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Mini Review

Autism during Adulthood: Neuropsychological Characteristics and Diagnosis

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Abstract

Autism spectrum disorders (ASD) are neurodevelopmental disorders with broad phenotypes, with a complex genetic-epigenetic origin. These disorders are usually diagnosed during childhood referring to specific criteria based on the International Statistical Classification of Diseases and Related Health Problems (ICD-10) or the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and are mainly characterized by impairments in social communications, repetitive behaviors as well as restrictions in interests. While this diagnosis is highly stable over the lifetime, there is an high neurological and psychiatric disorder comorbidity as well as a complex interaction of different neuropsychological impairments in ASD that coupled with the different and, often, in contrast definitions of the disorders produced by the classic manuals has been leading to inconsistencies and confusions about symptoms and their manifestations in adults with ASD. This mini-review will highlight the principal neuropsychological characteristics of ASD during adulthood as well as describing a more complex, multi-step, diagnostic model to better asses these disorders in order to build a personalized treatment.

Keywords: *Autism Spectrum Disorders; Adulthood; Diagnosis; Neuropsychology*

Abbreviations

ASD: Autism Spectrum Disorders; DSM: Diagnostic and Statistical Manual of Mental. Disorders; ICD: International Statistical Classification of Diseases and Related Health Problems; WAIS: Wechsler Adult Intelligence Scale; EEG: Electroencephalography

Introduction

Since the first classic definition given by Kanner in the 1940s, the once disorder named Autistic Disturbance of Affective Contact underwent different redefinitions. Indeed, while a manual like the International Statistical Classification of Diseases and Related Health Problems (ICD-10) [1] has always used standard psychological classes to define autism as one of the pervasive developmental disorders, another manual like the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [2] uses a dimensional approach, defining autism as a continuum and giving birth to the most accepted definition, that is "Autism Spectrum Disorders" (ASD). However, these different definitions, as stated by other authors [3], have been leading to inconsistencies and confusions about symptoms and their manifestations in ASD. These conceptual difficulties are even more pronounced when it comes to the diagnosis of ASD during adulthood. In general, ASD

are pervasive neurodevelopmental disorders with a complex and still not fully understood genetic basis, mainly characterized by social and communication deficits as well as restricted or repetitive behaviors [2]. A correct diagnosis is crucial to prepare specific treatments, focusing on the improvement of symptoms and social skills, but also to support the families of ASD patients [4].

Unfortunately, diagnosis of ASD during adulthood, usually based only on clinical interviews and checklists based on the DSM criteria, often results in misdiagnosed conditions such as schizophrenic disorders due to the confounding symptoms and possible comorbidities [3,5,6]. Furthermore, even though the term "ASD" is useful to categorize a broad spectrum of disorders, there still exist important difference within ASD themselves. For instance, adults with the previously defined "Asperger Syndrome" have richer verbal knowledge, less pathological behaviors and more interests in comparison to adults with high functioning autism and, thus, they are also less often diagnosed since childhood in comparison to other ASD. This lack of an early diagnosis and consequent treatment is also the crucial reason, in these individuals, for a psychopathological comorbidity, such as depression or anxiety, to emerge [7]. The purpose of this review is to briefly describe the most prominent neuropsychological characteristics of ASD during adulthood as well as proposing a comprehensive diagnosis using a multistep model [8].

Neuropsychological considerations

Only a few studies focused on the neuropsychological characteristics of adults with ASD, often with contrasting results, and even less studies used complete neuropsychological batteries [3,8-10]. Thus, the following considerations on the neuropsychological aspects of ASD have been derived mainly from experimental studies each focused on one single cognitive process.

Intelligence

Considering intellectual functioning, in general, adults with ASD show similar performances compared to neurotypical adults with specific differences based on subgroups of ASD, specifically between adults with Asperger Syndrome and high-functioning autism [11]. Indeed, adults with Asperger Syndrome showed higher global IQ, measured through the classic Wechsler Adult Intelligence Scale (WAIS), in comparison to high functioning ASD and their scores are comparable to control groups [12], in particular considering verbal comprehension and perceptual reasoning tasks [13]. However, control groups still showed higher processing speed than adults with both forms of ASD [13,14]. Even though these results are interesting and point out possible differences between subgroups of ASD, further highlighting the dimensional nature of these conditions, it has been noted that classic IQ testing may not be always appropriate to assess the intellective level in these patients [3].

