AUTISM SPECTRUM DISORDER ACROSS THE LIFESPAN

Exploring the complex landscape of human neurodevelopment, particularly in the context of Autism Spectrum Disorder (ASD) is like solving a fascinating puzzle, where each component is essential for comprehending our varied experiences. ASD is defined as a multidimensional concept that encompasses persons who display a distinct set of social communication issues, as well as repetitive behaviours, intensely concentrated interests, and, in some cases, sensory sensitivities that emerge early (Lord et al., 2020). Significantly, ASD in DSM-5 no longer has subgroups and is now characterised as a single condition determined by the amount of functional support needed by the person. In accordance with the DSM-5, individuals with ASD need to fulfil all three social criteria (i.e., difficulties in developing, comprehending, and maintaining relationships, nonverbal communicative behaviours, and social-emotional reciprocity) and at least two of the four behavioural criteria specified (i.e., repeating verbal or physical actions, a strong preference for routine, atypical reactions to sensory stimuli and narrow interests) (Wiggins et al., 2019). This combination of characteristics not only characterises the illness, but also highlights the complex tapestry of neurodevelopmental differences across afflicted people. Moreover, autism symptoms might vary between life stages for a variety of reasons. First, maturation and development processes interact with autism's basic symptoms, affecting skill acquisition. Autism is also characterised by the absence of usual developmental behaviours (such as eye contact) as well as the presence of aberrant behaviours. These various elements may follow unique growth paths (Seltzer et al., 2003). Additionally, it is not just a developmental occurrence but also a deep representation of the human experience due to its mysterious complexity.

Besides the characteristics of ASD, it also can be diagnosed in individuals at any age, from early childhood to adulthood. Research indicates that some children can be accurately diagnosed with ASD before the age of 2, whereas milder instances may become apparent at a later stage (Zwaigenbaum et al., 2019; Van ’t Hof et al., 2021). However, there is also a study by Leader at al., (2021) where they revealed that the mean age of ASD diagnosis was 5 years and 5 months. Although there is possibility for early identification of ASD due to advancements in screening and diagnostic techniques, diagnoses are still being made at a later age. Thereupon, the diverse range of ages at which ASD is diagnosed emphasises the challenge of detecting the illness and also the significance of continuous research and early intervention methods to assist individuals at various developmental phases. Moreover, the

aetiology of ASD is uncertain, however, certain genetic and non-genetic risk factors have been identified which may contribute individually or in concert to the onset of ASD. As revealed by Salari et. al (2022), research has extensively studied ASD and shown that its cause is complex, encompassing genetic, environmental, immunological, perinatal, neuroanatomical, and biochemical components. ASD is not just a clinical diagnosis, but a personal experience that influences the viewpoints, social engagements, and goals of individuals impacted by it. According to Huang et al. (2017), people with ASD encounter distinct obstacles while interacting in social situations, pursuing education and job prospects, and establishing significant connections. Also, family members of persons with ASD have challenges related to providing care and advocating for their loved ones' needs, including emotional and logistical responsibilities (Huang et al. 2017). Hence, understanding neurodevelopment in comparison to typical development is crucial for guiding tailored interventions, fostering empathy, and creating inclusive support networks for individuals on the spectrum.

The exploration of ASD involves the application of theoretical frameworks such as Empathizing-Systemizing theory (E-S theory), which shed light on the complex interaction between cognition and behaviour in individuals diagnosed with ASD. By proposing that individuals with ASD possess an "extreme male brain," E-S theory not only challenges conventional wisdom regarding cognitive patterns but also provides an engaging framework for examining the complex interplay between systemizing and empathising within the autistic mind. In order to illuminate the intricate connection between cognitive processes and behaviours observed in individuals with ASD, this essay will analyse the E-S theory within the context of ASD.

Baron-Cohen's Empathising–Systemising theory (E-S theory), one of several cognitive theories that attempt to explain ASD, posits that the most fundamental characteristics of the disorder may be accounted for by a deficiency in empathising in conjunction with intact or superior systemizing (Craig et al., 2019). In order to account for these two characteristics, the E-S theory was formulated through the introduction of the concepts of empathising (E) and systemizing (S) (Baron-Cohen, 2009). Empathising is characterised by the propensity to appropriately perceive and react to the emotions and sentiments of others. Conversely, systemizing refers to the propensity to analyse or develop rule-based systems for information processing, employing a highly specialised approach.

