O R I G I N A L   A R T I C L E

Developing an Artificial Intelligence Damage Management Model in the Process of Implementing Sports Researches, and Providing Relevant Solutions

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EXTENDED A B S T R A C T

Introduction

Artificial Intelligence (AI) is rapidly transforming nearly every aspect of human activity, including industry, education, medicine, and, increasingly, academic research. In the realm of sports science, AI applications are expanding swiftly, ranging from athlete performance tracking, injury prediction, and tactical simulations to the automation of training regimes and strategic decision-making. These developments have revolutionized the way sports are analyzed, taught, and even experienced. One of the most groundbreaking and controversial implementations of AI is its integration into the academic research process. This includes tasks such as literature reviews, data analysis, and scientific writing, all of which were traditionally the domain of human researchers.

AI-powered tools like ChatGPT, DeepSeek, Sider, and Gemini now offer unprecedented capabilities to accelerate the research workflow. They can summarize vast amounts of data, draft coherent texts, detect patterns in data, and even propose research questions or hypotheses. Their presence is reshaping the academic landscape by offering both support and potential disruption. However, despite their practical benefits, the adoption of AI in research, particularly within sports science, raises a wide array of concerns. These concerns range from the generation of technically incorrect or contextually shallow content to deeper ethical issues such as the erosion of human agency, data privacy violations, and algorithmic biases.

AI systems, while impressive in computational ability, are still limited in their understanding of domain-specific contexts and nuanced interpretations. In sports research, which often involves the integration of physiological, psychological, tactical, and sociocultural dimensions, these limitations become even more pronounced. The challenge is compounded when AI is used for content generation in academic publishing, where the accuracy and integrity of scientific communication are paramount. There are growing fears that over-reliance on AI tools might weaken essential research skills, reduce critical thinking, and promote a culture of superficial engagement with scholarly material.

Furthermore, the academic community faces the threat of standardization and homogenization in thought, where AI-generated content follows repetitive and formulaic patterns. The subtlety and originality that define rigorous academic work are at risk. There is also concern about the dilution of scholarly identity, as the line between human-authored and machine-generated content becomes increasingly blurred. Such developments can have far-reaching consequences, especially in fields like sports science that rely heavily on interdisciplinary insights and deep contextual understanding.

The purpose of this study is not to advocate for the abandonment of AI tools but rather to provide a structured framework for their responsible and intelligent use. This research aims to design a comprehensive model that identifies and categorizes the risks associated with AI in sports research and proposes targeted strategies to mitigate these risks. By doing so, it contributes to the development of policies and practices that preserve the integrity of academic output while

embracing the productive potential of AI.

Given the accelerated integration of AI in academia, the sports research community must proactively establish standards that ensure scientific quality, ethical rigor, and methodological transparency. This involves not only the technological fine-tuning of AI systems but also the education and empowerment of researchers. It is essential to cultivate a culture where AI is viewed as a complementary tool, not a substitute for human cognition. Such a paradigm shift requires comprehensive stakeholder engagement, including policymakers, educational institutions, journal editors, and technology developers.

The current study addresses this critical need by drawing insights from both human experts and advanced AI systems. Through a methodologically rigorous approach involving qualitative interviews and thematic analysis, it formulates a robust model of AI risk management in sports research. This model seeks to bridge the gap between AI innovation and academic responsibility, thereby ensuring that the future of sports science remains both dynamic and credible.

Mothodology

This qualitative research employed thematic analysis to identify key themes and patterns regarding the risks and management strategies associated with AI in sports science research. The study involved deep interviews with two types of participants: 12 human experts in AI and sports research and four major AI chatbots (ChatGPT, DeepSeek, Sider, and Gemini). Participants were selected based on their expertise in fields such as AI ethics, machine learning, sports informatics, and academic writing. The interviews continued until theoretical saturation was achieved. The data collected were coded and analyzed using MAXQDA software. Reliability was ensured through double-coding, expert validation, and structured feedback loops. Two primary research questions guided the interviews: first, to identify the specific risks of using AI in the academic research process within sports science; and second, to explore the most effective strategies for managing these risks. The responses were categorized into thematic codes, followed by the formulation of a structured conceptual model that connects identified risks with targeted mitigation strategies.

Findings

The findings revealed a set of critical issues and corresponding management strategies associated with AI use in sports research. The risks were categorized into six major sub-themes encompassing 46 unique codes. Firstly, in terms of content quality and accuracy, AI-generated texts often contained analytical errors, misleading information, repetitive content, and insufficient contextual understanding. Secondly, dependency on AI was shown to erode human research skills such as critical thinking, creativity, and academic writing. Thirdly, ethical and legal concerns arose due to AIے spotential to plagiarize, misuse data, breach privacy, and produce biased or untraceable content. The fourth risk area involved technical and infrastructural challenges, including software bugs, processing limitations, high costs, and cybersecurity vulnerabilities. Fifth, socio-cultural effects included reduced human interaction in research, the loss of traditional academic values, unequal access to technology, and declining trust in AI-generated outcomes. Lastly, a major concern was the threat AI poses to the credibility of scientific research through the proliferation of low-quality publications, reputational damage to authors, and ranking decline of institutions.

