



## What is 'high-functioning' in high-functioning autism?

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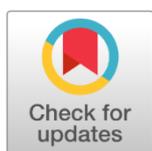
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**Abstract:** In several diagnostic manuals of disabilities and disorders, High-Functioning Autism (HFA) is omitted and/or remains an unofficial diagnostic term. However, in 2007, the American Academy of Special Education Professionals has given it an official diagnostic code AU-4.00 in its Educator's Diagnostic Manual of Disabilities and Disorders (EDM). This has rekindled research to re-look at HFA if it deserves to be given its own diagnostic code. Today, HFA refers to autistics who possess average/above-average intelligence and function in typical settings. This paper explores what 'high-functioning' is in the enigmatic condition of HFA.

**Keywords:** Asperger Syndrome, High-Functioning Autism.

## 1. Introduction

Anyone with a formal diagnosis of High-Functioning Autism (HFA) often manifests mild autism, referring to those who can “speak, read, write, and handle basic life skills like eating and getting dressed may live independently, and a lot like anyone else” (WebMD, 2018, para.1). Often more than not, HFA is associated with Asperger Syndrome (AS).

However, HFA is never an official term used in autism diagnosis (WebMD, 2018) though Chia (2008, 2012) repeatedly argued for its inclusion. When HFA is mentioned, it always refers to as autism spectrum disorder (ASD). It may also be comparable to AS, a condition that is no longer used in the current fifth edition of Diagnostic and Statistical Manual (DSM; APA, 2013). “The loss of Asperger Syndrome has been particularly controversial, but from a scientific standpoint,

members of the DSM-5 working group have argued that there are no consistent biological traits that distinguish Asperger Syndrome from autism” (Wright, 2013, p.2). Does it also apply to HFA?

## 2. Diagnostic Code for HFA

Without explicit diagnostic guidelines for HFA, it was considered appropriate to diagnose HFA in cases for which autistic disorder or childhood autism criteria applied and the total IQ was about 65-70 (Gillberg, 1998). The two widely used nosological systems – the DSM (APA, 2013) and the International Classification of Diseases (ICD; WHO, 2018) – do not provide an official diagnostic code for HFA.

Although HFA remains as an unofficial medico-psychological term, the American Academy of Special Education Professionals has given it an official diagnostic code AU-4.00 in the EDM (Pierangelo & Giuliani, 2007): “It

has come to refer to people with autism who have average or above-average intelligence and can function in typical settings, such as school or the workplace, with minimal assistance” (p.257-258) (see Table 1 below).

Table 1. EDM Classification for Autism at Levels #1 and #2

EDM Levels	Sub-Categories	Official Diagnostic Names
#1	AU	Autism
#2	AU-1.00	Asperger Syndrome
	AU-2.00	Autistic Disorder
	AU-3.00	Childhood Disintegrative Disorder
	AU-4.00	High-Functioning Autism
	AU-5.00	Hyperlexia
	AU-6.00	Multiplex Developmental Disorder
	AU-7.00	Rett Syndrome
	AU-8.00	Other types of Autism-to be designated specifically

### 3. Causes of High-Functioning Autism

Very little is known about the biological basis of HFA. However, brain studies (e.g., Amaral, Schumann, & Nordahl, 2008; Chia, Lim, & Lee, 2017) have revealed structural abnormalities in specific regions of an autistic brain, especially in the ‘social’ brain that includes the amygdala (Schumann et al., 2004), orbitofrontal cortex (Rempel-Clower, 2007), superior temporal sulcus and fusiform gyrus area (Brun et al., 2009; Chia, Lim, & Lee, 2017). Abnormalities have been also observed in the caudate nucleus – believed to be involved in restrictive, repetitive or ritualistic behaviors – as well as in a significant increase in the amount of cortical grey matter (Bonilha et al., 2008; Friedman et al., 2006) and atypical connectivity between brain regions (Supekar et al., 2013; Uddin et al., 2013).

