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MARKETING CHALLENGES IN THE DIGITAL AGE: ETHICAL DILEMMAS IN THE PROMOTION OF NON-INVASIVE BIOHACKING

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ABSTRACT

Marketing in the non-invasive biohacking industry relies heavily on digital platforms and sociotechnical systems to promote products and services aimed at enhancing users' physical, mental, and emotional well-being. This paper examines non-invasive biohacking products and services, with a particular focus on their ethical, marketing, and regulatory dimensions. Special attention is given to the practices of biometric data collection and processing, claims related to users' physical and mental health, and issues of transparency and consumer protection. The research employs a descriptive approach, literature analysis, and inductive reasoning. The aim of the study is to identify and analyze the key ethical challenges and potential risks in the marketing of non-invasive biohacking products, as well as to highlight the need for a clearer regulatory framework to safeguard users and promote responsible practices in this rapidly growing industry. While marketing in this field offers numerous benefits—such as public education and the promotion of healthy habits—it also faces serious ethical concerns. These include the manipulation of consumer needs, misuse of personal data, promotion of unrealistic body ideals, and the dissemination of medically unsubstantiated claims. At the same time, the lack of adequate regulatory mechanisms often shifts responsibility to the companies themselves. If developed responsibly, marketing in the biohacking industry has the

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potential to contribute to individual health and raise awareness about the importance of mental well-being, grounded in truth, ethics, and respect for human rights.

Keywords: ethical marketing, digital health, regulation, consumer protection

IZAZOVI MARKETINGA U DIGITALNOM OKRUŽENJU: ETIČKE DILEME U PROMOVISANJU NEINVAZIVNOG BIOHAKINGA

APSTRAKT

Marketing u industriji neinvazivnog biohacking-a oslanja se na digitalne platforme i sociotehničke sisteme kako bi promovisao proizvode i usluge usmerene na unapređenje fizičkog, mentalnog i emocionalnog blagostanja korisnika. Predmet istraživanja ovog rada su neinvazivni biohaking proizvodi i usluge, sa fokusom na njihove etičke, marketinške i regulatorne aspekte. Poseban akcenat stavljen je na praksu prikupljanja i obrade biometrijskih podataka, obećanja vezana za mentalno i fizičko zdravlje korisnika, kao i na pitanja transparentnosti i zaštite potrošača. U radu je korišćen deskriptivni metod, analiza relevantne literature, kao i metod indukcije. Cilj rada je da se identifikuju i analiziraju ključni etički izazovi i potencijalni rizici u marketingu neinvazivnih biohaking proizvoda, kao i da se ukaže na potrebu za jasnijim regulatornim okvirom koji bi zaštitio korisnike i promovisao odgovornu praksu u ovoj brzo rastućoj industriji. Iako marketing u ovoj industriji donosi brojne prednosti kao što su edukacija i širenje zdravih navika, suočava se i sa ozbiljnim etičkim izazovima. Među njima se izdvajaju manipulacija potrebama potrošača, zloupotreba privatnih podataka, promocija nerealnih telesnih ideala i plasiranje zdravstveno neutemeljenih tvrdnji. Istovremeno, ne postoji dovoljno regulatornih mehanizama, zbog čega odgovornost često ostaje u domenu samih kompanija. Ukoliko se razvija odgovorno, marketing u biohacking industriji ima potencijal da doprinese zdravlju pojedinaca i podizanju svesti o važnosti mentalnog blagostanja, uz jasno utemeljenje u istini, etici i poštovanju ljudskih prava.