In terms of management strategies, six sub-themes were identified with a total of 43 codes. These included improving AI algorithms to enhance transparency and reliability, implementing robust policy and legal frameworks to regulate ethical use, and investing in education to raise awareness and train researchers in responsible AI usage. Additionally, human oversight remained critical in validating AI-generated content and ensuring quality control. Infrastructure development was another pillar, emphasizing equitable access to technology and international collaboration. Finally, transparency and accountability were necessary to ensure responsible use, including open algorithmic disclosures and clearly defined roles for content responsibility.

Discussion and Conclusion

The exponential integration of AI into the sports research ecosystem presents both remarkable opportunities and significant vulnerabilities. On the positive side, AI enables efficiency, innovation, and access to vast data-driven insights. It allows researchers to accelerate data processing, identify patterns that may otherwise remain undetected, and simulate complex systems. This leads to increased productivity and, potentially, more impactful outcomes.

However, these benefits come with considerable risks. Without adequate human oversight and ethical safeguards, AI can compromise research quality, dilute scholarly rigor, and introduce systemic biases. The findings emphasize that AI systems frequently struggle with contextual nuances specific to sports science, leading to overly generic or misleading outputs. Such limitations can result in superficial analysis, erroneous interpretations, and ultimately, flawed conclusions.

The risk of skill degradation is particularly alarming. As researchers grow dependent on AI-generated outputs, their capacity for independent analysis, critical evaluation, and creative thinking may erode. This shift represents not only a methodological concern but also a cultural one. The academic tradition is built on inquiry, skepticism, and intellectual independence all of which are threatened when machines dominate cognitive tasks. The study sinsights suggest a clear need for recalibrating the human-AI relationship in academia to avoid becoming passive consumers of algorithmic content.

Ethical and legal challenges are also pressing. Issues such as data misuse, unintentional plagiarism, algorithmic opacity, and unregulated data scraping are becoming increasingly prevalent. These challenges underscore the urgency of developing institutional and national governance frameworks that can both empower and restrain AI usage. Legal structures must evolve to address the new realities introduced by intelligent systems, particularly in how intellectual property, data rights, and accountability are defined and enforced.

Technical and infrastructural obstacles further complicate the picture. Many institutions, especially in developing regions, lack the computational resources, cybersecurity infrastructure, and technical expertise to effectively implement and monitor AI tools. This creates disparities in research capacity and contributes to a growing digital divide. Such inequalities can marginalize institutions and researchers, limiting the global inclusiveness of sports science and hindering international collaboration.

Social implications are equally significant. The shift in the role of the researcher-from knowledge creator to system operator-can impact professional identity, academic motivation, and the broader culture of inquiry. Trust in research findings may decline if stakeholders suspect that outputs are generated by unvetted or untraceable algorithms. This erosion of trust not only affects individual researchers but also undermines the credibility of institutions, journals, and the broader scientific community.

In response to these multifaceted challenges, the study proposes a conceptual model that incorporates both preventive and corrective measures. These include legal and ethical frameworks, technological enhancements, capacity-building initiatives, and infrastructural support. A key recommendation is to embed transparency and accountability into the development and deployment of AI tools. Researchers must have access to clear documentation about how AI systems operate, what data they use, and how they make decisions. Furthermore, responsibility for AI-generated content must be explicitly defined to avoid ambiguity in authorship and liability.

The model also highlights the importance of educational reform. AI literacy should become a core component of academic training in sports science. Researchers need to understand not only how to use AI tools but also when not to use them. This involves critical thinking, ethical reasoning, and domain-specific expertise. Training programs should emphasize the limitations of AI, the value of human insight, and the necessity of methodological rigor.

Institutions are encouraged to adopt proactive policies that guide AI usage in research settings. These policies should align with global best practices but also reflect the unique ethical and cultural values of each region. Cross-border collaborations are especially important for sharing resources, harmonizing standards, and fostering innovation in a responsible manner.

Journals and peer-review systems must also adapt. Reviewers need tools and training to identify AI-generated content and assess its quality. Editorial guidelines should be updated to reflect the realities of AI-enhanced writing and establish expectations regarding transparency, authorship, and originality.

In summary, this study offers a forward-looking framework for integrating AI into sports science research in a manner that preserves its integrity and enhances its value. The proposed model serves as a roadmap for researchers, institutions, and policymakers seeking to harness the power of AI while safeguarding the foundational principles of academic inquiry. Responsible innovation, guided by ethical foresight and collective commitment, is essential to ensure that the adoption of AI leads to progress, not peril, in the world of sports research.