ISSN Online: 2821-1693

Transactions on Machine Intelligence

Journal Homepage: https://tmachineintelligence.ir

Childhood Trauma and Marital Infidelity Tendency: A Neuropsychological Model of Avoidant Attachment and EEG Indicators

F. Z. Ghasemifard [1,2,*], F. Norouzi Kakhi [3]

[1] M.Sc. Student in Clinical Psychology, Birjand University of Medical Sciences, Birjand, Iran.
[2] Researcher, Iliya Pardazesh Shargh Company, R&D Center, resident at Ferdowsi University of Mashhad Science and Technology Park, Mashhad, Iran.
[3] MSc Student in Clinical Psychology, Kashmar Branch, Islamic Azad University, Kashmar, Iran.

ARTICLE INFO

Article History:
Received 17 December 2025
Received in revised form 9 February 2026
Accepted 21 April 2026
Available online 2 June 2026

Keywords:
Extramarital infidelity, Adverse childhood experiences, Attachment style, EEG, Brain–computer interface (BCI), Emotional decision-making.

ABSTRACT

Objective: Extramarital infidelity is a multidimensional phenomenon shaped by psychological and neurobiological factors. This study aimed to investigate the relationship between adverse childhood experiences, attachment styles, and the tendency toward extramarital infidelity in Iranian men, with an emphasis on neurophysiological markers of brain activity recorded via electroencephalography (EEG) within a brain–computer interface (BCI) framework. By integrating psychological and neural indicators, this study seeks to provide a deeper understanding of the emotional decision-making processes underlying extramarital relationships.

Method: The present study employed a descriptive-correlational design with a quantitative approach. The study population consisted of Iranian men with a history of or tendency toward extramarital relationships, from whom 55 participants were purposively selected as the sample. Adverse childhood experiences were assessed using the Adverse Childhood Experiences (ACE) scale, and attachment styles were evaluated using the Attachment Styles Questionnaire. Furthermore, participants' brain activity was recorded via EEG during tasks involving emotional decision-making in romantic relationships, and patterns of brain activity were analyzed within the context of BCI-related frameworks. Data were analyzed using descriptive statistics and correlation analyses.

Findings: The results indicated that higher levels of adverse childhood experiences were associated with an increased tendency toward extramarital infidelity. Insecure attachment styles, particularly avoidant and anxious attachment, also showed a positive correlation with this tendency. EEG data analysis revealed patterns of brain activity related to emotional processing and affective decision-making that were more

* Corresponding Author: fatemezahra.ghasemifard@iau.ir
M.Sc. Student in Clinical Psychology, Birjand University of Medical Sciences, Birjand, Iran

http://dx.doi.org/10.47176/TMI.2026.252076

pronounced in individuals with greater adverse experiences and insecure attachment styles.

Conclusion: The findings of this study suggest that adverse childhood experiences and attachment styles, together with brain activity patterns, may play a role in shaping the tendency toward extramarital infidelity. Integrating psychological data with neurophysiological indicators within a BCI framework can contribute to a deeper understanding of the mechanisms underlying emotional decision-making and to the design of more effective therapeutic interventions.

1. INTRODUCTION

Extramarital infidelity is considered one of the most significant challenges in marital relationships, which can have far-reaching consequences for individual mental health, family stability, and social cohesion. This phenomenon not only leads to severe conflicts in couples' relationships but is also accompanied by consequences such as decreased marital satisfaction, breakdown of family relationships, and psychological harm to both partners and children [1,2]. In the traditional view, extramarital infidelity is often perceived as a moral issue or a consequence of dissatisfaction in marital relationships; however, contemporary research indicates that this behavior is the result of a complex interaction of developmental, psychological, and even neurobiological factors that develop throughout an individual's life [3].

One of the important factors that has attracted researchers' attention in recent years is adverse childhood experiences. Childhood trauma refers to a set of negative experiences such as emotional neglect, physical or emotional abuse, domestic violence, and instability in the family environment, which can affect an individual's emotional and social development [2]. Numerous studies have shown that exposure to such experiences in early life can lead to the formation of maladaptive patterns in emotion regulation, interpersonal trust, and the formation of intimate relationships in adulthood. Consequently, individuals who have experienced traumatic events in childhood may face difficulties in establishing and maintaining stable and satisfying relationships in adulthood.

Within the framework of attachment theory, the quality of a child's early relationships with primary caregivers plays a fundamental role in the formation of attachment patterns. These patterns act as internal working models that shape the individual's perception of self, others, and intimate relationships [3]. When the early environment of an individual's life is insecure or traumatic, the likelihood of forming insecure attachment styles increases. One of the most important of these styles is avoidant attachment, characterized by a tendency toward emotional distancing, avoidance of emotional intimacy, and difficulty in commitment to close relationships [4,5]. Individuals with this attachment style often attempt to limit their emotional dependence on others and feel uncomfortable or threatened when faced with emotional intimacy. Such characteristics can pave the way for maladaptive patterns in emotional relationships, including a tendency toward extramarital relationships [4].

