

AUTISM SPECTRUM RATING SCALES™ (ASRS™)

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PRODUCT OVERVIEW



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Please Note: All data presented in this overview are subject to change.

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Overview

The Autism Spectrum Rating Scales™ (ASRS™) are designed to measure behaviors associated with the Autism Spectrum Disorders (ASD) for children and youth aged 2 through 18 years, as reported by parents and/or teachers or childcare providers.¹ As recognition and prevalence of the ASDs increase, risk of over- and under-diagnosis increase in parallel. The need for a valid, reliable, and carefully crafted tool for assessment becomes paramount; the ASRS was developed to meet this need. The ASRS can help guide diagnostic decisions and can be used during treatment planning, ongoing monitoring of response to intervention, and program evaluation.

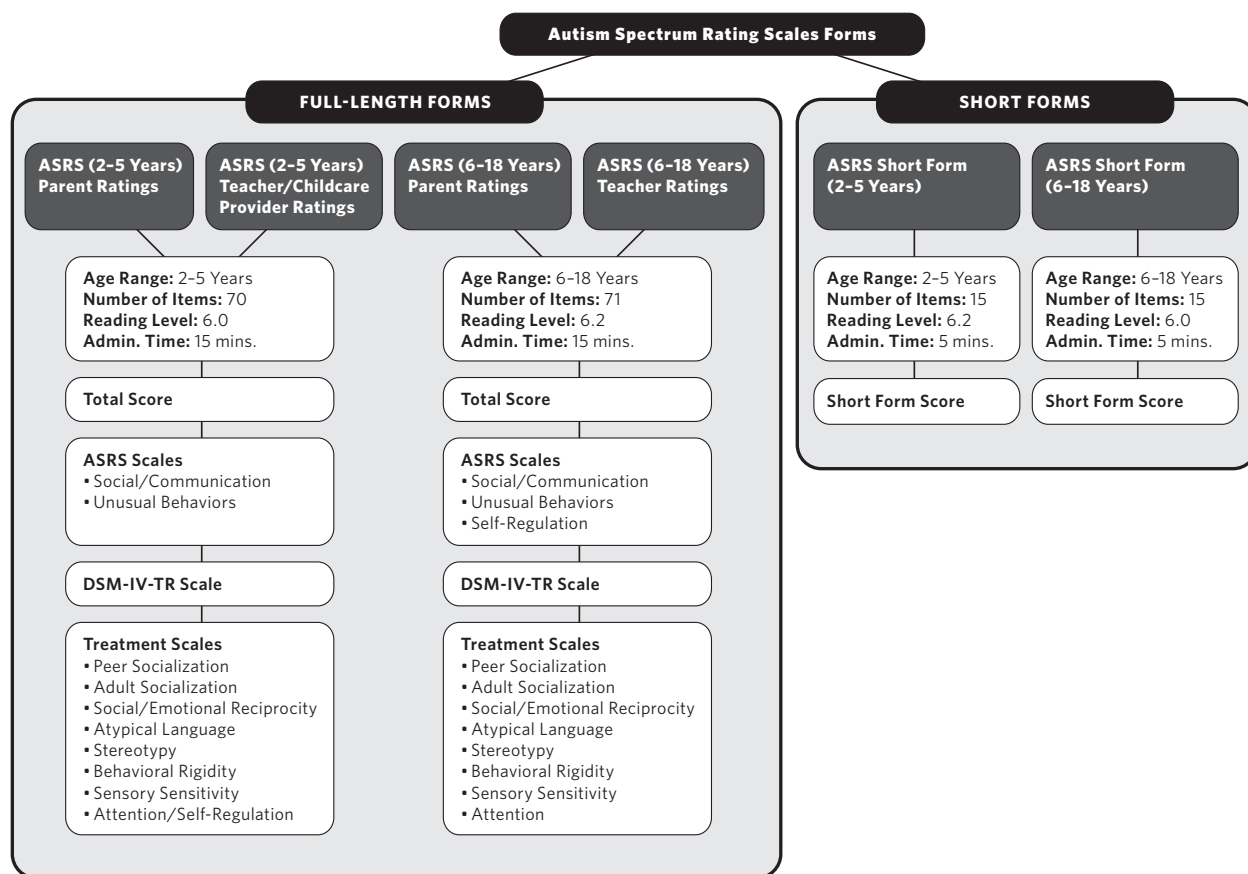
ASRS Components and Scale Structure

As illustrated in Figure 1, the ASRS has full-length and short forms for young children aged 2 to 5 years, and for older children and adolescents aged 6 to 18 years.

