INTERNATIONAL JOURNAL OF SOCIAL SCIENCE, EDUCATIONAL, ECONOMICS, AGRICULTURE RESEARCH AND TECHNOLOGY (IJSET) | ISSN (E): 2827-766X
Website: https://ijset.org/ | Volumes 5 No. 5 (2026)

NEUROETHICAL CONSIDERATIONS IN NEUROMARKETING: A FRAMEWORK FOR RESPONSIBLE RESEARCH AND APPLICATION

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Received: 05/03/2026 | **Revised**: 15/03/2026 | **Accepted:** 03/04/2026 | **Published**: 11/04/2026

Abstract

This article examines the neuroethical considerations associated with the growing use of neuromarketing in contemporary marketing practice. Advances in neuroscience and technologies such as functional magnetic resonance imaging (fMRI), electroencephalography (EEG), and eye-tracking have enabled marketers to gain deeper insights into consumers' subconscious responses. While these developments offer significant opportunities for improving marketing effectiveness, they also raise important ethical concerns related to consumer autonomy, privacy, and potential manipulation. Using a narrative literature review, this study synthesizes insights from marketing, neuroscience, and ethics to identify key ethical themes, including the protection of autonomy, risks of exploitation, data privacy, and the need for transparency and accountability. The article further explores neuroethical risks in practice, such as misuse of neural data and ethical issues involving vulnerable populations. Based on these findings, a neuroethical framework is proposed, grounded in the principles of autonomy, beneficence, non-maleficence, and justice. This framework provides guidance for responsible research and application in neuromarketing. The study contributes by integrating ethical theory with marketing practice and offers practical implications for organizations seeking to adopt neuromarketing responsibly. Future research should focus on empirical validation and cross-cultural applications of the framework.

Keywords: *neuromarketing; neuroethics; consumer autonomy; data privacy; ethical marketing*

INTRODUCTION

The emergence of neuromarketing represents a significant shift in how organizations seek to understand and influence consumer behavior. Advances in neuroscience have enabled marketers to move beyond traditional self-reported data and explore the underlying cognitive and emotional processes that drive decision-making. Neuromarketing integrates insights from neuroscience, psychology, and marketing to analyze how consumers respond to stimuli at a neural level (Aliyev, 2025). This interdisciplinary approach has gained increasing attention as organizations strive to develop more effective and precise marketing strategies. As a result, neuromarketing has become an important tool for understanding subconscious consumer responses that are often inaccessible through conventional research methods (Bhardwaj et al., 2024). However, its growing adoption also raises important ethical questions that require careful consideration.

The use of brain-imaging technologies such as functional magnetic resonance imaging (fMRI), electroencephalography (EEG), and eye-tracking has significantly enhanced the capabilities of neuromarketing. These tools allow researchers to measure brain activity, emotional responses, and attention patterns in real time, providing deeper insights into consumer preferences and behavior. For example, fMRI can identify areas of the brain associated with reward and decision-making, while EEG captures neural activity related to attention and engagement (Alsharif, Salleh, Baharun, et al., 2021). Eye-tracking technology further complements these methods by revealing how consumers visually interact with advertisements and products. Together, these technologies enable a more comprehensive understanding of consumer responses, improving the effectiveness of marketing campaigns (Goncalves et al., 2024). However, the ability to access such detailed neural data also introduces concerns about how

this information is collected, interpreted, and used. Despite its potential benefits, neuromarketing raises significant ethical concerns related to manipulation, privacy, and consumer autonomy. The ability to influence consumer behavior at a subconscious level has led to fears that neuromarketing could be used to manipulate individuals without their awareness (Rahaman et al., 2021). Additionally, the collection of neural data raises questions about privacy, as brain activity may reveal sensitive information about thoughts, emotions, and preferences. These concerns are further compounded by the lack of clear regulatory frameworks governing the use of neuromarketing technologies. As a result, there is growing debate about the ethical boundaries of applying neuroscience in marketing contexts. This situation highlights the need for a careful examination of the ethical implications associated with neuromarketing practices (Alsharif, Salleh, & Baharun, 2021).

