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Exploring Safety Management Dimensions in Sports: Insights for Public Health and Policy from a Content Analysis of Top-Ranked Articles

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ABSTRACT

One of the main tenets of sustainable development in societies is public health, which refers to a collection of coordinated efforts to prevent illness, promote health, and enhance population-level quality of life. A thorough understanding of the different aspects of health, combined with a structured analysis of the factors that influence it—especially in areas like sports and physical activity—can play a crucial role in formulating effective strategies for promoting safety, reducing risks, and enhancing public health outcomes. Given the physical activities and intense competitions of athletes, maintaining their health and safety is of paramount importance. The main goal of this research is to identify the dimensions of safety management in sports by studying and analyzing the top ten reputable articles in this field published in the Scopus citation database. This research aims to promote this crucial area by identifying key principles and dimensions of safety management in sports and focusing on improving the safety and health of athletes as its primary objective. To achieve this goal, 214 international articles from various sources around the world that were published in the Scopus citation database were selected and examined. These articles were published between 1993 and 2023 and were studied and analyzed to extract dimensions and principles of safety management in sports through content analysis. In this research, specialized software such as Publish OR Perish, Excel, VOSviewer, RStudio, R, and Maxqda2020 was used for searching, identifying, and evaluating safety management elements in sports. The results of this content analysis led to the identification of eight dimensions in the field of safety management and sports, which were repeatedly mentioned in the top ten articles in this area. These dimensions include physical safety, medical safety, psychological safety, legal safety, tourist safety, education and training, risk management processes, and safety barriers. With these dimensions, safety can be significantly enhanced, and unforeseeable risks can be greatly reduced.

Keywords: Public Health, Safety Management, Sport, Content analysis

Introduction

Public health stands as one of the most vital pillars of sustainable development in contemporary societies, encompassing organized efforts to prevent disease, promote well-being, and enhance the quality of life on a population scale (Bage, 2023). Over the past few decades, the burden of non-communicable diseases, injuries, and lifestyle-related

health risks has escalated worldwide, underscoring the necessity of preventive measures and evidence-based policy frameworks (Omotayo et al., 2024). In this context, public health research has evolved beyond the management of infectious diseases to incorporate broader social, political, and economic dimensions, placing a growing emphasis on behavioral and environmental determinants of health (Islam et al., 2025; Olorunsogo et al., 2024). Within this expanded framework, sports have emerged as a critical domain, with their inherent physicality and competitive nature both promoting health and posing significant safety challenges (Van Hoye et al., 2021).

Sports and physical activities play an integral role in enhancing physical and psychological health, fostering social cohesion, and contributing to national identity and cultural capital (Moghadam et al., 2019). However, these benefits are accompanied by substantial risks. The competitive pressure embedded in elite sports can push athletes toward risk-taking behaviors, often at the expense of safety protocols and ethical standards (Chen et al., 2019). This "winning at all costs" mentality increases the probability of injuries and jeopardizes athletes' long-term health, particularly in environments where safety regulations are poorly enforced or regarded as obstacles to performance excellence (Bryce & Dowling, 2024). The consequences of unsafe sporting environments extend beyond athletes, affecting spectators, coaches, and facility staff, and can undermine public trust in sports institutions.

The significance of safety management in sports has grown in tandem with the rapid globalization and commercialization of the sports industry. Modern sport events, especially those attracting mass audiences, pose complex safety challenges that demand robust management strategies (Cieslak, 2009; Kargar et al., 2017). Stadium disasters and security lapses, such as the infamous Hillsborough disaster, serve as cautionary reminders of the catastrophic consequences of inadequate safety oversight (Frosdick & Walley, 2010). Moreover, the persistent threat of terrorism since the September 11 attacks has transformed security protocols at large-scale sporting events worldwide, necessitating multilayered strategies to safeguard athletes and spectators alike (Taylor & Toohey, 2007). Consequently, sports managers are expected not only to mitigate conventional injury risks but also to anticipate and neutralize security threats, reinforcing the importance of comprehensive safety and risk management frameworks (Soleymani Tapesari & Mirshekari, 2022).

