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SOCIAL BEHAVIOR AFFECTED IN AN AUTISM SPECTRUM DISORDER BRAIN

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According to the Centers for Disease Control and Prevention, autism spectrum disorder (ASD) is a developmental disability that brings a range of social behavior challenges to a child; it can affect about 1 in every 44 8-year-old children (CDC, 2022). Autism can be diagnosed at any age, but symptoms generally appear in the first two years of a person's life. As individuals with ASD develop their brains, the impact of ASD on social behavior is particularly pronounced. In particular, ASD creates problems in social communication, social interaction, and restricted or repetitive behaviors or interests (NIMH, 2023).

Autism Spectrum Disorder Causes

Genetics

There is no direct cause for ASD, but scientists have found research showing that genetic and neurological factors play a major role in the onset of autism. Genetic causes result in 10% to 20% of cases (Dignity Health, 2023). One specific form of a genetic cause is the Fragile X syndrome, an inherited condition that causes developmental delays, intellectual disabilities,

learning and behavioral issues, physical abnormalities, anxiety, attention-deficit/hyperactivity disorder, and autism spectrum disorder (Cleveland Clinic, 2021). Fragile X syndrome is so named due to part of the X chromosome being viewed as broken or fragile under a microscope. It isn't certain how many people carry the fragile X permutation. Studies estimate that 1 in 148 to 291 women and 1 in 290 to 855 men have the premutation in the United States. Parents with the premutation are two times more likely to have a child with a disability than those without the premutation (Cleveland Clinic, 2021).

Another study using human "mini-brain" models known as organoids, revealed that the roots of autism spectrum disorder may be associated with an imbalance of specific neurons called excitatory cortical neurons. This study builds on 13 years of published studies by Dr. Abyzov and his collaborators. Their studies demonstrated molecular differences in organoids between people with autism and those without and implicated the deregulation of a specific transcription factor called FOXG1 as an underlying cause of the disorder (Murphy, 2023). Abyzov reviews the studies relating ASD to a genetic cause, and it is their goal to prevent the disorder in children. Although ASD is different for many people, there is a commonality in the heredity of autism. According to the Cleveland Clinic, "When one child receives an ASD diagnosis, the next child has about a 20% greater risk of developing autism than normal. When the first two children in a family have ASD, the third child has about a 32% greater risk of developing ASD" (Cleveland Clinic, 2021).

Neurological

The brain is a critical factor in causing autism. The brain is a complex organ that controls everything that regulates our body: thought, memory, emotion, touch, motor skills, vision, breathing, temperature, and hunger (John Hopkins, 2023). The brain sends and receives chemical

and electrical signals throughout the body, which control different processes that the brain interprets. The main parts of the brain consist of the cerebrum, brainstem, and cerebellum (Hines, 2018).

The difference in anatomy between an autistic brain and a non-autistic brain gives some answers to the causes of ASD. The two hemispheres of ASD brains have slightly more symmetry than non-ASD brains, in which left-right asymmetry is an essential aspect of brain organization. In a non-autistic brain, some functions tend to be dominated by one side of the brain (Rossi, 2021). This is seen in speech and understanding, which are mostly processed in the left cerebral hemisphere. People with ASD tend to have reduced leftward language lateralization, which could be a reason for the higher rate of left-handed people.

Another is the connectivity issue. When comparing the functional connectivity of ASD brains and unaffected brains, researchers see some networks with lower connectivity. For tasks that require regular humans to combine or assimilate information in different parts of the brain, ASD individuals have more trouble (Askham, 2020). Individuals with ASD tend to be much better than average at specific tasks focused on the single brain region that's primarily involved. These connections are only good as the neurons carry the message through cell bodies to other neurons, which are the neurotransmitters.

Prenatal or perinatal exposure to neurotoxins that influence the nervous system functioning is believed to affect brain development and, therefore, has been proposed as a cause of autism (Rossi, 2021). Using magnetic resonance imaging (MRI), researchers found that ASD-affected brains have an enlarged hippocampus, which is the area in the brain that forms and stores memories. Also, the size of the amygdala differed. The amygdala is an almond-shaped structure in the brain involved with the experience of emotions (John Hopkins, 2023). Some

researchers have found that people with autism have a smaller amygdala, but others found that autistic children have an enlarged amygdala early in development and that the difference levels off over time. The amygdala's size in an autistic brain differs based on gender. A 2020 study revealed that the amygdala is more affected in autistic girls than boys. An enlarged amygdala is associated with more severe emotional problems, specifically in autistic girls, according to other studies.