Memory

Memory does not refer to a rigid singular process but, instead, it is a cognitive term that encapsulate different processes often complementary to each other such as verbal or visual memory, long or short term memory but also visual and verbal working memory (i.e. a specific type of memory that is crucial to hold information temporarily to make prompt decisions, making it a part of the memory processes also related to executive functions). This distinction is important because it has been showed not only that individual with ASD can have an impairment in one specific type of memory while still performing similarly or better than neurotypical individuals in other memory domains [3,15] but also that within ASD, individual with Asperger Syndrome show different performances in comparisons to individuals with other forms of ASD [11]. For instance, it has been observed, in all the autism spectrum, a specific deficit in memorizing and recalling information from personal events previously experienced and specifically regarding cues crucially related to social interactions such as memories of other faces [16]. Furthermore, working memory in adults with ASD seems to be more impaired in its visual aspects in respect to its verbal counterpart [3,17]. Finally, it seems that adults with Asperger Syndrome seem to have specific deficits in the short term verbal memory as measured through the Digit Span task, that is when trying to remember and verbally recall a series of numbers [18]. Even though all deficits have been addressed under the "memory processes" etiquette, it is worth noticing that some authors hypothesized how

these impairments could be related to an inability, in adults with ASD, to analyze incoming verbal information (e.g. a series of numbers, words or images as in the working memory tasks)in a fast, reliable and flexible manner [3]. This last hypothesis is in line with data on the executive functions in adults with ASD.

Executive functions

The umbrella term "executive functions" represent different cognitive processes that allow an individual to cope with new situations and to adapt to the ever changing environment (including the social environment) and usually related to the correct functioning of the frontal lobes. Examples of these processes are mental flexibility, response inhibition, planning, concept formation and working memory. Crucially, it has been shown that, during childhood, quality of life children with ASD in respect to typically developing children is specifically worsened by deficits of the executive functions and not IQ or language impairments [19].

A recent meta-analysis, that is a complex statistical analysis performed on a group of studies focused on a specific topic, showed consistent evidence of an overall moderate deficit for all executive functions in ASD, from childhood to adulthood [20]. Furthermore, it has been showed how impairments in flexibility, that is the ability to change an action or a thought according to the situation, is associated with anxiety in adults with ASD [21], probably due to the difficulty to adapt their behavior to the environment (in particular to its social aspects).

Even though deficits related to the executive functioning have been recognized in both children as well as adults with ASD, it is still hard to use them among the diagnostic criteria since these deficits tend to be highly variable in ASD populations but they are also confounded by symptoms related to other psychiatric pathologies in adults with ASD [3].

Motor skills

In the neurodevelopmental literature, it has been widely recognized that motor skills deficits, often defined with the term "praxia", are of clinical and functional importance in the diagnosis of ASD and although these deficits are still not considered to be core features of these conditions, they can be observed among the first visible behavioral problems in children with ASD and become apparent across adolescence [22], significantly dampening the quality of life of these individuals both in private as well as in public environments [10]. Among other motor disturbances, children with ASD present clumsiness, postural instability as well as poor performance on several motor skills tests [23]. Recently, motor coordination has been also investigated in adults with ASD (high functioning) and directly compared to their motor imagery, that is the skill to imagine one own's movements: an ability that is crucial for programming novel or complex movements [24]. Results of this study revealed a dissociation between executed and imagined movements in these individuals compared to neurotypical controls. In particular, adults with ASD were able to perform a coordinated bimanual task similarly to the age matched control group but still showed a significantly lower ability to imagine movements in respect to adults without ASD. This result clearly show how the development of motor imagery seems to be still lagging behind the development of spatial coordination in adults with ASD.

Diagnosis

Given the characteristics delineated in the previous points, it is clear how ASD represent a set of complex and multidimensional disorders, often interwoven with other neuropsychological deficits. Thus, the diagnosis of ASD during adulthood should be based to a similar complex multi-step process consisting of five steps plus the definition of a personalized treatment [8].