Mechanical systems, natural systems, social systems, categorical systems, motoric systems, and legal frameworks are all examples that can be classified as systems (Baron-Cohen, 2009). He also suggests individuals may be categorised depending on their position along these dimensions, with some showing a greater tendency towards empathy, others towards systemizing, and some having a balanced combination of both. In such cases, individuals may display a greater inclination towards systemizing and a diminished capacity for empathising, which can negatively impact social interaction and communication capabilities (Pan et al., 2023). Pan et al. (2023) also mentioned that those with ASD often struggle with empathising, which includes comprehending social signs, identifying emotions, and participating in mutual social exchanges. This lack of empathy can result in difficulties in forming friendships, recognising facial emotions, and comprehending non-verbal communication signals. On the other hand, people diagnosed with ASD frequently demonstrate aptitudes for systemizing (Sindermann et al., 2019), wherein they exhibit a strong inclination towards comprehending and manipulating predictable elements, systems, and patterns within their surroundings (Zee & Derksen 2021). These measures of empathising and systemising are assessed by two self-report questionnaires, the Systemizing Quotient-Revised (SQ-R) and the Empathy Quotient (EQ) (Baron-Cohen et al. 2003; Baron-Cohen and Wheelwright 2004), to evaluate potential tendencies towards systemizing and empathising. The SQ-R assesses skills related to systemizing, while the EQ measures both cognitive and emotional empathy, which is classified into five "brain types" based on the E-S gap between scores, offering a detailed insight into cognitive and empathic inclinations (Kidron et al., 2018). Thus, this cognitive pattern of strengths and weaknesses is believed to influence the typical features and behaviours linked to ASD.

It is crucial to take into account gender variations concerning the E-S theory. The E–S theory underwent restructuring to become the 'Extreme Male Brain' (EMB) theory of autism, which posits that ASD embodies an extreme manifestation of the typical male brain (Craig et al., 2019). In the context of psychometrically, the male brain is defined as those individuals in whom systemizing is considerably more effective than empathising, whereas the female brain is defined as the inverse cognitive function (Baron-Cohen, 2002). Studies indicate that, typically, males exhibit greater scores in systemizing and lower scores in empathising when compared to females (Baron-Cohen, 2011; Greenberg et al., 2018). Lai et al. (2012) concluded that for male adults, variations in empathising and systemizing tendencies correlate with distinct differences in brain structure. Specifically, men with a stronger

inclination towards systemizing exhibit larger midline cingulate and prefrontal structures, while those with a stronger propensity for empathising display increased ventral basal ganglia and hypothalamic activity. These findings underscore the significance of investigating the neuropsychological underpinnings of dispositional cognitive styles for a comprehensive understanding of gender differences. Furthermore, the disparity in cognitive styles based on gender may influence the differences in social behaviour and communication patterns observed between males and females. Also, there is a study conducted by Wakabayashi et al. (2006) that supported this idea where when comparing individuals with ASD, male and female controls, distinct patterns emerged in their EQ and SQ scores. The ASD group got a high score on the SQ, while females scored low.

Moreover, the study by Hodges et al. (2019) reveals that the male-to-female ratio for ASD has decreased from the previously reported 4:1 ratio to 3:1. The observed inconsistency could potentially be attributed to the distinctive attributes of female ASD, which could lead to erroneous diagnoses or disregard for the disorder. To obscure their social deficiencies, females might employ "camouflaging" techniques, which would further complicate the diagnostic procedure. Furthermore, the attribution of ASD to males due to gender biases and stereotypes may impede the attainment of accurate diagnoses in females. In the debate, it was proposed that the difference in autism diagnosis between boys and girls may be due to females displaying behaviours that are more in line with traditional gender expectations, including as quiet, reserved, or socially skilled, which might hide the signs of autism. As an adaptive function that facilitates adaptation to particular environmental demands, camouflage consists of complexly copying behaviours and/or masking certain personality traits (Tubío-Fungueiriño et al., 2020; Hull et al., 2020). This is an extremely prevalent trait among high-functioning females with ASD (Tubío-Fungueiriño et al., 2020). Also, this can be explicable by Hull et al. (2020) research comparing females with and without ASD camouflage where he concluded, particularly because females with experience greater social pressure to conform, individuals who do not feel at home in a given social setting may attempt to modify their behaviour so as to appear more accepted. An individual may not perceive the necessity to adjust or make up for deficiencies in less demanding circumstances. Regrettably, as mentioned in the debate, those who use masking to hide their autistic characteristics in order to navigate social interactions end up suffering more than they would if they could express themselves truthfully and without the need for concealment. Hull et al. (2020) also found that camouflaging had effects like physical and mental exhaustion, which

often required time alone to recover; problems with identity and authenticity, which made some people lose track of who they really are; and trouble getting help and a diagnosis. These results showed that people with autism experience camouflaging in a variety of ways. Thus, recognising the changing dynamics of ASD diagnosis, especially when it comes to gender differences and the high prevalence of hiding behaviours among women, highlights the need for more nuanced approaches to assessment and support, with the ultimate goal of making things easier for people who are dealing with the difficulties of autism spectrum disorder.

