

Review article

Autism Spectrum Disorders in Adulthood—Symptoms, Diagnosis, and Treatment

Mandy Roy, Peter Strate

Autism Ambulance,
Asklepios Clinic Nord
Ochsenzoll, Ham-
burg: PD Dr. med.
Mandy Roy, Dr. med.
Peter Strate

Summary

Background: The negative effect of autism spectrum disorders (ASD) persists into adulthood, with impacts on social interactions and occupational development. This article reviews the current status of clinical aspects of ASD in adulthood on the basis of ICD-11.

Methods: A selective search of PubMed and other relevant publications on ASD focused on changes in ICD-11 and on prevalence, symptoms, diagnosis, treatment, and prognosis.

Results: The global lifetime prevalence of ASD is around 1%. A number of recent studies have concentrated on behaviors termed “camouflaging” (disguising symptoms typical of autism) and “stimming” (use of repetitive self-stimulation), which affect the mental health of those concerned. Standardized diagnostic instruments are available, but the data on validity in adulthood and on applicability are limited. Gestures, eye contact, facial expressions, social closeness, and reciprocity play particularly important roles in diagnosis. German-language treatment manuals lack randomized controlled studies: a validated treatment strategy is currently available only in English. Investigation of the prognosis showed limitation of occupational perspectives (54% unemployment in the study sample) and 2.9 times higher mortality compared to the general population.

Conclusion: Individual treatment goals should be set, taking account of any coexisting psychiatric disorders. The process of diagnosis remains clinical, using standardized instruments. Further improvement of diagnostic and therapeutic instruments for adult ASD is desirable.

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Autism spectrum disorders are characterized by a notably reduced intuition for social interactions, unusual interests, and stereotypical behaviors (1). In adulthood, substantial restrictions to professional development and to developing interpersonal relationships are common (1). This article aims to provide an overview of what is currently clinically known about the symptoms, diagnostic evaluation, and treatment of autism spectrum disorders in adulthood.

Methods

We conducted a selective literature search in PubMed in November 2021, using the search terms “autism” and “Asperger syndrome” as well as “adult/adulthood” in combination with “prevalence”, “symptoms”, “hypersensitivity”, “diagnosis/diagnostic”, “therapy/treatment”; the search was updated in October 2022. Systematic reviews, meta-analyses, and randomized controlled trials were preferentially considered. Furthermore we consulted both S3 guidelines for ASD (diagnostic evaluation; therapy), relevant handbooks, and online publications from WHO and the German Federal Statistical Office that were available up to October 2022.

Prevalence

Exact numbers on the prevalence of ASD in adults in Germany and trends over the past 20 years do not exist. For the purpose of an orientation estimate of prevalence

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TABLE 1

Diagnostic criteria for autism spectrum disorders (ASD) according to the ICD-11 and diagnostic codes according to intellectual development and possible functional speech impairment

Diagnostic criteria for ASD according to the ICD-11, summarized.

• **Sustained deficits in initiating/maintaining social communication and social interaction**

The following areas may be impaired:

- Sympathy for or inappropriate reactions to the verbal/non-verbal communication of others
- Integration of spoken language and non-verbal pointers (for example, eye contact, gestures, facial expressions)
- Comprehension/use of speech/language in social contexts and ability to initiate mutual social chats and sustain these
- Social awareness for behavior that is appropriate for the social context
- Ability to imagine the feelings and emotional states of others and react to those
- Mutual sharing of interests
- Ability to establish typical peer relationships and maintain these

• **Sustained restricted/limited repeated inflexible behavioral patterns or interests that are untypical/exaggerated for age or sociocultural context**

These may include:

- Lacking adaptability to new experiences; suffering as a result of trivial changes to a familiar environment or unexpected events
- Inflexible adherence to certain routines, for example, following familiar routes or keeping to exact mealtimes
- Sticking to rules excessively (for example, during play)
- Obstinate, ritualized behavior patterns—for example, putting objects in order in a particular way
- Repeated, stereotypical motor movements, such as moving the entire body, unusual movements of hands or fingers and bodily postures
- Sustained preoccupation with special interests, objects, or certain types of stimuli
- Hypersensitivity or hyposensitivity to sensory stimuli (noise, light, textures, smells, taste, heat, cold, and/or pain)
- Onset of disorder in early childhood
- Substantial impairments in personal, family related, social, professional, other areas

Diagnostic codes	Without impairment of intellectual development	With impaired intellectual development
No impairment or slight impairment of functional speech	6A02.0	6A02.1
Impaired functional speech*	6A02.2	6A02.3
Complete or almost complete absence/lack of functional speech	–	6A02.5

* Only single/individual words or simple sentences are used (1).

trends we interrogated the Information System of the Federal Health Monitoring database using the following criteria:

- Autism
- Clinical sample of inpatient treatment cases
- All lengths of stay of patients aged 20–50
- Diagnoses: early childhood autism, atypical autism, and Asperger's syndrome.

