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## **How does the environment affect early brain and cognitive development?**

The environment significantly affects the development of the early brain and its intellectual and cognitive development. Through studies by the Society for Neuroscience, it has been stressed that the environments of childhood have a significant effect on the whole future life of an individual by having access to several books in a home, experiencing abuse, and along with economic status in society (D'Arcy, 2012). It represents the early development of the brain in healthy conditions, intellectual, inspiring personality and to be a successful person for yourself in others society is completely dependent on the environment, conditions, behavior, and society provided to a child. The development of the brain goes through various stages from development in the uterus and in the first years of life exposure due to influences from the environment as the experiences that occurred in this period have permanently transformed the structures of the brain and its functions through genetic modifications (changes in the DNA structure and chromatin function) and subsequently, it affects vulnerabilities to the mental disorders (Miguel et al., 2019). It represented that brain changes and being exposed to mental disorders and traumas significantly affect physical, emotional, and above all neurological developments and health wellness.

The mental health has improved significantly over the years but it has not been focused on in the past as it has even been neglected that having a connection to the environment influences mental well-being and overall health. In the past, it has been believed that babies should be given exposure to every kind of environment to have the ideal brain health and development, but according to recent development, it has been stressed that sounds along with other sensory surroundings play the dynamic role for the right development of their brains and it also supports smooth development of the neural networks (Innovation District, 2023). It represented that recent studies have focused on how brain development is connected to a healthy environment and experiences whereas in the past brain health has not been focused on as it is now, which has been the reason for the increase in behavior and mental issues in our ancestors. It has been highlighted that prenatal, peripartum, and postnatal difficulties significantly affect the behavior of children along with neurodevelopment. Being vulnerable to the enhancement of the environment and constructive influences has the effect that could reverse the negative mental influence that includes putative mechanisms alterations in neurotrophic factors and also neurotransmitter systems (Miguel et al., 2019). As such neurological changes have a drastic impact on the future life of the child and also over time new tools, advancements, and conclusive findings have resulted in improving the mental health significance of overall health through understanding early impacts that change neurodevelopment as such studies helps to understand human brain development through studies on animals.

The environment that is provided to a child till adolescence has a significant role in the development of his cognitive and cognitive abilities, thinking, and decision-making process along with formation of the dynamic personality traits, which differentiate and make a unique individual from others as everyone is different that is based on childhood experiences and development. In a study it has been stressed that there is a linkage between parental education, economic status, and brain capacity regarding its specified regions that includes control of cognition and memory as the greater the economic well-being, the more hippocampal (important for memory and learning) size; it will develop the higher educational level, the less size in the amygdala (where stress is developed) (D'Arcy, 2012). It represents that the personality formation of a child as an individual in later life is completely dependent on the different phases of life, environment, and conditions provided by parents and the freedom given in showing your desires, wishes, and needs even to get a toy. It has been observed that children born and raised to such parents who have been going through low socioeconomic status (SES) have averagely worse development in various areas of the brain and personality, which includes lower cognitive abilities along with worse academic performance and more prone to suffer adversely with mental disorders (Klingberg et al., 2022). It highlighted that the living conditions, economic status, freedom or restrictions in expressing their thoughts, wishes, or needs, having a friendly atmosphere at home or an aggressive one significantly affects the personality development and traits along with cognitive abilities and decision-making process in adolescents as substantial abilities and development of brain continue to develop till the early 20s.

