Differential diagnosis of autism-spectrum-disorder (ASD) in adults

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Aim

- To describe the most frequent differential diagnoses of autism-spectrum disorder (ASD) in a "real world data set".

- To determine what disorder patients who present for diagnosis but do not have an ASD are suffering from.

Method

- We filtered the data bank for F84.x for the year 2017-2022
- 357 subjects were found
- Inclusion criterion was, presenting for diagnosing of ASD
- 29 subjects did not meet the inclusion criterion
- 335 were analyzed ☞ Fig 1

Results

- 305 of the 335 patients (91%, (95% confidence interval (CI) 88-94.1%) did not meet DSM-V criteria for ASD (ASDno). ASD was confirmed in 26 individuals (7.8%, 95% CI 4.9-10.6%)(ASDyes). In four individuals, the diagnosis could not be excluded with certainty (1.2%). ☞ Fig 2

- The cohort included 201 males (60.0%) and 134 females (40.0). ☞ Fig 2

- The gender distribution among ASD patients was m:f = 2-3:1 (male 69.2%, 95% CI 51.5-86.9, female 30.8, 95% CI 13.0-48.5%). ☞ Fig 2

- Cohort's mean age was 31.3 years (SD=11.2y, range 16-65). The age group 16 to 29 years was overrepresented (54.3%), resulting in a left-skewed age distribution. ☞ Fig 3

- The probability of ASD found was lower the older the patients were. ☞ Fig 4

- The top 6 most frequently found differential diagnoses are
  - Affective disorder
  - AD(H)D
  - Social Phobia
  - Anxious Avoidant PD
  - Panic Disorder with/without Agoraphobia
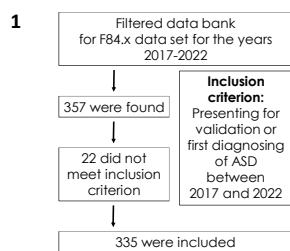 - Obsessive-Compulsive PD

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Figure 1. Flow-Chart of the study. The inclusion criterion was patients with suspected or supposedly diagnosis of ASD from other institutions presenting to our center for validation or first diagnosing of ASD between 2017 and 2022. All included patients were thoroughly assessed according to the German S3-guidelines for diagnosing ASD according to the DSM-V criteria by an examiner experienced, certified, and trained in diagnosing ASD. The local ethics committee approved the study. A total of 357 patients were analyzed. Twenty-two were excluded from the study because they did not meet the inclusion criteria as they had been diagnosed before and were at the institute for treatment or had the diagnose but were for treatment for co-morbidities.

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Häufigkeit von ICD-10 ASD Code

ICD-10 ASD Code	Gender			
	male		Female	
none	181		124	
F84.0	8		1	
F84.1	2	8.96%	1	5.97%
F84.5	8		6	
Probable	2		2	
	201 (60%)		134 (40%)	335

Figure 2. Frequency of diagnoses of ASD. The table gives the number and gender distribution of the found ASD diagnosis, given for the different subtypes.

Figure 3. Description of the cohort. The age at first presentation was 31.45 (SD=11.21) years in the total sample. The youngest participant was 16 and the two oldest participants were 65 years old. The age group of 16 to 29 years is significantly overrepresented with 54.1%, resulting in a left-skewed age distribution. This is due to the fact, that at our center, in general, presentation was possible with a minimum age of 18 years.

Figure 4. Box-plots of the representation of age by diagnosis group (ASD$_{yes}$ and ASD$_{no}$ group). The box includes the data between the lower and upper quartile, the dash indicates the median, while the black square indicates the mean. The individual data points are also shown (jittered). Note that we were unable to definitely verify or exclude the diagnosis of ASD in 4 subjects. The older the patients were at presentation, the less probable was the diagnosis of ASD. The one patient with the age of 60 and the diagnoses of ASD was female. The diagnosis was never suspected before. Yet, the woman lived in an assisted housing and had no school graduation.

