

# Autism Spectrum Screening Questionnaire

## Validity and factor structure

Guðmundur B. Arnkelsson  
University of Iceland

Páll Magnússon  
National University Hospital

A wide range of screening and diagnostic instruments of autistic spectrum disorders has been devised during the last decades. Generally observation schedules and interviews seem best suited for diagnosis (Rutter, LeCouteur, Lord, MacDonald, Rios & Folstein, 1988). Questionnaires, however, have an important role as screening instruments.

Ehlers, Gillberg & Wing (1999) devised the Autism Spectrum Screening Questionnaire (ASSQ) for an epidemiological study of Asperger syndrome. Their results indicated that the instrument was both reliable and valid for identification of school age children with Asperger syndrome as well as for identification of milder autistic symptoms.

The objective of the present study was to assess the factorial structure of the ASSQ and the utility of factor based subtests for identification of children with Asperger syndrome and autism in an epidemiological sample.

### Method

The target population was 6–12 year old pupils in the community of Kópavogur during the school year of 1990–1991. Schoolteachers of all 1,833 registered pupils indicated whether each pupil had a difficulty or delay in each of the following areas: Cognitive or learning, speech or language, conduct, and social relations. If they believed a difficulty was present in any of those areas, they filled out the ASSQ. A total of 1,744 questionnaires were returned with the ASSQ completed for a total of 107 pupils. This was augmented with seven pupils with autism residing in specialized settings within the community. The resulting sample of 114 participants contained 13 pupils diagnosed with Asperger syndrome or autism by the ADI-R diagnostic interview.

### Results

We performed a common factor analysis on the 27 items of the ASSQ for the 107 participants residing in the community. We extracted five factors on the basis of Cattell's scree test and parallel analysis (Fabrigar, Wegener, MacCallum, & Strahan, 1999). The stability of factor analytic results depends on sample size, level of communality and the determination of the factors (MacCallum, Widaman, Zhang, & Hong, 1999). With an average communality of .47 (SD= .17) and an average of five items per factor, the sample size of 107 is small but not unreasonable.

Table 1 presents the results of the factor analysis. The results were very interpretable and residual correlations were small. The highest residual correlation was .18 with only 12 out of 351 correlations higher than .10. Hence, the factors gave an accurate rendition of the inter-item correlations.

Table 2 and Figure 1 show the results for subtests based on the five factors. The total score differentiated the Asperger and Autism groups from the "normal" group but not between the former two,  $F(2, 111) = 17.9, p < .001$ . All subtests but Tics differentiated between the three groups,  $F(2, 111) \geq 4.7, p < .01$ . Inspection of means indicated that the Compulsive and Social Skills subtests differentiated the "normal" group from the other two, the Professor subtest differentiated the Autism group from the other and Social Insight differentiated the Asperger from the "normal" and autism group.

### Discussion

The results indicate that the factorial subtests differentiate better between the three groups than the total score alone. This has important implications for the use of the instrument for screening purposes.

Ehlers, S., Gillberg, C., & Wing, L. (1999). A screening questionnaire for Asperger syndrome and other high-functioning autism spectrum disorders in school age children. *Journal of Autism and Developmental Disorders*, 29, 129-141.

Fabrigar, L.R., Wegener, D.T., MacCallum, R.C., & Strahan, E.J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4, 272-299.

Rutter, M., LeCouteur, A., Lord, C., Macdonald, H., Rios, P., & Folstein, S. (1988). Diagnosis and subclassification of autism: Concepts and instrument development. In E. Schopler, G.B. Mesibov (Eds.), *Diagnosis and assessment in autism. Current issues in autism* (pp. 239-259). New York: Plenum Press.

MacCallum, R.C., Widaman, K.F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods*, 4, 84-99.

Table 1  
Items loadings for varimax rotation of a five-factor solution

Item	Professor	Social skill	Tics	Social Insight	Compulsions
1. old-fashioned	<b>.88</b>	.10	.06	.17	.34
2. "eccentric"	<b>.74</b>	.08	.10	.05	.17
3. idiosyncratic	.28	.02	.23	.20	<b>.60</b>
4. accumulates facts	.34	.01	-.01	.36	-.03
5. literal understanding	.22	-.08	.09	<b>.61</b>	-.02
6. deviant style	<b>.71</b>	-.08	.15	.01	.06
7. invents words	.30	-.03	<b>.51</b>	.17	.08
8. different voice	.25	-.12	.24	.20	<b>-.43</b>
9. expresses sounds	.15	.14	<b>.72</b>	.00	.15
10. surprisingly good	.24	-.18	.21	<b>.43</b>	.14
11. fails to make adjustments	.05	.31	.24	<b>.63</b>	.24
12. lacks empathy	-.08	.36	.15	<b>.70</b>	.28
13. naïve remarks	.04	<b>.45</b>	<b>.47</b>	.16	-.03
14. deviant gaze	-.08	.03	<b>.48</b>	.30	.22
15. wishes to be sociable but fails	-.14	<b>.60</b>	.10	-.01	.31
16. only on his/her terms	.03	<b>.59</b>	.13	.29	.33
17. lacks best friend	.08	<b>.57</b>	-.02	-.05	-.14
18. lacks common sense	-.18	<b>.40</b>	.04	<b>.44</b>	.04
19. poor at games	.05	<b>.47</b>	.25	.22	<b>.51</b>
20. clumsy	.08	-.19	.33	.09	.11
21. involuntary movements	-.07	-.01	<b>.64</b>	.01	.00
22. compulsory repetition	.30	.00	-.08	.14	<b>.48</b>
23. special routines	.26	.22	.32	.08	<b>.49</b>
24. idiosyncratic attachment to objects	.20	-.23	.22	.10	<b>.52</b>
25. bullied	.05	<b>.55</b>	-.08	.04	-.04
26. unusual facial expression	-.01	.07	<b>.73</b>	.20	-.04
27. unusual posture	.15	.05	<b>.59</b>	.00	.06
Eigenvalues <sup>a</sup>	2.61	2.39	3.16	2.24	2.17

Note. Loadings above .4 are in boldface and loadings above .3 are in italic face.  
<sup>a</sup> Eigenvalues after rotation.

