

NEUROCOGNITIVE ENHANCEMENT IN SPORT: STRIKING A BALANCE BETWEEN LEGITIMATE USE AND IMPROPER MANIPULATION (NEURO-DOPING)

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ABSTRACT: Neurocognitive enhancement involves the use of technologies with varying degrees of invasiveness to improve cognitive or motor performance. Their deliberate use to gain a competitive advantage without therapeutic justification (often referred to in the scientific literature as “neuro-doping”) raises significant ethical, legal, and regulatory concerns.

This article focuses on emerging non-invasive brain stimulation (NIBS) techniques and examines their implications for athletes’ privacy, health and safety as well as for the fundamental values of sport. The analysis is situated within the broader academic debate on neurorights and human rights, with particular attention to cognitive liberty, mental integrity, and mental privacy.

In light of ongoing scientific uncertainties and the inevitable emergence of increasingly sophisticated technologies capable of influencing sports performance, the article argues that neuro-doping can no longer be regarded as a marginal phenomenon. It calls on WADA and national and international sports federations to give this issue due consideration by promoting high quality independent research, implementing active monitoring, and, together with competent public authorities, initiating decision-making processes aimed at developing appropriate regulatory tools – either by expanding the scope of existing anti-doping rules or by introducing specific provisions on the use of neurotechnologies in sport.

Il potenziamento neurocognitivo implica l’uso di tecnologie con diversi gradi di invasività per migliorare le prestazioni cognitive o motorie. Il loro impiego deliberato al fine di ottenere un vantaggio competitivo senza una giustificazione terapeutica (spesso indicato nella letteratura scientifica come “neurodoping”) solleva rilevanti questioni etiche, giuridiche e regolatorie.

Questo articolo si concentra sulle tecniche emergenti di stimolazione cerebrale non invasiva (NIBS) ed esamina le loro implicazioni per la privacy, salute e la sicurezza degli atleti, nonché per i valori fondamentali dello sport. L’analisi è collocata nel più ampio dibattito accademico sui neurodiritti e sui diritti umani, con particolare attenzione alla libertà cognitiva, all’integrità e alla privacy mentale.

Alla luce delle persistenti incertezze scientifiche e dell’inevitabile comparsa di tecnologie

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sempre più sofisticate, in grado di influenzare la performance sportiva, l'articolo sostiene che il neuro-doping non possa più essere considerato un fenomeno marginale. Invita pertanto la WADA e le federazioni sportive nazionali ed internazionali a dedicare a questo tema un'attenzione adeguata, promuovendo ricerca indipendente di alta qualità, un monitoraggio attivo e, insieme alle autorità pubbliche competenti, l'avvio di processi decisionali volti a sviluppare strumenti regolatori appropriati, sia tramite l'estensione delle norme antidoping esistenti, sia mediante l'introduzione di disposizioni specifiche sull'uso delle neurotecnologie nello sport.

Keywords: *Neurocognitive Enhancement – Neuro-doping – Non-invasive Brain Stimulation (NIBS) – Transcranial Direct Current Stimulation (tDCS) – Transcranial Magnetic Stimulation (TMS).*

Potenziamento neurocognitivo – Neuro-doping – Stimolazione cerebrale non invasiva (NIBS) – Stimolazione transcranica a corrente diretta (tDCS) – Stimolazione magnetica transcranica (TMS).

SUMMARY: 1. Introduction – 2. Neurocognitive Enhancement, Neuro-doping and the Boundaries of Fair Performance – 3. Non-Invasive Forms of Neurocognitive Enhancement – 4. Main Legal Challenges – 4.1 Neurocognitive Enhancement and Privacy in Sport – 4.2 Health related Implications – 4.3 Potential Challenges for Core Sporting Values – 5. Conclusion

1. Introduction

This article examines the regulatory and policy implications of neurocognitive stimulation in sport and its qualification as “neuro-doping,”¹ focusing on non-invasive brain stimulation (NIBS) techniques such as transcranial direct current stimulation (tDCS), transcranial magnetic stimulation (TMS), and neurofeedback. These technologies are increasingly marketed and experimented with as tools for improving focus, reaction time, and fatigue resistance, and have begun to feature prominently in the doctrinal debate. A growing body of scholarship highlights their potential implications for athlete health, autonomy, privacy and the integrity of competition, while also underscoring the current scientific uncertainty regarding both their effectiveness and long term safety. This combination of fragmented evidence and the rapid evolution of neurotechnologies suggest that neurocognitive enhancement can no longer be treated as a marginal or purely speculative issue in sport.

¹ Although neurostimulation is not (yet) expressly prohibited under the WADA Code and therefore does not, in a strict legal sense, fall within the current formal definition of “doping,” the term “neuro-doping” has become widely used in the literature and public debate to describe the illegitimate performance enhancing use of neurotechnologies in sport. For reasons of clarity and consistency with this emerging discourse, the term “neuro-doping” is adopted in this paper, while its use