Causes of Autism Spectrum Disorder

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Introduction

Autism Spectrum Disorder is a neurological condition in the brain that affects how people behave, communicate, and learn. The abilities and needs of autistic people vary and can change over time. Some can live independently with interventions that improve basic skills, while others have severe challenges that require chronic support. Autism Spectrum Disorder accounts for a diverse group of conditions related to the development of the brain. The topic of this paper focuses on the causes and risk factors of Autism Spectrum Disorder, hoping to provide a clearer understanding of how genetic, immune related, and environmental influences can lead to more effective personalized intervention strategies that can improve outcomes of this disorder. (Mayo Clinic)

Genetic Causes

Research showed that Autism Spectrum Disorder does not have a single cause. Instead, it appears that when several different factors come together, with genetics as a major role. One of the strongest pieces of evidence for this is that autism often runs in families. (Bell) If one child in a family has ASD, their brothers or sisters are more likely to be diagnosed compared to children in families with no history of autism. Studies of twins show a similar pattern, identical twins who share most of their DNA have a much higher chance of both having autism than fraternal twins, who share only about half. This demonstrates that genes strongly influence the risk of developing ASD. (Lord et al.) In addition to that, Autism spectrum disorder affect children of all races and nationalities but boys are about four times more likely to be diagnosed with autism spectrum disorders than girls are because of the female protect effect hypothesis that girls need more genetic mutations or risk factors to develop autism, because of the two XX chromosomes raises the conditions required to develop autism comparing to males XY chromosomes.

Scientists have not discovered one single gene that causes ASD. They have identified many different genes that can slightly increase the chance of ASD. Some of these genes help

guide how brain cells grow, connect, and communicate with each other. When mutations occur in these genes, brain development may go on a different path. Sometimes, a single more serious genetic change can greatly increase the risk of autism. For example, conditions such as Fragile X syndrome, Rett syndrome, and tuberous sclerosis are known to be linked with higher rates of ASD. Not everyone with these conditions have autism but they are much more likely to than people without them. (National Institute of Mental Health)

However, genetics alone do not fully explain autism. Many people carry genetic variation that are associated with ASD but never develop the condition. This reveals that genes create a vulnerability. Whether someone actually develops ASD may depend on how these genetic risks interact with other influences during crucial stages of brain development. Genetics can offer a greater risk, but they don't act individually to cause Autism. (CDC)

Environmental Causes and Risk Factors

While genetics play a major role in Autism Spectrum Disorder, researchers have also identified several environmental factors that can increase the risk of ASD. Environmental refers to non genetic influences such as conditions during pregnancy, birth complications, and certain chemical exposures. None of these factors will guarantee that a child will develop autism, but they may raise the possibility when combined with genetic vulnerability.

A big part of the research is the prenatal environment, the period before a baby is born. Some medications taken during pregnancy, especially in the first periods of time, have been linked to higher rates of ASD. For example, the anti seizure drug valproic acid commonly used for epilepsy and bipolar disorder have been associated with an increased risk of Autism when used during pregnancy. Certain industrial chemicals and pollutants such as pesticides and air pollution also have been studied as possible risk factors. (Meador & Loring, 2013) Areas with high levels of traffic related air pollution or agricultural pesticides use can cause slightly higher

rates of ASD in parents. These findings revealed that exposure that disrupts brain development can contribute to Autism. (Ghahari et al., 2022)

Another part is parents that have a higher age. Children born to older mothers or fathers have a slightly higher chance of being diagnosed with ASD. Researchers think this may be because genetic mutations become more common in reproductive cells as people get older or they may face more health issues during pregnancy. Difficulties in pregnancy and birth also contribute to this. Very premature birth, low birth weight, and lack of oxygen during delivery have been associated with higher rates of developmental difficulties including Autism. It's because these situations can put stress on the developing brain, making it more unprotected to problems. (Lyall et al., 2020)

The mother's health during pregnancy is also important, conditions such as diabetes, high blood pressure, obesity, and autoimmune diseases can affect the baby's environment in the womb such as blood flow, inflammation, and nutrients that can affect brain development. There are also maternal infection and immune activities during pregnancy that might've also contributed to the development of ASD. Studies have found that mothers who experienced serious infections or high fevers while pregnant were more likely to have a child later diagnosed with Autism. Maybe because strong immune responses of brain development might change how neurons connections form. (*Inflammation in Pregnant Moms Linked to Child's Brain Development*, 2018)

Conclusion

In conclusion although Autism Spectrum Disorder is becoming more common, its exact causes are still not fully understood. Research shows that autism develops from a combo of strong genetic factors and environmental factors rather than a single cause. Many gene changes linked to autism are also found in individuals without the condition and environmental risk will not guarantee the development of autism. This shows that increased risk is not the same as causes. Autism is the result of multiple factors, understanding this complex process would help

prevent the development of autism. This paper's purpose is to support continued research at improving early diagnosis, intervention strategies, and gain more support on autism individuals. We hope these risk factors will give people an idea how different behaviors can affect Autism Spectrum Disorder and pay close attention to individual's development health.

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