The data interrogation found for 2000 a total of 124 treatment cases; by 2020 this had risen to 635 cases (2). This corresponds to an increase by a factor of five over this time period.

Two systematic reviews regarding ASD described for Europe prevalence rates of 0.38% (Germany) to 1.55% (Spain) and for the USA of 1.7–1.85% (3) and a global median prevalence of 1% (Europe 0.24–2.68%) (4). These reviews included mostly studies in children; only few studies included adults as hardly any data exist for this group. Prevalence rates reported 20 years ago were lower (including for Asperger's syndrome, of about 0.25%) (5). One reason for this increase could be increased attention regarding ASD, with diagnostic investigation more common. But there are also indications that environmental factors are involved, such as ASD after val-

proate intake during pregnancy (6) and an older age of father or mother at the time of fertilization (7).

Changes in the ICD-11

The ICD-10 included in the chapter on pervasive developmental disorders the categorical diagnoses of early childhood autism and atypical autism, as well as Asperger's syndrome (8). The crucial differential criterion to Asperger's syndrome was delayed cognitive development and speech development in early childhood autism (8). It transpired, however, that the validity of the distinction of these diagnostic criteria was not satisfactory and that transitions are fluent. Numbers and the severity of autism symptoms varied within and between the diagnostic subgroups and the prognostic predictability of the subcategories was low (9). The ICD-11 therefore now includes in the chapter on neuronal developmental disorders in analogy to the DSM-V the diagnostic category of autism spectrum disorders on a dimensional basis (1), which enables further specification by means of the two characteristics of an intellectual development disorder and the degree of functional speech impairment (*Table 1*).

The previously separate symptom areas of difficulties in social interaction and communication were

combined into one symptom area. Here too the separation was not valid—both areas have substantial overlap. Deficits in communication relate materially to social interaction and are not of a structural nature (vocabulary or grammar) (9). Furthermore, because of its frequent occurrence, hyper- or hyposensitivity to sensory stimuli was included as a diagnostically relevant symptom of ASD (9) (Table 2). In the ICD-11 the clinical severity across different phases of life is also described, including adulthood. The fact is mentioned that social difficulties in dyadic relationships can be better managed by compensation strategies than in group constellations and special interests can be useful professionally. The working environment should therefore be adapted to the person. Furthermore, mention is made of the fact that a first diagnosis in adulthood often happens after decompensation in the private or professional environment.

Symptoms

The symptom areas of ASD in the ICD-11 comprise two categories (Table 1) (1):

- Difficulties in social interaction/communication
- Limited areas of interest/repetitive behaviors including unusual sensory sensitivity.

The symptoms present typically from early childhood, are sustained, and lead to impairments in different areas of life—for example, in family, school, professional, or social environments.

Persons with ASD have a reduced intuition for social situations, do not recognize body language intuitively, and interpret language in a very concrete manner. In talks/chats they grasp the emotional level to an insufficient degree. Even though for their interlocutor, communication—for example during small talk—serves to shape the relationship, for persons with ASD the factual information level is of crucial importance.

Recently, the compensation of autistic characteristics—a conscious or unconscious behavior known as camouflaging or masking—has been studied in a systematic manner. A unified operationalization of this concept does not exist to date. Often, however, this is understood to be the use of specific behaviors and cognitive strategies that autistic persons deploy to ensure that social deficits remain as invisible as possible. They have adapted to the non-autistic world so as to be less conspicuous and cope better within this world (10). Non-autistic behavior can be advantageous especially in conducting partner relationships or friendships, when completing education/training/apprenticeships, in employment, or to prevent exclusion. Camouflaging can, for example, include suppression of repetitive movements, forcibly sustained eye contact, or the use of learnt formulaic phrases (10). Cook et al (2021) in a systematic review analyzed 18 studies of camouflaging in adults with ASD (10). Nine of the studies analyzed an association with sex:

TABLE 2

Rates of changed sensitivities in the respective sensory modalities*

Sensory modality	Rates of sensitivity changes in %
Auditory	43–57
Visual	23–63
Touch	55–63
Smell/taste	37–51
Pain	23–43

* Sample: n = 200 persons with ASD, age: 32 months – 38 years; the sample was categorized into four groups based on median age (10.3) and IQ (below or above 70) (16).