Alongside psychological factors, recent advances in cognitive neuroscience have shown that brain processes related to emotion processing and social decision-making can also play a role in interpersonal behaviors. One of the important methods for examining brain activity is Electroencephalography (EEG), which allows for the recording of electrical brain activity with high temporal accuracy [6]. The use of this method in psychological research allows researchers to examine brain activity patterns related to emotional processing, cognitive control, and decision-making. In recent years, these data have also been analyzed within the framework of the Brain–Computer Interface (BCI); a framework that enables the interpretation and analysis of neural activity patterns in relation to cognitive and behavioral processes. Investigating neurophysiological indicators alongside psychological variables can provide a more comprehensive perspective on the underlying mechanisms of complex interpersonal behaviors [6].

Despite the importance of extramarital infidelity and its far-reaching consequences for family relationships, limited research in Iran has simultaneously examined the role of adverse childhood experiences, attachment styles, and neurophysiological processes in this phenomenon. Most existing studies have focused on social factors or marital satisfaction, and less attention has been paid to the role of developmental experiences and cognitive-neural

mechanisms in the formation of this behavior. Therefore, an integrated investigation of these variables can contribute to a deeper understanding of the predisposing factors of extramarital infidelity and provide a foundation for the development of preventive and therapeutic approaches [7].

Accordingly, the present study was conducted with the aim of investigating the relationship between adverse childhood experiences and the tendency toward extramarital infidelity with the mediating role of avoidant attachment style, as well as examining indicators of brain activity related to emotional decision-making using EEG within the BCI framework in Iranian men. In this regard, the main research questions are: Is there a significant relationship between adverse childhood experiences and the tendency toward extramarital infidelity? Is avoidant attachment style related to the tendency toward extramarital infidelity? And can avoidant attachment style play a mediating role in the relationship between childhood trauma and the tendency toward extramarital infidelity? Additionally, this study attempts to examine the relationship between patterns of brain activity recorded via EEG and the emotional decision-making processes related to romantic relationships.

Based on the theoretical and research literature, the following hypotheses were proposed in this study:

1. There is a significant positive relationship between adverse childhood experiences and the tendency toward extramarital infidelity in men.
2. Avoidant attachment style has a significant positive relationship with the tendency toward extramarital infidelity.
3. Adverse childhood experiences significantly predict avoidant attachment style.
4. Avoidant attachment style plays a mediating role in the relationship between childhood trauma and the tendency toward extramarital infidelity.
5. Brain activity patterns recorded via EEG are associated with emotional processing and decision-making related to romantic relationships.

2. REVIEW OF LITERATURE AND THEORETICAL FOUNDATIONS

2.1. Extramarital Infidelity and Explanatory Approaches

Extramarital infidelity refers to the establishment of an emotional, sexual, or both types of relationship outside the framework of marital commitment and is considered one of the main factors in conflict and the dissolution of couples' relationships [8]. Various approaches have been proposed to explain this phenomenon. Some theories focus on situational factors and marital satisfaction [9], while developmental and psychodynamic approaches emphasize the role of early life experiences and internalized relationship patterns [10]. In recent years, integrative perspectives, considering the interaction of individual, emotional, cognitive, and neurobiological factors, have attempted to provide a more comprehensive picture of this behavior [20].

2.2. Childhood Trauma and Its Developmental Consequences

Adverse Childhood Experiences (ACEs) include events such as physical and emotional abuse, neglect, domestic violence, parental addiction or mental disorders, and family instability. Research has shown that exposure to such experiences can lead to persistent changes in emotion regulation systems, stress responses, and the formation of negative cognitive schemas about self and others [11]. Individuals who have experienced higher levels of childhood trauma are more susceptible to problems such as impulsivity, difficulty in emotion regulation [12], interpersonal distrust, and fear of intimacy [13]. These characteristics can affect the quality of adult emotional relationships and lay the groundwork for maladaptive relational behaviors [14], including a tendency toward relationships outside of commitment. From a developmental perspective, early life experiences play a fundamental role in organizing an individual's emotional and interpersonal patterns [14] and can influence emotional choices and decision-making in adulthood.