Despite widespread acknowledgment of its importance, the implementation of safety management within sports has often been fragmented and reactive rather than systematic and preventive (Swan et al., 2009). This gap is partly attributable to a lack of organizational accountability and standardized protocols, which weakens the consistency and effectiveness of safety measures across different levels of sport (Poulos et al., 2010). Furthermore, some sports organizations tend to prioritize performance and financial gains over safety, leaving critical vulnerabilities unaddressed (Charkhab et al., 2021). As a result, unsafe environments persist, elevating the frequency of preventable injuries and imposing substantial financial burdens on sports institutions (Koozehchiyan et al., 2012). Addressing these challenges necessitates the establishment of a coherent safety culture—an organizational mindset that places athlete well-being at the center of decision-making and operational practices (Hasanbeigi & Madavani, 2021).

Scholars have consistently stressed the need for comprehensive risk assessment mechanisms to detect and mitigate potential hazards before they lead to adverse events (Faraji et al., 2023). Effective risk management not only reduces injury rates but also enhances athlete performance by providing secure training environments conducive to skill development (Torkesaluye et al., 2015). In school and youth sports settings, where safety literacy is often underdeveloped, studies have revealed gaps in supervision, emergency preparedness, and safety training that endanger students and staff alike (Hassani et al., 2008). Such findings underscore the necessity of embedding safety management principles within the organizational systems of sports institutions from grassroots to elite levels (Seo et al., 2018). Moreover, safety management frameworks must be context-sensitive, accommodating the cultural, infrastructural, and environmental specificities of different sports and regions (Lee et al., 2018).

Technological innovation also offers promising avenues for strengthening safety practices in sports. Recent research has explored the use of wearable devices to monitor athletes' physiological and psychological states in real-time, allowing for timely interventions that can prevent overexertion and associated injuries (Guo et al., 2017). Similarly, the emergence of precision safety management models has enabled organizations to integrate data analytics and predictive modeling into their safety protocols, enhancing the accuracy and responsiveness of risk mitigation strategies (Wang et

al., 2023). However, the adoption of such innovations requires organizational readiness and supportive leadership, which are often lacking in sports contexts that undervalue safety as a strategic priority (Bagheri et al., 2019). Building this readiness involves cultivating a shared ethical responsibility among managers, coaches, and athletes to prioritize safety alongside performance goals (Diamond et al., 2019).

In addition to technological and organizational interventions, fostering a culture of ethical responsibility and safety awareness is pivotal. Many safety lapses in sports stem from human errors, poor communication, and inadequate training, rather than equipment failure alone (Dehghan et al., 2023). Promoting safety thus requires continuous education, regular drills, and transparent communication channels that reinforce safe behaviors as non-negotiable standards of practice (Van Hoye et al., 2021). Such cultural transformations depend heavily on leadership: managers who embody ethical conduct and proactively address risks can instill safety-conscious attitudes across their organizations (Karoubi et al., 2021). Conversely, organizations that neglect ethical leadership tend to struggle with low compliance and recurrent accidents, undermining both athlete welfare and institutional credibility (Bryce & Dowling, 2024).

Safety management in sports also intersects with broader public health objectives, as sports venues are public spaces that influence community health beyond their immediate participants (Bage, 2023). Effective safety systems can prevent mass-casualty events, reduce the burden on healthcare systems, and promote sustained public engagement in physical activity—all of which are cornerstones of population health (Olorunsogo et al., 2024). Moreover, safety concerns extend to ancillary domains such as sports tourism, where accidents or perceived security risks can erode public confidence and deter participation (Shahmansouri & Mozaffari, 2007). This highlights the necessity of embedding safety considerations into the broader policy frameworks governing sports and recreation (Veselinović et al., 2020). By aligning sports safety with public health policy, institutions can create synergistic systems that protect both individual athletes and the wider community.

Ultimately, the absence of an integrated safety management model undermines the resilience and sustainability of sports systems. While isolated initiatives—such as safety training workshops, equipment inspections, and emergency protocols—have been introduced in various contexts, they often lack coordination and systematic evaluation (Hosseinpour et al., 2019). A unified model that consolidates physical, medical, psychological, legal, educational, and organizational dimensions of safety is essential to achieve consistent and enduring outcomes (Musa, 2018). Developing such a model requires comprehensive research to synthesize existing evidence, identify critical gaps, and translate insights into practical frameworks that can be adopted across diverse sports organizations (Charkhab et al., 2021). The present study seeks to address this need by conducting an extensive content analysis of the most influential articles on safety management in sports, aiming to delineate its key dimensions and offer a systematic model for its implementation.