- In five studies, women with ASD deployed camouflaging more often than men with ASD
- One study confirmed stronger camouflaging in a non-binary gender identity compared with male sex
- Three studies did not show any association.

An association with camouflaging and mental wellbeing was investigated in 10 of the studies. Eight studies showed increased depression, anxiety, and a heightened perception of stress for a higher degree of camouflaging.

Repetitive behaviors comprised, for example, rocking and twisting movements, knuckle cracking, chewing items, or producing auditory stimuli such as whistling, humming, or clapping. This self stimulation has recently become known in science as “stimming.” In the past, these stereotypical behaviors in children were categorized as redundant and gradually reduced by training wherever possible. Recent studies in which adults with ASD were questioned in an interview or by means of a questionnaire showed consistently that these behaviors have an important self regulatory function (11–13): affected persons deploy self stimulation, initially often unconsciously, in order to regulate intense positive or negative emotional states, to soothe themselves, and to regain emotional control over themselves. In this setting, rhythm seems a helpful component in stimming, and focusing the attention on stereotypical behaviors results in a reduction in the perception of overly demanding stimuli. Such stimuli are among the crucial causes of the increased stress experience in ASD and can be externally caused—for example, in the form of noise or other sensory stimuli—or they are of an intrinsic nature—for example, in the sense or debilitating thoughts and feelings (13). Those affected described as problematic the fact that stimming is often socially undesirable (11, 13), since repetitive noises or movements are experienced by others as odd or disturbing. Suppressing stimming, however, leads to further stress. Affected persons have reported improved acceptance of stimming after explaining its function (13).

TABLE 3

Recommendations of the NICE guideline (21) for instruments for diagnosing ASD in adulthood and available quality criteria*

Name	Reference	Intervention	Validity in adults
ASD without intellectual disability			
Adult Asperger Assessment (AAA)	(35)	Interview, self assessment questionnaires Autism spectrum quotient (AQ)/empathy quotient (EQ)	X
Autism Diagnostic Interview-Revised (ADI-R)	(17; 36)	Interview	X
Diagnostische Beobachtungsskala für autistische Störungen (ADOS-2, diagnostic observation scale for autistic disorders), module 4	(18)	Interview, test tasks	Sensitivity 61 %, specificity 71 %, test-retest reliability 90 %
Asperger syndrome (and High-Functioning Autism) Diagnostic Interview (ASDI)	(38)	Interview	X
Ritvo Autism Asperger Diagnostic Scale – Revised (RAADS-R)	(37)	Self assessment scale	Cut-off 65: sensitivity 97 %, specificity 100 %, test-retest reliability > 76%
ASD with intellectual disability			
ADI-R, ADOS-2, see above			

* X = insufficient data exist regarding the diagnostic validity in adulthood
ASD, autism spectrum disorders

Sensory sensitivities in ASD manifest, for example, as hypersensitivities towards auditory or tactile stimuli, so that ticking clocks, humming electrical devices, or light touches can be experienced as disagreeable or burdensome. Studies have described that in 18–69% of people with ASD who are affected have hyperacusis (14). The underlying causes are heterogeneous and can, among others, also result in a reduced/delayed stapedius reflex, anatomical particularities of the semicircular canals of the ear, or abnormal neuronal connections in the olivary nuclei (14). The other sensory modalities too can be affected by changed sensitivity, visually, for example, in the form of heightened contrast perception or an extended visual field (15). Olfactorily or gustatorily, hypersensitivity or hyposensitivity may be present (15). *Table 2* provides an overview of data on the rates of changed sensitivity of the sensory modalities, collected by Leekam et al (2006) in 200 autistic children and adults (categorized into four groups by IQ and age) (16). In 64–83% more than one sensory modality was affected. The rates of changed auditory sensitivities was lower in this study than in the study reported by Danesh et al (14).