Ključne reči: etički marketing, digitalno zdravlje, regulacija, zaštita potrošača

Introduction

The concept of biohacking emerged within the framework of transhumanist practices and refers to the application of scientific knowledge and technology aimed at enhancing an individual's physical, cognitive, and emotional capacities. In the literature, a distinction is often made between non-invasive ("soft") and invasive ("hard") forms of biohacking. Non-invasive biohacking encompasses the monitoring, quantification, and optimization of physiological processes without medical or surgical intervention. Its primary tools include wearable devices (e.g., smartwatches, rings, bracelets) and mobile applications – digital technologies that provide users with insights into their biometric data. In contrast, invasive biohacking involves implants, genetic engineering, and experimentation beyond the scope of conventional medicine, frequently operating outside established regulatory frameworks (Escobar, B. R. et al., 2022).

Non-invasive biohacking is often portrayed as a means of personal development and health improvement, yet it also entails risks such as data misuse, excessive self-monitoring, pseudoscientific claims, and commercial exploitation. The boundary between acceptable and problematic practices in this context is not always clearly defined. Marketing messages frequently promote idealized images of health and physical performance, without transparent disclosure of the scientific validity, risks, or ethical implications associated with the use of such technologies.

Accordingly, the aim of this paper is to examine the ways in which non-invasive biohacking is promoted through marketing, with particular attention to the ethical dimensions of communication directed at users of health-enhancing applications and devices. This involves a critical review of the ethical and regulatory challenges accompanying the expansion of the non-invasive biohacking market, with a focus on promotional strategies, corporate responsibility, user relations, data protection, and the broader societal implications of the commodification of health. The paper also highlights the need for consumer education and more robust regulation of health-related technological products and services.

Methods

The methodological approach of this paper is predominantly descriptive and interpretative. Data from contemporary academic and professional sources

were analyzed and used as the basis for drawing conclusions. The findings were derived through inductive reasoning. All significant facts identified in the available literature were examined through the lens of ethical and marketing frameworks. In order to reach relevant conclusions, the discussion also includes an analysis of legal sources pertaining to this domain. Additionally, secondary statistical data were utilized and analyzed to support the findings.

Discussion and Results

Biohacking is a broad concept that encompasses various ways in which individuals seek to enhance their bodies, minds, and performance. The overarching goal is the optimization of physical and mental functions, life extension, and overall health improvement. People employ a range of strategies, from simple lifestyle modifications to advanced biotechnological interventions. The non-invasive approach to biohacking involves changes in diet and lifestyle, often facilitated through technology and digital platforms, such as wearable devices and health-monitoring applications that track vital and physiological functions. Within this context, an entire spectrum of products and services has emerged, aimed at promoting physical, mental, and emotional well-being. These include a wide array of solutions—from dietary regimes and supplementation to various forms of physical activity, as well as the use of wearable technology and apps for tracking vital signs (Vidhate, S. and Sarmah, B., 2024).

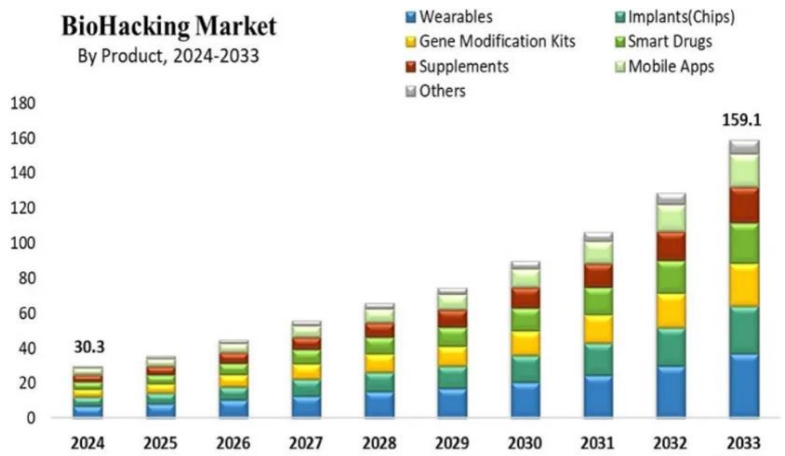
The prioritization of a good, happy, and healthy life has become a global phenomenon. Even the World Health Organization has defined individual well-being not merely as the absence of disease or infirmity, but as a state of complete physical, mental, and social well-being (World Health Organization, 1946). Contemporary approaches to health emphasize its holistic dimension, linking physical, emotional, and social well-being as essential components of life quality (Ihle, A. et al., 2015; Hettler, B., 2020; Kumar, R. and Singh, P., 2023). Particularly in recent decades, the development of transhumanist thought has significantly influenced the redefinition of health, longevity, and human potential. Transhumanism, as both a philosophical and technological movement, has raised the question of improving the human condition through science and technology, with the aim of overcoming biological limitations—including aging, illness, and death (Bostrom, N., 2005). Although critics have warned that transhumanist ideals often overlook complex ethical and societal dilemmas, such as unequal access to technologies, potential disruptions to human identity and integrity, and legal ambiguities surrounding bodily autonomy, it has