In summary, safety management is not a peripheral concern but a foundational element of sustainable sports development and public health promotion. It demands an interdisciplinary approach that integrates ethical leadership, technological innovation, risk assessment, regulatory compliance, and cultural change. By clarifying the multidimensional nature of safety management in sports, this study aims to support the development of coherent, evidence-informed strategies that can reduce accidents, safeguard athlete health, and enhance the long-term viability of sports institutions.

Methods and Materials

The present study is conducted with an emphasis on a qualitative approach and is based on the interpretive research paradigm. The main objective of this research is to identify the dimensions of safety management in sports. To achieve this, a three-stage coding method of Grounded Theory was employed, consisting of open coding, axial coding, and selective coding. The statistical population of this study consists of all articles published in the Scopus database related to safety management and sports from 1993 to 2023, which also includes the relevant keywords for the research. According to the latest search, the total number of these articles was 214. The three main keywords used in the search

were "safety management," "risk management," and "sports," which served as the primary criteria for identifying these articles. Another important criterion was the publication of the identified articles in journals and periodicals, which led to the exclusion of conference papers from the scope of the study. Since the researchers were unable to review all the published documents, the top ten articles in this field were identified using Rstudio software, and the coding process was carried out on these articles.

In the open coding stage, the concepts extracted from the top ten articles are first divided into semantic units. In other words, these concepts are broken down into semantic components, and each unit is assigned an appropriate label. Each semantic unit is represented with a concept that refers to a specific sentence or word. These concepts are then grouped and organized within a common framework known as categories. To further clarify the relationships among these categories, the characteristics and dimensions of each are also identified. In the next stage, known as axial coding, the core categories around which other categories are organized are identified, and the relationships between these central categories and other categories are examined. The goal of this stage is to establish connections between the categories produced in the open coding stage. In this process, the core categories are identified, and the relationships between these central categories and other categories are analyzed. Selective coding refers to limiting the coding process to those variables that are related to the central variable. In the selective coding stage, based on the results obtained from the previous two stages of analysis, the information is coded, and this stage is considered one of the crucial parts of the research. In this phase, the categories of safety management in sports are identified and developed, such that related concepts are recognized as a set or category and are linked to safety management in the field of sports.

On the other hand, in any research, attention to two fundamental components, namely validity and reliability, is among the most important aspects. These two elements are examined differently in qualitative research compared to quantitative research and are assessed using specific indicators. In qualitative studies, validity is evaluated through the acceptance and recognition of the results. To ensure the validity of the concepts and codes obtained, three faculty members with extensive experience in conducting qualitative research and using the Maxqda2020 software reviewed the coding process. Their feedback on the coding stages was provided, and necessary corrections were made to the identified issues. In this study, to assess reliability, the test-retest method was employed. For calculating the reliability of this test, a selection of articles was chosen as samples, and each of them was re-coded at different time intervals. This process was carried out to evaluate and ensure the reliability of the research findings, and Table 1 illustrates this process.

Table 1. The Process of Determining the Reliability of Article Coding

Articles	Number of Codings	Number of Agreements	Number of Disagreements	Test-Retest Reliability (%)
Deck & Willinger (2008)	174	165	9	94.82
Rödler et al. (2012)	148	130	18	87.73
Taylor & Tohi (2007)	287	256	31	89.19
Total	609	551	58	90.47

In most cases, the test-retest reliability coefficient is reported, and if the result exceeds 60%, it is considered to indicate acceptable reliability in the study. The results of the retest showed that the coding reliability coefficient of the articles was 90.47%, meaning that the reliability of the research has been confirmed to be acceptable.

Findings and Results

According to the information presented in Figure 1, the top ten articles in the field of safety management and sports were extracted from a total of 214 articles in this domain using R Studio software, along with several characteristics such as citation counts, and other relevant features. In the first stage of the coding process, the content of the top ten articles was analyzed until no new codes emerged from the text of these articles.

