

A review on the Extreme Male Brain Theory of Autism across the lifespan

Autism spectrum disorder (ASD) can be defined as a range of neurodevelopmental diseases marked by limited or repetitive behaviours, as well as social and communicative difficulties (American Psychiatric Association, 2013). Over the decades, the meaning of the term 'autism' has changed. However, since people with ASD frequently exhibit a wide variety of symptoms and degrees of impairments, the word "spectrum" was coined to describe the disorder's varied presentations in this day and age. The range of core symptoms, linguistic proficiency, cognitive abilities, and associated mental and physical health issues are the characteristics of this diverse and complicated collection of disorder (Havdahl et al., 2021). According to Hyman et al. (2020), due to the heterogeneity of symptoms and their intensity in ASD, it can be diagnosed among children of various ages, with reported ages reflecting recognition rather than actual onset. Hyman et al. also explained that because of this, prevalence rather than incidence is more frequently recorded, representing the rate of occurrence of ASD in the general population at a certain moment in time. Typically, ASD shows symptoms within the initial five years of an individual's life and continues through their adulthood (World Health Organization, 2019). In the UK, the diagnosis of ASD was made for 79% of children after they started primary school and for 28% of them within their secondary school years with 75% of those who of those identified later exhibiting social issues by the age of 5 years old (Hosozawa et al., 2020).

The general public's ignorance about autism may cause delays in its identification and treatment, particularly for those who can spot the condition's earliest signs (Al-Mazidi & Al-Ayadhi, 2021). This indicates that study of ASD is crucial to acquire a deeper comprehension regarding the disorder which can help enhance the general quality of life for those experiencing this condition. Society may also become more receptive and helpful to people with ASD by gaining awareness and disseminating correct information about the disorder while creating a more welcoming and inclusive environment. In agreement with Hyman et al. (2020), following the American Academy of Pediatrics (AAP) clinical reports in 2007, advances in professional education and awareness among the public made it easier to identify early symptoms, use standardised screening procedures, and handle the medical and behavioural components of ASD from infants through adolescence. Additionally, Hyman et al. (2020), mentioned that having an ASD child will have a significant effect on the whole family along with their society. In the UK, 1%–2% of students in primary schools experience

autism, which has a substantial impact on learning and family life and is expected to cost £3.1 billion for assistance each year (Milosevic et al., 2022). For that reason, families and carers of those with ASD can benefit greatly from the knowledge and resources gained from studies regarding the condition. As research emphasises the crucial relevance of comprehending ASD for early detection and complete support, investigating theoretical frameworks provides more insight into the intricacies of this condition.

Although there can be several ideas that provide insight into ASD, Simon Baron-Cohen's Extreme Male Brain (EMB) theory will be the emphasis of this essay. As explained by Baron-Cohen et al. (2011), EMB theory of autism expands on the Empathizing-Systemizing (E-S) idea of conventional sex differences, which suggests females have a higher desire to empathise, whereas males possess a greater desire to systemize. Within this framework, empathising involves acknowledging and reacting to the feelings and perspectives of others, enabling behaviour to be predicted and become considerate of others' emotions while systemising is examining a system's variables to determine its basic principles and build systems that allow for behaviour management and prediction (Baron-Cohen, 2002). In the debate, some examples of systemising were given which include mechanical things, mathematics, systems, patterns. While typical individuals can exhibit this sex disparity, those with ASD displayed more systematic reactions and poorer empathy skills, particularly in predicting others' emotions and behaviours, yet females with the disorder still display a more empathic profile despite reports of enhanced masculine traits in both sexes (Santos, 2022). Harmsen (2019) had revealed a study that used an advanced test of Theory of Mind, assessing cognitive empathy, showing that the EMB argument was supported by the absence of usual gender disparities between individuals with ASD. Furthermore, typical females achieve higher on the Empathy Quotient (EQ) than typical males, who outperform individuals with ASD, whereas people with ASD score greater on the Systemizing Quotient (SQ) than typical males, who in turn achieve more than typical females (Baron-Cohen et al., 2011).