Diagnosis

The diagnosis of ASD is made clinically. To date no valid methods exist for confirming the diagnosis technically or biologically. The diagnostic investigation is done mostly in specialized centers and includes a detailed psychiatric examination and medical history regarding the diagnostic criteria in childhood and adulthood. The Autism Diagnostic Interview-Revised (ADI-R) (17) and the diagnostic observation scale for autistic disorders (ADOS-2) (18) are still the diagnostic gold standard. The ADI-R comprises 93 items and is

preferably undertaken with the patient's parents. Module 4 of the ADOS-2 was conceived for adults and included special interview questions and test questions. A study of 385 adolescents with ASD and 288 controls found by using machine learning that the isolated use of five test subgroups of the ADOS module 4 (gestures, eye contact, facial expressions, social approaches, reciprocity), with a sensitivity of 72% and a specificity of 87%, were comparable with the application of the entire test (19).

In the most recently published S3 guidelines for the diagnostic evaluation of ASD, neither of these two instruments is recommended, and nor are any of the other available standardized diagnostic interviews for use in adults, as there isn't enough study evidence for their diagnostic validity, among others (20). The current UK guidelines from the Institute for Health and Care Excellence (NICE) (21) do, however, recommend several standardized interviews and instruments for diagnosing ASD in adults (*Table 3*).

A third-party medical history should be taken from a person who experienced the affected person in childhood (for example, a parent or an older sibling). If available, comments from school reports or psychiatric preliminary reports are also helpful information sources. On contact, especially the lacking eye contact and lack of facial expression and a monotonous way of speaking may be conspicuous.

A physical exam should be added in order to, for example, ascertain low-grade ataxia or slight uncertainty in coordination as soft signs of ASD (22). Particularities of the facial skull (Fragile X syndrome: narrow, elongated face, prominent ears and forehead, in 20–30% ASD), height, and development of secondary sexual characteristics (Klinefelter syndrome; above average height, reduced body hair; in 11–12%

TABLE 4

Therapeutic interventions in autism spectrum disorders (ASD) in adulthood

Reference	Evidence level	Intervention	Effects	Comment
PEERS for young adults				
Gantman et al., 2012 (39)	Randomized controlled trials	Group training social competency with support by caregivers/reference persons/attachment persons for 14 weeks (one 90 minute session/ week)	- Gantman et al., 2012 (39): n (treatment) = 9, n (control) = 8; MANOVA: significant improvement in social competencies in different tests; Wilks' Lambda = 0.34; F (1.16) = 4.27; p < 0.02 - Laugeson et al., 2015 (28): n (treatment) = 1; n (control) = 10; MANOVA: significant improvement in social competencies in different tests; Wilks' Lambda = 0.14; F(5.11) = 12.43, p < 0.001	- No German language version available - Very small number of subjects
FASTER Manual				
Ebert et al., 2012 (26)	Non-controlled individual case studies	Group psychotherapy, modules: psychoeducation, stress management, training in social communication	- Decrease in depressive symptoms (BDI), n = 12: M1 = 17.42 (SD = 12.64), M2 = 11.33 (SD = 11.32), p = 0.027 - Increase in general self esteem (ASW), n = 12: M1 = 82.08 (SD = 33.09), M2 = 92.67 (SD = 26.20); p = 0.028 - Improved quality of life (WHOQOL-BREF), n = 11: Environment: M1 = 15.55 (SD = 2.42), M2 = 16.75 (SD = 1.88), p = 0.048	- In German - RCT under way (van Elst et al., 2021) (40)
GATE Manual				
Gawronski et al., 2012 (27)	Non-controlled individual studies	Group psychotherapy, focus: psychoeducation, stress management, training for social competency	- Patients' experience of effective factors, n = 10: STEP-K: T = 45.4, STEP-P: T = 46.8, STEP-B: T = 54.1 - Trend to decrease of depressive symptoms (BDI-II), n = 10: M1 = 15.7 (SD = 15.3), M15 = 12.2 (SD = 16.8), p = 0.075	In German
High functioning autism in adults (cognitive-behavioral therapeutic manual)				
Dziobek and Stoll, 2019 (25)	Authors' clinical experience	Individual psychotherapy, modules: psychoeducation, self esteem/identity, stress management, socio-emotional competency, partner relationship, professional orientation	Not described	In German
Job application training in a group setting				
Morgan et al., 2014 (29)	Randomized controlled trial	Training of skills relating to the application process over 12 weeks, among others via role play, video feedback, peer review	Significant increase in job application skills, n (training) = 12; n (control) = 12: M (training) = 0.87, SD = 1.99; M (control) = -0.87, SD = 1.99; t (23) = 2.14, p < 0.05, Glass's delta = 0.87	Very small number of subjects
JobTIPS: Job application training in an internet based individual setting				
Strickland et al., 2013 (30)	Randomized controlled trial	5 internet based and "virtual reality" lessons regarding job related interests, finding/maintaining, and holding down a job, further job related themes	Significant improvement to what is said in the answers in the job interview, n (training) = 11; n (control) = 11: M (training) = 0.448, SD = 0.41; M (control) = -0.034, SD = 0.17; F(1.20) = 17.46, p < 0.0001, $\eta^2 = 0.47$	- www.Do2Learn.com/JobTIPS - Very small number of subjects