nonetheless become one of the conceptual frameworks underpinning technological advancement.

The popularity of the health enhancement and life extension industry has significantly increased in recent decades, driven by individuals' growing need to balance professional and personal lives. According to a report by the Global Wellness Institute (2024), the wellness market alone was valued at over USD 6.3 trillion, establishing it as a major sector in the global economy. The market is projected to continue its growth, reaching an estimated USD 9 trillion by 2028, making it one of the fastest-growing industries worldwide.

In 2024, the global biohacking market was valued at USD 30.3 billion. The expansion of this industry is further evidenced by forecasts suggesting that the global biohacking market is expected to reach USD 159.1 billion by 2033 (Dimension Market Research, 2024), positioning it as one of the world's leading emerging sectors. As shown in Figure 1, the primary drivers of this growth are non-invasive biohacking products, including various wearable devices and applications for biometric data analysis. These products recorded the highest growth rates in 2024. Market success has been largely driven by their accessibility and non-invasive nature, based on the idea that individuals can continuously monitor and optimize their bodies with the aid of technology.

Figure 1. Biohacking Market from 2024 to 2033 (in USD billions)



Source: Dimension Market Research, July 4. https://tinyurl.com/25cj3k5f

Behind this expansion lies a growing societal interest in physical and mental health, emotional stability, and a high-quality lifestyle. In response, models have been developed to fulfill the moral, material, and health-related interests of individuals (Campbell, C. M., 2015), while physical activity has increasingly been recognized as a key factor in human development (Petronijević, S. et al., 2024).

A particularly significant role within this commercialized framework is played by digital platforms that combine technology with social interaction. These platforms offer users access to personalized wellness advice, physical activity tracking, and biometric data analysis, allowing them to optimize vital functions without medical intervention. They constitute a core component of non-invasive biohacking by providing users with a sense of autonomy in managing their health through technology. At the same time, they raise important concerns regarding data privacy, the reliability of health recommendations, and the long-term consequences of such practices.

Marketing of Non-Invasive Biohacking Products

Alongside the development of these products, there has been a growing need to adapt marketing strategies. Within the broad spectrum of activities and services aimed at enhancing physical, mental, and emotional well-being, marketing plays a key role in aligning market offerings with both actual and projected user needs. In the context of "soft" biohacking – which relies on non-invasive, technologically mediated forms of self-help and quality-of-life improvement – promotional efforts are focused on building emotional and value-based relationships with consumers, emphasizing education, prevention, and self-regulation of health.

The promotion of products and services in this sector goes beyond traditional advertising models, relying instead on a holistic health approach, individualized recommendations, and an emotional narrative grounded in personal development. Consumers are encouraged to use digital tools and mobile applications that promise balance, stress reduction, improved sleep, and enhanced mental clarity (Baker and Cameron, 2017). Advertising is predominantly oriented towards personalized solutions, dietary regimes, physical activity programs, and mental health guides, delivered through increasingly accessible digital platforms.