In the past, males have been diagnosed with autism more often than females. Although ASD is more prevalent in men, a latest meta-analysis found that, despite not following the DSM-5 criteria, the real male-to-female ratio is roughly 3:1 compared to the previously disclosed 4:1 (Hodges et al., 2020). Simcoe et al. (2022), also found that the gender ratio can also vary with age, ranging from 5.5:1 in primary school kids to 2.3:1 in

adolescents along with 1.8:1 to 2.57:1 in older individuals with autism. Besides, compared to females, males generally perform higher on assessments of autistic features in the overall population (Kung et al., 2020). As mentioned in the debate, there is a higher variability of diagnosis in boys with ASD as an individual but as a group identity for girls. For that reason, Hull et al. (2020), has suggested some research indicates that women are underdiagnosed with the conditions, maybe as a result of the manner in which women display their autism which do not correspond to the present diagnostic mould. Considering these evaluations, the results support the EMB theory, which postulates that traits associated with autism may be an exaggerated manifestation of typical male cognitive behaviours. This is supported by the fact that males are more likely than females to experience a greater prevalence of autism. Delving into the complex structure of ASD at various phases of life exposes a fascinating range of intricacies, providing the foundation for a more profound comprehension. In the meanwhile, the EMB Theory offers substantial insight on how it develops differently from typical trajectories.

The complex processes of social interaction and communication are vital in understanding a child's development. Tanner and Dounavi (2020) proposed, social communication consists of several aspects, including shared feelings and affect, reacting and starting joint attention, maintaining eye contact, and reading facial expressions, usually emerging before language use that is vocal. Although, for ASD children, getting to these stages can be difficult. For young children, the first step towards comprehending others' feelings or "emotion acknowledgment" is to devote attention to others' emotions while avoiding getting caught up in their own discomfort (Tsou et al., 2021). Yet, research examining children with ASD age 1 to 7 showed, in contrast to non-autistic peers, ASD children pay less attention to adult emotional displays, demonstrated by how they behave in behavioural tasks intended to gauge empathy (Li et al., 2023). These findings support the EMB theory, which holds that ASD involves exaggerated male-typical social features, specifically possessing less empathy and attention towards others' emotions. Subsequently compared to high-risk non-ASD and low-risk groups, high-risk ASD babies displayed less smiling and positive affect during 12 months, while at 14 months, they exhibited fewer involvement of concentration and orientation to name throughout certain Autism Observation Scale for Infants presses (Filliter et al., 2015). When Bedford et al. (2016) examined particular behavioural markers in high-risk ASD children at 12 months, they discovered that it predicted autism around 36 months in boys but not girls. The discovery implies that autism

is more prevalent in boys, they exhibit more behavioural features associated with the EMB theory.

Orben et al., (2020) highlights that friendship connection becomes more important during adolescence because social stimuli elicit increased sensitivity. In comparison with TD adolescents, adolescents with ASD develop fewer social circles, dedicate a smaller amount of time socialising with others, and are not as inclined to form reciprocating friendships (Dean et al., 2020). It may be because of their social and communications deficiencies, they experience greater social difficulties including trouble making and maintaining friendships throughout adolescence versus in childhood (Huang et al., 2017). Shattuck et al. (2011), discovered that of the teenagers with ASD, 43% never went out with peers after school or scheduled activities, 50% of friends never got invited to social events, and 54% had never gotten calls from friends. In fact, it appears that females face greater social pressure since they are expected to cover up their autism and live up to societal norms pertaining to their gender (Tubío-Fungueiriño et al., 2021). Linking to the debate, it was argued that will masking make the life of females with ASD much easier? Tierney et al., (2016) stated that camouflaging may emerge to cope with societal standards and lessen the likelihood of experiencing tension, rejection from peers, or misinterpretation by other people. Moore et al. (2022) also explained that the EMB theory links autism to masculinity, and cultural connotations that associate masculinity with detached emotions serve to support this theory. They also said the notion of "camouflaged autistic femininity" has similarities to the way it perpetuates gender stereotypes by having women create "masks" to fit conventional ideas of femininity.