### 4. AS vs HFA

People with AS often encounter difficulty with social interactions, restricted interests, desire for sameness and exhibition of distinctive strengths. They also exhibit challenging behaviors, e.g., hypersensitivities (e.g., to light, noise, smell, etc.), difficulty with the turn-

taking during a conversation, poor non-verbal communication skills (e.g., keeping an appropriate social distance), and stereotyped movement. However, AS does manifest certain strengths, such as remarkable focus and persistence, aptitude for recognizing patterns, and attention to detail.

AS has an interesting history that began in 1944. An Austrian pediatrician, Dr Hans Asperger (b.1906-d.1980), published a paper on his four young patients with autistic-like symptoms: normal to high intelligence, showed extremely narrow interests, rather clumsy, and lacking in social skills. It was not until 1981 when the British psychiatrist Lorna Wing (b.1928-d.2014) coined the term Asperger Syndrome (AS) and published a series of similar case studies. In 1994, AS was listed in the DSM-IV (APA, 1994) and DSM-IV-TR (APA, 2000). However, in 2013, AS was removed. The different autism types came under one diagnostic code – ASD – in DSM-5 (APA, 2013).

As the two terms AS and HFA are often used interchangeably, both describe a mild form of autism (Daisley, 2018). Because of their cognitive capacity to achieve and for some even over-achieve, individuals with AS

or HFA are easily misunderstood, and their conditions are often missed out or misdiagnosed. Moreover, AS and HFA have very few differences, and hence, treatments relevant to AS are also applicable to HFA, i.e., individuals of both disorders are given the same treatment. Though the two terms are used interchangeably to mean the same condition, they are, in fact, not (Allen, 2019). 'Some experts have questioned the differentiation between HFA and AS, noting that there are some people with AS whose speech did not develop normally, while there are people with HFA who demonstrate the same high level of self-care and cognitive skills' (Pierangelo & Giuliani, 2007, p.258).

Several studies done in the 1980s (e.g., Gillberg, 1989; Szatmari, Bartolucci, & Brenner, 1989) and later in the 1990s (e.g., Ozonoff et al., 1994; Ramberg et al., 1996) indicated that what distinguishes AS (with higher VIQ and FSIQ) from HFA (with lower FSIQ) is the VIQ. It is possible that a positive family history is more typical of AS but less obvious in HFA (Gillberg, 1989). It is also noted that motor clumsiness may be typical of AS than HFA (Gillberg, 1989), but this is not generally agreed (Ghaziuddin et al., 1992; Manjiviona & Prior, 1995). In two separate studies done by Ghaziuddin et al. (1992) and Manjiviona and Prior (1995), they found no difference: full-scale and/or performance IQ are higher in the individuals with AS than those with HFA. Hence, it is difficult to draw clear conclusions between AS and HFA. It is conceivable that individuals with AS may be more 'high functioning' than those with HFA, and that abnormal social motor control and apraxia may be more evident, because of the wider range of abilities shown by people with AS than those with HFA.

According to another study done by Ozonoff, Rogers and Pennington (1991), the findings on the neuropsychological profiles of individuals with HFA and AS suggest two things: Firstly, HFA and AS are empirically

distinguishable on measures independent of diagnostic criteria; and secondly, impairment on theory of mind measures is not universally found among individuals with autistic spectrum conditions.

In addition, McLaughlin-Cheng (1998) and Chia (2008) have identified four categories of behaviors to distinguish between HFA and AS:

(i) Intelligence quotient

There is a difference in the IQs between individuals with HFA, whose full-scale IQ (FSIQ) falls in the borderline-low average IQ range 50-85, and AS, whose FSIQ falls in the average-high average IQ range 90-119.

