

Understanding the Link Between Biological Motion Processing and Social Responsiveness in Autism

A Comparison Between Two Measures

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INTRODUCTION

Autism is characterized by difficulties in some aspects of social functioning, which form the basis of their diagnosis. Social development in autism is studied both experimentally and with observer report, but concordance between measures is often minimal.

- **Experimental Measures: biological motion tasks (BM)**¹
 - Involves the perception of human movement from minimal visual cues
 - used to study dynamic social information processing.
 - In autistic individuals, performance in BM tasks may reflect learned, more deliberate cognitive processing of movement rather than intuitive social perception^{2,3,4}.
- **Observer report: the Social Responsiveness Scale (SRS-2)**⁵
 - Parent-report questionnaire used to assess broader patterns of social functioning ability in everyday contexts.

Research Questions:

- To what extent are scores on these measures related among both autistic and non-autistic persons?
- Is the relationship between BM perception and social responsiveness moderated by mental age (MA)⁶ in autistic and non-autistic persons?

METHOD

Participants:

	Autistic	Non-Autistic
N (participants)	29	29
Gender	5 females, 24 males	8 females, 21 males
Age (years)	12.47 ± 3.63	10.40 ± 2.19
MA (years)	10.90 ± 3.61	11.21 ± 3.21

Measures:

- **Mental Age (MA):** Age-equivalent cognitive ability derived from the Perceptual Reasoning Index (PRI)⁷.
- **Biological Motion Task (BM)**¹: Accuracy in identifying walking direction of a point-light figure with an increasing number of distractor dots (social perceptual processing) (Figure 1). Scored on average number of distractor dots through which the participant could accurately detect the direction of BM.
- **Social Responsiveness Scale (SRS-2)**⁵: Parent-reported autistic traits capturing social reciprocity and everyday social behavior. Higher scores indicate lower levels of social adaptation (more autistic traits).

Data were divided by diagnostic group and further subdivided into high and low MA groups based on the median MA (10.79 years)

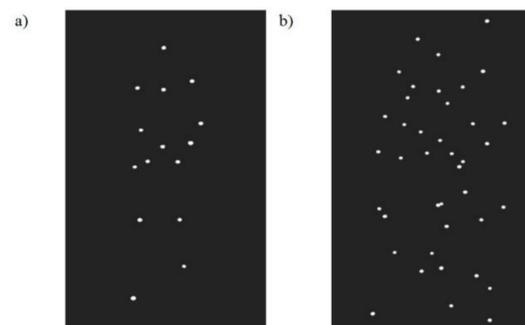


Figure 1: Biological Motion task. Example of the biological motion task a) without distractor dots and b) with distractor dots.

RESULTS

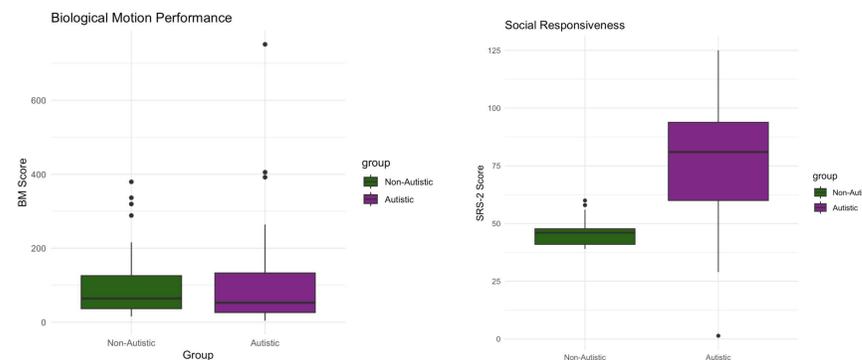


Figure 2: Diagnostic Groups. Comparison between autistic and non-autistic participants of a) BM Task Score and b) SRS-2 Score, shows that the scores between autistic and non-autistic participants did not differ for BM. The autistic participants received significantly higher SRS-scores than the non-autistic participants.