The Full-Length ASRS Form: The full-length ASRS (2–5 Years) comprises 70 items, and the full-length ASRS (6–18 Years) consists of 71 items. There are separate parent (ASRS Parent Ratings) and teacher (ASRS Teacher Ratings) rating forms for each age group. This form is the most comprehensive and offers the most complete assessment information, including the Total Score, the ASRS Scales, the DSM-IV-TR Scale, and the Treatment Scales. The full-length form is recommended for use in initial evaluations and full re-evaluations.

The ASRS Short Form: The ASRS Short Form was developed by selecting items that best differentiated nonclinical youth from youth diagnosed with an ASD. The ASRS Short Form (2–5 Years) and ASRS Short Form (6–18 Years) both contain 15 items, and parents and teachers complete the same form. This form provides one Short Form total score, and can be used as a screener to determine which youth are most likely to require additional evaluation or services for an ASD and related issues. The Short Form may be most suitable for monitoring treatment/intervention.

Figure 1. Overview of the ASRS Forms



Note. Reading Level determined by the Flesch-Kincaid Grade Level.

¹ For the ASRS (2–5 Years) both teachers and/or childcare providers can complete the form. For ease of presentation, this group of raters is referred to as “teacher” herein.

Administration and Scoring Options

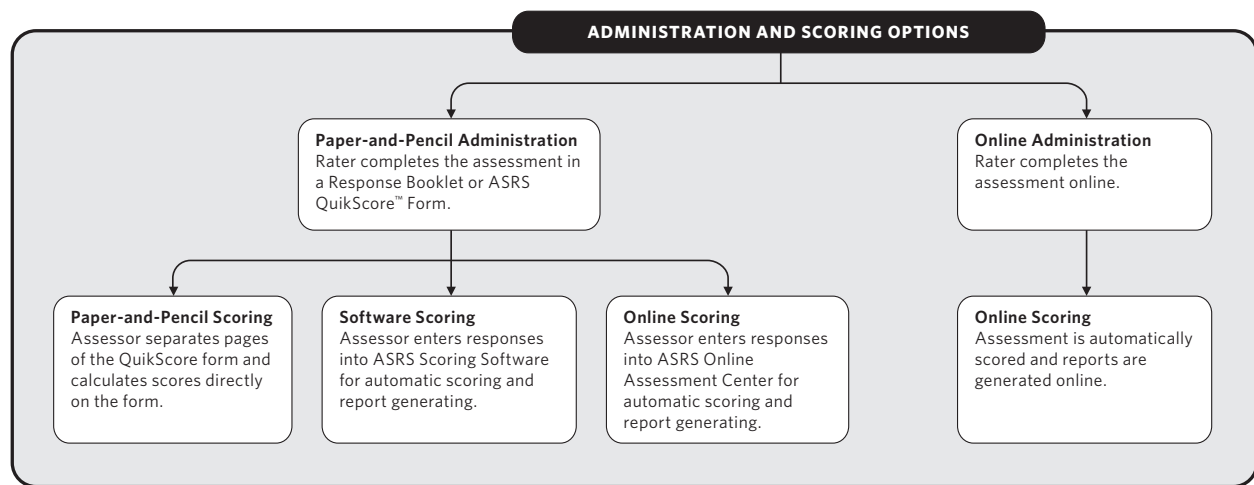
All of the forms can be administered via paper-and-pencil or using the ASRS Online Assessment Center. The ASRS can be scored via paper-and-pencil, the ASRS Scoring Software, or the ASRS Online Assessment Center. Figure 2 outlines the various combinations of administration and scoring options.