B, therapeutic relationship; BDI(-II), Beck Depression Inventory (-II); K, understanding the motivation; M1/2, mean time point of measurement1/2; P, active support for coping with problems; RCT, randomized controlled trial; SD, standard deviation; STEP, session questionnaire for general and differential individual psychotherapy; WHOQOL-BREF, WHO-Quality of Life – Short Form; WHO, World Health Organization

ASD) can indicate syndromic autism (22). There are no precise data on the rates of syndromic disorders as a cause of ASD; according to estimates rates vary between 10% and 20% (22).

An exploration regarding psychiatric comorbidities should be carried out, especially depression (30–70%), anxiety disorders (45–56%), and attention deficit/hyperactivity disorder (ADHS) (30%) are common in ASD (22).

In terms of perspective/outlook, the development of objective methods to add to the diagnostic repertoire is important. In a study of 664 persons with and without ASD, differences were seen on MRI scans of the brain by means of machine learning and a specific neuronal atlas was developed. This atlas helps identify the brains of patients with ASD with a precision of 97±2% (23), although no prospective confirmation of this tool is available to date.

Therapy

The S3 guideline on the therapy of ASD (24) emphasizes that at the start of treatment, clear, individual therapeutic goals should be defined that can be geared towards the core symptoms of ASD as well as on comorbid psychiatric disorders. For adults with ASD without intellectual disability, group therapy for 3–6 months with 6–8 participants is recommended, which among others includes the following parameters (24):

- Discussions of situations in everyday life
- Training in small talk, conversational technique, and establishing contact
- Dealing with stress, emotions, and conflicts.

German-language manuals for psychotherapy in adults with ASD in a one-to-one setting (25) and group setting (26, 27), which also address the listed topics, exist (*Table 4*), but no randomized controlled trials (RCTs) have been published for these so far. The therapeutic concept “PEERS for young adults” (28), however, has been investigated in RCTs, but it is available in English only (*Table 4*). In adults patients with ASD and existing mental retardation, the treatment according to S3 guidelines should consist primarily of behavioral therapeutic training of everyday practical activities according to the current developmental state of the patient (24). In concrete terms this may mean, for example, practicing bodily hygiene, housework, or an activity in a workshop (24).

Self help groups can also provide complementary support for affected persons.

A further important area is job support. Studies have shown that job application training, where job interviews are practiced in role play or in a virtual environment and small talk is rehearsed, and which conveys knowledge regarding finding and holding down a job, improve the success of job applications and result in placements in the first workplace (24, 29, 30) (*Table 4*).

Thus far, no medication exists for treating the core symptoms of ASD. The S3 guidelines recommends in pronounced stereotypical behaviors to give antipsychotic drugs, such as risperidone or aripiprazole (24) for a limited period of a few weeks. The evidence for use in adults is poor, however (effects size risperidone: standardized mean difference [SMD]=0.97; 95% confidence interval [0.21; 1.74]; effect size of aripiprazole is available only for children/adolescents: SMD=0.48; [0.26; 0.70]) (31). For comorbid anxiety disorders or depressive disorders, selective serotonin reuptake inhibitors (SSRIs) can be used (24) and for comorbid ADHD, methylphenidate or atomoxetine (24).

Oxytocin is an active substance that has been investigated in studies for several years for its potential future clinical application (for example, administered via a nasal spray). Data continue to be heterogeneous, however. Some studies showed short-term unsustained improvements in social interaction, recognition of emotions, and repetitive behaviors, whereas other studies did not show any significant ef-

fect (32). The existing data therefore do not justify the use of oxytocin for the treatment of ASD in routine clinical practice.