This article aims to explore the neuroethical issues associated with neuromarketing and to propose a framework for responsible research and application. By synthesizing insights from marketing, neuroscience, and ethics, the study seeks to provide a comprehensive understanding of the challenges and opportunities in this field. The article adopts a conceptual, non-systematic review approach to examine existing literature and identify key ethical principles relevant to neuromarketing. It also aims to bridge the gap between theoretical discussions and practical applications by offering actionable guidelines for marketers and researchers. The scope of the study focuses on the ethical dimensions of neuromarketing rather than its technical aspects. Ultimately, the article seeks to contribute to the development of responsible and sustainable neuromarketing practices that respect consumer rights and promote trust.

LITERATURE REVIEW

Evolution of Neuromarketing

Neuromarketing has evolved from traditional consumer research methods toward more advanced neuroscience-based approaches. In earlier stages, marketers relied heavily on surveys, focus groups, and interviews to understand consumer preferences and behavior (Aliyev, 2025). While these methods provided valuable insights, they were often limited by biases such as social desirability and inaccurate self-reporting. As a result, researchers began seeking more objective ways to capture consumer responses. The emergence of neuroscience offered new opportunities to explore the subconscious processes that influence decision-making. By examining brain activity and physiological responses, neuromarketing provides deeper insights that go beyond what consumers can explicitly articulate (Bhardwaj et al., 2024). This shift marks a significant transformation in how consumer behavior is studied and understood.

The development of neuromarketing also reflects the integration of multiple disciplines, including psychology, neuroscience, and marketing. Psychology contributes an understanding of cognitive and emotional processes, while neuroscience provides the tools to measure these processes at a biological level (Alsharif, Salleh, Baharun, et al., 2021). Marketing, in turn, applies these insights to develop more effective strategies and communication techniques. This interdisciplinary approach has enabled a more holistic understanding of consumer behavior, combining both conscious and subconscious elements. It also allows researchers to link neural responses with marketing outcomes such as brand perception and purchase intention (Goncalves et al., 2024). However, this integration also introduces complexity, as it requires collaboration across fields with different methodologies and ethical standards. As neuromarketing continues to evolve, its interdisciplinary nature remains both a strength and a challenge.

Neuromarketing Tools and Techniques

Neuromarketing relies on a range of advanced tools and techniques to measure consumer responses at both neural and physiological levels. Functional magnetic resonance imaging (fMRI) is one of the most prominent methods, enabling researchers to observe brain activity by detecting changes in blood flow. Electroencephalography (EEG) is another widely used technique that measures electrical activity in the brain, providing insights into attention, engagement, and emotional responses (Rahaman et al., 2021). Eye-tracking technology complements these methods by analyzing visual attention and identifying which elements of a stimulus capture consumer focus. In addition, biometric measures such as heart rate, skin conductance, and facial expression analysis provide further information about emotional and physiological reactions (Alsharif, Salleh, & Baharun, 2021). Together, these tools offer a comprehensive view of consumer responses that extends beyond traditional research methods. These technologies have been applied across various areas of marketing, including advertising, branding, and product design. In advertising, neuromarketing tools are used to evaluate the effectiveness of campaigns by analyzing how consumers emotionally and cognitively respond to different messages. In branding, these techniques help identify the neural

correlates of brand perception and loyalty, providing insights into how brands are represented in the mind of the consumer (Goncalves et al., 2024). Product design also benefits from neuromarketing by assessing user interactions and emotional responses to different design elements. This allows companies to optimize products based on actual user reactions rather than assumptions. While these applications offer significant advantages, they also raise concerns about the potential for misuse and overreliance on neuroscientific data. Therefore, the use of these tools must be carefully managed to ensure ethical and responsible application (Pluta-Olearnik & Szulga, 2022).

Ethical Foundations in Marketing and Neuroscience

The ethical foundations of neuromarketing are rooted in established principles from both marketing ethics and biomedical ethics. Key principles include autonomy, beneficence, non-maleficence, and justice, which guide responsible research and practice. Autonomy emphasizes the importance of respecting individuals' rights to make informed decisions without undue influence. Beneficence focuses on promoting positive outcomes and ensuring that research benefits participants and society (Hayes et al., 2021). Non-maleficence requires that harm is avoided, particularly in situations where sensitive data such as neural responses are involved. Justice ensures fairness in the distribution of benefits and risks, preventing exploitation of vulnerable groups. These principles provide a framework for evaluating the ethical implications of neuromarketing practices (Bleier et al., 2020).

