



NOVA Policy Network
Policy Brief

Expanding Anti-Doping Frameworks to Include Neuroenhancement

*WADA (World Anti-Doping Agency) and
Neurodoping*

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Policy Brief

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Executive Summary

As cognitive enhancement technologies evolve—from prescription neurostimulants to transcranial stimulation devices and nascent brain-computer interfaces—the boundary between legal performance enhancement and forbidden neurodoping dissolves at a faster and faster rate. While the World Anti-Doping Agency (WADA) has maintained a rigorous system of regulation of physical enhancement in sports for decades, its methods are becoming more and more moot in the face of memory, attention, decision-making, and reaction time-augmenting agents and devices. It is here that the gaps are widest in high-stakes, cognitively challenging domains such as esports, elite university exams, combat in military, and financial trading, where neuroenhancers are generally deployed off-label or clandestinely.

Current WADA policy focuses heavily on anabolic agents, stimulants with strong physical concomitants, and drugs with historical patterns of abuse. However, newer neuropharmacological drugs such as modafinil, racetams, and noopept are often able to evade detection due to their legally ambiguous status, pale physiological trace, and lack of uniform world regulation. Meanwhile, non-pharmacological neurotechnologies like transcranial direct current stimulation (tDCS) and closed-loop neurofeedback systems are entirely unregulated despite mounting evidence of their cognitive impact.

This paper argues that the global anti-doping system must be expanded to govern cognitive enhancement technologies scientifically responsibly, ethically consistently, and field-sensitive manner. It recognizes three determinative challenges: definitional vagueness of neurodoping, lack of testing facilities for non-invasive technology, and the difficulty of crafting equitable access and enforcement across cognitive occupations. Without regulatory modernization, competitive equity and health security will be eroded, as well as public trust in new areas where mental performance matters.

The brief concludes by suggesting a tiered framework of neurodoping categorization, placement of cognitive enhancement substances in the WADA monitoring program, and creation of an interdisciplinary advisory board on neuroethics and performance enhancement. These measures would modernize the anti-doping system without discrediting its core

Introduction

The concept of doping has historically referred to the use of substances that improve physical performance in traditional athletic competition. But the culture of high-level performance has expanded rapidly across the 21st century to encompass domains where cognitive ability—more than physical strength—is the primary determinant of achievement. Esports, school examinations, algorithmic trading, high-stakes negotiations, and even war now rely on sustained attention, memory retrieval, rapid decision-making, and emotional regulation. These are the regions where neuroenhancement technologies—pharmacological as well as device-based—churn up fundamental issues about fairness, safety, and long-term effects on the brain.

Despite such shifts, the World Anti-Doping Agency (WADA) and its affiliate groups are still preoccupied with a conventional definition of doping based on muscle enhancement, endurance enhancement, or recovery enhancement. The Prohibited List contains the stimulants amphetamines and methylphenidate, but is relatively silent regarding more covert cognition-enhancing substances with little systemic effect and strong psychological effect. In addition, non-pharmacological aids—e.g., transcranial magnetic stimulation (TMS), neurofeedback equipment, or EEG-based reaction-training modules—are not evaluated within any formal anti-doping system.

This delay in regulation carries several dangers. First, it calls into question the honesty and uniformity of anti-doping regimes, particularly in esports and combined sports where intellectual input is most valuable. Second, it invites unequal access and unregulated application in military or high-skill professional settings where intellectual optimization can become a prerequisite for competition or employment. Third, it exposes users—particularly youth and vulnerable populations—to long-term neurotoxicity without medical oversight or clinical evaluation.

In this new neurotechnological landscape, the challenge is not so much to extend classic definitions of doping to encompass new drugs. Rather, it is to re-imagine a model of regulation that accommodates the ethics, efficacy, and situational significance of cognitive enhancement. Such a model must preserve individual autonomy without sacrificing public trust in performance-based structures. It must also consider the significant world regional variation in neuroenhancer availability, attitudes, and testing feasibility. This brief begins mapping that paradigm by combining current governance gaps, surveying domain-specific threats, and proposing a forward-thinking regulatory strategy for neurodoping.

Issues / Policy Gaps

Even as neuroenhancement technologies increase exponentially, anti-doping models continue to narrow their focus on traditional pharmacological substances with measurable physical effects. This leaves several significant regulatory blind spots in environments where mental acuity and long-term cognitive capability are increasingly determinative. These are not theoretical—these blind spots are already shaping the way that cognitive competition is competed, regulated, and considered globally.

The most pressing issue may well be definitional ambiguity about neurodoping. Unlike anabolic steroids or transfusions of blood, cognitive enhancement need not have a clear physiological signature, and it need not invariably violate the classic pillars of WADA’s evaluation criteria: improvement of performance, danger to health, and sacrilege of the sporting spirit. Substances such as modafinil or racetams may improve wakefulness, attention, or memory with low patent risk profiles such that their designation as “doping agents” is scientifically and ethically questionable. Therefore, the Prohibited List is generally lagging behind actual use, and users exploit legal loopholes to remain ahead.