Drawing from the convergence of cognitive psychology and neurodiversity research, the E-S theory presents an interesting framework that sheds light on the multifaceted manners in which people interact with their environment. The E-S theory provides a comprehensive framework for understanding the complexities of human cognition and behaviour in a variety of settings. By incorporating both systemizing (S) and empathising (E) tendencies, its dual-factor approach offers a holistic perspective on individual variations in cognitive styles. Baron-Cohen (2009) also stated the E-S theory's strength rests in its dual-factor approach, adequately explaining both social and non-social traits seen in autism spectrum illnesses. The theory provides a comprehensive framework by suggesting that below-average empathy may explain social-communication issues, while average to above-average systemizing can help describe restricted interests, repetitive behaviours, and resistance to change. Furthermore, through an elucidation of the functions of empathy and systemizing in influencing behaviour, the theory provides pragmatic perspectives that have extensive reach (Sindermann et al., 2019). For example, within academic environments, knowledge of the diverse empathising and systemizing profiles of students can guide the development of individualised teaching approaches that accommodate various learning methods and preferences. Also, Baron-Cohen (2009) mentioned where systemizing enables humans to enhance predictability by altering one aspect at a time, helping them grasp cause-and-effect linkages and make the environment more comprehensible. This detailed comprehension illuminates the intricate behaviours and characteristics linked to autism spectrum disorders, offering useful perspectives for study and practical intervention. Evidently, a study conducted by Svedholm-Häkkinen et al. (2018) concluded that the E-S theory can provide a valuable explanation for autistic characteristics in the general population because the paradigm emphasises the spectrum of cognitive styles rather than seeing autism as a separate group.

However, there's also limitation for the theory where Greenberg et al. (2018) stated, the E-S theory does not support generating predictions about an individual's psychological profile based on biological sex to avoid damaging stereotyping. In order to prevent the reinforcement of harmful stereotypes, the E-S theory does not endorse the generation of predictions regarding an individual's psychological profile predicated on their biological sex. The proponent of the theory, Simon Baron-Cohen, emphasises that although there may be statistically significant group-level differences in systemizing and empathising tendencies between males and females, these differences do not characterise individuals. Moreover, Greenberg et al. (2018) stated these types of generalisations have the potential to sustain detrimental gender stereotypes while disregarding the immense variety and distinction that exist among people of every gender. Gender generalisations support harmful stereotypes and fail to acknowledge the diversity and unique qualities that exist among individuals of all genders (Blum, 2010); this is due to the oversimplification of intricate human identities and experiences. Likewise, gender generalisations that are overly simplistic, such as the assumption that all women are nurturing or all men are assertive, fail to account for the considerable variation in personality traits, behaviours, and preferences that exist within each gender category. Such oversimplification may result in the perpetuation of detrimental stereotypes (Grzelec, 2022), whereby people may perceive societal expectations regarding their gender as a source of pressure to conform. Additionally, for those whose experiences deviate from conventional gender norms, these stereotypes may impede progress and erect obstacles. In perpetuating exclusion and inequality, generalisations fail to acknowledge the richness and complexity of human identity by disregarding the immeasurable diversity and distinction among individuals of every gender. In order to foster inclusiveness, comprehension, and equity for all individuals, irrespective of gender, it is critical to recognise and value the diversity inherent in gender categories (Grzelec, 2022). Thus, the E-S theory promotes a more comprehensive comprehension of cognitive styles and places emphasis on unique distinctions among individuals, as opposed to strict adherence to gender-related norms.

Exploring human neurodevelopment, especially in ASD, uncovers a complex puzzle that demands a detailed understanding. Individuals with ASD experience a variety of challenges related to social communication, repetitive behaviours, and sensory sensitivities, leading to a diverse range of experiences. Studying ASD using theoretical frameworks like the E-S theory provides valuable insights into the cognitive and behavioural patterns seen in

individuals with ASD. The E-S theory offers a thorough perspective on the complexities of ASD by highlighting the interaction between empathising and systemizing tendencies. Furthermore, acknowledging gender variations within the E-S theory highlights the significance of taking into account various cognitive styles and experiences, going beyond fixed gender stereotypes. Although the E-S theory provides valuable perspectives, it highlights the importance of refraining from harmful generalisations based on biological sex and embracing the diversity inherent in human identity. In the end, promoting inclusivity, comprehension, and fairness through exploring ASD and cognitive theories like the E-S theory helps in establishing a kind and supportive atmosphere for individuals of all backgrounds, enabling them to navigate neurodevelopment challenges with strength and respect.