Most studies (e.g., Chiang et al., 2014; Planche & Lemonnier, 2012) reported that individuals with HFA have a cognitive profile characterized by a lower verbal IQ but a higher performance IQ. However, the cognitive profile of those with AS is reversed, i.e., better verbal abilities on the IQ test. Other studies (e.g., Ghaziuddin, 2008; Macintosh and Dissanayake, 2004) failed to confirm the existence of these cognitive profiles, and their findings indicated mixed cognitive profiles that are inconsistent to provide a clear diagnostic differentiation between HFA and AS.

(ii) Language development

Many with HFA suffer developmental delay in their language, but individuals with AS develop their language quite normally. However, not all individuals with HFA exhibit extreme developmental delay or profound lack of language development that is often observed in more severe autistic forms. However, they still encounter difficulty in many aspects of communication, in addition to their other autistic features, which include '[A]verage or above average intelligence, with an IQ of at least 85; lack of communication skills; impaired ability to understand non-verbal communication and express emotion; intense reactions to sensory stimuli, including

sights, sounds, smells or textures; fascination with or obsessive interest in certain topics or categories of objects; and delayed motor skills and/or poor coordination' (Health Guide Info, 2010, para.4).

(iii) Receptive and expressive language skills

The language skills of individuals with AS fall within the normal range of developmental limits. However, those with HFA show obvious speech delay in both receptive and expressive language skills, and more so with expressive language skills.

According to Pierangelo and Giuliani (2007), individuals with HFA 'are much more efficient with expressive and receptive speech, less likely to suffer from epilepsy, and have IQ score of 71 or above, ... have a stronger tolerance and learn to desensitize themselves' (p.258). In addition, these individuals have a stronger grasp on the theory of mind and can empathize with others in terms of feelings.

(iv) Socio-emotional behavior

Individuals with HFA manifest impairment in their social cognition skills (e.g., aloofness, *la belle* indifference, and unresponsiveness). Today, based on the DSM-5 criteria, those with 'social deficits but without repetitive behaviors will receive a new diagnosis of social communication disorder' (Wright, 2013, p.3). However, those with AS often display peculiar behaviors related to their narrow 'self-interests and their social cognition deficits vary in quality' (Chia, 2008, p.9); and (v) Stereotyped behavior: This refers to physical and/or motor skills, especially the gross motor and repetitive behaviors. While stereotyped behavior (e.g., echopraxia), which is probably the cause of dysfunction in executive skills, might be seen in individuals with AS, no such deficits have been observed in those with HFA.

During the first decade of the 21<sup>st</sup> century, studies done by Carpenter, Soorya

and Halpern (2009), and Sanders (2009) have shown that HFA is autism without an intellectual disability (an IQ of 70 or less). However, it may manifest deficits in areas of communication, emotion recognition and expression, and social interaction (Sanders, 2009). Today, more research on HFA is currently being carried out than before.

## 5. Diagnostic Symptoms of HFA

There are four key symptoms that best describe HFA. They are listed below (WebMD, 2018, para.5-8):

(i) Difficulty in socialization / communication

Though individuals with HFA are considered high-functioning, they also encounter serious challenges in social interaction and communication. The problem is their poor non-verbal communication skills, such as inability to decipher read social cues and, hence, they might find it difficult to make friends. Stress and anxiety constitute an issue of concern for them so much so that they suffer a shutdown in any given social situation. Often, they avoid making eye contact or engaging in small talk (WebMD, 2018, para.5);

(ii) Stereotypy/Perseverative behaviors

Individuals with HFA are often obsessed with routine and order. 'They might have repetitive and restrictive habits that seem odd to others' (WebMD, 2018, para.6). These apparently purposeless behaviors can be explained by their individual sensory profiles in terms of sensory processing, modulation and response to their environment or from within. If individuals with HFA are assessed on the Sensory Profile (Dunn, 1999), they are often found to show extreme sensitivity to sensory stimuli, i.e., this hyper-responsive sensory behavior can cause them to be easily distracted or disturbed by sounds, sights or smells that others may not even be

aware of, or can easily ignore. This has been described as having low neurological threshold. Tactile sensitivity or defensiveness may cause them to detest being touched in any way. Others may also strongly resist having to wear clothes that are made of certain types of fabrics.