The second shortfall is a failure to address non-pharmacological neuroenhancement methods. Transcranial Direct Current Stimulation (tDCS), neurofeedback headsets, brain-training AI software, and reaction-time improvers are out there and used more than ever before in professional esports, military exercises, and even test prep. These substances avoid chemical regulation altogether and are hard to detect without specialized apparatus or baseline cognitive standards. The lack of procedures to assess and test for these means leaves the system open to silent escalation and unfair competition.

Third, there is a marked deficiency of domain-sensitive enforcement mechanisms. While WADA imposes reasonably visible regulations on Olympic and national sports associations, its jurisdiction has not yet officially extended to professional game leagues, individual drone operators, high-stakes academic competitions, or military test protocols. These mentally demanding activities operate in disparate or proprietary regulatory environments, and there is no multilateral consensus on whether and how cognitive doping should be addressed within them. Lacking harmonized standards, regulatory capture, uneven enforcement, or competitive coercion becomes more likely.

Fourth, the ethical basis for extending cognitive enhancement to anti-doping is in its infancy. Physical doping has long been framed as a violation of the “level playing field” ideal and a threat to bodily integrity. But the ethical implications of enhancing cognition—especially in those with differing neurological baselines—are more complex. They pose questions of neurodiversity, autonomy, accessibility, and even disability accommodation. Lacking a solid ethical framework, policymakers are faced with resistance from advocates who view cognitive enhancement as either self-enhancement or as necessary compensation.

Finally, global asymmetry between the availability and regulation of neuroenhancers compounds the complexity. Nations divide hot-selling nootropics into over-the-counter supplements and controlled substances. Testing infrastructure is skewed, and cognitive aids are prohibited in some states but permitted in others. These differences create loopholes and jurisdictional arbitrage, and no single regulatory body can adequately monitor or administer neurodoping prohibitions across international events or professions.

Together, these policy gaps declare the need for a more adaptive and forward-thinking anti-

doping framework—one that recognizes cognitive performance as a new frontier of competition ethics, safety, and human enhancement.

Policy Recommendations

In light of the complex ethical, scientific, and enforcement challenges posed by neuroenhancement technologies, it is essential that anti-doping frameworks evolve to reflect the realities of cognitive competition. Rather than applying legacy physical doping paradigms to novel domains, a bespoke regulatory architecture is needed—one that integrates pharmacological, technological, and behavioral enhancement modalities. Below, we outline a set of strategic policy recommendations structured around risk-tiered regulation, predictive modeling, and domain-specific enforcement.

First, WADA and its partner organizations should adopt a tiered classification system for cognitive enhancers, akin to a cognitive analog of the World Health Organization’s controlled substance scheduling. Enhancers would be evaluated along three principal dimensions: (1) magnitude of cognitive effect (C), (2) health risk (H), and (3) enhancement asymmetry potential (A). These variables can be formalized in a risk function:

$$\mathcal{R}_i = \alpha C_i + \beta H_i + \gamma A_i$$

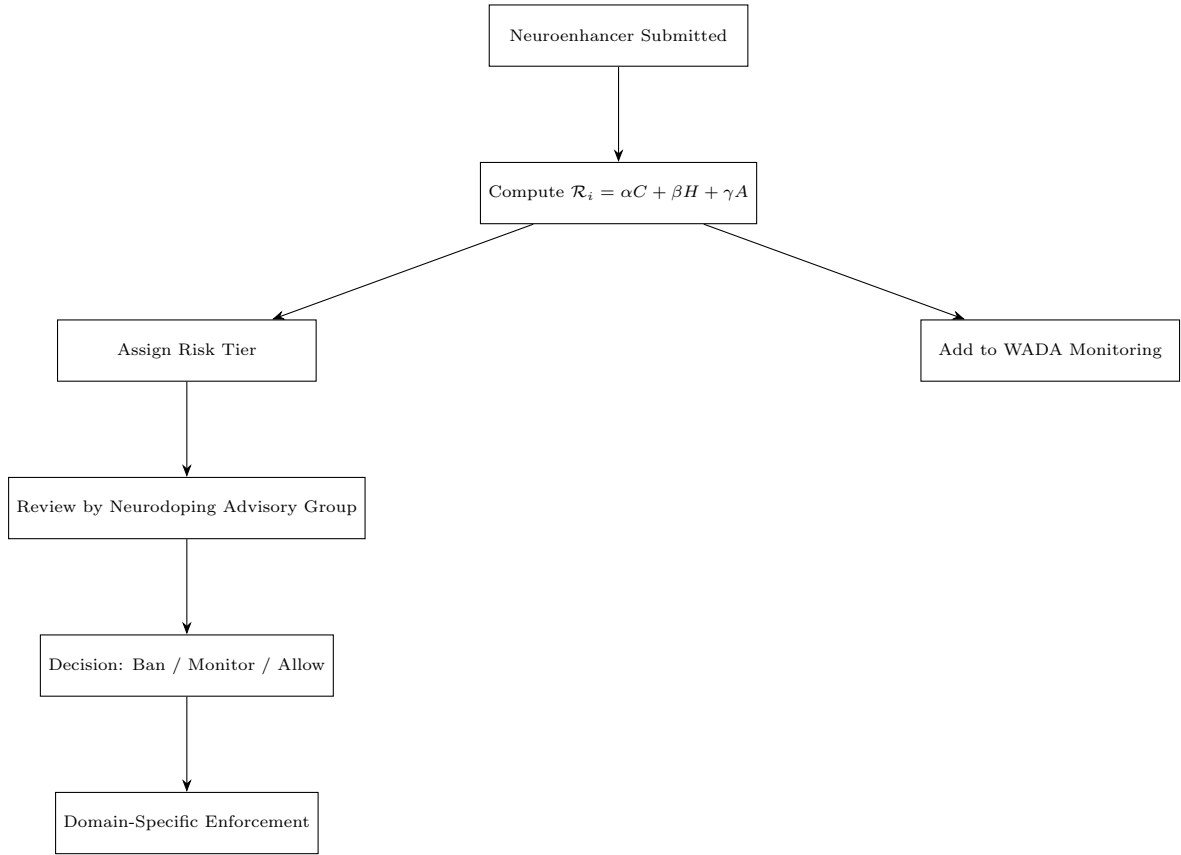
\mathcal{R}_i is the neurodoping risk index for substance or device i , and α, β, γ are domain-adjustable weights calibrated based on competitive context. A threshold \mathcal{R}^* could be defined, above which an enhancer is provisionally banned or subject to enhanced review. This allows regulators to dynamically update classification without needing binary “ban or not” judgments.

Second, cognitive-enhancement drugs and technologies would be placed on WADA’s Monitoring Program, but not necessarily prohibited outright. This two-tracking would allow for collation of global usage statistics, test-enforcement pilot tactics, and construction of a neuroenhancement efficacy-risk database to inform future policy. Specific attention should be given to low-side-effect, high-impact enhancers like modafinil, noopept, and non-invasive neurostimulation devices.

Third, WADA needs to call a Neurodoping Advisory Group (NAG) composed of neuroscientists, ethicists, esports federations, military ethicists, and pharmacologists. Such an interdisciplinary group would review cases on the cusp, make recommendations for testing methods for non-invasive devices, and develop ethical guidance documents for high-cognitive-load occupations.

Fourth, domain-specific enforcement policies must be designed. Anti-doping can’t be a blanket program; military performance, esports, testing in academia, and classic athletics require differentiated norms and standards. For instance, rather than banning all nootropics for esports, a “declaration + transparency” policy might be used, where disclosures are made and further testing conditions are met.

Finally, we propose the following conceptual framework as a visual flow of policy action:



This flowchart represents a modular, data-driven neurodoping regulation cycle that emphasizes transparency, adaptability, and precision rather than blanket prohibition. By combining quantitative modeling with ethical deliberation and community engagement, anti-doping agencies can remain effective in preserving fairness and health in both physical and cognitive performance domains.

Conclusion

As the horizon for human enhancement expands from strength and endurance to cognitive capacities, the global anti-doping system must evolve. Neurodoping is not only a technical frontier but a regulatory, ethical, and cultural one as well. Existing systems such as WADA's Prohibited List were not conceived with neurotechnologies in mind, and their ongoing silence regarding nootropics, neuromodulation devices, and cognitive stimulation practices threatens to leave a vacuum of regulation that is already being filled by competitors and institutions.

This policy brief has described the definitional vaguenesses, enforcement loopholes, and ethical tensions around neurodoping in various sectors, from esports to military missions and high-risk cognitive occupations. It has also set out a plan for adaptive governance—founded on a dynamic risk index, multi-tiered regulatory regimes, and integration across disciplines—governing the intricacies of this new challenge. Above all, regulation must reconcile maintaining cognitive integrity with enabling safe, equitable access to enhancement technologies for those who might be helped by them therapeutically or in their careers.

Neuroenhancement per se is not unethical or unjust—but its unregulated use in competitive contexts dismantles trust, distorts results, and carries long-term threats. WADA, in concert with national governments and discipline-specific regulators, must now rise to the challenge by taking actively to include cognitive performance in its anti-doping mandate. In doing so, it can ensure that the pursuit of human excellence—whether on the field, in the mind, or across new digital arenas—remains governed by principles of fairness, transparency, and respect for human dignity.

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