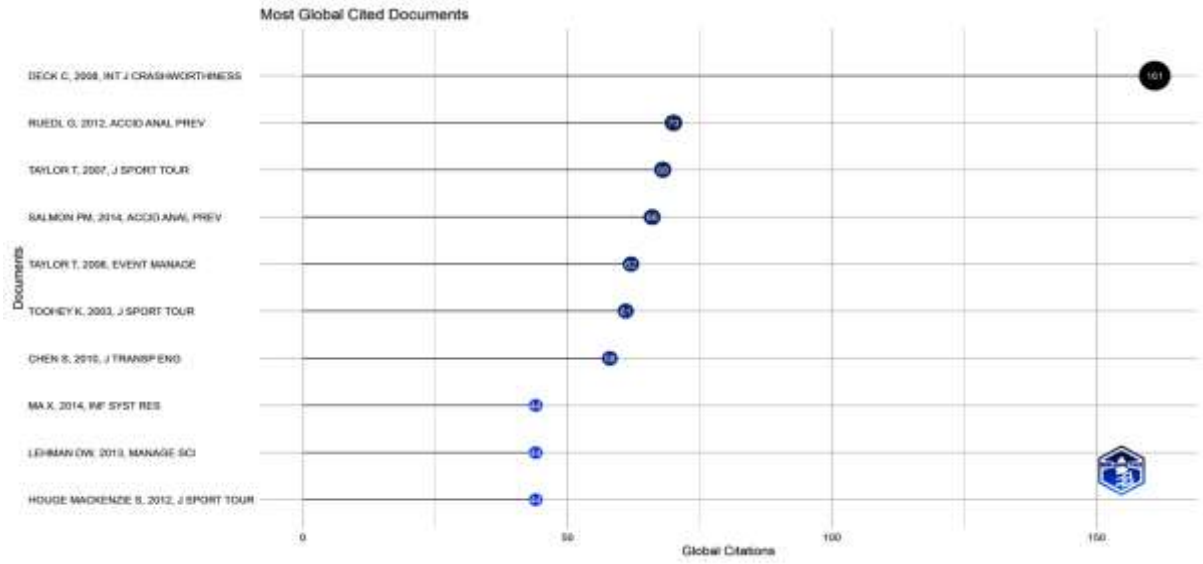

Figure 1. Top Ten Studies in Safety Management and Sports

A sample of how this analysis was conducted and how concepts were assigned to the semantic units in this study is presented in Table 2.

Table 2. Analysis and Assignment of Concepts to Semantic Units

Semantic Units	Concepts	Article
Adventure activities are recognized for facilitating optimal states such as flow, as these activities provide opportunities to exercise personal control over risks and choose challenging activities freely.	Personal Safety	McKenzie & Kerr, 2012
The results indicate that the presence of road barriers, the use of helmets, not riding at excessive speeds, and not driving under the influence of alcohol each typically provide small safety benefits for motorcyclists in collisions with fixed objects when considered separately.	Safe Driving Education	Salmon & Lenne, 2015
The legacy of September 11, 2001, and subsequent terrorist attacks such as the Bali (2002), Madrid (2004), and London (2005) bombings is evident in the increased security systems and measures implemented at major sporting events.	Installation of Security Systems	Taylor & Toohey, 2007

In the axial coding phase, the initial data and codes were repeatedly reviewed and compared. Codes with greater semantic similarity were organized into unified concepts. Ultimately, the initial codes extracted in the previous stage were presented as axial codes, leading to a reduction in their total number. As a result, 39 axial codes were identified, as illustrated in Table 3.

Table 3. The Axial Coding Process of the Top Ten Articles in the Field of Safety Management in Sports