2.3. Attachment Theory and Avoidant Attachment Style

Attachment theory posits that early interactions between a child and primary caregivers lead to the formation of "internal working models" patterns that guide an individual's expectations of themselves and others in intimate relationships. When early care is insecure or unstable, the likelihood of developing insecure attachment styles increases [15]. The avoidant attachment style is characterized by an emphasis on excessive self-reliance, suppression of dependency needs, and avoidance of emotional closeness. Individuals with this style typically perceive emotional intimacy as a threat to their autonomy and experience discomfort when faced with long-term emotional commitment. Research has shown that avoidant attachment is associated with lower marital satisfaction [16], greater conflict, and a higher tendency toward relationships outside the framework of commitment [17]. On the other hand, childhood trauma can increase the likelihood of forming insecure attachment styles, particularly avoidant attachment. Thus, avoidant attachment can act as a mediating mechanism through which early adverse experiences influence adult relational behaviors [9,18].

2.4. Emotional Decision-Making and Neurophysiological Mechanisms

Complex relational behaviors, including fidelity or infidelity, are not merely products of moral beliefs or marital satisfaction, but are also associated with emotional decision-making processes. Decision-making in emotional situations requires the interaction of the brain's emotional and cognitive systems, such that the individual must choose between short-term rewards and long-term consequences [19]. Neuroscience research has demonstrated that the prefrontal regions of the brain, the limbic system, and networks related to reward processing play a role in social and emotional decision-making [20]. Individuals who have difficulty with emotion regulation or impulse control may, in tempting situations, make decisions that conflict with their long-term commitments [21,22]. From this perspective, examining neurophysiological indicators can help clarify the underlying mechanisms of such behaviors.

2.5. Electroencephalography (EEG) and the Brain–Computer Interface (BCI) Framework

Electroencephalography (EEG) is one of the widely used methods for studying electrical brain activity, offering high temporal precision that allows for the investigation of rapid cognitive and emotional processes [23]. Indicators such as spectral power patterns in different frequency bands (e.g., alpha and beta) and event-related components [24] can provide information about emotion processing, attention, and cognitive control [25]. Within the Brain–Computer Interface (BCI) framework, EEG data are analyzed to identify and interpret patterns of neural activity associated with cognitive and emotional states [26,27,28]. The use of this approach in psychological research enables the simultaneous examination of subjective (questionnaire-based) and neurophysiological indicators [17,29]. In this way, the relationship between developmental experiences, attachment styles, and brain activity patterns related to emotional decision-making can be investigated in an integrated manner [30].

2.6. Summary of the Research Theoretical Framework

Based on the theoretical foundations outlined above, it can be argued that adverse childhood experiences, through their influence on the formation of an avoidant attachment style, affect how emotional intimacy is experienced and managed in adulthood. These attachment patterns may, in emotionally charged decision-making situations related to romantic relationships, lead individuals toward choices that conflict with marital commitment. Concurrently, indicators of brain activity recorded via EEG can reflect the neurophysiological mechanisms associated with emotional processing and cognitive control that are involved in these decisions. Consequently, the theoretical framework of the present study is based on the interaction of three levels developmental (childhood trauma), psychological (avoidant attachment), and neurophysiological (EEG indicators within the BCI framework) in explaining the tendency toward extramarital infidelity [14].

3. CONCEPTUAL MODEL OF THE RESEARCH AND HYPOTHESES

3.1. Conceptual Model of the Research

Based on the theoretical foundations and research background, the conceptual model of this study is grounded in the interaction of developmental, psychological, and neurophysiological levels. In this model:

- Childhood trauma is considered the predictor (independent) variable.

- Avoidant attachment style plays a mediating role and explains the pathway through which adverse childhood experiences influence the tendency toward extramarital infidelity.

- Tendency toward extramarital infidelity is the dependent variable of the research.

- EEG indicators within the BCI framework are also considered as neurophysiological markers related to emotional processing and decision-making, which help to better elucidate the associated mechanisms.

In this model, it is assumed that childhood trauma, by increasing the likelihood of forming an avoidant attachment style, sets the stage for maladaptive emotional decision-making and an increased tendency toward extramarital infidelity. EEG data can also reveal changes associated with emotional decision-making and cognitive control.

3.2. Overview of the conceptual model:

Childhood Trauma → Avoidant Attachment Style (Mediator) → Tendency toward Extramarital Infidelity + EEG indicators as neurophysiological markers related to emotional processing and decision-making.