In addition to these principles, ethical standards in research involving human subjects play a critical role in guiding neuromarketing activities. Researchers are required to obtain informed consent from participants, ensuring that they understand the purpose, methods, and potential risks of the study (Aliyev, 2025). Confidentiality and data protection are also essential, particularly given the sensitive nature of neural and biometric data. Ethical review boards and regulatory guidelines help ensure that research is conducted responsibly and transparently. However, the application of these standards in neuromarketing can be challenging due to the complexity of the technologies involved (Bhardwaj et al., 2024). There is also ongoing debate about whether existing ethical frameworks are sufficient to address the unique issues posed by neuromarketing. As the field continues to develop, there is a growing need to adapt and strengthen ethical guidelines to ensure responsible practice.

METHODOLOGY

This study adopts a narrative literature review as its research design to examine neuroethical considerations in neuromarketing. Unlike systematic reviews, which follow strict protocols and predefined selection procedures, a narrative approach allows for greater flexibility in exploring interdisciplinary topics. Neuromarketing lies at the intersection of marketing, neuroscience, and ethics, making it particularly suitable for a qualitative and integrative method of analysis. The narrative review enables the inclusion of diverse perspectives, including theoretical discussions, empirical findings, and practitioner insights. The sources selected for this study include academic journals from marketing, neuroscience, and ethics, as well as relevant industry reports that provide practical viewpoints. This combination ensures a comprehensive understanding of both conceptual developments and real-world applications in neuromarketing.

The inclusion criteria for selecting sources are based on their relevance to neuromarketing practices and ethical considerations, ensuring that the review remains focused and meaningful. A thematic synthesis is employed as the primary analytical approach, allowing the identification of recurring themes, patterns, and ethical concerns across the literature. Through this process, key issues are organized into a structured framework that supports the study's objectives. However, the study is subject to certain limitations due to its non-systematic scope. The narrative approach may introduce selection bias and does not guarantee exhaustive coverage of all available literature. Despite these limitations, the methodology provides a coherent and interpretive synthesis of existing knowledge. Ultimately, this approach allows the study to bridge theoretical insights with practical implications in a flexible and accessible manner.

RESULTS AND DISCUSSION

Key Ethical Themes Identified

One of the central ethical themes in neuromarketing is the protection of consumer autonomy, which emphasizes individuals' right to make independent and informed decisions. Neuromarketing techniques, by accessing subconscious processes, have the potential to influence behavior in ways that consumers may not fully recognize (Lyu & Mañas-Viniegra, 2021). This raises concerns about whether such practices undermine free will and informed choice. Closely related is the risk of manipulation and exploitation, particularly when insights from neural data are used to nudge consumers toward specific decisions without their awareness. Such practices may

prioritize organizational objectives over consumer well-being, creating ethical tension (Mouammine & Azdimousa, 2023). Additionally, data privacy and security emerge as critical concerns, as neural and biometric data are highly sensitive and may reveal intimate aspects of an individual's thoughts and emotions. Ensuring that such data is securely stored and responsibly managed is essential for maintaining trust.

Another important theme is transparency and accountability, which are fundamental to ethical neuromarketing practices. Consumers must be clearly informed about how their data is collected, analyzed, and used, allowing them to make informed decisions about participation (Garofalo & Gallucci, 2021). Transparency helps reduce uncertainty and fosters trust between organizations and consumers. Accountability, on the other hand, ensures that organizations are held responsible for their actions and the potential consequences of their research and applications. Without clear accountability mechanisms, there is a risk of misuse or unethical practices going unchecked. These ethical themes collectively highlight the need for a balanced approach that respects consumer rights while leveraging the benefits of neuromarketing (Sposini, 2024). They also underscore the importance of integrating ethical considerations into both research design and practical applications.