Axial Code	Article	Axial Code	Article
Safety Culture	(Swan et al., 2009), (Bryce & Dowling, 2024), (Veselinović et al., 2020), (Taylor & Toohey, 2007), (Charkhab et al., 2021)	Adventure Tourism	(Moghadam et al., 2019)
Automation and Engineering Controls	(Wang et al., 2023), (Seo et al., 2018), (Lee et al., 2018)	Increasing Participation	(Van Hoye et al., 2021), (Moghadam et al., 2019)
Procedures and Protocols	(Bagheri et al., 2019), (Hosseinpour et al., 2019), (Faraji et al., 2023)	Safe Sports Training	(Diamond et al., 2019), (Bagheri et al., 2019)
Safety Signs	(Lee et al., 2018)	Skill Enhancement	(Faraji et al., 2023), (Diamond et al., 2019), (Bagheri et al., 2019)
Emergency Systems	(Dehghan et al., 2023), (Faraji et al., 2023), (Bryce & Dowling, 2024), (Taylor & Toohey, 2007), (Swan et al., 2009)	Safety Knowledge Dissemination	(Bagheri et al., 2019), (Van Hoye et al., 2021), (Faraji et al., 2023), (Seo et al., 2018), (Diamond et al., 2019), (Charkhab et al., 2021), (Chen et al., 2019)
Physical Barriers	(Dehghan et al., 2023), (Frosdick & Walley, 2010)	Implementation of Safety Protocols and Procedures	(Bagheri et al., 2019), (Faraji et al., 2023), (Swan et al., 2009), (Hosseinpour et al., 2019)
Preventing Terrorist Attacks	(Taylor & Toohey, 2007), (Cieslak, 2009), (Frosdick & Walley, 2010)	Risk Assessment	(Faraji et al., 2023), (Bryce & Dowling, 2024), (Chen et al., 2019), (Bagheri et al., 2019)
Transportation Safety	(Taylor & Toohey, 2007), (Lee et al., 2018), (Bryce & Dowling, 2024), (Swan et al., 2009)	Identifying Potential Hazards	(Faraji et al., 2023), (Bryce & Dowling, 2024), (Seo et al., 2018), (Chen et al., 2019), (Frosdick & Walley, 2010), (Bagheri et al., 2019)
Crowd Safety	(Cieslak, 2009), (Taylor & Toohey, 2007)	Legal Regulations	(Kargar et al., 2017)
Venue Safety	(Koozehchiyan et al., 2012), (Swan et al., 2009), (Frosdick & Walley, 2010)	Property Rights	(Kargar et al., 2017)

Legal Responsibilities	(Kargar et al., 2017), (Swan et al., 2009), (Taylor & Toohey, 2007)	Public Space Safety	(Taylor & Toohey, 2007), (Veselinović et al., 2020), (Lee et al., 2018), (Cieslak, 2009)
Gender Discrimination	(Van Hoye et al., 2021), (Taylor & Toohey, 2007), (Charkhab et al., 2021)	Emergency Preparedness	(Dehghan et al., 2023), (Faraji et al., 2023)
Legal Support	(Kargar et al., 2017), (Taylor & Toohey, 2007)	Environmental Safety	(Olorunsogo et al., 2024), (Omotayo et al., 2024), (Seo et al., 2018), (Bage, 2023)
Rule of Law	(Kargar et al., 2017), (Taylor & Toohey, 2007), (Veselinović et al., 2020), (Cieslak, 2009)	Drug Safety	(Chen et al., 2019), (Diamond et al., 2019)
Legal Rights and Freedoms	(Kargar et al., 2017)	Road Safety	(Lee et al., 2018), (Bryce & Dowling, 2024)
Mental Health	(Guo et al., 2017), (Van Hoye et al., 2021)	Personal Safety	(Bagheri et al., 2019), (Diamond et al., 2019), (Bryce & Dowling, 2024), (Faraji et al., 2023), (Hasanbeigi & Madavani, 2021), (Musa, 2018)
Emotion Regulation	(Guo et al., 2017), (Van Hoye et al., 2021), (Bagheri et al., 2019), (Hasanbeigi & Madavani, 2021)	Use of Protective Equipment	(Diamond et al., 2019), (Faraji et al., 2023), (Chen et al., 2019), (Dehghan et al., 2023)
Positive Feedback	(Diamond et al., 2019)	Environmental Safety	(Olorunsogo et al., 2024), (Omotayo et al., 2024), (Bage, 2023), (Seo et al., 2018), (Veselinović et al., 2020), (Van Hoye et al., 2021)
Supportive Environments	(Van Hoye et al., 2021), (Bryce & Dowling, 2024), (Faraji et al., 2023), (Seo et al., 2018), (Bage, 2023), (Taylor & Toohey, 2007), (Charkhab et al., 2021), (Veselinović et al., 2020)	Injury Prevention	(Bagheri et al., 2019), (Diamond et al., 2019), (Faraji et al., 2023), (Chen et al., 2019), (Dehghan et al., 2023)
Equipment Safety	(Diamond et al., 2019), (Faraji et al., 2023)		

In the final stage, following the initial steps of open and axial coding, all the extracted codes were organized and categorized into eight final dimensions based on the research topic, which focuses on the dimensions of safety management. The final model of safety management dimensions in sports, derived from a content analysis of the ten most relevant articles in this field, is presented in Figure 2. In this model, the thickness of some lines indicates a stronger relationship between the corresponding codes.