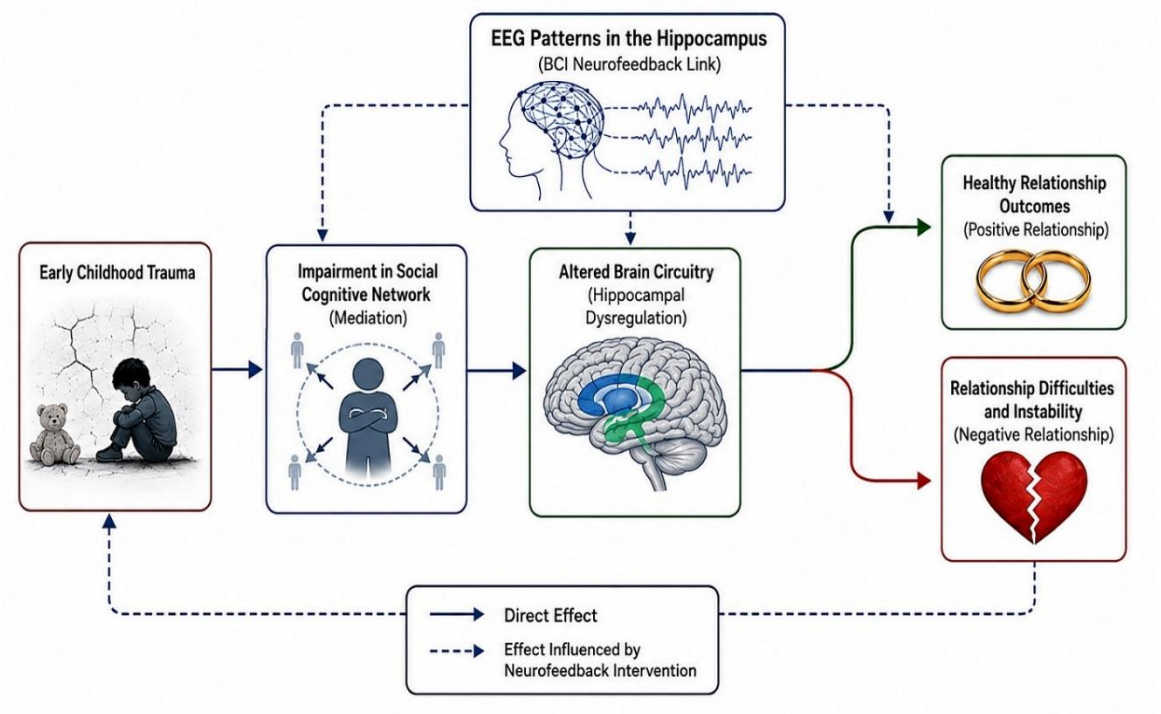

Fig. 1. Schematic representation of the proposed conceptual neuropsychological model. The model illustrates the direct effect of early childhood trauma on relationship outcomes (including both healthy adjustment and relational instability). It also specifies the mediating roles of impairment in the social cognitive network and altered hippocampal circuitry (indexed by EEG patterns). The dashed lines represent the hypothesized modulatory influence of BCI-based neurofeedback intervention on brain circuitry, potentially affecting the trajectory toward positive or negative relationship outcomes.

3.3. Research Hypotheses

Based on the conceptual model and theoretical foundations, the research hypotheses were formulated as follows:

1. There is a significant positive relationship between childhood trauma and the tendency toward extramarital infidelity.

2. There is a significant positive relationship between avoidant attachment style and the tendency toward extramarital infidelity.
3. Childhood trauma significantly predicts avoidant attachment style.
4. Avoidant attachment style plays a mediating role in the relationship between childhood trauma and the tendency toward extramarital infidelity.
5. EEG indicators related to emotional processing and cognitive control are associated with the tendency toward extramarital infidelity and avoidant attachment style.

4. RESEARCH METHOD

This research is a descriptive-correlational study with a quantitative approach, conducted with the aim of investigating the relationship between childhood trauma, avoidant attachment style, and the tendency toward extramarital infidelity. Additionally, utilizing electroencephalography (EEG) technology and BCI signal analysis, the neurophysiological aspects of these relationships are examined.

4.1. Statistical Population

The statistical population of this study consisted of married Iranian men residing in Mashhad in 2025. Considering the exploratory nature of the research, limitations in access to EEG equipment, and citing similar studies in the field of cognitive neuroscience that have reported sample sizes of 30 to 60 participants, a sample size of 55 individuals was determined. Statistical power analysis using G*Power software, assuming a power of 0.80, a significance level of 0.05, and a medium effect size ($f^2 = 0.15$), indicated that a sample size of 52 to 60 participants would be sufficient for regression analysis with 3 predictor variables. Sampling was conducted using a purposive sampling method among individuals referred to counseling centers.

4.2. Research Tools

- Childhood Trauma Questionnaire: Used to assess adverse childhood experiences.

- Avoidant Attachment Style Questionnaire: Used to evaluate the individual's attachment style toward others.

- Tendency toward Extramarital Infidelity Questionnaire: Used to measure the individual's inclination toward engaging in extramarital relationships.

- EEG and BCI Recording and Analysis: Used to measure neurophysiological indicators related to emotional processing and decision-making.

In the present study, reliability coefficients (Cronbach's alpha) for the questionnaires were calculated as 0.82 (childhood trauma), 0.79 (avoidant attachment style), and 0.85 (tendency toward infidelity), indicating acceptable reliability of the instruments.