The first step is to refer to internationally validated core diagnostic criteria, these (as mentioned in the DSM) are the persistent deficits in social communication and interaction and the presence of restricted and repetitive behaviors, usually characterized by being ste-

reotyped, ritualized, restricted or hyper/hypo reactive to sensory inputs. These symptoms should be present since early childhood and should impair everyday functioning.

The second step requires to collect clinical information from the family of the adult with suspected ASD. Indeed, family is crucial to collect clinical history but also to further define a personalized treatment for the adult with ASD. It is worth to notice that, during this step, it is important to think that even though ASD have a strong genetic basis, they are not hereditary in nature. The main information to be collected from the family of the adult with ASD are, among others [8], related to the presence of neurological/psychiatric disorders in relatives, the age of language and walking development, the social relationship and way of playing with other children during childhood (3 - 8 years), the presence of repetitive games, speech or movements and the social relationship during adolescence in school and out of school.

The third step of the diagnosis refers to the psychiatric and neurological evaluation of the adult with the supposed ASD. Lifetime psychiatric Axis I comorbidity is indeed common in ASD during adulthood concerning specifically changes in mood, depression, anxiety, hyper or hypo attention as well as, albeit less frequently, psychotic episodes [25]. The clinical evaluation of ASD in adults should also be accompanied with an analysis of motor functions which, as mentioned before, are frequently impaired in ASD.

The fourth step of the diagnosis is related to the use of specific tests that could be useful in ASD assessment. Without going through all the tests present in the literature it is worth mentioning that no single neuropsychological battery can rigidly define the diagnosis of ASD but, instead, tests should be used as a complementary measure to confirm or corroborate a diagnostic decision [7]. Example of these batteries are tests for cognitive assessment such as the WAIS, tests for psychopathological evaluation such as structured clinical interviews or self-report test (being careful with these last ones given the possibility for the patient with ASD to read each question too literally) but also specific tests for ASD diagnosis as the Autistic Diagnostic Interview (ADI) or the Autism Diagnostic Observation Schedule (ADOS), which have been both used with adults [26,27].

The fifth step concerns the medical assessment that has to take into account and detect coexisting disorders since both environmental as well as genetic factors are involved in the pathogenesis of ASD. For instance, congenital infections contribute to neurodevelopmental disorders and thus, a clinical assessment should look for a possible history of declined health with multi-systemic symptoms (cognitive, psychiatric, neurological and somatic) and functional impairment during school or at work. Also, epilepsy can be present in people with ASD and thus, an EEG screening might be useful to detect epileptiform abnormalities (spikes, spike waves and patterns of slow waves) for a complete clinical overview [28].

Conclusion

The knowledge of the possible neuropsychological, psychiatric and neurological characteristics of ASD during adulthood as well as the complex multi-step processes of the assessment are required to build a personalized treatment [8]. Furthermore, the data collected from the complex assessment is crucial to create a network with the family and possibly extending this network to the social environment (being it the school or the workplace) to plan and achieve a treatment that will enhance the autonomy and the quality of life of the adult with ASD.

Conflict of Interest

All the authors have no conflicts of interest to declare.

Bibliography

1. World Health Organization. WHO Collaborating Centres for Classification of Diseases., and S. International Conference for the Tenth Revision of the International Classification of Diseases (1989): Geneva, International statistical classification of diseases and related health problems. World Health Organization (1992).

2. American Psychological Association (APA), Diagnostic and Statistical Manual of Mental Disorders: Depressive Disorders. American Psychiatric Publishing, Inc (2013).

3. M Walęcka., *et al.* "The assessment of neuropsychological functioning in adults with autism spectrum disorders-tackling the challenge". *Archives of Psychiatry and Psychotherapy* 2 (2019): 22-27.

4. S Bari., *et al.* "Caring for autistic adults. A qualitative analysis under the lens of capability approach". *Italian Sociological Review* 8.2 (2018): 243-264.

5. K Takara and T Kondo. "Comorbid atypical autistic traits as a potential risk factor for suicide attempts among adult depressed patients: A case-control study". *Annals of General Psychiatry* 13.1 (2014).

6. K Takara and T Kondo. "How and Why is Autism Spectrum Disorder Misdiagnosed in Adult Patients? - From Diagnostic Problem to Management for Adjustment". *Mental Health in Family Medicine* 11.02 (2015).

