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Technological doping in sports: The new frontier of competitive advantage

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Abstract

A new frontier in the pursuit of competitive advantage is technical doping. It asks for a re-evaluation of the principles that guide sports and questions established ideas of justice. It will be more crucial than ever to have strong regulations and unambiguous ethical standards as athletes, coaches, and regulators navigate this changing environment. Technical doping, the use of advanced technologies to enhance athletic performance, has become a significant issue in the sports world. It involves devices, equipment, or substances that provide athletes with a performance advantage beyond natural human capability. The rise of technical doping presents ethical and regulatory challenges for sports governing bodies, as it undermines the principle of equal opportunity and diminishes the value of athletic achievements. Regulating technical doping is complicated by the rapid pace of technological innovation, and distinguishing between acceptable advancements and those that constitute technical doping can be subjective. Supporters argue that technological advancements can enhance the overall experience of sports, while opponents argue that it undermines the essence of athletic competition. Striking a balance between embracing innovation and preserving the integrity of sports is crucial. Governing bodies, athletes, and stakeholders must collaborate to develop clear guidelines that ensure a fair and level playing field for all competitors.

Keywords: Technological doping, equipment enhancement, biomechanical devices

Introduction

The pursuit of improved performance in the dynamic world of sports has crossed conventional lines and into the domain of technological innovation. Technological doping, or the use of cutting-edge technology to obtain an advantage over competitors, has generated a lot of discussion and called into question the values of sportsmanship and fair play. This article examines the many aspects of technology doping, the effects it has on sports, and the moral conundrums it raises.

Modern technology is frequently accepted unless the sport's regulatory bodies believe it poses a threat to its integrity. People fear that sports engineering could: overshadow the triumph of human spirit and effort, make certain sports easier, create unfairness so the "best athletes" might not win, and ensure that rich athletes and countries have an advantage over the poor ones, according to a report released just before the 2012 Summer Olympics. The report quotes an extensive public survey (Hsu, Jeremy, 2012)^[2].

The act of exploiting athletic equipment to obtain a competitive advantage is known as "technology doping." When it comes to technologies that are "performance-enhancing" or "going against the spirit of the sport," the World Anti-Doping Agency (WADA) is considering banning them. WADA started a consultation on technology doping in 2006, and it is now officially acknowledged as a concern. However, each sport's governing body is ultimately responsible for deciding whether to accept or prohibit new technology, particularly when it comes to sports equipment (Institution of Mechanical Engineers, 2012)^[3].

The Development of Doping in Technology

Doping with technology is not a new thing. There are numerous examples in sports history of sportsmen using technology to enhance their performance. Technology has always contributed to improving athletic talents, from the development of high-performance training gear to the introduction of lightweight materials in equipment.

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On the other hand, more advanced technological advancements like wearables, data analytics, and biomechanical improvements characterise the current wave of technological doping.

Different Kinds of Technology Doping

1) Equipment Enhancements

Swimsuits

A large number of world records were broken in 2009 as a result of the competitive swimming community's adoption of polyurethane swimsuits. Because these suits increased buoyancy and decreased drag, the regulatory body decided to outlaw them.

The majority of swimmers competing in the 2008 Beijing Olympics used Speedo LZR swimsuits, which were made expressly to increase swimmer speed. The entire body, from shoulder to leg, was covered by the suit, which was engineered to maximise hydrodynamics and body compression. Better oxygen delivery to the muscles was made possible by the suit, but it also trapped air to increase buoyancy. The International Swimming Federation (FINA) decided to outlaw all full-body swimsuits in 2009 in response to a lot of controversy and debate about whether or not these suits were so technologically sophisticated as to be considered a kind of mass doping. The new regulations remained in place when they were implemented in January 2010. The sport hasn't yet recovered from the dramatic decline in performance caused by the outlawing of LZR suits (Thomson C, 2021)^[4].

Running Shoes

Discussions concerning the effects of advanced running shoes with responsive cushioning and carbon fibre plates on running performance have been generated. With their ability to replenish the runner's energy, these shoes may lessen weariness and speed up runs.

The Nike Vaporfly running shoe was launched in 2017. Its sole has Pebax foam and a full-length carbon fiber plate. As with the LZR case, it was debated whether they were a form of technology doping (Futterman, Matthew, 2020)^[1].

The legal Vaporflys appear to be typical shoes on the outside. However, little variations add enough to make a big difference. The British Journal of Sports Medicine claims that the Vaporfly's effectiveness is primarily dependent on the carbon fibre plate, midsole composition, and thickness.

The full-length plate serves as a lever to cut work at the ankle while also stiffening the shoe. According to studies that are peer-reviewed and sponsored by Nike, this improves running efficiency by 1.5%. The hardness of the carbon plate alone could seem uncomfortable, but the heel's 31mm thickness of the midsole compensates for this.