Report Options

ASRS reports can be obtained by using the ASRS Scoring Software or the ASRS Online Assessment Center. There are three report types:

- (1) the **Interpretive Report** provides detailed results from one administration,
- (2) the **Comparative Report** provides a multi-rater perspective by combining results from up to five different raters, and
- (3) the **Progress Monitoring Report** provides an overview of change over time by combining results of up to four administrations from the same rater.

Figure 2. Overview of Administration and Scoring Options



Normative and Clinical Samples

Data collection took place between October, 2006 and October, 2008. Over 7,000 assessments were collected which included normative data, clinical data, as well as reliability and validity research data. Of these assessments, 2,560 were included in the normative sample (320 ASRS [2–5 Years] Parent Ratings, 320 ASRS [2–5 Years] Teacher/Childcare Provider Ratings, 960 ASRS [6–18 Years] Parent Ratings, and 960 ASRS [6–18 Years] Teacher Ratings). The ASRS normative samples are proportioned evenly in terms of age and gender (see Table 1) and are highly similar to the most recent U.S. Census in terms of race/ethnicity (see Table 2). While the normative samples primarily include ratings of nonclinical children, 7.6% of the normative sample includes ratings of children with an educational classification or clinical diagnosis. These cases were included in the normative sample in order to reflect the actual U.S. general population, which includes both children with and without clinical conditions.

In addition to the clinical data that were collected for inclusion in the normative sample, ratings from over 1,600 youth with a clinical diagnosis were collected in order to create clinical samples; see Table 3 for the diagnostic makeup of these samples.

Table 1. Age x Gender Distribution: ASRS Normative Samples

Age	Parent Ratings			Teacher Ratings		
	Male (N)	Female (N)	Total (N)	Male (N)	Female (N)	Total (N)
2	40	40	80	40	40	80
3	40	40	80	40	40	80
4	40	40	80	40	40	80
5	40	40	80	40	40	80
ASRS (2–5 Years) Total	160	160	320	160	160	320
6	40	40	80	40	40	80
7	40	40	80	40	40	80
8	40	40	80	40	40	80
9	40	40	80	40	40	80
10	40	40	80	40	40	80
11	40	40	80	40	40	80
12	40	40	80	40	40	80
13	40	40	80	40	40	80
14	40	40	80	40	40	80
15	40	40	80	40	40	80
16	40	40	80	40	40	80
17/18	40	40	80	40	40	80
ASRS (6–18 Years) Total	480	480	960	480	480	960
Total	640	640	1,280	640	640	1,280

Table 2. Race/Ethnicity Distribution: ASRS Normative Samples

Race/Ethnicity	Parent Ratings					Teacher Ratings				
	ASRS (2–5 Years)	ASRS (6–18 Years)	Total	Census		ASRS (2–5 Years)	ASRS (6–18 Years)	Total	Census	
	N	N	N	%	%	N	N	N	%	%
Asian	10	43	53	4.1	3.8	8	48	56	4.4	3.8
African American	53	137	190	14.8	15.7	48	143	191	14.9	15.7
Hispanic	58	142	200	15.6	15.1	48	158	206	16.1	15.1
White	184	597	781	61.0	61.9	199	559	758	59.2	61.9
Other	15	41	56	4.4	3.5	17	52	69	5.4	3.5
Total	320	960	1,280			320	960	1,280		

Table 3. Primary Diagnosis: ASRS Clinical Samples

Diagnosis	Parent Ratings			Teacher Ratings			Total		
	ASRS (2–5 Years)	ASRS (6–18 Years)	Total	ASRS (2–5 Years)	ASRS (6–18 Years)	Total	ASRS (2–5 Years)	ASRS (6–18 Years)	Total
Autism Spectrum Disorder	135	214	349	124	234	358	259	448	707
ADHD	N/A	123	123	N/A	147	147	N/A	270	270
Anxiety/Mood Disorders	N/A	31	31	N/A	29	29	N/A	60	60
Communication Disorders	35	39	74	38	40	78	73	79	152
Delayed Cognitive Development	41	N/A	41	43	N/A	43	84	N/A	84
Other	58	92	150	69	110	179	127	202	329
Total	269	499	768	274	560	834	543	1,059	1,602

Note. N/A = Not Applicable.