Table 1. Key Neuroethical Themes in Neuromarketing Research and Application

Ethical Theme	Definition	Key Characteristics	Strategic Implications
Protection of Consumer Autonomy	Ensuring individuals can make independent and informed decisions	Free will, informed choice, awareness of influence	Requires informed consent and respect for consumer decision-making
Manipulation and Exploitation	Use of neural insights to influence behavior without consumer awareness	Subconscious influence, behavioral nudging, ethical tension	Demands ethical limits to prevent misuse and protect consumer well-being
Data Privacy and Security	Safeguarding sensitive neural and biometric data	Confidentiality, secure storage, sensitive personal information	Necessitates strict data protection policies and responsible data management
Transparency and Accountability	Clear communication and responsibility in data usage and research practices	Openness, disclosure, ethical responsibility	Builds trust and ensures organizations are accountable for ethical compliance

The table as shown in Table 1 highlights four fundamental ethical themes that shape responsible practices in neuromarketing. Protection of consumer autonomy underscores the importance of ensuring that individuals retain control over their decisions, even when advanced techniques are used to analyze subconscious responses. This is closely linked to concerns about manipulation and exploitation, where the use of neural insights may unintentionally or deliberately influence consumers without their full awareness. Data privacy and security further reinforce the need to safeguard highly sensitive neural and biometric information, as misuse could lead to serious ethical and trust-related issues (Christensen et al., 2022). Transparency and accountability serve as essential mechanisms for addressing these risks by ensuring that organizations clearly communicate their data practices and take responsibility for their actions. Together, these themes emphasize that neuromarketing must balance innovation with ethical responsibility. They demonstrate that maintaining consumer trust and protecting individual rights are critical for the sustainable and acceptable use of neuromarketing technologies (Ichraq et al., 2025).

Neuroethical Risks in Practice

In practical applications, neuromarketing presents several neuroethical risks that require careful consideration. One of the most significant risks is the misuse of neural data, where sensitive information about consumers' cognitive and emotional states may be exploited for commercial gain (Ferrell et al., 2025b). Such misuse can occur when data is collected without proper consent or used beyond its intended purpose. This raises serious concerns about privacy violations and potential harm to individuals. Another risk involves the overinterpretation of neuroscientific findings, where marketers may draw exaggerated or misleading conclusions from neural data (Aliyev, 2025). This can lead to flawed strategies and unethical practices based on inaccurate assumptions about consumer behavior. Therefore, ensuring the validity and responsible interpretation of neuroscientific data is essential.

Ethical concerns are particularly pronounced when neuromarketing is applied to vulnerable populations, such as children, the elderly, or individuals with limited cognitive capacity. These groups may be more susceptible

to influence and less able to critically evaluate marketing messages (Bhardwaj et al., 2024). As a result, the use of neuromarketing techniques in such contexts raises questions about fairness and exploitation. Additionally, repeated exposure to persuasive stimuli based on neural insights may contribute to long-term behavioral manipulation. These risks highlight the need for stricter ethical guidelines and safeguards in neuromarketing practice. Organizations must take proactive steps to ensure that their research and applications do not harm or exploit vulnerable individuals (Alsharif, Salleh, Baharun, et al., 2021). Addressing these risks is essential for maintaining ethical integrity and public trust in neuromarketing.

