Brazilian Journal of Psychiatry
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Revista Brasileira de Psiquiatria
Brazilian Psychiatric Association
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(article published as accepted)

Editorial

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http://doi.org/10.47626/1516-4446-2026-5087

Submitted: 24-Jun-2026

Accepted: 03-Sep-2026

This is a preliminary, unedited version of a manuscript that has been accepted for publication in the Brazilian Journal of Psychiatry. As a service to our readers, we are providing this early version of the manuscript. The manuscript will still undergo copyediting, typesetting, and review of the resulting proof before it is published in final form. The final version may present slight differences in relation to the present version.

Transcranial direct current stimulation: a historical continuum from the Victorian medical battery to the contemporary do-it-yourself movement

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The history of psychiatry and the neurosciences is often narrated as a linear succession of triumphant discoveries [1], in which the present represents the pinnacle of scientific rigor in opposition to a past of obscure empiricism. Yet the trajectory of transcranial direct current stimulation (tDCS) reveals a more nuanced reality: a cyclical and recurrent pattern of technological appropriation that appears to blur the boundaries between the clinic and the home. We focus on tDCS here not because it exhausts the history of brain electrical stimulation, but because its accessibility, simplicity, and current regulatory trajectory make it a particularly instructive case study within that broader history, serving as a representative model for how portable neuromodulation challenges institutional frameworks. For the purpose of this discussion, tDCS is defined as a non-invasive brain stimulation technique that applies a low-intensity direct current (typically 1–2 mA) through electrodes placed on the scalp to modulate cortical excitability. The contemporary do-it-yourself (DIY) tDCS movement, understood as the unsupervised, consumer-driven construction and use of stimulation devices outside the formal healthcare system, is not a digital-age anomaly but

rather the re-emergence of Victorian sociotechnical patterns [2]. This editorial reflects on the historical continuum linking the 19th-century medical battery to modern neuromodulation, examining how scientific boundary work and regulatory gaps shape current psychiatric practice.

The search for relief from mental suffering through electricity has ancestral roots. As early as 46 AD, Scribonius Largus documented the use of the torpedo fish for persistent headaches, often cited as an early antecedent of bioelectricity as a therapeutic tool [3]. Between 1870 and 1920, the so-called Golden Age of Electrotherapy, electricity became increasingly democratized as a medical and domestic intervention. Devices such as Gaiffe batteries, known for their portability, and Morrison batteries, celebrated for their technical robustness, allowed galvanic current to move from laboratories into Victorian homes [2]. Influence machines such as the Toepler-Holtz, with their glass disks and brass combs, were not only treatment instruments but also symbols of an era that regarded electricity as a vital force capable of restoring balance to a nervous system strained by industrialization [4].

In this context, Wexler draws on the concept of boundary work, a sociological framework useful for interpreting how scientific communities exert rhetorical and institutional effort to delegitimize lay use and protect scientific authority [2]. In the past, physicians such as Beard and Rockwell sought to distance clinical electrotherapy from the quackery of catalog-sold batteries, labeling home use as unorthodox or marginal [5]. A broadly similar dynamic has been observed more recently: as modern tDCS gained traction following the seminal studies of Nitsche and Paulus in 2000 [6], the scientific community responded to the growth of the DIY movement with open letters and safety warnings. While these warnings are grounded in real risks, they may also serve to reaffirm the medical monopoly over the brain [2].

Boundary work is not merely a professional dispute; it may also be understood as an attempt to maintain the integrity of psychiatric practice in the face of a technology that is inherently simple and accessible. The ease of constructing a tDCS device, essentially a battery coupled to a regulator circuit and electrodes, challenges the complexity that academic psychiatry tends to project. Wexler argues that by labeling lay use as dangerous or ineffective,

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scientists may create an artificial barrier that the technology itself does not necessarily impose [2]. This tension is exacerbated by the brain hacking culture, in which the goal shifts from treating pathologies to optimizing cognitive performance in healthy individuals, an ambition that traditional psychiatry often hesitates to embrace [5].