A route to professional success, personal development, and society impact is provided at the junction of adult development and employment. Daily job duties can be extremely difficult for adults with ASD since the majority of workplaces demand conformity to social standards and manners, which are fundamental demands in occupational environments (Frank et al., 2018). The individual might manage to engage in conversations when needed but struggle to sustain them or determine when to conclude them, possibly requiring a structured routine and struggling with changes, as well as facing challenges in organisation and planning (Griffiths et al., 2020). On the other hand, when Cope and Remington (2022) analysed alongside neurotypical (NT) individuals, autistic individuals exhibit a greater capacity for local processing, which means they are more inclined to pay attention to minor details prior

to digesting the bigger context, resulting in them to be more successful at specific tasks. Compared to NT people, people with ASD frequently exhibit characteristics that usually correspond with male behaviour, for example lower results in empathy tasks and better results on attention-to-detail tasks (van Eijk and Zietsch, 2021). They also continue and further explained that these results point to a strong male-typical profile within the ASD group, which motivates future research into the possibility that ASD and a more male-typical brain are related. Hence, something should be done to assist autistic adults in finding jobs, as 77% of jobless autistic people say they are interested in finding employment (Office for National Statistics, 2021).

The EMB theory of autism provides a distinctive viewpoint on the underlying characteristics seen in people with ASD and provides a deep understanding concerning the complex nature of ASD. First and foremost, this theory offers a thorough framework for comprehending specific behavioural and cognitive traits seen in people with ASD by focusing on the two key dimensions, that is systemising and empathising. Xiong et al. (2020), concluded that the discovery that individuals with ASD also exhibit extreme features that are more prevalent in men than in women suggests a vulnerability exclusive to one sex. They also state that by assessing the EMB theory, it could facilitate the initial stages of identifying common psychological risk factors among illnesses exhibiting abnormalities particular to a certain sex. The capacity to recognise similarities across various disorders amplifies the theory's usefulness in expanding our comprehension of neurodevelopmental disorders and providing guidance for focused interventions and therapies. Another essential strength of the EMB theory is it provides substantial understanding towards gender differences with regard to cognitive profiles and provides reasons over the prevalence along with presentation of ASD. This can be supported with a study conducted by Ecker et al. (2017) with 98 ASD individuals, where they discovered that as opposed to females who had typical female brain structure, those with ASD were more inclined to have brain regions more akin to those of men. This shows that the gender disparity in autism prevalence may be due in part to variations in brain structure.

Despite its contributions to our knowledge of the cognitive and behavioural characteristics of people with ASD, the EMB theory of autism has drawbacks that limit its generalizability to a wide range of populations. Ridley (2019) pointed out that the overlapping range of cognitive types shared by men and women is overlooked by this

traditional view of gender. According to the hypothesis of the EMB theory, average Western men tend to be less empathic and more systemic than females; these characteristics are also observed in autistic people, who may display an extreme form of this masculine profile. However, studies on Asians revealed that while men were more systemizing, both genders' levels of empathy suggested that cultural variables might have an impact on this relationship (Chieng, 2023). Therefore, this could make the theory less applicable to a wider range of demographics and fail to take into account the distinct cognitive abilities and difficulties that people with ASD experience regardless of their gender or ethnicity. Research on autism has largely concentrated on males since the condition initially emerged, which has resulted in an overall absence of awareness of girls suffering the disorder because it is often thought that they have the exact same fundamental neurobiology as men. However, an increasing body of research indicates that this oversimplification runs the risk of hiding the molecular underpinnings of autism (Lai et al., 2013). Consequently, the claim highlights a flaw in the EMB Theory—namely, that it may fail to take into account the different lived experiences and biological causes of autism that exist for both sexes.

In brief the EMB theory of Autism has made tremendous progress in our knowledge of the behavioural and cognitive traits linked to ASD. With its emphasis on systemizing and empathising characteristics, the theory offers a useful framework for understanding the various ways that people with ASD exhibit themselves. The idea has also advanced our understanding of the development of ASD by explaining gender disparities in cognitive traits and prevalence patterns. But it's important to acknowledge the theory's shortcomings, especially its restricted emphasis on typical gender stereotypes and the past emphasis on males in studies, which may not adequately represent the developmental complexity of people with ASD. Numerous factors affect developmental elements, which are essential for an in-depth awareness of ASD. A more nuanced approach is needed to accommodate the different experiences that individuals have throughout their lives. Future studies should take into account the developmental paths of both males and females with ASD as the field develops, using a more comprehensive cultural and contextual perspective to improve our comprehension of the complex development of people on the autistic spectrum. It is apparent that this strategy will enable an opportunity for more focused and broad interventions that address the particular developmental requirements of people with ASD.

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