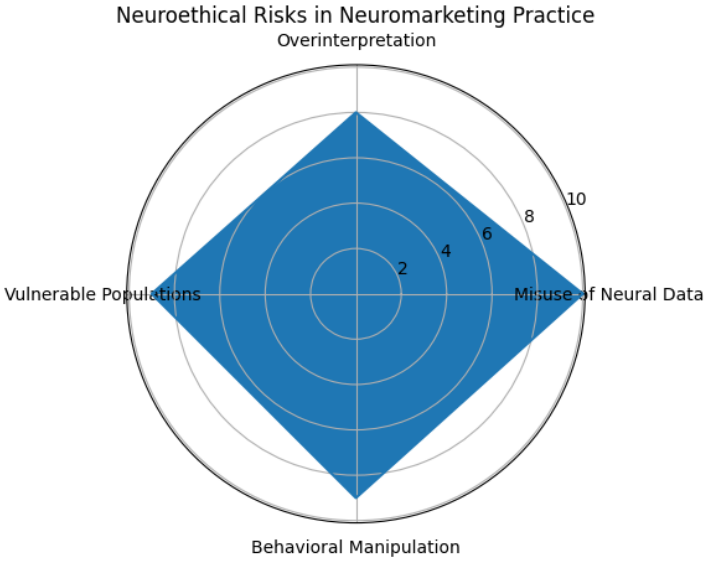

Figure 1. Neuroethical Risks in Neuromarketing Practice

The radar chart provides a visual representation of the relative severity of key neuroethical risks associated with neuromarketing practices. Among these, the misuse of neural data appears as the most critical concern, highlighting the significant ethical implications of collecting and potentially exploiting sensitive cognitive and emotional information (Rahaman et al., 2021). Behavioral manipulation and risks related to vulnerable populations also show high levels of concern, emphasizing the potential for long-term influence and the ethical responsibility to protect individuals who may be more susceptible to such practices. Overinterpretation of neuroscientific findings, while slightly lower, remains an important issue, as inaccurate conclusions can lead to misguided strategies and ethical misjudgments. The overall shape of the chart suggests that these risks are interconnected and collectively contribute to the ethical complexity of neuromarketing. This visualization underscores the need for comprehensive ethical guidelines that address multiple dimensions of risk rather than focusing on a single issue (Alsharif, Salleh, & Baharun, 2021). Ultimately, it reinforces the importance of adopting a responsible and balanced approach to neuromarketing that prioritizes consumer protection and ethical integrity.

Proposed Neuroethical Framework

To address these concerns, this study proposes a neuroethical framework based on four key principles. The first principle, respect for autonomy, emphasizes the importance of informed consent and user awareness. Participants should be fully informed about the nature of neuromarketing research, including how their data will be collected, analyzed, and used (Lyu & Mañas-Viniegra, 2021). This ensures that individuals can make voluntary and informed decisions about their participation. Respecting autonomy also involves providing individuals with the option to withdraw from studies without any negative consequences. By prioritizing autonomy, organizations can build trust and ensure ethical engagement with participants. This principle serves as a foundation for responsible neuromarketing practices (Mouammine & Azdimousa, 2023).

The framework also includes the principles of beneficence, non-maleficence, and justice, which guide ethical decision-making in research and application. Beneficence focuses on ensuring that neuromarketing activities produce positive outcomes for consumers, such as improved products and experiences (Garofalo & Gallucci, 2021). Non-maleficence requires organizations to avoid causing harm, particularly in relation to manipulation or misuse of data.

Justice emphasizes fairness and equitable treatment, ensuring that the benefits and risks of neuromarketing are distributed appropriately across different groups. Together, these principles provide a comprehensive ethical foundation for neuromarketing (Sposini, 2024). They help organizations balance innovation with responsibility and ensure that consumer rights are protected. This framework offers a structured approach for integrating ethical considerations into neuromarketing practices.

