second videos and images (8 total) depicting two actresses engaged in a shared activity (Figure 2, 3)

• Distractor objects placed throughout scene

• Two gaze conditions: activity or other actress

Is EF related to %Head or %Total?
Pearson’s correlations revealed relationships between %Head and CASI-I: the social facet of the stimuli

• %Head stimuli (gaze condition: activity).

Results
Figure 2. Example stimuli of the AM paradigm

Figure 3. Corresponding areas of interest (AOIs) for Figure 2.

Do group differences in gaze patterns exist when controlling for IQ and EF ability?

• Linear Mixed Model examining %Head averaged across time point

• % Head: all effects and interactions significant, including the 3-way interaction between group, IQ, and CASI-I

How do IQ and EF impact the relationship between group and %Head?

To interpret the group*CASI*IQ interaction, we examined effects at group averages of IQ and CASI-I (Figure 4)

Significant group differences were found at each IQ/CASI level. The greatest between group difference emerged when CASI and IQ were set to ASD group averages

References

Acknowledgements
We thank the clinicians, staff, and families without whose work this would not be possible. Support for this project was provided by the Autism Biomarkers Consortium for Clinical Trials (U19 MH108206, McPartland).

Conclusions
• Consistent with our first hypothesis, EF ability was related to %Head in the sample overall. When broken down by group, this pattern only remained in ASD

• As predicted in our second hypothesis, TD children looked at the heads more than kids with ASD, regardless of IQ or CASI scores

• We did not see the predicted effect of EF on %Head in either group. However, when poor EF was paired with lower IQ in the TD group, %Head significantly increased, while %Head in the ASD group remained the same

• Decreased EF and IQ may have underscored a core-between-group difference in social motivation. When TD kids were not looking at the expected targets, they appeared to be drawn to the social facets of the stimuli

• In contrast with our third hypothesis, when controlling for IQ and EF, group differences in %Head decreased after each time point