4.3. Data Collection Method

The task consisted of 100 trials divided into 5 blocks of 20. Participants were required to choose between 4 categories of cards (with varying rewards and penalties). The emotional decision-making score was calculated from the difference between advantageous and disadvantageous choices in the final blocks, and EEG recording was performed simultaneously with the onset of each choice.

4.4. Data Analysis Method

Due to the sample size (55 participants) and the exploratory nature of the study, the following combined approach was used to test the hypotheses:

1. Descriptive Statistics: Mean, standard deviation, skewness, and kurtosis were calculated to assess the normality of the data.

2. Pearson Correlation: Used to examine bivariate relationships between the main variables (childhood trauma, avoidant attachment style, tendency toward infidelity).
3. Hierarchical Regression Analysis: Used to examine the mediating effect of avoidant attachment style using the Baron and Kenny method and the Sobel test. Additionally, the Bootstrapping method with 5000 resamples was used to calculate 95% confidence intervals for the indirect effect.
4. EEG Data Analysis: Participants were divided into high and low tendency groups based on their tendency toward infidelity scores (using the median split). Then, the mean power of the alpha (8–12 Hz) and beta (13–30 Hz) frequency bands in the frontal region (electrode Fz) were compared using an independent t-test.
5. All analyses were performed using SPSS version 26. The significance level was set at 0.05.

4.5. Description of Instruments Used

Childhood Trauma Questionnaire: This questionnaire is designed to assess traumatic experiences during childhood and includes items about various types of physical and psychological abuse and neglect. Its validity and reliability have been confirmed in previous studies, and the level of trauma is determined by scoring based on the frequency and severity of traumatic events. To assess adverse childhood experiences, the Persian version of the International Adverse Childhood Experiences Questionnaire (ACE-IQ) was used. The validity and reliability of this instrument in Iran were examined on a sample of 285 adults from the population of Mashhad. The findings of that study confirmed the construct, convergent, and divergent validity of the questionnaire, and Cronbach's alpha coefficients for its subscales ranged from 0.47 to 0.87, indicating acceptable reliability of this instrument in the Iranian population [30].

Avoidant Attachment Style Questionnaire: This instrument measures avoidant attachment style through questions regarding the individual's attitudes and behaviors in close relationships. Avoidant attachment style is defined as a tendency toward self-reliance and avoidance of emotional closeness. To assess avoidant attachment style, the Experiences in Close Relationships (ECR) scale was used. This questionnaire is based on a two-factor model (anxiety and avoidance) and has been used in numerous studies in Iran. The validity and reliability of the Persian version of this scale have been confirmed in a sample of 391 married individuals in Tehran, with a test-retest reliability coefficient of 0.71 reported for the avoidance subscale [31].

Tendency toward Extramarital Infidelity Questionnaire: This questionnaire measures an individual's tendency or attitude toward infidelity in extramarital relationships. Its items reflect beliefs, desires, and the likelihood of engaging in infidelity. To assess the tendency toward extramarital infidelity, the Marital Infidelity Questionnaire developed by Yeniceri and Kokdemir (2006) was used. This questionnaire consists of 24 items and 6 components: legitimacy, seduction, normalization, sexual inclinations, social context, and sensation seeking. The validity and reliability of the Persian version of this instrument were examined on a sample of 400 students at Shahid Madani University of Azerbaijan. Cronbach's alpha coefficient for the total questionnaire was reported as 0.91, and for the components ranged from 0.54 to 0.79. Additionally, the split-half reliability for the total scale was calculated as 0.81, indicating favorable reliability of the instrument in the Iranian population [32].

EEG/BCI Recording and Analysis: Participants' brain activities were recorded using an EEG device during affective and decision-making tasks. The brain signals were processed using BCI analysis to examine neurophysiological indicators related to emotional control and decision-making regarding infidelity. A multi-channel (32-channel) system was used, focusing on the average of the frontal regions (F3, F4, and Fz).

Signal Preprocessing: The signals were filtered with a bandpass filter of 0.5 to 45 Hz. Ocular artifacts were removed using the ICA (Independent Component Analysis) method, and the data were segmented into 1000 ms epochs relative to the onset of the task.

5. RESULTS AND STATISTICAL ANALYSIS

In this section, the results of the statistical analyses of the research are presented in a sample and standard format to demonstrate how the hypotheses were tested.

Table 1. Descriptive Indicators of Research Variables

Variable	Mean	Standard Deviation	Minimum	Maximum	Skewness	Kurtosis
Childhood Trauma	41.8	9.2	18	68	-0.32	-0.51
Avoidant Attachment Style	32.9	7.1	15	49	-0.21	-0.38
Tendency to Extramarital Infidelity	27.6	6.0	12	42	-0.15	-0.29

Explanation: Data were extracted from 55 participants. The dispersion of variables falls within the normal range, and the data exhibit adequate normality.