Because the midsole is composed of Pebax foam, a polyamide block elastomer, it doesn't add weight in comparison to a standard race shoe. Air pods, an additional suspension system, are also present in more modern versions (Witts J., 2021)^[7].

2) Biomechanical apparatuses

Prosthetics

The use of prosthetic limbs by double-amputee sprinter Oscar Pistorius brought to light the benefits and drawbacks of biomechanical improvements. Prosthetics can help injured athletes compete on an even playing field, but they also raise concerns about undue advantages.

Artificial limbs can be used by amputees to compete in the Paralympic Games. There has been much discussion on whether athletes who use prosthetic limbs have an advantage

over others who are able-bodied and if they are allowed to compete in the Olympics. Another topic of discussion has been the impact of artificial limb length at the Paralympic Games.

Exoskeletons

By offering support and lowering the chance of damage, emerging technologies like exoskeletons can help athletes train and recuperate. Their application in competition is somewhat controversial, nevertheless.

3) Wearable Technology

Ionized Shirts

"IonX shirts" are made of a material that a New Zealand company says has a negatively charged electromagnetic field. It also says that the shirt promotes blood flow, which helps the muscles absorb oxygen more quickly and expel lactic acid more swiftly. The World Anti-Doping Agency has determined that this technique is not currently forbidden because there is no scientific publication proving the material genuinely alters the body's ion charges or improves performance, nor does the material include any compounds that are prohibited.

Performance tracking

Athletes can tailor their training routines to maximise their heart rate, mobility, and other physiological data with wearable devices. Although they are helpful for personal growth, the data-driven insights they offer have the potential to distort the competitive landscape.

Augmented Reality

By offering immersive simulations and real-time feedback, AR devices can improve training. The way athletes practice for competition is evolving as a result of the use of augmented reality.

4) Interactive Materials

An Australian science organisation called the Commonwealth Scientific and Industrial Research Organisation developed a garment with the ability to track movement and provide feedback. A basketball player, for instance, may put the material on as sleeves. The athlete receives real-time feedback on their motions from sensors in the material, which transmit data to a computer when the player makes shots and responds with audio tones. To improve, athletes might employ tonal patterns they learn to identify successful or poor motions. In order for the athlete to continue performing well after the material is removed, the substance helps the athlete acquire muscle memory and correct their movement.

5) Telemetry Hacking

In an effort to increase public interest in the sport, the organisers of the Women's World Gliding Championship at Lake Keepit 2020 required competitors to utilise a real-time tracking technology prior to the event. For the purpose of keeping the race interesting, each competitor's position was held back by fifteen minutes. After a few days of competition, suspicions were raised due to the Australian pilots' extraordinary accuracy in predicting their opponents' movements. On the penultimate day of the competition, Terry Cubley, the EO of the GFA, the captain of the Australian team, admitted hacking the live tracking system (while denying cheating), avoiding the 15-minute delay, and radioing the competitors' real-time positions to the Australian pilots, giving them a significant tactical advantage.

6) Mechanical Doping

The use of a covert motor to power a bicycle is known as mechanical doping in cycling. The International Cycliste Union forbids it. In the 2010 Tour of Flanders, there was one of the earliest accusations of mechanical doping. The 2016 UCI Cyclo-cross World Championships saw the first—and thus far, only—confirmed use of mechanical doping. Since the 2015 season, bike checks have become a regular occurrence in road racing. A fine of between 20,000 and 200,000 Swiss Francs and a minimum six-month penalty await riders found guilty of mechanical doping (BBC, 2016) [6]. French officials used thermal cameras during the 2016 Tour de France to enforce its anti-mechanical doping policy (Thorbecke, Catherine, 2016) [5].

Ethics-Related Issues and Rules

There are basic moral concerns with technological use in sports. Whether technology doping compromises the spirit of fair competition is the main worry. Sports have historically been seen as an examination of human aptitude, skill, and willpower. The distinction between artificial enhancement and natural talent can become hazy when technology gets involved.

Regulating organisations must overcome the difficulty of formulating and implementing technical doping regulations. To address this issue, the International Olympic Committee (IOC) and some sports federations have put in place guidelines. For example, prohibiting some types of swimwear and regulating the requirements for running shoes are measures taken to uphold equity. But the speed at which technology is developing frequently outpaces regulators' capacity to keep up.

Sports' Future in a Technological Age

With the help of technology, you may be able to run faster in the future by feeling less exerted. This focuses on transcranial direct current stimulation (tDCS), a method of brain manipulation that is already gaining traction. The theory is that when you flag, your brain learns to sustain stronger neural impulses by sending a low current through your grey matter, which speeds up your time. Large claims made by tDCS products that aren't supported by third-party research are already available on the market (Witts J., 2021) [7].

There will be a greater discussion over technology's place in sports as it develops further. Technology improvements have the potential to improve performance and increase the excitement of sports, but they also run the risk of levelling the playing field. Maintaining the integrity of sports will require striking a balance between fairness and innovation.

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