Reliability

Internal Consistency refers to the extent to which all items on the same scale consistently or reliably measure the same content, and is commonly assessed by an examination of Cronbach’s alpha statistic, which ranges from 0.0 to 1.0 (Cronbach, 1951). The internal consistency of the ASRS was assessed, and the scales were found to demonstrate high levels of internal consistency (see Table 4).

Test-Retest Reliability refers to the stability of test scores when an assessment is administered on two or more occasions. Test-retest reliability scores were computed for the ASRS scores over a 2- to 4-week interval (see Table 5). Overall, the test-retest values indicate excellent test-retest reliability.

Table 4. Internal Consistency Coefficients (Cronbach’s Alpha)

Scale	Parent Ratings			Teacher Ratings			
	ASRS (2–5 Years)	ASRS (6–18 Years)		ASRS (2–5 Years)	ASRS (6–18 Years)		
		6–11 Years	12–18 Years		6–11 Years	12–18 Years	
Total Score	.97	.97	.97	.97	.97	.97	
ASRS Scales	Social/Communication	.96	.95	.94	.97	.95	.94
	Unusual Behaviors	.94	.95	.94	.93	.94	.95
	Self-Regulation	N/A	.92	.93	N/A	.94	.92
DSM-IV-TR Scale	.95	.96	.95	.95	.95	.95	
Treatment Scales	Peer Socialization	.89	.88	.88	.91	.87	.87
	Adult Socialization	.77	.77	.78	.82	.81	.77
	Social/Emotional Reciprocity	.91	.90	.90	.93	.91	.91
	Atypical Language	.74	.83	.84	.70	.82	.83
	Stereotypy	.81	.79	.78	.78	.73	.77
	Behavioral Rigidity	.90	.91	.91	.90	.92	.92
	Sensory Sensitivity	.81	.82	.80	.78	.82	.86
	Attention/Self-Regulation	.86	NA	N/A	.86	N/A	N/A
	Attention	N/A	.91	.90	N/A	.92	.92
Short Form	.92	.92	.92	.93	.91	.92	

Note. N/A = Not Applicable.

Table 5. Test-Retest Reliability Coefficients (Pearson’s r)

Scale	Parent Ratings		Teacher Ratings	
	ASRS (2–5 Years)	ASRS (6–18 Years)	ASRS (2–5 Years)	ASRS (6–18 Years)
Total Score	.90	.92	.81	.78
ASRS Scales	Social/Communication	.93	.91	.73
	Unusual Behaviors	.88	.91	.84
	Self-Regulation	N/A	.90	.82
DSM-IV-TR Scale	.91	.91	.87	.78
Treatment Scales	Peer Socialization	.79	.87	.78
	Adult Socialization	.88	.90	.79
	Social/Emotional Reciprocity	.86	.88	.70
	Atypical Language	.89	.90	.86
	Stereotypy	.87	.88	.83
	Behavioral Rigidity	.85	.90	.81
	Sensory Sensitivity	.82	.90	.88
	Attention/Self-Regulation	.90	N/A	N/A
	Attention	N/A	.91	.83
N	56	109	62	218

Note. All rs significant, $p < .001$. N/A = Not Applicable.

Validity

Discriminative Validity pertains to an instrument's ability to distinguish between relevant participant groups (i.e., the ability of the ASRS to differentiate between Autism Spectrum Disorder group membership and General Population or Other Clinical group membership).

A series of discriminant function analyses were conducted in order to determine the ability of the scores to predict group membership into the Autism Spectrum Disorder or General Population group. Table 6 displays the classification accuracy of both the ASRS full-length and ASRS Short Form Total Scores. On average, the scales were able to very accurately predict group membership, with a mean overall correct classification rate of 92.10%.