Marketing campaigns in this industry increasingly rely on content marketing, which aims to inform and educate rather than simply promote. Blogs, video tutorials, app usage guides, expert tips, and user experiences

have become key communication formats (Lee and Lee, 2019). Through large sociotechnical networks such as Facebook, Instagram, YouTube, and Amazon, targeted content is disseminated by addressing topics like physical and mental health, nutrition, meditation, and fitness (Pulizzi, 2014). In such marketing strategies, influencers, often fitness coaches, nutritionists, or therapists with large followings, play a crucial role. Their recommendations are often perceived as more authentic than traditional advertisements, as they are based on personal experiences and value alignment with their audiences (Carter and Gilroy, 2021). This approach fosters two-way communication, encouraging user comments, experience sharing, and the creation of communities that exchange information.

However, this trend also carries risks, including the commercialization and oversimplification of complex health issues, as well as the promotion of products lacking scientific validation. Moreover, influencer-based marketing strategies often rely on personalization grounded in the collection and analysis of user data, including biometric and health-related information (Chaffey, 2021; Khastgir, 2024). Data are collected through various methods: from simple algorithms to machine learning models for behavior pattern analysis, and more advanced predictive systems that estimate individual health risks and generate tailored wellness plans. In this way, highly specific individualized telehealth solutions. For instance, algorithms process data on sleep, nutrition, physical activity, and stress in order to generate personalized recommendations (Ibidem). From this, it is evident that the marketing of "soft" biohacking operates not merely as a promotional tool, but as a culture of self-regulation in which health is increasingly framed as a personal project rather than a collective or social value. This blurs the boundaries between consumption, therapy, and identity, with digital technologies serving as mediators between the body and the market.

Although these practices offer certain benefits, they also raise new ethical concerns: from the accuracy and truthfulness of recommendations to the risk of medical hyper-individualization and the erosion of boundaries between expert knowledge and marketing discourse. The commercialization of health is not without complications, especially when it comes to distinguishing between scientifically validated and pseudoscientific products, transparent versus manipulative marketing, and the issue of control over data that users routinely provide to digital platforms. These developments give rise to new ethical challenges and demand an analysis of how such challenges manifest in specific market segments.

Ethics in the Marketing of Non-Invasive Biohacking Products

Within the non-invasive biohacking industry, the personalization of marketing approaches introduces a range of ethical dilemmas. In many cases, this industry relies on so-called "pull-up" marketing, which is based on the collection and processing of users' biometric data. At the same time, there exists a risk that the quality of products or services will not meet user expectations, which further complicates the ethical framework of this business model. This issue becomes even more pronounced when considering that certain applications and wearable devices collect billions of personalized, highly sensitive private and biometric data points on a daily basis, as illustrated by the following case examples.

Case Studies

Water Apps

Supporting the claim that the quality of these products can be questionable is a recent study by McKenzie et al. (Philiph McKenzie, Y., et al., 2020), which analyzes hydration-tracking mobile applications and clearly demonstrates that many of these products fail to incorporate essential physiological parameters or provide reliable information to users. The absence of medical expertise in the development process undermines the principle of beneficence – users are not adequately protected from potential harm resulting from inaccurate or incomplete data. This creates space for misleading representations of product efficacy, which is ethically unacceptable.

Whoop

Similar issues arise with wearable devices such as WHOOP, which monitor a wide array of biometric indicators, including sleep, recovery, stress, and physical performance. Although these devices are marketed as innovative tools for a "biohacker's approach to the body," there is serious concern about the average user's ability to accurately interpret and understand the collected data. This may compromise both their privacy and personal autonomy. Overreliance on such technologies can lead to dependency, various forms of anxiety, and negatively affect mental health, outcomes that are fundamentally at odds with the medical ethical principle of non-maleficence (*non nocere*) (Beauchamp & Childress, 2013).

