

Healthy Parenting in the Age of the Genome: Nature or Nurture?

In 1969, John Bowlby and Mary Ainsworth established the Attachment Theory, according to which secure attachment between child and caregiver is strongly associated with better future outcomes regarding self-esteem, social competence and empathy and vice versa.^[1] It is now well-established that good parenting and a caring maternal behavior are essential for the psychologically healthy development of offspring.^[2,3]

In recent years, advancements in evolutionary biology have resulted in “epigenetics” becoming increasingly important in the field of biomedical research. Epigenetics refers to the role of environmental factors on gene activation or silencing, without changing the DNA nucleotide sequence. Maternal behavior is also considered to be transmitted in this manner across generations.^[4]

Studies in both animals and humans have shown that the quality of parenting is affected in mothers who had received poor care during childhood.^[5] Hormones play a significant role in maternal behavior. However, for example, levels of oxytocin, which stimulates and maintains maternal behavior, have been found to be lower in mothers with insecure attachment after interaction with their infants than mothers with secure attachment.^[5] In addition, adverse parenting received during the early years of life negatively influences women’s brain morphology, such as the hippocampus, as well as maternal brain activations to child stimuli, such as in the hippocampus, nigrostriatal pathways and insula.^[5,6]

It should be noted that although extensive studies have been conducted to determine the epigenetic influences on maternal behavior, there have been inconsistent results,^[7-9] and thus this research area has remained complex. Furthermore, it is difficult to ascertain the extent to which parenting behavior is influenced by epigenetics alone and to analyze this separately from the influence

of environmental factors. Therefore, it is challenging to integrate the genetic and environmental principles and identify all factors that influence the processes of attachment and maternal behavior. Understanding how these factors influence each other and eventually maternal behavior would help in developing a holistic therapeutic approach. Furthermore, given the plasticity of the maternal brain and that epigenetic modifications can be changed or reversed through experiences,^[4] interventional programs can be developed for mothers who had experienced poor parenting once biomarkers have been established.

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