Relationship between BM task score and SRS-2 score across all participants

- Across all participants, BM performance was significantly related to SRS-2 scores ($\beta = 0.037, p = .048$).
- The autistic participants showed notably higher SRS-2 scores than the non-autistic participants ($p < .001$)

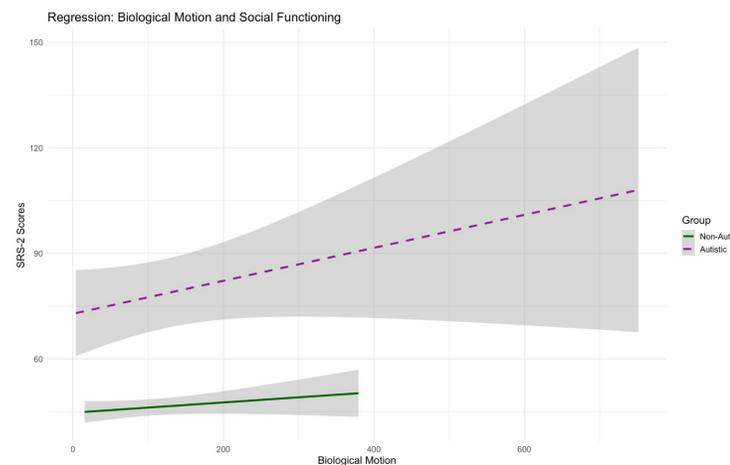


Figure 3: Relationship between Biological Motion and SRS-2 Scores. Regression plot for both autistic and non-autistic groups of biological motion vs. SRS-2 data, indicates that for autistic participants higher BM sensitivity was associated with higher SRS-scoring, while for non-autistic participants the relationship was weaker.

Relationship between BM task score and SRS-2 score separated by Mental Age Group

Participants with lower mental age (≤ 10.79 years)

- BM performance and SRS-2 scores were not related within diagnostic group ($p > .50$).
- The autistic participants exhibited higher scores on the SRS-2 than non-autistic participants ($p < .001$).

Participants with higher mental age (> 10.79 years)

- BM performance and SRS-2 scores were significantly related within diagnostic group ($\beta = 0.341, p = .046$).
- Higher BM performance was associated with higher SRS-2 scores, with a stronger relation observed in the autistic participants than the non-autistic participants

Social Functioning and Biological Motion by Mental Age

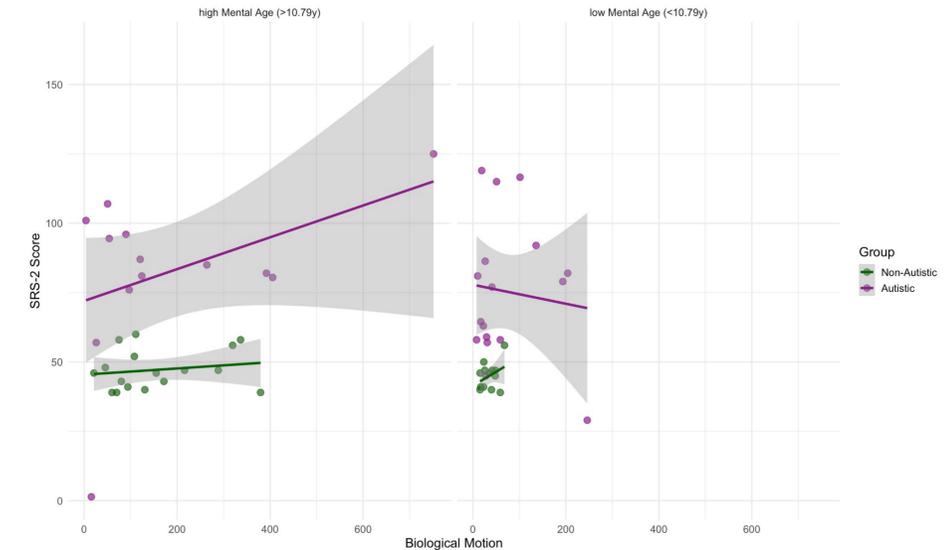


Figure 4: Relationship between biological motion and SRS-2 scores for autistic and non-autistic participants, separated by mental age. For participants with lower mental age, BM scores were not related to SRS-2 scores. For participants with higher mental age, better BM performance was linked to higher SRS-2 scores, particularly among autistic participants.

CONCLUSION

- Across all participants, BM performance showed only a weak relationship with SRS-2 scores
 - However, an association was seen in the higher mental age group, particularly among autistic individuals.
 - No association was observed in the participants in the lower mental age group
- Dynamic attention, as indicated by BM, appears to play a greater role at higher levels of cognitive ability
 - Connection between perceptual and behavioral aspects of social functioning may strengthen with cognitive development.
 - The link between perceptual and behavioral aspects of social functioning is stronger in autistic participants, suggesting perceptual measures of social responsiveness may be more nuanced than parent-reported social functioning.

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