Given that WHOOP is a widely accepted wearable in the fitness and sports industries, with the capability to monitor over 50 billion biometric data points per day, including metrics such as sleep quality, stress levels, recovery, and physical activity, there is no doubt that the device collects an

immense amount of confidential information. Furthermore, it employs advanced artificial intelligence algorithms, including machine learning and time-series analysis, to interpret users' biometric data. The system is designed to adapt to individual behavioral patterns, enabling increasingly precise and personalized recommendations related to recovery, sleep, and physical performance. Although this enhances the device's value for users, it also complicates transparency, as the AI models used are often proprietary and closed to external auditing. In addition, the sheer volume of biometric data collected raises serious concerns about privacy protection and the potential for users to develop psychological dependence on health-tracking technologies (Anumeha, 2025).

Oura Ring

One notable example is the Oura Ring, a smart ring that tracks over twenty biometric parameters, including sleep quality, heart rate, and stress levels. This product combines advanced technology with sophisticated design, targeting users seeking a luxurious and aesthetically appealing health monitoring device. Smart rings used in non-invasive biohacking, such as the Oura Ring, rely on a combination of machine learning algorithms and real-time temporal data analysis. These systems identify patterns from biometric data and generate personalized recommendations. Through the application of artificial intelligence, these devices transcend passive monitoring and assume an active role in shaping user behavior, which raises potential regulatory and ethical concerns.

Similar to WHOOP, significant ethical issues arise regarding the accuracy of the data obtained and its potential impact on users' mental health. Of particular concern is the fact that marketing campaigns may create pressure for the Oura Ring to become a "must-have" device for every athlete, potentially leading to unrealistic expectations and increased stress due to constant monitoring of physical condition (Marketingino, 2023). Additionally, the lack of clear warnings that the device is not a medical diagnostic tool may mislead users and result in inappropriate health decisions.

Based on these examples, it can be concluded that the ethical challenges in non-invasive biohacking are multifaceted. First and foremost is the protection of personal data, as most of these applications collect and analyze a large volume of sensitive biometric information. Transparency in how these data are used and stored, along with educating users about the limitations and risks of the products, is crucial for establishing trust and ethically acceptable business practices. The vast amount of personal data

collected raises concerns about privacy and data security. Considering the quantity and nature of information gathered by devices like WHOOP, there is a legitimate worry that data could be misused or shared with third parties without adequate transparency toward users. Moreover, there is a risk that such data could be employed in decision-making processes regarding employment, insurance, and other significant changes in users' status.

While professional athletes often have access to expert support for interpreting such data, average users typically lack the necessary medical knowledge, which can lead to misinterpretation or inappropriate use of the information. This potentially compromises user autonomy and poses risks to their health and well-being (*Ibidem*). A third issue is the risk of developing dependence on the device, where users become overly focused on quantifying their health, potentially leading to adverse psychological effects. Further important concerns include the scientific validity of the promised health benefits. Although many of these products are not classified as medical devices, they nonetheless perform functions that directly impact user health. This raises ethical questions regarding the responsibility of manufacturers – particularly whether they are obliged to comply with medical standards and whether the algorithms generating health recommendations are subject to independent evaluation. The scientific basis for the functioning and recommendations of these products is often vague, potentially jeopardizing users' health. An additional ethically relevant dimension relates to potential mental health issues and the pressure to 'optimize' one's body, even in the absence of medical justification, which can foster both dependency and anxiety.

Table 1 presents the primary risks associated with non-invasive biohacking, along with the corresponding ethical values that may be compromised. Broadly, these risks can be categorized as follows: (a) data misuse, which infringes on the right to privacy and personal autonomy; (b) unrealistic marketing claims (consumer protection); (c) false sense of security (safety and accountability); (d) excessive self-monitoring (freedom and mental health); and (e) discriminatory use of data (equality and non-discrimination).

