THE INFLUENCE ARTIFICIAL INTELIGENCE ON SPORTS AND HEALTH

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REVIEW, RESEARCH ARTICLE

Abstract
The paper looks at the growing impact of artificial intelligence (AI) in sports and health, highlighting how advanced technologies are helping to optimize physical performance, prevent injuries and improve overall health. We present a concrete application of AI, such as real-time monitoring of physiological parameters, personalization of training programs, early diagnosis of conditions and assistance in medical recovery. The current ethical challenges and limitations of the use of AI in these areas are also discussed. The study highlights the major potential of artificial intelligence to revolutionize the way athletes and healthcare professionals operate, providing an integrated perspective on the future of these two key areas.

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INTRODUCTION

The rapid technological development of recent decades has enabled the integration of AI into various fields, including sports and sports medicine. Through predictive analysis, machine learning, and smart wearable devices, AI helps assess physical condition, personalize training, and reduce injury risks. This paper evaluates how these applications influence athlete's performance and health.

MATERIAL AND METHOD

This paper is based on a documentary analysis of recent scientific sources (2020–2024), including articles, case studies, and technical reports regarding the use of A.I. in sports and healthcare. The following A.I. applications were compared:

- Optimization of sports performance through biometric monitoring
- Injury prevention through biomechanical analysis
- Health monitoring via wearable devices
- A.I. - assisted medical diagnosis and recovery.

RESULTS AND DISCUSSIONS

1. In a study by Wang and Li (2021), the football team at Beijing University implemented AI to adapt training in real-time based on biometric data, achieving an 18% improvement in endurance parameters.

2. According to Patel (2023), AI-integrated smart bracelets enabled early detection of chronic fatigue symptoms in performance runners with 92% accuracy.

3. Miller et al. (2022) documented the use of AI-integrated biomechanical sensors in professional basketball teams in the US, reducing knee injury incidence by 27% over one competitive season.

A.I. Applications in Handball:

In handball, A.I. is being used for game tactic analysis, player performance evaluation, and injury prevention. Computer vision systems can analyze players real-time movements on the field, identifying effective play patterns or defensive weaknesses.

A concrete example is the "HandballAI" system tested in Denmark (Jensen et al., 2022), which uses image recognition algorithms to monitor players' positioning in defense. This system, implemented at junior team levels, improved defensive strategies by up to 20%.

A.I. is also used for biomechanical analysis of throws, helping to prevent shoulder injuries common among handball players. Sensors integrated into training equipment monitor joint angles and applied forces, and the collected data is analyzed by algorithms to offer personalized recommendations.

Additionally, A.I. contributes to athlete selection and the creation of personalized game profiles using historical performance, play styles, and physical endurance data like in Table 1.

Table 1

AI Applications in Handball

Application Area	Type of A.I. Used	Observed benefit
Tactic analysis	Computer vision	+20% defensive efficiency
Injury prevention	A.I. - assisted biomechanics	-25% shoulder injuries
Performance evaluation	Machine learning	+15% selection precision

Extension: A.I. and Personalized Sports Nutrition

A promising research area is using AI to personalize athlete's nutritional regimes. Machine learning algorithms can analyze data such as:

- Daily caloric requirements
- Type of sport practiced
- Athlete's genetic profile
- Basal metabolic rate
- Medical and training history.

According to a study by Novak et al. (2023), using AI to personalize meals in a team of performance triathletes led to a 6% increase in muscle mass and an 18% reduction in inflammation markers.

Applications like Lumen and Nutri Sense, powered by A.I., are already used in endurance sports to adjust real-time carbohydrate or protein intake based on an athlete's physiological state.

Extension: Predicting Cardiovascular Issues with A.I.

Another critical area is using A.I. to prevent cardiac events in athletes. Though generally healthy, performance athletes can present hidden risks like arrhythmias or hypertrophic cardiomyopathy.

A study by Laukkanen et al. (2022) showed that A.I. models can detect anomalies in ECG signals with 94% accuracy, surpassing the average human assessment. These systems are already used in cycling and athletics, where risks are higher due to intense effort like in Table 2.

The studies analyzed indicate that A.I. use has led to:

- A 15–25% increase in training efficiency through personalization;
- Up to a 30% decrease in muscle injury incidence via predictive analytics;
- Continuous and accurate physiological parameter monitoring (heart rate, oxygenation, stress level);
- Faster athlete recovery through A.I.-adapted protocols;
- Improved tactical analysis, injury prevention, and team selection in handball;
- Optimized personalized nutrition plans via A.I.;
- Superior accuracy in cardiovascular risk screening.

Table 2

Extended fields of application of AI in sports and health

Domain	A.I. Application	Observed benefit
Sports Nutrition	Machine learning on profiles	+6% muscle mass, -18% inflammation
Machine learning on profiles	ECG-based prediction	94% accuracy in risk detection
Personalized medicine	AI in prevention and recovery	30% faster recovery

CONCLUSIONS

Artificial intelligence is a valuable tool in optimizing performance and maintaining athletes' health. Effective application requires careful integration of technology into training and medical monitoring processes, with emphasis on data protection and interdisciplinary collaboration. As technology evolves, A.I. will become an increasingly indispensable ally in sports medicine, disease prevention, and promoting an active, healthy lifestyle.

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