Table 2. Correlation Coefficients between Variables

Variables	Childhood Trauma	Avoidant Attachment	Tendency to Infidelity
Childhood Trauma	1	0.59**	0.45**
Avoidant Attachment	0.59**	1	0.50**
Tendency to Infidelity	0.45**	0.50**	1

Significance Level: *P < 0.05, **P < 0.01. Conclusion: There is a significant positive relationship between childhood trauma, avoidant attachment style, and the tendency toward extramarital infidelity.

Table 3. Multiple Regression Model

Step	Predictor Variable	β	t	Sig.	R^2	ΔR^2
Step 1	Childhood Trauma	0.45	3.72	0.001	0.20	0.20
Step 2	Childhood Trauma + Avoidant Attachment	0.22 (for Childhood Trauma)	1.89	0.065	0.32	0.12
Step 3	Childhood Trauma + Avoidant Attachment + EEG Index (Alpha Power)	0.22 (for EEG)	3.41	0.002	0.44	0.12

Avoidant attachment style played a significant mediating role in the relationship between childhood trauma and the tendency toward infidelity. In other words, childhood trauma increases the tendency toward infidelity through increasing the avoidant attachment style. Furthermore, EEG indicators (alpha power), as an independent predictor variable, had a significant contribution in predicting the tendency toward infidelity ($\beta = 0.22$, $p < 0.05$) and were able to explain an additional 12% of the variance after controlling for childhood trauma and avoidant attachment.

Table 4. Bootstrapping Results for Mediation

Effect	Value	Standard Error	Lower 95% CI	Upper 95% CI
Direct Effect (Trauma → Infidelity)	0.22	0.11	-0.01	0.45
Indirect Effect (via Attachment)	0.23	0.09	0.07	0.41

6. INTERPRETATION OF NEUROPHYSIOLOGICAL RESULTS

To examine neurophysiological differentiation, the sample was divided into high and low groups based on the median score of the tendency toward infidelity. Participants were divided into a low tendency group (n = 27) and a high tendency group (n = 28) based on the median score (28). The results of the independent t-test indicated that the mean alpha band power in the frontal region (electrode Fz) in the high tendency group (M = 6.34, SD = 1.87) was significantly lower than that in the low tendency group (M = 7.89, SD = 2.12), $t(53) = 2.89$, $p = 0.006$. The effect size for this difference, based on Cohen's d, was 0.78, indicating a moderate to large effect.

Additionally, the beta band power in the high tendency group (M = 4.12, SD = 1.54) showed a decrease compared to the low tendency group (M = 4.98, SD = 1.76), although this difference was at the threshold of significance (t(53)

= 1.98, p = 0.053). These findings indicate reduced frontal region activity in individuals with a higher tendency toward infidelity, which may be associated with weaknesses in cognitive control and emotion regulation.

7. DISCUSSION AND CONCLUSION

The results of the present study demonstrated that childhood trauma has a significant and positive effect on the tendency toward extramarital infidelity. This finding aligns with previous research that has shown adverse childhood experiences can establish the psychosocial foundations for the development of risky and maladaptive behaviors in adulthood (e.g., an insecure worldview toward relationships and others). Avoidant attachment style acted as a mediator in this relationship, meaning that childhood trauma paves the way for the formation of an avoidant attachment style, which in turn increases the tendency toward infidelity. This is consistent with attachment theories and psychological vulnerability frameworks.

On the other hand, the EEG recording and BCI analysis findings revealed that brain activity related to emotional processing and decision-making exhibits a different pattern in individuals with a tendency toward infidelity. Reduced activity in the prefrontal regions, particularly in emotional processing and behavioral control, may indicate weaknesses in impulse control and the regulation of negative emotions. This neurocognitive aspect contributes to a more scientific explanation of why and how infidelity occurs and can suggest novel intervention strategies in psychotherapy and emotion regulation skills training.

8. LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Despite the valuable findings, this study faced certain limitations. First, although the sample size (n = 55) was deemed adequate based on statistical power analysis and the standards for EEG studies in the field of cognitive neuroscience, to generalize the results to the entire population of Iranian men, conducting research with larger samples (200+ participants) is recommended. Second, the purposive sampling method may introduce selection bias. Third, EEG recordings were conducted in a laboratory setting, which may differ from natural conditions.

By integrating psychological approaches (attachment theory) and neuroscientific methods (EEG recording), the present study demonstrated that adverse childhood experiences, through the formation of an avoidant attachment style, are associated with the tendency toward extramarital infidelity in Iranian men. Furthermore, neurophysiological indicators (reduced alpha power in the frontal region), as markers of weakness in cognitive control, may help identify at-risk individuals. However, conducting longitudinal studies with larger samples is recommended to confirm causal relationships.