7. R Keller., *et al.* "Diagnosing autism spectrum disorders in adulthood". *Journal of Psychopathology* 21 (2015): 13-18.

8. R Keller., *et al.* "Diagnosing ASD in Adolescence and Adulthood". In Psychopathology in Adolescents and Adults with Autism Spectrum Disorders, Springer International Publishing (2019): 1-21.

9. S Brighenti and R Keller. "Neuropsychology of ASD". In Psychopathology in Adolescents and Adults with Autism Spectrum Disorders, Springer International Publishing (2019): 35-49.

10. GP Zwick. "Neuropsychological assessment in autism spectrum disorder and related conditions". *Dialogues in Clinical Neuroscience* 19.4 (2017): 373-379.

11. S Brighenti., *et al.* "Neuropsychological aspects of Asperger Syndrome in adults: A review". *Edizioni Universitarie di Lettere Economia Diritto* 24 (2018): 63-95.

12. FZ Ambery., *et al.* "Neuropsychological functioning in adults with Asperger syndrome". *Autism* 10.6 (2006): 551-564.

13. J Holdnack., *et al.* "Social perception and WAIS-IV performance in adolescents and adults diagnosed with asperger's syndrome and Autism". *Assessment* 18.2 (2011): 192-200.

14. A Bucaille., *et al.* "Cognitive profile in adults with Asperger syndrome using WAIS-IV: Comparison to typical adults". *Research in Autism Spectrum Disorders* 21 (2016): 1-9.

15. J Boucher., *et al.* "Memory in autistic spectrum disorder". *Psychological Bulletin* 138.3 (2012): 458-496.

16. DL Williams., *et al.* "Impaired memory for faces and social scenes in autism: Clinical implications of memory dysfunction". *Archives of Clinical Neuropsychology* 20.1 (2005): 1-15.

17. Y Funabiki and T Shiwa. "Weakness of visual working memory in autism". *Autism Research* 11.9 (2018): 1245-1252.

18. T Torralva., *et al.* "Impaired theory of mind but intact decision-making in Asperger syndrome: Implications for the relationship between these cognitive domains". *Psychiatry Research* 205.3 (2013): 282-284.

19. M de Vries and H Geurts. "Influence of Autism Traits and Executive Functioning on Quality of Life in Children with an Autism Spectrum Disorder". *Journal of Autism and Developmental Disorders* 45.9 (2015): 2734-2743.

20. EA Demetriou., *et al.* "Autism spectrum disorders: A meta-analysis of executive function". *Molecular Psychiatry* 23.5 (2018): 1198-1204.

21. GL Wallace., *et al.* "Real-World Executive Functions in Adults with Autism Spectrum Disorder: Profiles of Impairment and Associations with Adaptive Functioning and Co-morbid Anxiety and Depression". *Journal of Autism and Developmental Disorders* 46.3 (2016): 1071-1083.

22. E Gowen and A Hamilton. "Motor abilities in autism: A review using a computational context". *Journal of Autism and Developmental Disorders* 43.2 (2013): 323-344.

23. KA Fournier., *et al.* "Motor coordination in autism spectrum disorders: A synthesis and meta-analysis". *Journal of Autism and Developmental Disorders* 40.10 (2010): 1227-1240.

24. A Piedimonte., *et al.* "Dissociation between executed and imagined bimanual movements in autism spectrum conditions". *Autism Research* 11.2 (2018).

25. TR Buck., *et al.* "Psychiatric Comorbidity and Medication Use in Adults with Autism Spectrum Disorder". *Journal of Autism and Developmental Disorders* 44.12 (2014): 3063-3071.

26. JA Bastiaansen., *et al.* "Diagnosing autism spectrum disorders in adults: The use of Autism Diagnostic Observation Schedule (ADOS) module 4". *Journal of Autism and Developmental Disorders* 41.9 (2011): 1256-1266.

27. S Magaña and LE Smith. "The use of the autism diagnostic interview-revised with a latino population of adolescents and adults with autism". *Journal of Autism and Developmental Disorders* 43.5 (2013): 1098-1105.

28. R Keller., *et al.* "Autism, epilepsy, and synaptopathies: a not rare association". *Neurological Sciences* 38. 8 (2017): 1353-1361.

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