

# Psychometric Properties of the M-ASD Questionnaire

H. van de Sluis<sup>1</sup>, M.L. Bezemer<sup>1,3</sup>, & E.M.A. Blijd-Hoogewys<sup>1,2,3</sup>

<sup>1</sup>Autism Team, INTER-PSY, NL; <sup>2</sup>Developmental Psychology, University of Groningen, NL; <sup>3</sup>Psychiatrie Noord, NL

INTER-PSY  
GROEP



PSYCHIATRIE  
NOORD

[h.vandesluis@inter-psy.nl](mailto:h.vandesluis@inter-psy.nl)

## Background

### ASD manifestations

- Under-recognition and misdiagnosis of ASD, due to more elusive manifestations, most in female, also in male (Hull et al., 2020).
- Diagnostic delay ~7 years (Haney, 2016).
- Timelier identification could lead to better prognosis, prevent secondary problems, reduce family stress and decrease societal costs (Garcia-Primo et al., 2014).
- M-ASD questionnaire (50 items): considers more elusive ASD manifestations (Grondhuis et al., 2020).

**Objective:** Validate M-ASD in clinical setting and control group.

## Methods

### Retrospective diagnostic data (clinical groups)

- $N = 1260$  adults suspected of having ASD (see Table 1)
- ASD diagnostic assessment, incl. M-ASD, AQ-50 and BRIEF-A
- 63,4% received ASD diagnosis (clinical ASD group, 62% women), remaining received another or no psychiatric diagnosis (clinical non-ASD group, 62% women)
- Subgroup did M-ASD retest ( $n = 68$ ; max = 2-8 weeks interval)

### Retrospective diagnostic data (control group)

- $N = 181$  adults from general population (see Table 1, 84% women)
- M-ASD and AQ-10

### Analyses

- M-ASD (range 0-150; continuous item-scoring); AQ-50 scores (range 0-50; dichotomous item-scoring)
- Internal consistency: Cronbach's  $\alpha$
- Construct validity: Pearson's  $r$  (convergent and divergent validity); T-tests
- Criterion validity: ROC (sensitivity, specificity, PPV & NPV)
- Test-retest reliability: Pearson's  $r$

Table 1: Descriptive statistics

| Group            | <i>n</i> | M-ASD         | AQ            | Age           | Min - Max     |
|------------------|----------|---------------|---------------|---------------|---------------|
|                  |          | <i>M (SD)</i> | <i>M (SD)</i> | <i>M (SD)</i> |               |
| Clinical ASD     | 799      | 78.53 (26.64) | 29.53 (7.26)  | 32.73 (11.74) | 18.05 – 64.75 |
| Clinical non-ASD | 461      | 55.64 (25.72) | 22.91 (7.49)  | 33.97 (12.02) | 18.03 – 65.30 |
| Control          | 181      | 13.04 (9.93)  |               | 41.82 (11.42) | 22.00 – 65.00 |

Table 2: M-ASD total score group comparisons

| Group                       | <i>p</i> -value | Cohen's <i>d</i> |
|-----------------------------|-----------------|------------------|
| Clinical ASD vs non-ASD     | <.001           | 0.870            |
| Clinical ASD vs Control     | <.001           | 2.679            |
| Clinical non-ASD vs Control | <.001           | 1.899            |

Table 3: M-ASD total score Receiver Operating Curves

| Group                   | <i>AUC</i> | <i>p</i> -value | Cut-off |
|-------------------------|------------|-----------------|---------|
| Clinical ASD vs non-ASD | .734       | <.001           | >73.91  |
| Clinical ASD vs Control | .989       | <.001           | >39     |