Table 1. Risks and Ethical Challenges in Non-Invasive Biohacking

Risk	*Description*	*Ethical Value*	*Potential Solution*
Data misuse	Sharing biometric data without users' knowledge	Privacy Autonomy	Transparency Strict regulation (e.g., GDPR)
Unrealistic advertising claims	Promises without scientific foundation	Honesty Consumer protection	Marketing restrictions Scientific

			evaluation
False sense of security	Users trust apps over medical advice	Safety Accountability	Clear disclaimers (ethical design)
Excessive self-monitoring	Anxiety from constant self-tracking	Freedom Mental health	User education Balanced design
Discriminatory data use	Data used for unethical candidate selection (employment, insurance)	Equality, Non-discrimination	Legal prohibitions Access control

Source: Authors

These issues demand effective solutions within the framework of digital health ethics, which aims to balance the potential benefits for users with the risks of manipulation, misuse of biometric data, and misleading claims. The development, promotion, and implementation of non-invasive biohacking products must align with ethical principles such as autonomy, beneficence, non-maleficence, and justice, as well as with legal regulations. Only through such alignment can user protection be ensured and public trust in this rapidly growing industry be strengthened.

Regulation of Non-Invasive Biohacking: The Need for a Normative Framework in Digital Health

Numerous ethical issues emerging within the non-invasive biohacking industry also give rise to a range of legal and regulatory concerns. Although classified as non-invasive, the evidence presented indicates that these tools may produce serious consequences for users if deployed without professional oversight, rigorous validation, and ethical governance. This underscores the urgent need for a clearly defined institutional framework that regulates not only the technical specifications but also the ethical and legal dimensions of non-invasive biohacking.

According to Miller (Miller, K., 2011), software developers for digital health solutions, as well as their promoters and distributors, must recognize the potential risks arising from algorithmically generated recommendations, especially when such advice has not been validated by medical authorities or clinical trials. Therefore, it is essential that non-invasive biohacking applications be tested under controlled conditions before becoming available to the general public. Additionally, experts from the fields of medicine, bioethics, and law should be consulted during the development phase. This approach would address the issue of certification: users must have verification of the application's validity, whether it has undergone expert evaluation, whether it adheres to data protection standards (e.g., GDPR), and whether the health claims it promotes are grounded in scientific

evidence. In Table 1, alongside the ethical risks, potential legal solutions for these risks are also presented.

The potential legal solutions highlight the need for strict regulation, limitations on the marketing and promotion of these products, mandatory scientific evaluation, clear warnings (certification, ethical design), and legal restrictions on third-party access to data. A particularly complex issue is the liability for damages that non-invasive biohacking products may cause. Since these technologies are typically developed and distributed by a range of actors, including programmers, designers, marketing agencies, and others, it is difficult to precisely identify the legally responsible party. This creates room for legal ambiguity and the potential for evading responsibility.

The European Union, for instance, prescribes stringent regulations governing the use of biometric data. However, in practice, manufacturers frequently request users' "consent" without ensuring they fully comprehend the implications. Nonetheless, such forms of "pull-up" marketing, which entail the collection and analysis of personal data, must comply with the privacy standards established by the General Data Protection Regulation (GDPR) and related legislation. The GDPR explicitly affirms users' rights to informed consent, access to their own data, and transparency in its usage, rights that are not always fully honoured within this sector.

EU member states have introduced core regulatory mechanisms applicable to non-invasive biohacking, including the Medical Device Regulation (EU) 2017/745 (MDR) and initiatives such as Digital Health Europe. The MDR introduces stricter requirements for the safety, efficacy, and transparency of medical devices within the EU market. It demands high standards, especially for products with diagnostic or therapeutic functions. Although many biohacking devices are not formally classified as medical devices, their functionalities often border on clinical use, thereby creating a space for regulatory reinterpretation and potential stricter oversight.