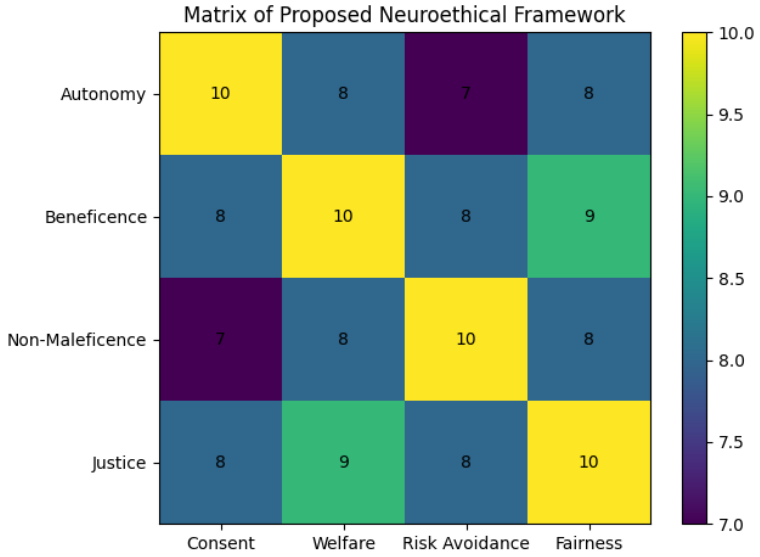

Figure 2. Matrix of Proposed Neuroethical Framework

The matrix chart illustrates the alignment between the four core neuroethical principles and key ethical dimensions, providing a structured view of how responsible neuromarketing practices can be operationalized. Respect for autonomy shows the strongest association with consent, emphasizing the importance of informed participation and user awareness in ethical research (Christensen et al., 2022). Beneficence is closely linked to welfare and fairness, highlighting the need to ensure that neuromarketing activities generate positive outcomes while treating individuals equitably. Non-maleficence is most strongly connected to risk avoidance, underscoring the obligation to prevent harm, particularly in the handling of sensitive neural data and the avoidance of manipulation (Ichraq et al., 2025). Justice demonstrates a balanced relationship across dimensions, reinforcing the importance of fairness and equitable distribution of benefits and risks. The overall pattern suggests that while each principle has a primary focus, they are interconnected and collectively contribute to ethical decision-making. This matrix reinforces the idea that responsible neuromarketing requires a holistic integration of ethical principles across multiple dimensions rather than isolated consideration of individual factors (Aliyev, 2025).

Implementation Guidelines

Implementing neuroethical principles in practice requires the establishment of clear ethical standards for research design. Researchers must ensure that studies are conducted with transparency, integrity, and respect for participants. This includes obtaining informed consent, minimizing potential risks, and ensuring that participants fully understand the purpose and implications of the research (Bhardwaj et al., 2024). Ethical research design also involves careful consideration of how data is collected and analyzed, ensuring that methods are scientifically valid and ethically sound. By adhering to these standards, organizations can maintain the credibility and reliability of their research. This also helps prevent misuse and promotes responsible innovation in neuromarketing (Alsharif, Salleh, Baharun, et al., 2021). Transparency in data usage is another critical aspect of implementation, as it directly affects consumer trust and acceptance. Organizations should clearly communicate how data is stored, processed, and shared, providing consumers with greater control over their information. In addition, regulatory and organizational policies play a vital role in ensuring ethical compliance (Goncalves et al., 2024). Governments and industry bodies must establish guidelines that define acceptable practices and protect consumer rights. Organizations should also develop internal policies and training programs to promote ethical awareness among employees. By combining transparency, regulation, and organizational commitment, it is possible to create a robust framework for ethical neuromarketing

(Rahaman et al., 2021). Ultimately, these guidelines support the responsible application of neuromarketing while safeguarding consumer interests.

CONCLUSION

This article has examined the growing role of neuromarketing and the ethical challenges that arise from its application in understanding and influencing consumer behavior. While advances in neuroscience and the use of tools such as fMRI, EEG, and eye-tracking provide valuable insights into subconscious processes, they also introduce significant concerns related to autonomy, privacy, and potential manipulation. The findings highlight that neuromarketing is not merely a technological advancement but also an ethical issue that requires careful consideration. Key themes such as the protection of consumer autonomy, risks of exploitation, data privacy, and the need for transparency underscore the complexity of applying neuroscience in marketing contexts. In addition, the identification of neuroethical risks and the mechanisms through which they may impact consumers further emphasize the importance of responsible practice. As such, neuromarketing must be approached with a balance between innovation and ethical responsibility.

The proposed neuroethical framework provides a structured approach for addressing these challenges by incorporating the principles of autonomy, beneficence, non-maleficence, and justice. This framework offers both theoretical and practical contributions by integrating ethical considerations into neuromarketing research and application. From a practical perspective, it provides guidance for organizations to design ethical research protocols, ensure transparency in data usage, and implement appropriate safeguards to protect consumers. However, this study is limited by its narrative review approach, which may not capture all relevant empirical evidence. Future research should focus on empirically testing the proposed framework and exploring its applicability across different cultural and regulatory contexts. Additionally, further studies could examine how emerging technologies influence ethical perceptions and practices in neuromarketing. Ultimately, the long-term success of neuromarketing depends on its ability to maintain consumer trust through ethical and responsible use.

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