Furthermore, Figures 3 to 6 reveal that for virtually every scale, the Autism Spectrum Disorder group was rated higher than both the General Population and the Other Clinical groups. Results from a series of Analyses of Covariance revealed that these differences were statistically significant for every scale (with mostly large effect sizes;² mean Cohen's $d = 1.60$), with the exception of the Attention scale on the ASRS (6–18 Years) Teacher form, where scores between the Autism Spectrum Disorder and Other Clinical groups did not differ significantly from each other (this result is not unexpected due to the fact that the Other Clinical group in the ASRS [6–18 Years] sample includes a large ADHD sample).

Convergent Validity is established if results from the measure of interest are correlated with results from theoretically-related measures (Anastasi & Urbina, 1997). In an attempt to provide evidence for the convergent validity of the ASRS, a sample of parents and teachers completed the ASRS forms along with at least one other measure of childhood psychopathology

that assesses Autism Spectrum Disorders. These other measures included the Gilliam Autism Rating Scale Second Edition (GARS-2™; Gilliam, 2006), the Gilliam Asperger's Disorder Scale (GADS™; Gilliam, 2001), and the Childhood Autism Rating Scale (CARS™; Schopler, Reichler, & Rothen Renner, 1986).

The correlations (both obtained and corrected for range instability), as well as means and standard deviations, are provided in Table 7. Examination of these values must be made with recognition of the different metrics used for the different rating scales, and the fact that the CARS only provides a raw score. The mean scores obtained on the GARS and GADS are based on a comparison to atypical samples so that a score of 100 indicates average performance in relation to individuals on the Autism Spectrum. For children rated on both the ASRS and the GARS, the ASRS means by rater and age varied from 69.3 to 75.3 and the GARS values ranged from 88.6 to 100.9. The results for the 6–18 year olds rated by parents and teachers were particularly important because the GARS means were less than 100, yet the ASRS means were about 70 (two standard deviations above the normative mean for the general population). Similar findings were obtained for the GADS, illustrating the importance of having a general population reference group.

The ASRS Total Score was moderately correlated with the GARS Autism Index and the GADS Asperger's Disorder Quotient. The correlations between the ASRS Total Score and the CARS Total Score were somewhat lower. The low ASRS–CARS correlations could be due to the fact that different raters completed the forms (i.e., scores from parent- and teacher-completed ASRS forms were compared to clinician-completed CARS scores) and/or the CARS only yields a raw score.

Table 6. Classification Accuracy of the ASRS Total Scores

Classification Statistic	Full-Length Total Score				Short Form Total Score			
	Parent Ratings		Teacher Ratings		Parent Ratings		Teacher Ratings	
	ASRS (2–5 Years)	ASRS (6–18 Years)	ASRS (2–5 Years)	ASRS (6–18 Years)	ASRS (2–5 Years)	ASRS (6–18 Years)	ASRS (2–5 Years)	ASRS (6–18 Years)
Overall Correct Classification (%)	90.0	91.3	89.4	91.4	94.2	93.4	88.4	94.9
Sensitivity (%)	89.8	90.3	90.2	92.1	93.9	92.7	92.6	95.4
Specificity (%)	90.3	92.2	88.6	90.7	94.5	94.1	84.3	94.3
Positive Predictive Power (%)	91.3	91.8	88.6	90.3	94.6	94.1	85.5	94.1
Negative Predictive Power (%)	88.7	90.8	90.2	92.5	93.8	92.7	91.9	95.6
False Positive Rate (%)	9.7	7.8	11.4	9.3	5.5	5.9	15.7	5.7
False Negative Rate (%)	10.2	9.7	9.8	7.9	6.2	7.3	7.4	4.6
Kappa	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9
Autism Spectrum Disorder (N)	126	183	114	206	129	202	131	219
General Population (N)	115	196	112	212	128	207	111	228

² Rough rules of thumb for interpreting effect size in clinical/educational psychology have been provided by Cohen (1988): small effect size = .2; medium effect size = .5; large effect size = .8.