Another perseverative behavioral feature observed in individuals with HFA is their obsession with specific topics or certain things. They become over-focused on a certain topic of interest (e.g., ships, airplanes, trains) or category of objects (e.g., electrical appliances) for intense examination. Termed as systemizing ability, it includes hyper-systemizing to analyze and construct a system of any kind, hyper-attention to detail and sensory hyper-responsivity to certain stimuli (Baron-Cohen et al., 2009).

(iii) Broad spectrum of cognitive maturity and capacity

There is a wide range of cognitive maturity as well as cognitive capacity manifested by individuals with HFA. The term *cognitive maturity* refers to one's ability to respond to the environment being aware of the correct time and location to behave and knowing when to act, according to the circumstances and the culture of the society where they live (Xie, 2020). Some of these individuals appear to know how to behave, when to behave and respond appropriately, what they are to expect to do. The other term *cognitive capacity* refers to one's ability (competence) to do or perform a task or an act (performance), or the amount of it that s/he is able to do, involving an individual to adapt, think, rationalize, change, learn, analyze and act (Xie, 2020). There is a wide range of how these individuals with HFA are coping with their studies in school and/or in workplace for those who are already working. Some do academically well in studies, while others are easily overwhelmed and unable to concentrate (WebMD, 2018);

(iv) Underdeveloped social skills

Social skills are required for interaction with others, verbally (i.e., spoken language or speech) and non-verbally (e.g., using gestures, facial expression, body language, and personal appearance). Many individuals with HFA may find it really difficult to interact with others in school where they attend or workplace where they are employed. It all depends on individuals with HFA and the situations they are in. An individual with HFA who has a sedentary disposition will prefer to work alone without interacting or socializing with others. Many of them will find it very challenging or stressful if they have to socialize with others in their daily living activities. However, 'even for someone on the spectrum who can do a lot, social skills are usually underdeveloped' (WebMD, 2018, para.8).

Unlike those with more severe forms of autism, not all individuals with HFA avoid social contact. However, while individuals with HFA do display a desire to be involved with other people, they lack in certain social skills (e.g., the ability to understand other people's emotions, read facial expressions or interpret body language). Moreover, they also fail to appreciate humor or sarcasm, and often take words literally. Such a serious lack of communication skills often leads them to awkward social situations. Hence, many individuals with HFA are often being teased, rejected or bullied by their peers. This social rejection and failure to connect and/or form relationships can cause them to feel a sense of isolation, sometimes leading them to anxiety and/or depression.

## 6. Conclusion

The term *high-functioning* in HFA can be best understood in three ways. Firstly, people with HFA may have high FSIQ score but low adaptive behavior composite score (ABCS). Their FSIQ may fall between borderline (70-79) and low average (80-89)

IQ. Hence, HFA differs from low-functioning autism, whose FSIQ is lower than 70. However, there are those with FSIQ of 70 or less. Such contradictory results are still found in the current literature since the 1980s. Secondly, they may have low FSIQ score but high ABCS. Adaptive behavior refers to the age-appropriate behaviors that a person needs to live independently and to function well in daily life. Despite the difficulty with communication and other challenging autistic traits, they can take care of themselves independently during adulthood. That, perhaps, is their saving grace. Lastly, being high-functioning for someone with HFA can mean being *high* in either cognitive capacity or adaptive behavior ability, but never both.

One plausible explanation is that the definition of HFA and the diagnostic criteria used in its identification have yet to be universally agreed among the autism professionals. The term *high-functioning* is also subjective in the way it is used in describing autism. In fact, the questions should be asked of HFA are: What exactly is *high-functioning* when it is used? Is it about FSIQ or ABCS? Could it also be referring to the Autism Index score as measured by a standardized autism rating scale? Until these questions are answered, the term *high-functioning* in HFA will remain enigmatic.

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