A recent study, led by Dr. Daniel Geschwind from UCLA, looked into how the brain changes in people with autism at a very detailed level. The goal was to figure out what causes autism and find ways to treat it. Dr. Geschwind focused on specific parts of the brain that are important for thinking and social skills, which are often affected in autism. The study compared the activity of genes in these brain areas between people with autism and those without. They found big differences in areas related to touch, pain, and temperature, which might explain why people with autism often have heightened sensitivities (UCLA Health, 2023). The study also pointed to certain genes linked to autism risk. The next step is to see if using computer methods can help develop treatments by reversing these gene activity changes identified in autism.

Social Interactions with Autism

One of the main components of ASD is its effect on social interactions. Thus, young adults' developing minds and brains are stimulated in a problematic way as the brain works differently from neurotypical teenagers (Autism Research News, 2019). As children transition to adolescence, brains develop to create and maintain friendships, flourish in school, gain independence, and increase work around the house. For those with autism, research has shown that the connections between different parts of the brain diverge from neurotypical individuals. This can be seen in the overactive amygdala in teens with ASD, hindering them from coping in

unfamiliar social situations. ASD teenage brains show sustained amygdala activity over time, highlighting their difficulty in adjusting to a situation (Team, 2020). This anxiety can be why ASD teenagers actively avoid social situations. Also, ASD teens mature at a much slower pace with executive functioning skills that are responsible for organization, flexibility, working memory, and initiating skills. Teens need help making plans, keeping track of time, maintaining self-control, and working well together in a group without developing executive functioning. With ASD affecting social life, it makes it harder for teens going through changes to find a comfortable environment and people in places like a school (CDC, 2022).

Therapy Through Society

Although there has not been a direct cure for ASD, as it is a neurodevelopmental disability, there are many treatments affiliated to help acquire new skills and overcome a variety of developmental challenges. There is an outsized number of different types of ASD treatment, with the most common ones being behavior therapy, speech-language therapy, play-based therapy, physical therapy, occupational therapy, and nutritional therapy (Cleveland Clinic, 2020). Specific to improving social life includes pivotal response treatment and cognitive behavior therapy.

Pivotal response treatment, or PRT, is a play-based approach that follows applied behavior analysis practices. It focuses on motivation, self-management, response to multiple cues, initiating social interactions, and helping children improve their social skills and communication. Cognitive behavior therapy can help ASD children understand how thoughts influence behavior. In this treatment, the therapist can show the child how to recognize, reevaluate, and regulate emotions to teach children how to cope with difficult social situations and other challenges in life (Cleveland Clinic, 2020).

Although treatments can be super effective, it is not the only method to improve symptoms of ASD, specifically in children. The documentary, *The Horse Boy* follows an autistic boy named Rowan whose speaking and behavior problems have been a big issue in his family. The only exception to his behavior is a horse named Betsy. Rowan would only talk to Betsy and not even his intermediate family. His family goes to Mongolia to find a way to help his autism, as Mongolia has many horses that Rowan loves. They began to interact with Mongolian culture, including shamanic rituals and therapy associated with horse bonding (Davidson, 2021, 1:07:06). Overall, this experience improved Rowan's behavior and well-being, creating a stronger bond between him and the horses. Not only do treatments provided by healthcare providers improve ASD symptoms, but being able to find therapeutic ways through an ASD individual's interests could create a comfortable environment where the individual can branch out.

Conclusion

In individuals with autism spectrum disorder, genetic influences and neurological factors can significantly impact social behaviors. The brain, which controls thoughts, memories, speech, bodily movements, and functions of many organs, imposes difficulty on individuals with ASD. Left-right symmetry, atypical connectivity patterns, enlarged amygdala, and RNA levels in the brain are all aspects of how ASD brains compare to neurotypical brains. Genetics play a part in these characteristics, allowing people with ASD to have difficulty experiencing social interactions. Many problems could be improved through treatments, although continued services and support are often needed as one ages.

Information about ASD is easily accessible as it is a current topic in today's healthcare. There is extensive ongoing and active research on the causes of ASD and early diagnosis.

However, much research still needs to be done to further clarify and understand the true origin of ASD in individuals.

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