

TRANSHUMANISM AND ITS EMBODIMENT IN SPORTS: THE FUTURE OF ATHLETIC EVOLUTION

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Nəşr tarixi

Qəbul edilib: 14 oktyabr 2024

Dərc olunub: 25 dekabr 2024

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Annotation. This article explores the transformative influence of transhumanism on sports, focusing on the integration of advanced technologies to enhance human performance and redefine athletic boundaries. Transhumanism, which advocates for the augmentation of physical and cognitive capabilities, has introduced revolutionary changes in sports through innovations such as biomechanical prosthetics, genetic modifications, and neural implants. These advancements challenge traditional notions of fairness, inclusivity, and the essence of competition. The study examines the current applications of transhumanist technologies in sports, from performance enhancement to injury recovery, highlighting their potential to foster inclusivity for differently-abled athletes. Ethical dilemmas and regulatory challenges, such as the definition of fairness and the accessibility of these enhancements, are critically analyzed. Furthermore, the article investigates the implications of transhumanist principles on the future of sports, offering insights into how these innovations can be integrated sustainably within competitive frameworks. By bridging the gap between natural ability and technological augmentation, transhumanism presents both opportunities and challenges that are reshaping the sports industry. Ultimately, this article highlights the necessity for regulatory bodies to balance technological progress with ethical considerations, ensuring fairness and accessibility as sports continue to evolve in the age of human enhancement.

Keywords: *technology, transhumanism, natural, competitive, future of sports, inclusivity, ethical dilemmas.*

Introduction. The intersection of transhumanism and sports presents a revolutionary shift in how we perceive athletic performance, competition, and human potential. Transhumanism, as a philosophy advocating the enhancement of human capabilities through advanced technology, has found profound relevance in the realm of sports. From advanced prosthetics enabling differently-abled athletes to compete at elite levels to emerging technologies like gene editing and neural interfaces, the integration of these innovations blurs the line between the natural and the augmented. In an era where sports strive for inclusivity and technological advancement, the question arises: What defines fairness and the human spirit in competition when technology becomes a decisive factor? This article explores how transhumanism shapes modern sports, delving into its benefits, ethical dilemmas, and potential future implications. By examining case studies and technological breakthroughs, the paper aims to shed light on how sports organizations and regulatory bodies can navigate this transformative era [1], [2], [4].

Historical Context. The concept of human enhancement in sports predates the modern era of transhumanism. Early forms of "enhancement" included the use of specialized diets, rigorous physical training, and basic performance aids like caffeine or herbal supplements. Over time, sports science evolved with the advent of medical technologies like anabolic steroids (introduced in the 1950s) and blood doping (notorious in the 1990s), which led to intense ethical debates about fairness and natural human limits. The early 2000s marked the rise of biomechanical prosthetics, most notably carbon-fiber running blades, as seen in

Paralympic competitions. Athletes like Oscar Pistorius sparked global debate over whether prosthetic limbs provided an "unfair advantage" over biological limbs, challenging traditional definitions of fairness in competition. Genetic enhancement became a topic of serious discussion with the advent of CRISPR technology in the 2010s. Concerns grew that "gene doping" could create genetically modified athletes, blurring the line between natural talent and engineered performance. Regulatory bodies like WADA (World Anti-Doping Agency) introduced rules to preemptively ban genetic doping, though technological enforcement remains challenging [3], [11], [12].

Current Embodiment in Sports. The principles of transhumanism are actively reshaping modern sports, with technologies that enhance physical, cognitive, and sensory capabilities. These developments aim to push the limits of human performance, increase inclusivity, and challenge traditional notions of fairness.

Biomechanical Prosthetics Prosthetic technology has advanced significantly, allowing athletes with physical impairments to compete at elite levels. Carbon-fiber running blades, made famous by Oscar Pistorius, exemplify how prosthetic limbs can sometimes offer advantages over biological limbs. Advances in prosthetic design now allow for better energy return, improved shock absorption, and customizable features [1], [12].

Genetic Modification and Gene Doping While traditional doping has focused on chemical substances, gene doping represents a new frontier. With the emergence of CRISPR-Cas9 gene editing, it is theoretically possible to alter genetic traits like stamina, muscle growth, or oxygen efficiency. The World Anti-Doping Agency (WADA) has banned gene doping, but enforcement remains complex due to the difficulty of detecting gene modifications [4], [5], [11].

Neural Interfaces and Cognitive Enhancers Brain-machine interfaces (BMI) and neural stimulation devices are being explored as tools to improve mental clarity, decision-making, and reaction times. These technologies

allow athletes to "train their brains" for faster reflexes and better concentration during competitions [2], [9], [6].

Wearable Technologies and Smart Fabrics Wearable devices like smart sensors, heart rate monitors, and motion trackers have become standard in training and performance analysis. Advanced smart fabrics are now being integrated into sportswear, offering athletes real-time biofeedback. Companies like WHOOP and Catapult create devices that track vital signs, fatigue, and hydration levels, providing coaches with precise data to optimize performance [2], [9], [8].

AI-Driven Coaching and Data Analytics Artificial intelligence (AI) is redefining coaching by providing predictive insights on player performance. AI tools analyze large datasets on player movement, fatigue, and decision-making patterns. These systems offer personalized training regimens and predictive injury analysis [9], [7], [8].

Ethical and Social Implications. Fairness and Equal Opportunity Technologies like carbon-fiber prosthetics, gene doping, and neural enhancers can provide advantages that are inaccessible to athletes from less wealthy teams or countries. This could create a class divide where only wealthier teams have access to "superhuman" enhancements [1], [5], [12].