Figure 3. Mean T-Scores by Group: ASRS (2-5 Years) Parent Ratings

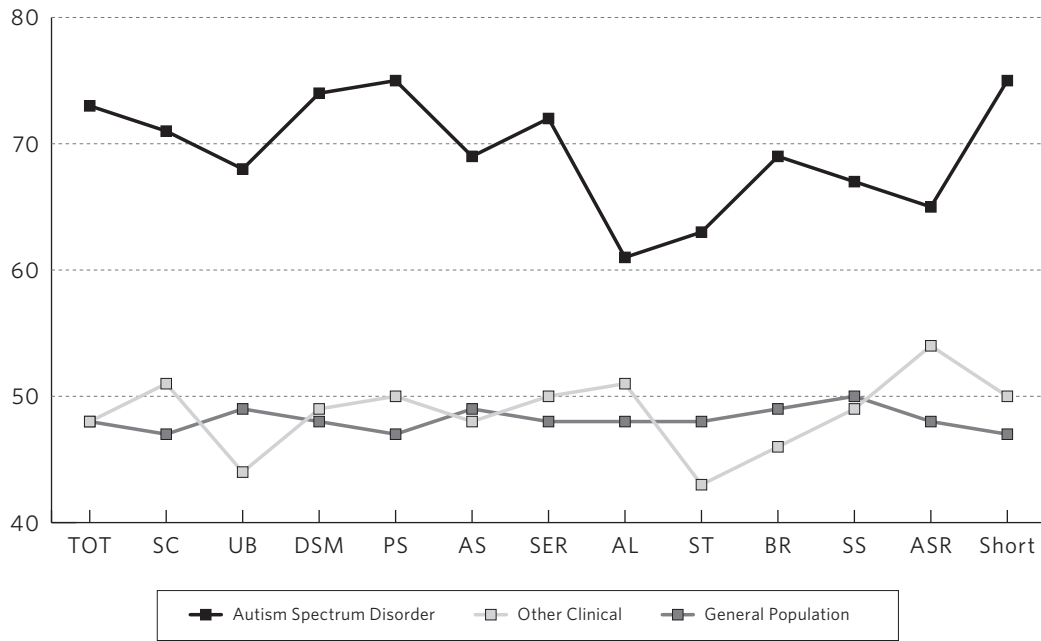
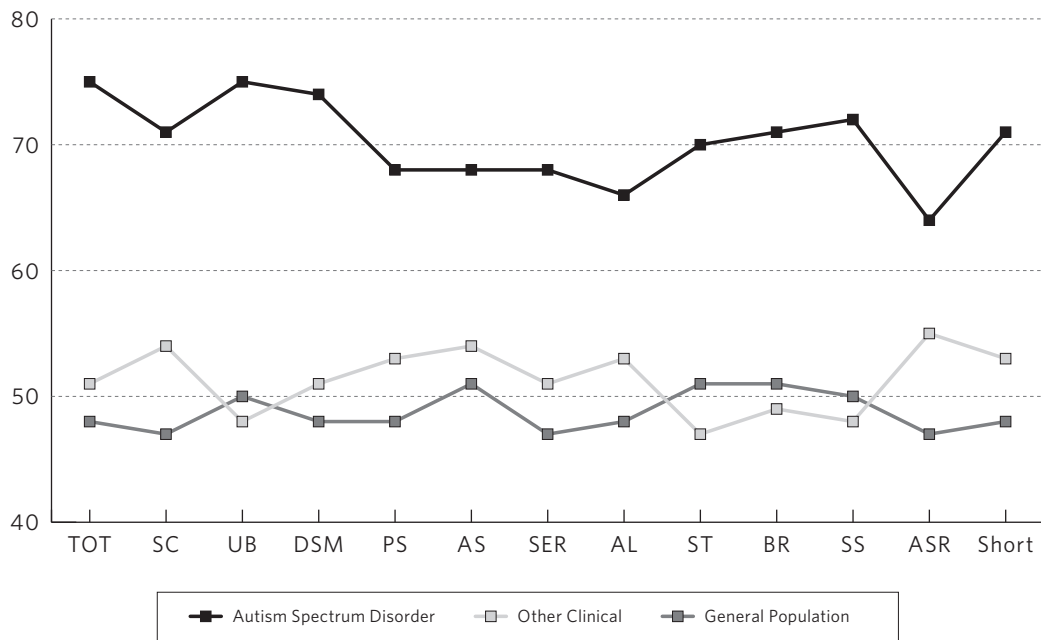