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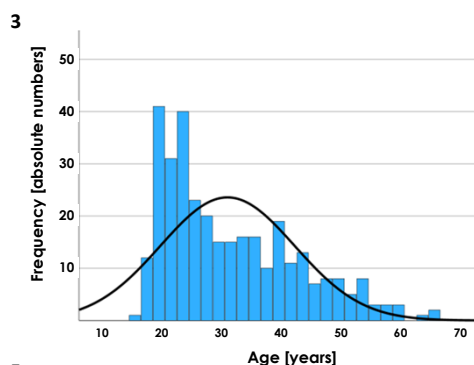
| Diagnosis (N=883), %		Diagnosis of ASD			
		Total (N = 335)	Yes (N = 26)	No (N = 305)	Probable (N = 4)	P [1]
Depression	Yes	197 (58.8%)	8 (30.8%)	189 (62.0%)	4 (100%)	<.001
(22.3%)	No	138 (41.2%)	18 (59.2)	116 (38.0%)		
AD(H)D	Yes	134 (40.0%)	5 (19.2%)	126 (41.3%)	1 (25.0%)	.031
(15.2%)	No	201 (60.0%)	21 (80.8%)	179 (58.7%)	3 (75.0%)	
Social Phobia	Yes	95 (28.4%)		95 (31.1%)		<.001
(10.8%)	No	240 (71.6%)	26 (100%)	210 (68.9%)	4 (100%)	
Anxious Avoidant PD	Yes	72 (21.5%)		72 (23.6%)		.001
(8.2%)	No	263 (78.5%)	26 (100%)	233 (76.4%)	4 (100%)	
Panic Disorder with/without Agoraphobia	Yes	51 (15.2%)	1 (3.8%)	50 (16.4%)		.161
(5.8%)	No	284 (84.8%)	25 (96.2%)	255 (83.6%)	4 (100%)	
Obsessive-Compulsive PD	Yes	51 (15.2%)		50 (16.4%)	1 (25.0%)	.071
(5.8%)	No	284 (84.8%)	26 (100%)	255 (83.6%)	3 (75.0%)	
Diagnosis <15%						
Combined PD	Yes	41 (12.2%)		40 (13.1%)	1 (25.0%)	.108
(4.6%)	No	294 (87.8%)	26 (100%)	265 (86.9%)	3 (75.0%)	
Other PD	Yes	30 (9.0%)		29 (9.5%)	1 (25.0%)	.140
(3.4%)	No	305 (91.0%)	26 (100%)	276 (90.5%)	3 (75.0%)	
Specific Phobia	Yes	27 (8.1%)		27 (8.9%)		.236
(3.1%)	No	308 (91.9%)	26 (100%)	278 (91.1%)	4 (100%)	
OCD	Yes	26 (7.8%)		26 (8.5%)		.250
(2.9%)	No	309 (92.2%)	26 (100%)	279 (91.5%)	4 (100%)	
Borderline PD	Yes	23 (6.9%)		23 (7.5%)		.297
(2.6%)	No	312 (93.1%)	26 (100%)	282 (92.5%)	4 (100%)	
Eating Disorder	Yes	6 (1.8%)		6 (2.0%)		.414
(1.8%)	No	329 (98.2%)	26 (100%)	299 (98.0%)	4 (100%)	
Substance Use Disorder (Illegal Substance)	Yes	17 (5.1%)		17 (5.6%)		.414
(1.9%)	No	318 (94.9%)	26 (100%)	288 (94.4%)	4 (100%)	
PTSD	Yes	16 (4.8%)		16 (5.2%)		.438
(1.8%)	No	319 (95.2%)	26 (100%)	289 (94.8%)	4 (100%)	
Other neurotic, stress-related and somatoform disorders	Yes	14 (4.2%)	1 (3.8%)	13 (4.3%)		.911
(1.6%)	No	321 (95.8%)	25 (96.2%)	292 (95.7%)	4 (100%)	
Substance Use Disorder (Alcohol)	Yes	13 (3.9%)		13 (4.3%)		.514
(1.5%)	No	322 (96.1%)	26 (100%)	292 (95.7%)	4 (100%)	
Schizophrenia Spectrum Disorder	Yes	13 (3.9%)	3 (11.5%)	10 (3.3%)		.103
(1.5%)	No	322 (96.1%)	23 (88.5%)	259 (96.7%)	4 (100%)	
Intellectual Disability	Yes	11 (3.3%)	3 (11.5%)	8 (2.6%)		<.001
(1.5%)	No	324 (96.7%)	23 (88.5%)	279 (97.4%)	4 (100%)	
Specific Developmental Disorders (Lernbehinderung)	Yes	11 (3.3%)	3 (11.5%)	8 (2.6%)		.047
(1.2%)	No	324 (96.7%)	23 (88.5%)	279 (97.4%)	4 (100%)	
Generalized Anxiety Disorder	Yes	8 (2.4%)		8 (2.6%)		.668
(0.9%)	No	327 (97.6%)	26 (100%)	297 (97.4%)	4 (100%)	
Transsexualism	Yes	7 (2.1%)		7 (2.3%)		.704
(0.8%)	No	328 (97.9%)	26 (100%)	298 (97.7%)	4 (100%)	
Bipolar Disorder	Yes	3 (0.9%)		3 (1.0%)		.862
(0.3%)	No	332 (99.1%)	26 (100%)	302 (99.0%)	4 (100%)	
Tourette Spectrum Disorder	Yes	2 (0.6%)		2 (0.7%)		.906
(0.2%)	No	333 (99.4%)	26 (100%)	303 (99.3%)	4 (100%)	
Narcisstic PD	Yes	2 (0.6%)		2 (0.7%)		.906

