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Contents

Monthly Volume 12 Number 8 August 19, 2022

EDITORIAL

REVIEW

ORIGINAL ARTICLE

Case Control Study

Observational Study

LETTER TO THE EDITOR

World Journal of Psychiatry

Monthly Volume 12 Number 8 August 19, 2022

Contents

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LETTER TO THE EDITOR

Genetics of adult attachment and the endogenous opioid system

Alfonso Troisi

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Abstract

Since the pioneering work by Panksepp *et al*, the neurobiological bases of attachment behavior have been closely linked with opioid neurotransmission. Candidate gene studies of adult individuals have shown that variation in the mu-opioid receptor gene (*OPRM1*) influences attachment behavior. Early maternal care and the A/A genotype of the A118G polymorphism interact in modulating levels of fearful attachment. Compared to their counterparts carrying the A/A genotype, individuals expressing the minor 118G allele show lower levels of avoidant attachment and experience more pleasure in social situations. Brain imaging research has strengthened the biological plausibility of candidate gene studies. The avoidance dimension of attachment correlates negatively with mu-opioid receptor availability in the thalamus and anterior cingulate cortex, as well as the frontal cortex, amygdala, and insula. Overall, findings from human studies combined with those from animal models suggest that research on the genetic bases of attachment should include the endogenous opioid system among the investigated variables.

Key Words: Genetics; Avoidant attachment; Fearful attachment; Endogenous opioids; *OPRM1*; A118G polymorphism

Core Tip: Genetic studies of attachment should target the endogenous opioid system. Candidate gene studies of adult individuals have shown that variation in the mu-opioid receptor gene (*OPRM1*) influences attachment behavior. Early maternal care and the A/A genotype interact in modulating levels of fearful attachment. Compared to their counterparts carrying the A/A genotype, individuals expressing the minor 118G allele show lower levels of avoidant attachment. Brain imaging research has strengthened the biological plausibility of candidate gene studies. The avoidance dimension of attachment correlates negatively with mu-opioid receptor availability in the thalamus and anterior cingulate cortex, as well as the frontal cortex, amygdala, and insula.

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TO THE EDITOR

I read with interest the narrative review by Erkoreka *et al*[1] who analyzed the existing literature regarding the implication of candidate genes related to oxytocin, dopaminergic pathways, serotonergic pathways, and brain-derived neurotrophic factor in adult attachment. Yet, the authors failed to discuss the studies that focused on the opioid pathways, which is surprising considering that, since the pioneering work by Panksepp *et al*[2], the neurobiological bases of attachment behavior have been closely linked with opioid neurotransmission. In this letter, I summarize the findings of the studies that Erkoreka *et al*[1] failed to report and show why genetic research on attachment should target the endogenous opioid system.

There is evidence that variation in the mu-opioid receptor gene (*OPRM1*) influences attachment behavior in both healthy volunteers and patients with psychiatric disorders. Troisi *et al*[3] aimed at ascertaining if the A118G polymorphism of the *OPRM1* moderates the impact of early maternal care on fearful attachment in 112 psychiatric patients. Early maternal care and fearful attachment were measured using the Parental Bonding Inventory and the Relationship Questionnaire (RQ), respectively. The pattern emerging from the RQ data was a crossover interaction between genotype and maternal caregiving. Participants expressing the minor 118G allele had similar and relatively high scores on fearful attachment regardless of the quality of maternal care. By contrast, early experience made a major difference for participants carrying the A/A genotype. Those who recalled higher levels of maternal care reported the lowest levels of fearful attachment whereas those who recalled lower levels of maternal care scored highest on fearful attachment. These data fit well with the differential susceptibility model which stipulates that plasticity genes would make some individuals more responsive than others to the negative consequences of adversity and to the benefits of environmental support and enrichment. In a mixed sample (n = 214) of adult healthy volunteers and psychiatric patients, Troisi *et al*[4] analyzed the association between the A118G polymorphism of the *OPRM1* and avoidant attachment as measured by the Attachment Style Questionnaire. The findings showed that, compared to their counterparts carrying the A/A genotype, both healthy volunteers and psychiatric patients expressing the minor 118G allele showed lower levels of avoidant attachment and experienced more pleasure in social situations.

The biological plausibility of the candidate gene studies reported above is strengthened by findings from brain imaging research. Nummenmaa *et al*[5] scanned 49 healthy subjects using a mu-opioid receptor-specific ligand and measured their attachment avoidance and anxiety with the Experiences in Close Relationships-Revised scale. The avoidance dimension of attachment correlated negatively with mu-opioid receptor availability in the thalamus and anterior cingulate cortex, as well as the frontal cortex, amygdala, and insula. These results confirm that the endogenous opioid system may underlie inter-individual differences in avoidant attachment style in human adults, and that differences in mu-opioid receptor availability are associated with the individuals' social relationships and psychosocial well-being.

Overall, findings from human studies combined with those from animal models[6] suggest that research on the genetic bases of attachment should include the endogenous opioid system among the investigated variables.

FOOTNOTES

Author contributions: Troisi A wrote the letter.

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