Figure 4. Mean T-Scores by Group: ASRS (2-5 Years) Teacher Ratings



TOT = Total Score	AS = Adult Socialization	BR = Behavioral Rigidity
SC = Social/Communication	SER = Social/Emotional Reciprocity	SS = Sensory Sensitivity
UB = Unusual Behaviors	AL = Atypical Language	ASR = Attention/Self-Regulation
DSM = DSM-IV-TR Scale	ST = Stereotypy	Short = Short Form
PS = Peer Socialization		

Figure 5. Mean T-Scores by Group: ASRS (6–18 Years) Parent Ratings

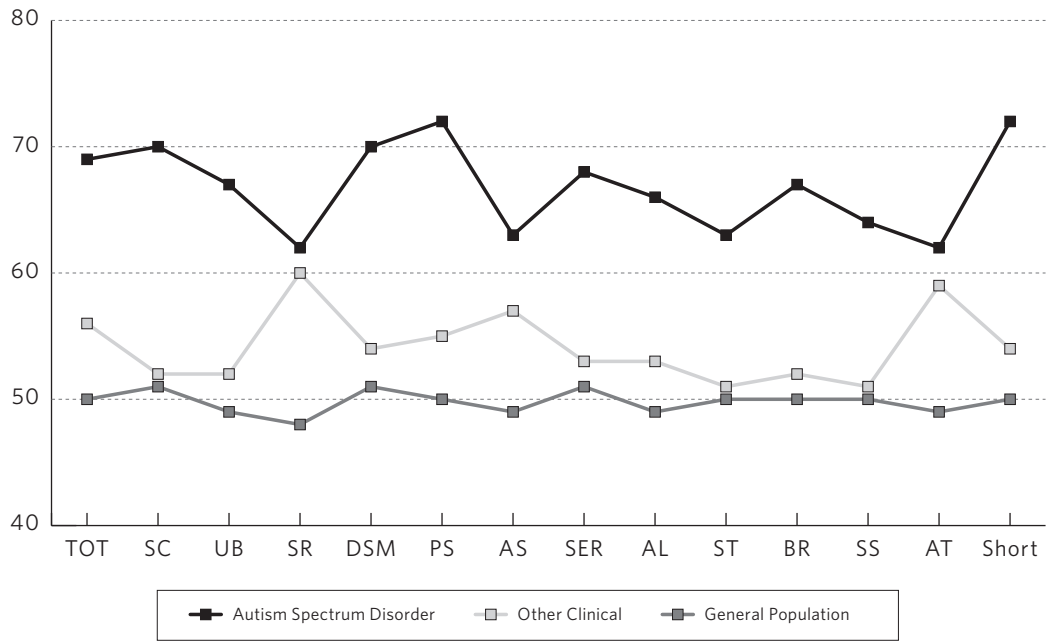
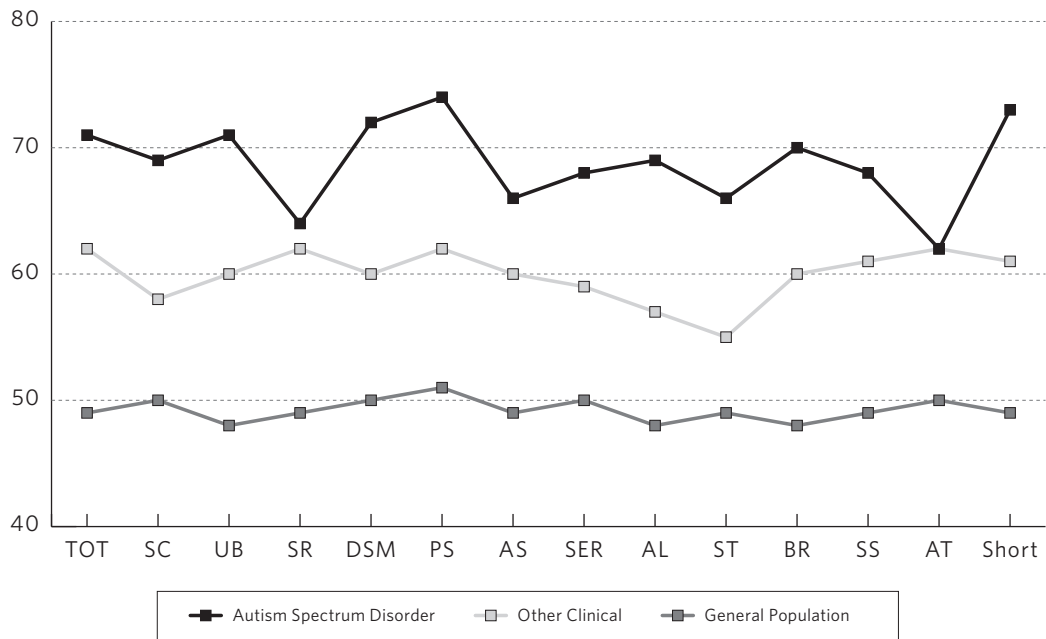


