### Using a novel self-report measure to quantify predictive skills **Massachusetts Institute of** in autistic adults **Technology**





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# Introduction

- Autism is a complex neurodevelopmental disorder with a range of phenotypes
- Diagnostically, autism is characterized by social communication difficulties and the presence of **restricted and repetitive behaviors**<sup>1</sup>

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• Recent hypotheses and some literature

## Results

Mean responses to individual survey items between groups I have trouble crossing a busy street if there is no crosswalk. I am really good at predicting the weather just by looking at the sky. I can tell if I have enough time to cross the street before the.. I know when to move out of the way if someone is walking towards. I am able to push someone on a swing without getting hit. I am often clumsy when handing someone an object. I can step onto an escalator without tripping. I can usually catch a ball.

# Discussion

- Autistic participants scored significantly lower than neurotypical controls, indicating they had more difficulty with prediction-related tasks
- Autistic males had significantly higher scores than females, indicating a **potential sex-based**

have suggested that traits associated with autism can be attributed to **differences in** predictive abilities<sup>2, 3</sup>

- If an individual has difficulty making predictions, events may seem to occur **unexpectedly** without a specific cause, leading to difficulties with daily life<sup>2</sup>
- Currently, there is **no self-report data** on prediction skills as they relate to daily life
- Goal: to develop a normally-distributed self-report measure to **quantify** individuals' predictive skills
  - Identifying individuals with strong/weak predictive abilities



**difference** in predictive abilities

- Survey scores were **normally distributed**, indicating the measure captured a **full range of predictive** skills across the sample
- IQ and scores were not correlated so predictive abilities as measured by this survey are not related to intelligence
- AQ and scores were strongly negatively correlated • Participants with higher AQ scores more traits associated with autism) had lower survey scores, so individuals with more autistic traits have more difficulty with predictive abilities

### ■ Autism mean ■ NT mean

# Methods

- Prediction Survey characteristics: • 30 items, 8 of which were reverse coded
  - Sorted into 4 domains: daily living, Ο motor, sensory, and social
- Participants (recruited online):

**Table 1.** Participant demographic information by group.

Croup	Ν	Age		IQ		AQ	
Group		Mean	Stdev	Mean	Stdev	Mean	Stdev
Autism	70 (F = 44)	29.70	7.22	35.90	26.65	32.13	8.25
NT	71 (F = 35)	29.61	8.67	52.17	39.62	18.98	7.27

Note: N = number, IQ = intelligence quotient score, AQ =autism quotient score, Stdev = standard deviation, F =female, and NT = neurotypical.

- Survey scoring:
  - Participants responded to survey items using a system based on a **4-point**

Figure 1. Mean scores for each group by item. The autism group scored significantly lower across items compared to the NT group (p < 0.0001).



Figure 2. Scores were normally distributed across participants (p = 0.11).

Total score on survey vs IQ for all participants

90

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Figure 3. Mean scores for each group by sex. Females in the autism group performed significantly lower than males in the autism group (p = 0.001), there were no differences between males and females in the NT sample (p = 0.99).

# **Future Directions**

- Quantify prediction abilities before and after interventions aiming to increase performance on prediction-related tasks
- Investigate sex-based differences in prediction abilities within populations
- Analyze the relationship between gender diversity and prediction skills in autistic adults
- Explore use of the survey with **other** conditions and diagnoses that may have differences in predictive abilities

### References

### Likert scale

- Ranged from 0-3
- 0 = "not at all like me", 3 = "just like me"
- Higher scores indicated higher prediction abilities

## • Analyses:

- Item level assessment (independent t-tests) to compare groups/sexes
- Normal distribution analysis using Jarque-Bera test
- **Correlation analysis** between IQ/AQ and total scores



Figure 4. There was little to no correlation between IQ and total score for all participants ( $R^2 = 0.0003$ ).

#### Total score on survey vs AQ for all participants



Figure 5. There was a significant negative correlation between AQ and total score for all participants ( $R^2 = 0.5252$ ).

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