Table 2  
Descriptive statistics for Total Score and subtests of ASSQ.

Group	n	Compulsive	Professor	Tics	Insight	Social Skills	Total score
"Normal"	101	.30 (.36)	.19 (.42)	.18 (.32)	.32 (.38)	.78 (.51)	9.11 (6.55)
Asperger	7	1.06 (.56)	.14 (.38)	.43 (.58)	1.14 (.34)	1.29 (.44)	21.57 (6.32)
Autism	6	.93 (.43)	1.22 (.81)	.36 (.44)	.40 (.49)	1.17 (.41)	19.33 (5.85)

Note. Subtest scores are the mean scores of all items loading .4 or higher on the corresponding factor. Item 13 was excluded since it loaded higher than .4 on two factors. Total score is the sum of all items in the questionnaire.  
n = number of participants in each group. Standard deviations are within parentheses.

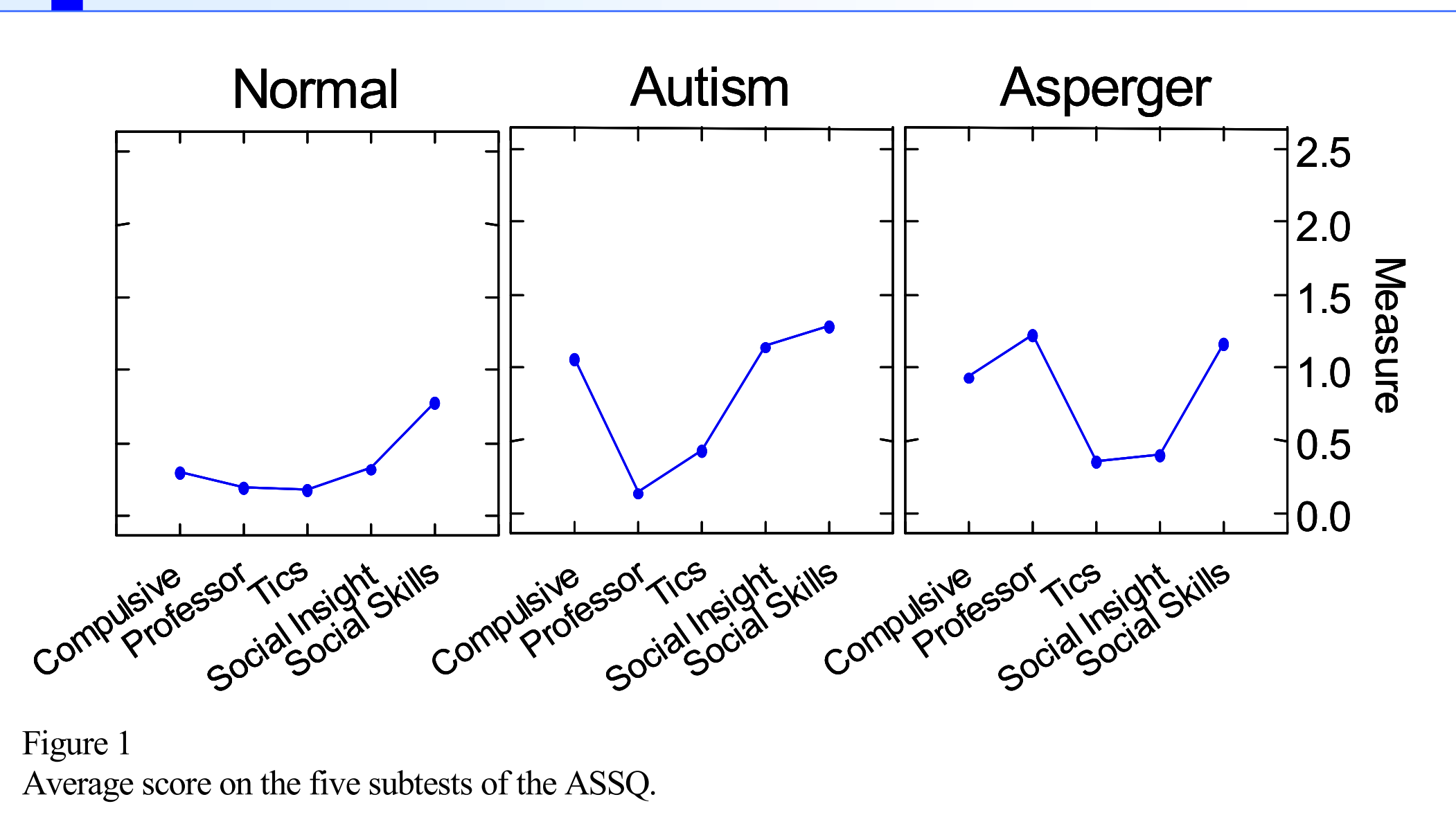


Figure 1  
Average score on the five subtests of the ASSQ.