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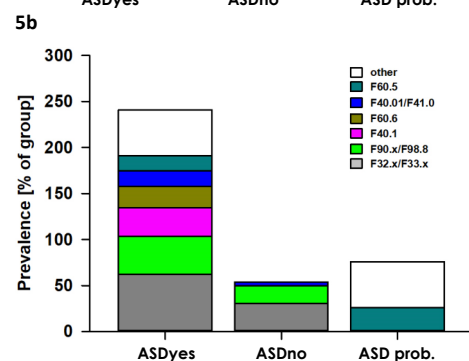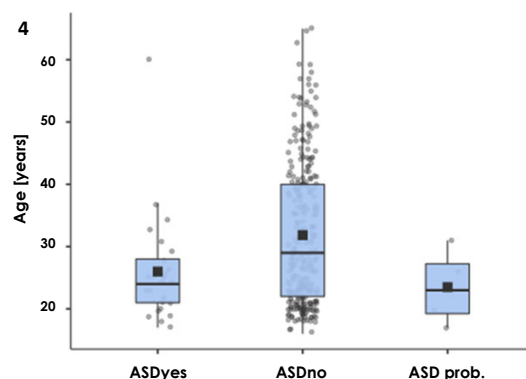
Figure 5. The differential diagnosis in our sample. The table gives the diagnoses found in our sample. We believe some of the found diagnoses are indeed differential diagnoses rather than comorbidities. However, as the sample was analyzed retrospectively, and the patients initially presented at our center for diagnosis purposes, we focused on explaining patients' suffering. This approach might have led to an underestimation of the comorbidities in the ASD group, as this was not in the scope of the original task.
Figure 5b shows the stacked bars of the most frequently found diagnoses by diagnosing group (ASDyes and ASDno). For detailed information, see Table 5a (left).

Conclusion

- We conclude that ASD in adults is suspected considerably too frequent.

- ADHD, Personality disorders, and conditions from the group of phobic and anxiety disorders are more often differential diagnosis than comorbidities

- These data might be particularly relevant from a patient management perspective.