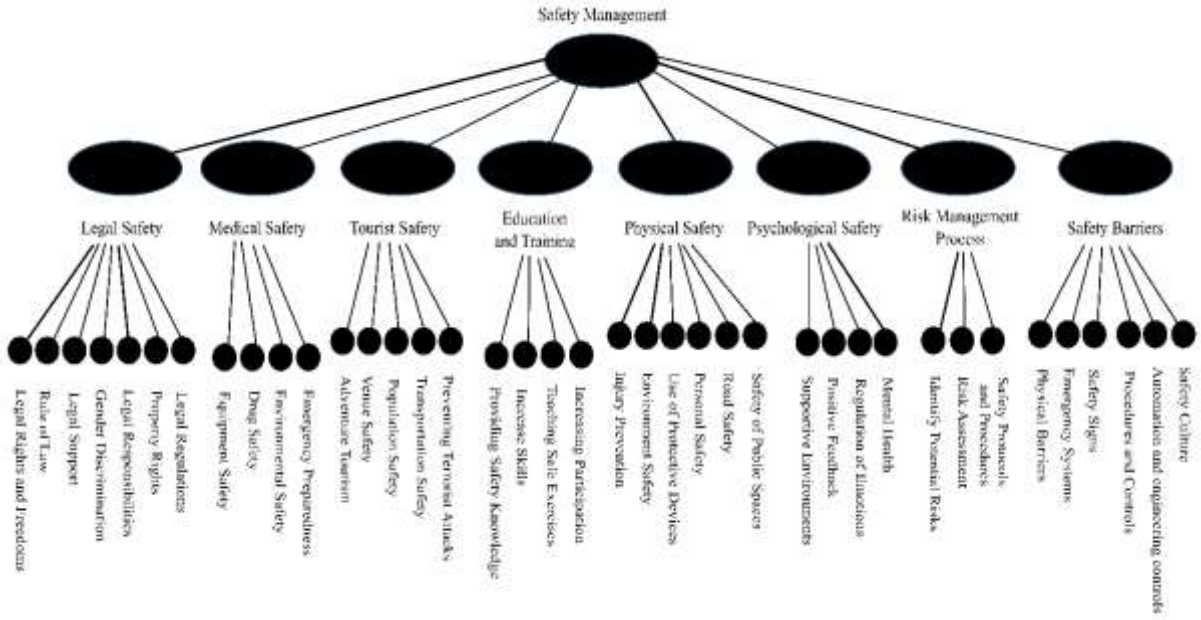

Figure 2. Final Diagram of Safety Management Dimensions

Discussion and Conclusion

The findings of the present study revealed eight distinct yet interconnected dimensions of safety management in sports: physical safety, medical safety, psychological safety, legal safety, tourist safety, education and training, risk management processes, and safety barriers. These dimensions emerged from a rigorous content analysis of the ten most influential scholarly articles on safety management in sports, reflecting a comprehensive approach to safeguarding athletes, staff, and spectators within sporting environments. The multidimensionality of safety management identified in this study underscores that safety in sports is not merely a set of technical procedures but a complex, systemic construct embedded within organizational culture, governance structures, and public health policies. This perspective

aligns with the broader view of public health as an integrative system encompassing preventive strategies, health promotion, and quality of life improvements at the population level (Bage, 2023; Islam et al., 2025; Olorunsogo et al., 2024).

A notable contribution of this research is the emphasis on the interdependence of physical and medical safety measures. The analysis showed that the most frequently cited safety components across the reviewed studies were the installation of security systems, identification of potential hazards, and implementation of emergency preparedness protocols. These elements collectively reinforce the infrastructure necessary for mitigating injuries and ensuring immediate medical responses when incidents occur. This finding is consistent with the assertion by (Faraji et al., 2023) that systematic risk management frameworks can substantially reduce the frequency and severity of sports-related injuries by addressing hazards before they escalate into crises. Moreover, (Torkesaluye et al., 2015) reported that regular assessments of multipurpose sports halls in relation to injury patterns revealed a strong correlation between proactive safety inspections and a reduction in injury rates, further supporting the significance of physical safety interventions.