Another significant regulatory framework at the EU level is the Artificial Intelligence Act (AI Act, Regulation (EU) 2024/1689), which categorizes AI systems based on risk levels. It is the first comprehensive legal framework governing the use of AI across sectors including health, safety, biometrics, and consumer products. According to this regulation, wearable devices that use AI to process biometric data or generate health recommendations may fall under the category of *high-risk systems*, subject to rigorous transparency, oversight, and user rights protection requirements. This Act not only enables stronger user protection in the context of non-invasive biohacking but also holds manufacturers accountable for clearly explaining how their algorithms function and on what data they base their

recommendations. The adoption of this legal framework demonstrates growing recognition of the need for regulation at the intersection of technology, ethics, and consumer rights. Based on this regulation, wearable devices analyzed in this study, such as the Oura Ring or WHOOP, could be categorized as high-risk.

In the Republic of Serbia, this area remains under-regulated. It is therefore essential to develop a dedicated e-health regulation that would encompass certification, protection of biometric data, liability of stakeholders, and ethical evaluation of non-invasive biohacking products. Such regulation is necessary to protect consumers and preserve the integrity of the healthcare system. In Serbia, beyond the Constitution and the Law on the Ratification of the European Convention on Human Rights ("Official Gazette of the RS," No. 10/2015), the Law on Standardization ("Official Gazette of the RS," Nos. 36/2009, 46/2015) also applies. Article 5 of this law stipulates that the aim of standardization is to enhance the protection of human health and safety, which can serve as a legal foundation for the development of specific regulations in the field of digital health and non-invasive biohacking.

Conclusion

Consumers increasingly seek products and services that improve not only their physical condition but also their mental and emotional well-being. Marketing within the non-invasive biohacking industry offers opportunities to promote healthy lifestyles. Transparency, inclusivity, mental health support, and education about healthy habits are among the key aspects that can enhance everyday life of consumers. However, it is crucial that these strategies are approached with care, ensuring that the information presented is accurate, ethical, and beneficial to the end users.

Alongside numerous advantages, marketing in this industry faces significant ethical challenges. Manipulation of consumer needs, improper use of private data, commercialization of health issues, promotion of "quick fixes," and the portrayal of unrealistic body ideals as norms represent the primary ethical dilemmas emerging in the promotion of these products.

Non-invasive biohacking presents a challenge to existing legal and ethical frameworks, particularly in countries that have yet to develop clear e-health regulations. While it promises users a better understanding of their bodies and greater control over their health, it carries risks of commercial exploitation, misuse of biometric data, misinterpretation of results, as well as threats to mental health, autonomy, personal well-being, and potential discrimination. Given that these risks undermine fundamental human rights

and ethical principles—such as autonomy, equality, non-discrimination, privacy, freedom, and safety—it is necessary to establish a multidisciplinary framework involving technologists, medical professionals, lawyers, and ethicists. This framework should ensure that non-invasive biohacking does not cause harm and instead contributes safely to individual health, while marketing of such products is regulated by general legal norms.

Particularly problematic is the presentation of these products as substitutes for medical treatment without validation through clinical research. To overcome these challenges, an improved ethical and legal framework is needed that encompasses responsible use of biometric data, clear labeling of technological limitations, and ethical marketing practices. Such a framework must ensure compliance with fundamental human rights, including privacy protection and the right to informed choice.

The deepest ethical dilemma remains the question of the limits of human "enhancement." Although non-invasive biohacking is an external and technically non-invasive practice, it raises issues related to autonomy, societal health norms, and the potential normalization of constant self-monitoring. On a broader social level, non-invasive biohacking fosters the commodification of health, treating it not as a fundamental value but as a market ideal. In this context, users increasingly become products of the digital market, and their biometric data a resource for commercial exploitation. Therefore, the promotion of non-invasive biohacking products must be guided by principles of responsibility, truthfulness, and respect for human dignity. Only through an ethically and legally grounded approach can digital health be shaped as a tool for the well-being of all, respecting individual dignity, autonomy, and the broader development of society as a whole.

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