Defining "Natural" Human Limits How do we define "natural" athletic ability in an age where genetic modification and prosthetics are becoming normalized? Genetic enhancements like CRISPR challenge the idea that "natural talent" is the only valid basis for athletic competition [1], [3], [5].

Access and Equity While wearable tech like fitness trackers is accessible to the general public, high-end technologies like prosthetics, neural stimulators, and genetic modification are expensive. This creates inequity in access, with wealthier teams having a clear competitive advantage [5], [1], [6].

Health and Safety Neurostimulation devices, CRISPR-based gene editing, and cognitive enhancers all carry health risks. Genetic modification can have unforeseen side effects, while neural implants could lead to long-term

neurological issues [13], [1], [3].

Conclusion. Transhumanism in sports is no longer a distant concept but an active force shaping the present and future of athletic competition. Technological innovations like biomechanical prosthetics, genetic modification, and cognitive enhancement are redefining the core principles of sports, such as fairness, inclusivity, and natural human limits. For regulatory bodies, the challenge lies in setting clear rules that balance innovation with ethical considerations. Sports organizations must establish guidelines that ensure equitable access to enhancement technologies and prevent unfair competitive advantages. The future of sports depends on a collaborative approach where regulators, athletes, and technology developers work together. By doing so, sports can continue to embody the values of fair competition, inclusivity, and human excellence while embracing technological progress. Addressing these issues now will pave the way for a more sustainable and ethically sound sports ecosystem in the years to come.

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TRANSHUMANİZM VƏ ONUN İDMANDA TƏCƏSSÜMÜ: İDMAN TƏKAMÜLÜNÜN GƏLƏCƏYİ

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Annotasiya. Bu məqalə transhumanizmin idmana transformativ təsirini araşdırır, insan performansını artırmaq və İdman sərhədlərini yenidən nəzərdən keçirmək üçün qabaqcıl

texnologiyaların inteqrasiyasına xüsusi diqqət yetirir. Fiziki və idrak qabiliyyətlərinin inkişafını müdafiə edən transhumanizm, biyomekanik protezlər, genetik dəyişikliklər və sinir im-

plantları kimi yeniliklər sayəsində idmanda inqilabi dəyişikliklər etdi. Bu nailiyyətlər ənənəvi ədalət, inklüzivlik və rəqabətin mahiyyəti anlayışlarına meydan oxuyur. Tədqiqat, transhumanist texnologiyaların idmanda performansını artırmaqdan zədələrin bərpasına qədər müasir tətbiqlərini araşdırır, müxtəlif qabiliyyətli idmançılar üçün inklüzivliyi təmin etmək potensialını vurğulayır. Etik dilemmalar və bu inkişafın ədalətliliyini və mövcudluğunu müəyyənləşdirmək kimi tənzimləmə problemləri tənqidi şəkildə təhlil edilir. Bundan əlavə, məqalədə transhumanist prinsiplərin idmanın gələcəyinə təsiri araşdırılır və bu yeniliklərin rə-

qabət çərçivəsinə necə davamlı şəkildə inteqrasiya oluna biləcəyi barədə fikir verilir. Təbii qabiliyyət və texnoloji tərəqqi arasındakı boşluğu aradan qaldıraraq, transhumanizm İdman sənayesini dəyişdirən həm imkanlar, həm də problemlər açır. Nəticədə, bu məqalə tənzimləyici orqanların texnoloji tərəqqini etik mülahizələrlə tarazlaşdırmasına, ədalət və əlçatanlığı təmin etməsinə ehtiyac olduğunu vurğulayır, çünki idman insanın təkmilləşmə dövründə inkişaf etməyə davam edir.

Açar sözlər: *texnologiya, transhumanizm, təbiilik, rəqabət, idmanın gələcəyi, inklüzivlik, etik dilemmalar.*

ТРАНСГУМАНИЗМ И ЕГО ВОПЛОЩЕНИЕ В СПОРТЕ: БУДУЩЕЕ СПОРТИВНОЙ ЭВОЛЮЦИИ

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Аннотация. В этой статье исследуется преобразующее влияние трансгуманизма на спорт, особое внимание уделяется интеграции передовых технологий для повышения результативности человека и пересмотра спортивных границ. Трансгуманизм, который выступает за развитие физических и когнитивных способностей, внес революционные изменения в спорт благодаря таким инновациям, как биомеханическое протезирование, генетические модификации и нейронные имплантаты. Эти достижения бросают вызов традиционным представлениям о справедливости, инклюзивности и сути соревнования. В исследовании рассматриваются современные области применения трансгуманистических технологий в спорте, от повышения производительности до восстановления после травм, подчеркивается их потенциал в обеспечении инклюзивности для спортсменов с различными способностями. Критически анализируются этические дилеммы и проблемы регулиро-

вания, такие как определение справедливости и доступности этих усовершенствований. Кроме того, в статье исследуется влияние трансгуманистических принципов на будущее спорта, а также предлагается понимание того, как эти инновации могут быть устойчиво интегрированы в рамки соревнований. Преодолевая разрыв между природными способностями и технологическим прогрессом, трансгуманизм открывает как возможности, так и проблемы, которые меняют спортивную индустрию. В конечном счете, в этой статье подчеркивается необходимость того, чтобы регулирующие органы уравнивали технический прогресс с этическими соображениями, обеспечивая справедливость и доступность, поскольку спорт продолжает развиваться в эпоху совершенствования человека.

Ключевые слова: *технологии, трансгуманизм, естественность, конкуренция, будущее спорта, инклюзивность, этические дилеммы.*