Psychological safety also emerged as a salient dimension, highlighting the need to address mental well-being as an integral part of sports safety management. Psychological safety pertains to creating environments where athletes feel secure to express concerns, seek help, and recover from errors without fear of punishment or stigma. This finding resonates with the growing recognition that psychological strain and mental fatigue can elevate the risk of injuries and impair performance if left unaddressed (Guo et al., 2017). Technological tools such as wearable devices, which monitor stress and psychological indicators, offer innovative approaches to support this dimension, allowing for early interventions before mental strain translates into physical harm. This aligns with the broader principle of precision safety management proposed by (Wang et al., 2023), which advocates for individualized and data-driven safety strategies tailored to the specific physiological and psychological profiles of athletes.

Legal safety constituted another crucial dimension, encompassing regulatory compliance, liability management, and enforcement of safety legislation. Several of the analyzed articles stressed that legal oversight functions as a structural backbone for sustaining safety practices in sports organizations. The lack of legal clarity or accountability mechanisms often leads to inconsistent safety standards and exposes organizations to litigation following accidents. (Kargar et al., 2017) demonstrated that well-structured legal frameworks directly enhance the perceived safety and security of sporting events by delineating clear responsibilities among stakeholders. Similarly, (Veselinović et al., 2020) argued that integrating security management within sports governance models requires not only physical safeguards but also enforceable legal obligations and rights protection mechanisms to prevent negligence. The inclusion of legal safety as a core dimension in this study thus underscores that safety management cannot function effectively without a robust regulatory infrastructure.

The findings also underscored the relevance of tourist safety as an often-overlooked yet critical dimension of sports safety management. With the globalization of sports and the growth of sports tourism, ensuring the safety of visiting fans and foreign participants has become a priority. (Shahmansouri & Mozaffari, 2007) observed that large-scale sporting events can trigger crises when host organizations neglect to address cultural, linguistic, and logistical safety considerations for tourists. Neglecting these aspects can harm not only the reputation of the hosting organization but also the public health of the community. This is especially relevant given the increased security threats to international sports events since the September 11 attacks, which have necessitated multilayered security systems to protect foreign visitors (Cieslak, 2009; Taylor & Toohey, 2007). Embedding tourist safety into the broader safety management framework, as the current study proposes, therefore strengthens both the resilience and the global credibility of sports institutions.

Another prominent theme emerging from the data is the centrality of education and training. Many of the reviewed articles emphasized that technical infrastructure alone cannot ensure safety without a parallel commitment to continuous training, awareness-building, and safety culture development among all stakeholders. (Bagheri et al., 2019) and (Hosseinpour et al., 2019) both confirmed that implementing structured training programs on safety procedures significantly decreased the occurrence of accidents in sporting environments by improving staff and athlete readiness to handle emergencies. (Swan et al., 2009) also warned that without consistent monitoring and educational

reinforcement, safety policies risk being underutilized or ignored in practice. Therefore, this study's identification of education and training as a distinct dimension reinforces that human behavior and organizational culture are as critical to safety outcomes as physical equipment and structural safeguards.

The dimension of risk management processes further complements this emphasis by providing an overarching system for identifying, analyzing, and mitigating potential hazards. The reviewed studies frequently discussed the lack of systematic risk assessments as a root cause of recurring accidents in sports contexts. According to (Bryce & Dowling, 2024), many failures in major international sporting events stemmed from inadequate pre-event risk analyses and the prioritization of financial and competitive outcomes over safety preparedness. (Chen et al., 2019) similarly noted that risk-taking behaviors, driven by pressure to win, often flourish in environments where managers fail to enforce risk evaluation and mitigation protocols. This study's results affirm that risk management must be embedded as an ongoing, cyclical process rather than a one-off checklist, integrating data analytics, stakeholder engagement, and real-time monitoring to anticipate and neutralize threats proactively.