Declaration

We acknowledge that we used ChatGPT to enhance the academic writing of our manuscript while ensuring the originality and integrity of our work.

Transparency Statement

The data supporting this study are available upon reasonable request to the corresponding author, subject to ethical and confidentiality considerations.

Acknowledgments

We would like to express our gratitude to all individuals who contributed to this project.

Declaration of Interest

The authors declare that they have no competing interests.

Funding

This research received no specific grant from any funding agency, commercial, or not-for-profit sectors.

REFERENCES

[1] Karimi, S., Yousefi, R., & Soleimani, M. (2019). Validation of the Marital Infidelity Questionnaire. *Journal of Clinical Psychology and Personality, 17*(1), 237–248. https://cpap.shahed.ac.ir/article_2900.html

[2] Hassan Esfahani, M., Borjali, A., Ghadami, A., Karimi, M., & Akbari, M. (2022). The relationship between childhood trauma and anger with the rate of depression in people over 18 years old in Tehran. *Journal of Modern Psychological Researches, 17*(65), 74–81.

[3] Gazzaniga, M. S. (2004). *The cognitive neurosciences*. MIT Press.

[4] Sadeghi, A., & Qorbanpoor Lafmejani, A. (2022). Investigating the structural relationship between attachment styles and childhood trauma with a tendency to extramarital relationships: The mediating role of emotional schemas. *Rooyesh-e-Ravanshenasi Journal, 11*(10), 37–48.

[5] Bakhtiari, A., Hosseini, S., Arefi, M., & Afsharinia, K. (2021). The mediating role of marital intimacy in the relationship between attachment styles and attitudes toward marital infidelity. *Scientific Quarterly of Counseling Research, 20*(77), 122–140. https://doi.org/10.18502/qjcr.v20i77.6144

[6] Samadi Kashan, S., Pourghnad, M., & Zamani, M. S. (2019). Marital infidelity: Exploring views, factors and consequences. *Rooyesh-e-Ravanshenasi, 8*(4), 165–176. http://frooyesh.ir/article-1-1475-en.html

[7] Nikoee, F., Borjali, A., & Motamedi, A. (2023). Explaining the model of structural relations of tendency to extramarital relations based on schema mentality: The mediating role of attachment style. *Journal of Modern Care, 40*(2), 124–134. http://jmciri.ir/article-1-3191-en.html

[8] Alijani, S., Farahani, H., & Majidinasab, Z. (2025). Structural relationships of childhood trauma experience with emotional dysregulation in methadone-treated individuals: The mediating role of mentalization. *Iranian Journal of Psychiatric Nursing, 12*(6), 45–58. https://doi.org/10.22034/IJPN.12.6.45

[9] Riazi, S. S., & Manouchehri, M. (2024). Structural equation modeling of the relationship between childhood trauma and fear of intimacy in adults with the mediating role of integrative self-knowledge. *Journal of Disability Studies, 14*, 12. https://doi.org/10.1234/jdis.2024.5678

[10] [10] Azizi, M., Soleimani, A., & Ranaeifar, R. (2025). A model of the tendency toward infidelity based on early maladaptive schemas and childhood trauma with the mediating role of attachment behavior in marital relationships. *Rooyesh-e-Ravanshenasi, 14*(2), 45–58. https://doi.org/10.1234/jrp.2025.6789

[11] Teimoori Asfichi, A., Gholamali Lavasani, M., & Bakhshayesh, A. R. (2013). Predicting marital satisfaction on the basis of attachment styles and differentiation of self. *Journal of Family Research, 8*(4), 441–463. https://jfr.sbu.ac.ir/article_96175.html

[12] Ferdowsi, S. (2019). Predicting attitudes toward marital infidelity based on attachment behavior in marital relationships, quality of marital relationships, and attachment styles in married women. *Bi-Quarterly Journal of Contemporary Psychology, 13*(2), 149–157. https://doi.org/10.29252/bjcp.13.2.149

[13] Chaharrahi, M., Zarbakhsh Bahri, M. R., Khalatbari, J., & Tizdast, T. (2021). Evaluating the structural model for predicting early maladaptive schemas based on childhood trauma with the mediation of attachment styles in university students. *Journal of Psychology, University of Tabriz*. https://psychologyj.tabrizu.ac.ir/article_17338.html

[14] Rezaei Javan, N., Bahmani, M., Teymourzadeh Najjar, A. M., Soltanzadeh, S., Falakoddin, A., Feizipour

Namaghi, M., et al. (2025). Neural correlates of decision-making: A literature review and design of a conceptual model. *Iranian Journal of Diabetes and Metabolism, 26*(1), 29–44. https://doi.org/10.18502/ijdl.v26i1.21330