Figure 6. Mean T-Scores by Group: ASRS (6–18 Years) Teacher Ratings



TOT = Total Score	PS = Peer Socialization	BR = Behavioral Rigidity
SC = Social/Communication	AS = Adult Socialization	SS = Sensory Sensitivity
UB = Unusual Behaviors	SER = Social/Emotional Reciprocity	AT = Attention
SR = Self-Regulation	AL = Atypical Language	Short = Short Form
DSM = DSM-IV-TR Scale	ST = Stereotypy	

Table 7. Correlations Between the ASRS Total Score and Other Measures

Other Measures	Rater	Ages	Obtained <i>r</i>	Corrected <i>r</i>	<i>N</i>	GARS, GADS, or CARS		ASRS	
						<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
GARS Autism Index	Parent	2–5 Years	.83	.61	78	100.9	25.7	74.5	11.4
	Teacher	2–5 Years	.76	.41	53	100.1	30.5	75.3	12.7
	Parent	6–18 Years	.80	.63	104	93.9	24.4	69.3	10.0
	Teacher	6–18 Years	.82	.68	116	88.6	23.3	69.8	10.0
GADS Asperger’s Disorder Quotient	Parent	2–5 Years	.63	.49	78	96.9	19.3	74.5	11.4
	Teacher	2–5 Years	.76	.56	52	98.3	20.8	75.6	12.6
	Parent	6–18 Years	.70	.54	83	92.3	21.6	68.1	10.7
	Teacher	6–18 Years	.74	.61	82	91.5	21.6	67.7	10.0
CARS Total Raw Score	Teacher	2–5 Years	.50	.66	34	36.8	9.7	76.7	6.6
	Parent	2–5 Years	.06	.06	36	36.9	10.3	78.4	10.1
	Teacher	6–18 Years	.35	.40	109	35.3	10.5	69.5	8.7
	Parent	6–18 Years	.50	.51	122	35.7	10.8	71.3	9.9

Note. ASRS *T*-scores (normative sample *M* = 50, *SD* = 10) were correlated with: GARS-2 and GADS Standard Scores (reference sample *M* = 100, *SD* = 15), and CARS raw scores. All correlations significant, *p* < .01, except for the ASRS (2–5 Years) Teacher correlation with the CARS (*ns*). Pair-wise deletion of missing cases was used.

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