It has been focused that families have to ensure economic freedom assists children's development of cognitive abilities comprehensively but the poor conditions and the family issues between parents lead to behavior, emotional, and personality problems in children along with mental disorders at an early age that show aggressive behavior and could not adjust with others to live a progressive life. It has been stressed that socioeconomic status (SES) has been observed higher in significantly connected with protracted structural brain development and a lengthy track of functional network segregation, which majorly leads to more efficient cortical development in adulthood (Tooley et al., 2021). It highlighted that economic freedom helps children in the healthy development of the child's brain as economic and above all factors of environment play a significant role in the development of various parts of the brain. In another study, it has been highlighted that the environmental experiences in the early stage of life have a major and life-long impact on emotional, cognitive, neurobiological, and other physical and also mental health development (Luby et al., 2022). It demonstrated that It has been observed through the study that functional magnetic resonance imaging (fMRI) has demonstrated that the brain systems that have been affected by SES are frontal and parietal regions, which have been relevant to rational thinking and major functions linked to temporal language areas, along with medial temporal lobe and the hippocampus that are linked to long-term memory (Tooley et al., 2021). Early childhood experiences could have a long-lasting and significant impact on the futuristic opportunities and experiences of life as these experiences have a dynamic impact on the workings of the brain and its size.

The mental development is connected with the overall health of a child and ultimately an adult but it varies from society to society and culture to culture as it is significantly dependent on the norms, values, behavioral patterns, and emotional well-being that is followed in a family and that passes from generations to generations. In a comparative study, it has focused that there is a significant influence of early care that is given to infants has a massive effect on the positive neurodevelopment results that have been observed in several species as the conditions of the environment are considered to nurture healthy development, improve resilience along with preventing the root cause of psychopathology and physical health problems (Innovation District, 2023). It demonstrated that brain development varies from family to family due to perceiving differently to mental health and development of children as normally only physical development is focused but it works vice versa as healthy brain development represents healthy physical development. In other studies, it has been stressed that cognitive development has been impacted negatively due to premature birth, disease, poor nutrition, social isolation, and being neglected, which could decrease the myelin integrity and significantly affect the person's ability to function properly to perform basic motor skills and cognitive functions (Innovation District, 2023). It represents weaknesses in childhood, developmental problems, and personality deficiencies are the impacts that make the individual challenged to cope with mental disorders and the commonly neglected ones are stress and depression which even lead to suicidal attempts and taking lifelong medications.

It has been focused on that there has been an evidence-based connection between the primary environment to neurocognitive development that has stressed the design of primary childhood development programs. In this conclusive research, it has been stressed that increased translated and applied early childhood education gives significance to cognitive stimulation in the early ages and has gained considerable acceptance in society and healthcare and educational programs to design the syllabus of various child educational programs (Innovation District, 2023). It represented that with time, society, educational, and healthcare institutions have given profound significance to mental health and formulated living practices, cultures, norms, and values that vary from society to society and country to country. In the comparative study of the large group in which imaging the brains of 1,099 individuals in the age group of 3 and 20 years have discovered that the total cortical surface has been connected to both parental educational levels and their income as it has been significantly linked and associated to major parts of the cortex, which supports the functions of reading, executive functions, language capabilities and also the spatial skills (Klingberg et al., 2022). It represents that the major brain functions have been associated with the educational and behavioral, emotional, and psychological development through the parent's upbringing. The positive influences like exposure to a large vocabulary and novel objects could increase the growth of myelin whereas the negative influences like social and neglect-based isolation could significantly harm it, which could significantly change the phases of brain development (Innovation District, 2023). It represented that the environment is considered a

noninvasive therapeutic approach through its healing properties that have a dynamic impact to heal the individual from the traumas, to come out of the mental disorders and conditions that could significantly influence the person to be a civilized and useful individual for himself and the society.

Thus, the environment has a profound impact on personality development, enhancement of intellectual capabilities, and overall health development that come under the effect of various experiences, cognitive development in childhood, and the learned values, norms, and family background. The environment significantly affects the overall brain development, cognitive abilities, and intellectual capabilities that are enhanced with age development, positive and negative impacts of the environment along with psychological developments, and ultimately it impacts health and well-being. It has been stressed through conclusive studies, that “provide powerful evidence that even relatively minor variations within the normal range of home experience can affect brain development over a lifetime,” as highlighted by Brian Avants, known as an assistant professor at the University of Pennsylvania (Innovation District, 2023). It represents that brain development is a continuous process that significantly affects from the early development of the brain to the development of adolescence, and adulthood, and even the positive and negative surroundings, happenings, and experiences.

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