Prognosis

Intellect is a decisive factor in the prognosis in ASD. Intellectual disability mostly requires comprehensive support, a structured environment, and carers (22). Furthermore, a therapeutic living environment may be indicated. In high functioning ASD, impairments often affect the achievement of age-typical life goals. Often, persons have an above-average educational attainment, but no corresponding employment (22). In the authors' own studies of adults patients with ASD (aged 20–62 years, mean/average 36.5 years), 46 of 50 persons with ASD under study were in employment, 28% lived in a partner relationship, and 20% had children (33).

A Swedish cohort study of 27,122 persons with a diagnosis of ASD between 1987 and 2009 showed a higher mortality for persons with ASD than for the general population (mortality general population 0.91% versus persons with ASD 2.60%), with mortality increased in almost all causal diagnostic categories (34).

This illustrates the urgent need for specific treatments and support for adults with ASD.

Conclusions

The estimated global median prevalence of ASD is 1%. The diagnosis is still made clinically, by using standardized instruments. The treatment comprises primarily psychotherapeutic interventions. The prognosis in adults with ASD with regard to gainful employment and development of partner relationships is associated with limitations; mortality is higher than in the general population.

Conflict of interest statement

The authors declare that no conflict of interest exists.

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Corresponding author

PD Dr. med. Mandy Roy
Autismus-Ambulanz
Asklepios Klinik Nord Ochsensoll
Langenhorn Chaussee 560
22419 Hamburg, Germany
m.roy@asklepios.com

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Questions on the article in issue 6/2023:

Autism spectrum disorders in adulthood—symptoms, diagnosis, and treatment

cme plus+

The submission deadline is 9 February 2024. Only one answer is possible per question.
Please select the answer that is most appropriate.

Question 1

For which of the following influences during pregnancy does the text mention of potential association with autism spectrum disorder?

- a) Nicotine consumption
- b) Substantial overweight
- c) Alcohol consumption
- d) Valproate intake
- e) Severe underweight

Question 2

Which of the following terms is presented in the text for describing a typical behavior of persons with autism spectrum disorder?

- a) Fidgeting
- b) Stimming
- c) Flicking
- d) Clicking
- e) Slapping

Question 3

Which special trait is assumed to be the cause of hyperacusis in ASD, among others?

- a) Abnormal neuronal connections in the olivary nuclei
- b) Increased and accelerated stapedius reflex
- c) Free fluid in the inner ear
- d) Enlarged and misshapen cochlear nuclei
- e) Enlarged auditory ossicles

Question 4

In a sample of 200 persons with ASD, how often was a changed sensitivity of the sensory modality „touch“ detected?

- a) In 6–11 %
- b) In 12–20 %
- c) In 21–35 %
- d) In 42–50 %
- e) In 55–63 %

Question 5

Which association between a greater degree of camouflaging and psychological wellbeing was found in eight of 10 studies investigating this question?

- a) Lower perception of stress and lower level of aggression
- b) Higher level of aggression and lower suicidality
- c) Increased perception of stress and more anxieties
- d) Reduced motivation and increased suicidality
- e) Lower levels of depression and increased motivation

Question 6

Which particular characteristics in the eyesight of persons with ASD does the text name as examples?

- a) General colour blindness and extended visual field
- b) Red-green blindness and paracentral scotoma
- c) Increased contrast perception and peripheral scotoma
- d) Increased contrast perception and extended visual field
- e) Decreased contrast perception and central scotoma

Question 7

Which of the following tests are the diagnostic gold standard in ASD, according to the text?

- a) DASl and AAA
- b) ASDI and SODA-2
- c) ARI-2 and DRA
- d) ADI-R and ADOS-2
- e) RAA and ADRR

Question 8

Which syndrome does the text mention in connection with syndromic ASD?

- a) Fatigue syndrome
- b) Adrenogenital syndrome
- c) Metabolic syndrome
- d) Klinefelter syndrome
- e) Cushing syndrome

Question 9

For which of the following therapeutic concepts—mentioned in the text—do randomized controlled trials exist?

- a) Hypnosis
- b) Psychoanalysis
- c) Acupuncture
- d) PEERS for young adults
- e) CBASP

Question 10

Which of the following comorbidities occurs in about half of the patients with ASD?

- a) Anxiety disorder
- b) Gambling addiction
- b) Narcolepsy
- c) Anorexia
- d) Isolated delusional disorder