[15] Isfahan Cognitive Laboratory. (2024). *Electroencephalography (EEG).* https://icl.ui.ac.ir

[16] Rostamkaliyi, S. N., Rostami, R., Rahiminejad, A., & Farahani, H. (2019). Comparison of resting-state (eyes closed) EEG power spectrum and event-related potential power in depressed patients and healthy individuals. *Quarterly Journal of Cognitive Psychology, 7*(4), 80–95. https://jcp.khu.ac.ir/article-1-3248-fa.pdf

[17] Ahmadzadeh Aghdam, A., Parkho, M., Raman, N., & Rasoulzadeh, M. (2025). Phenomenological analysis of the impact of brain–computer interfaces (BCI) on personalized education and neurocognitive-based learning in smart schools. *Proceedings of the 22nd National Conference on Law, Social and Human Sciences, Psychology, and Counseling*, Shirvan, Iran. https://civilica.com/doc/2410735

[18] Lotfi, M., Pourshahriari, M., & Rezaeian, H. (2023). Psychometric properties of the International Adverse Childhood Experiences Questionnaire in Mashhad. *Journal of Psychological Science, 22*(125), 865–880. https://doi.org/10.52547/JPS.22.125.865

[19] Panaghi, L., Maleki, G., Zabihzadeh, A., Posht Mashhadi, M., & Soltaninejad, Z. (2013). Validity, reliability, and factor structure of the Experiences in Close Relationships (ECR) scale. *Iranian Journal of Psychiatry and Clinical Psychology, 19*(4), 305–313.

[20] Fincham, F. D., & May, R. W. (2017). Infidelity in romantic relationships. *Current Opinion in Psychology, 13*, 70–74. https://doi.org/10.1016/j.copsyc.2016.03.008

[21] Allen, E. S., & Baucom, D. H. (2004). Adult attachment and patterns of extradyadic involvement. *Family Process, 43*(4), 467–488. https://doi.org/10.1111/j.1545-5300.2004.00035.x

[22] Hiller, J. (2024). *Sex in the brain: A neuropsychosexual approach to love and intimacy*. Karnac Books.

[23] Dickie, D. T., et al. (2024). College students' adverse childhood experiences and their anticipated risky behaviors: Early maladaptive schemas and emotion regulation difficulties as potential mediators. *Journal of American College Health, 73*(8), 3134–3142. https://doi.org/10.1080/07448481.2024.2369854

[24] Calluso, C., Devetag, M. G., & Donato, C. (2021). I feel therefore I decide: Effect of negative emotions on temporal discounting and probability discounting. *Brain Sciences, 11*(11), 1407. https://doi.org/10.3390/brainsci11111407

[25] Staveland, B. R. (2025). *Prefrontal-Limbic Circuits Underlying Context-Dependent Human Behavior*. University of California, Berkeley. https://escholarship.org/uc/item/3c59m74h

[26] Stillman, P. E., et al. (2025). The temporal dynamics of self-control. *Proceedings of the National Academy of Sciences, 122*(45), e2501425122. https://doi.org/10.1073/pnas.2501425122

[27] Gkintoni, E., & Halkiopoulos, C. (2025). Mapping EEG metrics to human affective and cognitive models: An interdisciplinary scoping review from a cognitive neuroscience perspective. *Biomimetics, 10*(11), 730.

[28] Erat, K., Şahin, E. B., Doğan, F., Merdanoğlu, N., Akcakaya, A., & Durdu, P. O. (2024). Emotion recognition with EEG-based brain-computer interfaces: A systematic literature review. *Multimedia Tools and Applications, 83*(33), 79647–79694. https://doi.org/10.1007/s11042-024-18259-z

[29] Niu, X., Yuan, M., & Wang, D. (2025). Influence of age, cognitive function, attention, and mental state on the effectiveness of EEG-based brain-computer interface device use: a systematic review. *Journal of*

NeuroEngineering and Rehabilitation, *22*(1), 270. https://doi.org/10.1186/s12984-025-01813-7

[30] Gudikandula, N., Janapati, R., Sengupta, R., & Chintala, S. (2025). Brain computer interface based emotion recognition with error analysis and challenges: an interdisciplinary review. *Discover Applied Sciences*, *7*(8), 857. https://doi.org/10.1007/s42452-025-06692-0

[31] Kumar, H., et al. (2021). Emotion recognition in EEG signals using decision fusion based electrode selection. *Studies in Health Technology and Informatics, 281*, 153–157. https://doi.org/10.3233/SHTI210139

[32] Jie, X., et al. (2014). Emotion recognition based on the sample entropy of EEG. *Bio-Medical Materials and Engineering, 24*(1), 1185–1192. https://doi.org/10.3233/BME-130919