The complexity of this scenario becomes evident in regulatory analysis, specifically regarding intended use. Regulation by agencies such as the FDA (and, by analogy, ANVISA in Brazil) is based not only on the device's mechanism but on what the manufacturer claims it does. If a brain stimulation device is marketed to treat depression, it is classified as a high-risk medical device requiring rigorous clinical trials [7,8]. If the same device is sold to improve focus and well-being, it may fall into a regulatory gap as a consumer electronic product [9]. This ambiguity has allowed a gray market of direct-to-consumer sales to flourish, in which companies evade clinical rigor by adopting lifestyle language and shifting the responsibility for safety and efficacy to the end user. It is within this regulatory context that the recent FDA approval of home-delivered tDCS for depression must be introduced [7], a development that represents a formal attempt to bridge the gap between clinical supervision and domestic convenience, as discussed further below.

It is important to acknowledge that the concerns raised by the scientific community are not merely rhetorical. Unsupervised use of tDCS carries legitimate risks, including incorrect electrode placement, inadequate or excessive stimulation parameters, the presence of underlying neurological or psychiatric disorders that may contraindicate stimulation, and the absence of adequate clinical evaluation. These risks justify a cautious stance and underscore the importance of medical oversight, even as we recognize the sociological dimension of home use. A balanced perspective must therefore hold both considerations in tension: the legitimate safety concerns and the human desire for autonomy.

The DIY tDCS movement and the FDA-approved home-delivered tDCS should not be treated as parallel developments; rather, they represent two poles of home use that illuminate the central argument. On one hand, DIY tDCS refers to unsupervised, consumer-driven use outside the healthcare system. On

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the other hand, FDA-approved home-delivered tDCS represents the incorporation of a regulated device into clinical practice under structured medical supervision. Their convergence on the home environment, yet their divergence in regulatory status, illustrates precisely the ambiguity this editorial seeks to highlight: the same technology can occupy very different positions on the continuum between the laboratory and the home, depending on how it is framed and regulated. This regulatory gap is the modern reflection of Victorian catalogs that sold electric belts and portable batteries without oversight.

The historical lesson suggests that the decline of classical electrotherapy around 1910 did not occur solely due to a lack of public interest, but also because of the collapse of unfulfilled promises and the rise of pharmacology, which offered clearer regulation and more reproducible results [2]. The recent FDA approval of home-delivered tDCS for depression marks a historic shift toward clinical legitimacy [7], yet this decision has been challenged as not yet scientifically justified [8], and long-term clinical and ethical considerations remain unresolved [10]. Contemporary tDCS faces the reproducibility crisis and meta-analyses questioning cognitive effects of single sessions in healthy populations suggest that technological enthusiasm may, once again, be preceding robust scientific validation.

For Brazilian psychiatry, the challenge is twofold. On one hand, we must integrate non-invasive neuromodulation as a powerful, evidence-based tool for treating resistant disorders, respecting safety protocols and neurophysiology. On the other hand, we cannot ignore the human and sociological component driving home use [11]. The patient seeking DIY tDCS may not only be looking for treatment; they may also be exercising a desire for autonomy and control over their own biology, an impulse that echoes the users of Morrison batteries who sought relief for neurasthenia without the stigma of the asylum [2].

In conclusion, the DIY tDCS movement may be understood as the re-emergence of a historical pattern of technological appropriation [2,9]. The role of the modern psychiatrist should not be merely that of a boundary guardian, but that of an informed mediator who understands that brain technology will always occupy an ambiguous space between the laboratory and the home [2,9,10]. To prevent neuromodulation from suffering the same ostracism that

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affected the medical battery in the early 20th century [2], it is imperative that scientific communication be honest about the technique's limitations [10] and that regulation evolves beyond intended use, focusing on the effective protection of neural tissue [7,8]. Only through a practice that balances neuroscientific rigor with historical and humanized understanding can we ensure that the circle of neuromodulation finally transforms into a spiral of sustainable progress [2].

Disclosure

The authors report no conflicts of interest.

Author contributions

SM: Conceptualization, Formal analysis, Resources, Writing– original draft, Writing– review & editing.
ASSF: Formal analysis, Resources, Writing– original draft, Writing– review & editing.
TDBB: Formal analysis, Resources, Writing– original draft, Writing– review & editing.
AEN: Formal analysis, Resources, Writing– original draft, Writing– review & editing.
Both authors have read and approved of the final version to be published.

Edited by: Andre Brunoni

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