Safety barriers, the final dimension identified, represent the physical and procedural protections that prevent hazards from materializing into incidents. This includes equipment standards, emergency response systems, safety signage, and controlled access measures. Such barriers act as the last line of defense when preventive measures fail. The importance of safety barriers has been repeatedly highlighted in the literature. (Dehghan et al., 2023) demonstrated that multi-layered safety models in swimming pools, including physical barriers and procedural safeguards, were particularly effective during hygienic crises such as the COVID-19 pandemic. This reinforces the notion that layered safety designs, combining infrastructural and behavioral controls, are essential for building resilient sports environments. As (Frosdick & Walley, 2010) noted, the failure to maintain or update safety barriers has historically contributed to catastrophic stadium disasters, cementing their role as an indispensable component of safety management systems.

Collectively, these eight dimensions form a holistic framework that addresses both the preventive and responsive aspects of safety management in sports. The model integrates structural, behavioral, technological, legal, and cultural components, reflecting the complex reality of modern sports organizations. The interplay among these dimensions echoes the systems perspective emphasized by (Van Hoye et al., 2021), who argued that sustainable health promotion in sports requires interventions at multiple organizational levels rather than isolated technical fixes. By confirming the interconnectedness of these dimensions, this study contributes to shifting safety management from a reactive paradigm—focused on responding to accidents after they occur—toward a proactive paradigm that anticipates, prevents, and manages risks comprehensively. This paradigm shift is crucial not only for protecting athletes and spectators but also for enhancing organizational credibility, reducing legal liabilities, and promoting long-term participation in sports.

Despite its contributions, this study has several limitations that warrant consideration. First, the research relied exclusively on content analysis of published articles indexed in the Scopus database, which may have excluded valuable insights from non-indexed regional studies, industry reports, and grey literature. This could introduce publication bias, as indexed articles often emphasize novel or statistically significant findings while overlooking contextual nuances. Second, while the coding process employed rigorous open, axial, and selective coding procedures, qualitative analysis inherently involves interpretive subjectivity, which may have influenced the categorization of concepts. Although efforts were made to enhance reliability through test-retest methods and expert validation, the findings remain shaped by the researchers' perspectives. Third, the study focused on a limited sample of the top ten most-cited articles, which may not fully represent the diversity of existing research on safety management in sports, especially in underrepresented regions or amateur sports settings. Finally, the rapidly evolving nature of safety technologies and organizational practices means that some identified dimensions may shift over time, necessitating periodic updates to ensure continued relevance.

Future research should expand the scope of inquiry by incorporating a broader and more diverse range of sources, including non-indexed studies, organizational reports, and practitioner perspectives from various cultural and economic contexts. Comparative cross-country analyses would be particularly valuable for examining how cultural,

infrastructural, and policy differences shape the implementation and effectiveness of safety management models in sports. Moreover, future studies could employ mixed-methods designs that combine qualitative content analysis with quantitative surveys or experimental evaluations to triangulate findings and enhance generalizability. Longitudinal studies are also recommended to assess how the integration of the identified dimensions influences safety outcomes over time, including injury rates, legal claims, and athlete retention. Additionally, there is a need to explore the role of emerging technologies—such as artificial intelligence, machine learning, and real-time monitoring systems—in operationalizing precision safety management models and improving predictive risk assessment. Finally, future research should examine the ethical and psychological aspects of safety management, particularly how organizational culture, leadership styles, and athlete perceptions influence safety compliance and risk-taking behaviors.

Practitioners and sports managers should consider adopting the eight-dimensional model identified in this study as a strategic framework for designing and evaluating safety management systems. This involves embedding safety responsibilities into organizational governance structures, ensuring that safety objectives are integrated into all operational and decision-making processes. Regular safety audits, risk assessments, and scenario-based emergency drills should be institutionalized to maintain preparedness and adaptability. Training programs should target all stakeholders—including athletes, coaches, medical staff, and event personnel—to cultivate a shared culture of safety and ethical responsibility. Legal departments should work closely with operational units to ensure compliance with safety regulations and to establish clear accountability mechanisms. Additionally, investments in technology, such as wearable monitoring devices and automated safety systems, should be prioritized to enhance real-time risk detection and response capabilities. By operationalizing this model, organizations can create safer sports environments, reduce the incidence of injuries, and strengthen public trust in their capacity to safeguard athlete welfare.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Written consent was obtained from all participants in the study.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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