Figure 1: ROC M-ASD total score Clinical ASD vs Clinical Non-ASD

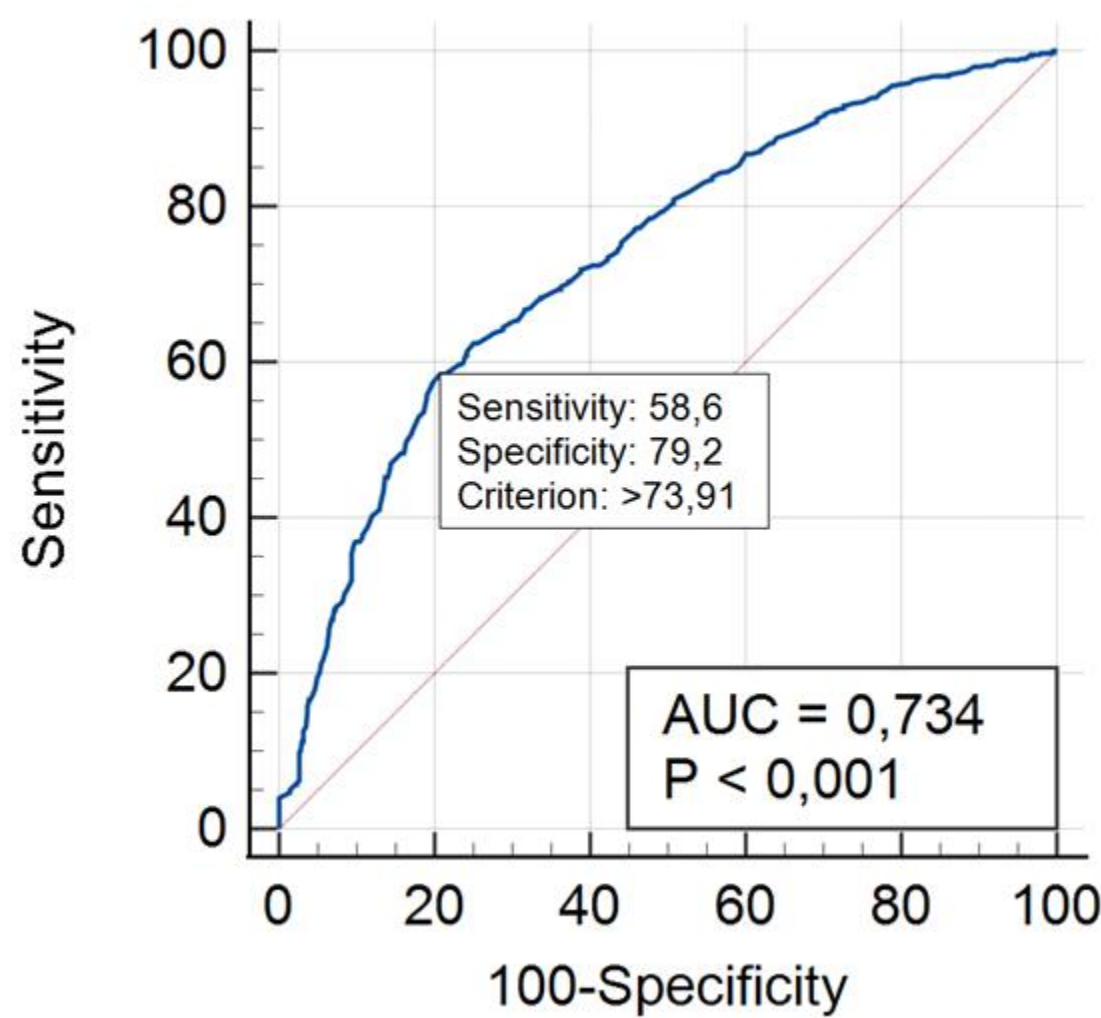
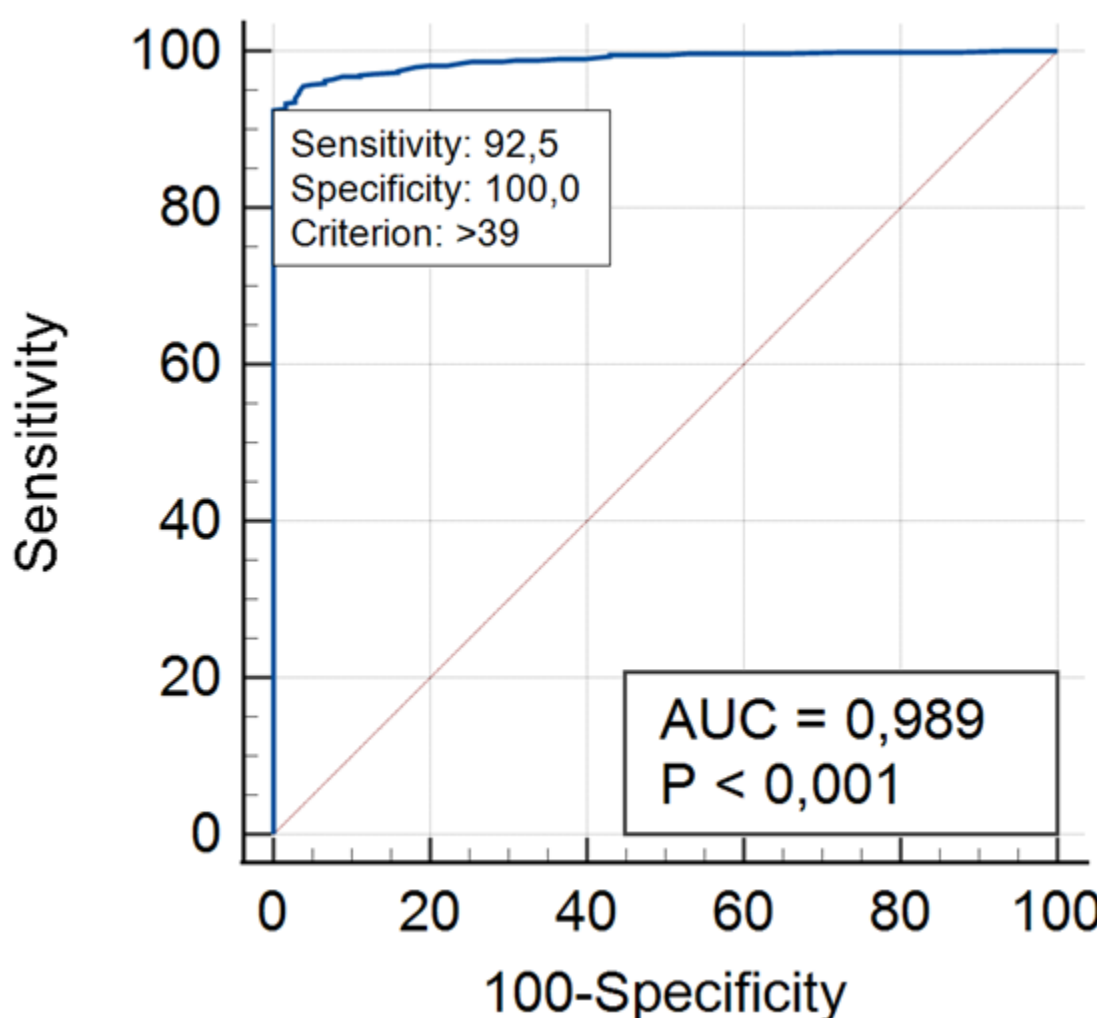


Figure 2: ROC M-ASD total score Clinical ASD vs Control group



### References

- Garcia-Primo, P., Hellendoorn, A., Chamman, T., Roeyers, H., Dereu, M., Roge, B., ... Canal-Bedia, R. (2014). Screening for autism spectrum disorders: state of the art in Europe. *European Child & Adolescent Psychiatry*, 23, 1005-1021.
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- Haney, J.L. (2016) Autism, females, and the DSM-5: Gender bias in autism diagnosis. *Social Work in Mental Health*, 14(4), 396-407.
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## Results

### Reliability & validity of M-ASD

- Internal consistency: Cronbach's  $\alpha = .955$
- Test-retest reliability:  $r = .917$ , CI (95%) = .868 - .948
- Correlation with AQ:  $r = .760$ ,  $p < .001$ , CI (95%) = .736 - .782
- Correlation with BRIEF-A (Organization of Materials):  $r = .194$ ,  $p < .001$ , CI (95%) = .135 - .252
- Correlation with BRIEF-A (Task Monitor):  $r = .282$ ,  $p < .001$ , CI (95%) = .225 - .337
- ASD > non-ASD > Control group (see Table 2, large - very large ES)

### Sensitivity & specificity of M-ASD

- Clinical ASD vs Non-ASD (see Table 3 & Figure 1)
  - Sensitivity = 59% & Specificity = 79%
  - PPV: 83% & NPV: 52%
- Clinical ASD vs Control (see Table 3 & Figure 2)
  - Sensitivity = 93% & Specificity = 100%
  - PPV = 100% & NPV = 75%

## Conclusions

### M-ASD has good psychometric qualities

- Excellent internal consistency & test-retest reliability
- Strong convergent & divergent validity
- Good criterion validity

### Critical note

- Still 48% of ASD classifications were missed in the clinical group
- Diagnosis should never be based on a questionnaire
- Relative higher age and percentage of women in control group

### Clinical implications

- The M-ASD is useful as a screening tool for detecting individuals with ASD, with distinct cut-offs for general population and clinical setting
- The (Dutch) M-ASD is open source available for clinical use via: <https://www.fann-autisme.nl/informatie/producten/m-asd/>