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Managerial Guidelines to Sports Injury Prevention for Aerobic Dance of University Students in Henan Province

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Abstract

Background and Aim: The core objective of this study is to develop a set of managerial guidelines for sports injury prevention for university students in Henan Province. The research scope covers the full workflow, including current situation investigation, opinion collection, guideline development, expert evaluation, and effect verification. A mixed-methods research design was adopted in this study.

Methodology: This study employed a mixed-methods design. All samples were selected via purposive sampling to ensure alignment with the research requirements, including 318 enrolled university students in Henan Province, 8 college aerobics instructors, 7 experts in related fields, and a 10-member focus group. The research instruments included questionnaire surveys, in-depth interviews, focus group discussions, and the expert evaluation method, all of which were validated by the Item Objective Congruence (IOC) test (IOC = 1.00). For data analysis, quantitative approaches, including mean and standard deviation (S.D.), as well as the qualitative method of content analysis, were employed. The results demonstrated that prominent problems existed in the current status of aerobics dance sports injury prevention among university students in Henan Province ($\bar{x}$ =2.68, S.D.=1.14), and fragmentation was identified as a core limitation of traditional management measures. The managerial guidelines, developed based on the classic POLC (Planning, Organizing, Leading, Controlling) framework, consist of 4 core dimensions, 13 secondary indicators, and 49 tertiary indicators, thus establishing a systematic management process.

Results: These findings effectively address the key limitations of traditional management practices, provide a standardized reference for universities, contribute to reducing sports injuries and safeguarding students' health, and offer a valuable reference for similar research.

Conclusion: The guidelines can be adapted to the differentiated needs of various colleges and student groups, effectively enhance the systematicity and specificity of aerobics dance sports injury prevention, and provide robust support for relevant practical applications.

Keywords: Managerial Guideline; Sports Injury Prevention; Aerobic Dance; University Students

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Introduction

Aerobic dance, which integrates rhythmic music and whole-body coordination, has become a key option for university students in Henan Province in physical education (PE) curricula, student club activities, and after-school exercise. However, its high-intensity movements carry a high risk of sports injuries, including muscle strains and joint sprains, which directly impair students' physical and mental health and academic progress (Zhao, 2023), forming the core research problem of this study.

The core rationale for this research lies in critical gaps in the current aerobics dance sports injury prevention management system in Henan colleges: the absence of systematic prevention guidelines, insufficiently standardized and poorly planned teaching and training (Zhao, 2023), plus prominent curriculum-level issues, including weak student learning motivation and rigid one-size-fits-all teaching models (Yuan, 2023). These long-unaddressed problems call for targeted solutions via specialized research, with further motivation from national education policy guidance and existing research gaps, which provide policy support and reinforce the academic necessity of this study.

From the student perspective, it can reduce aerobics dance injury incidence and safeguard students' physical and mental health (Guo, 2024). For institutions, it can optimize the aerobics curriculum system, standardize teaching processes, improve teaching quality, and fulfill the integrated development goal of aesthetic and physical education (G. Huang, 2020). Regionally, it fills the local research gap in aerobics dance injury prevention and management, provides standardized, implementable solutions for provincial colleges, promotes coordinated development of physical and aesthetic education (Lu & Liu, 2024), and offers localized support for the Healthy China Initiative in Henan higher education institutions.

First, the current status and core problems of aerobics dance injury prevention in Henan colleges are the study's foundational orientation, with a focus on injury characteristics, risk factors, and management limitations. The most frequent injury sites are the lower extremities and trunk, with the highest incidence in the knee and ankle joints (Zhao, 2023); lumbar injuries are mainly associated with insufficient core strength and incorrect technical movements (Long, 2024); risk factors cover individual, behavioral, instructional, and environmental dimensions (Zhou, 2025). Second, theoretical support is centered on the POLC management theory (Lou & Praphanbundit, 2023), integrated with the PDCA Cycle Theory (Li, 2024), Factor Management Theory (Zhao & Wang, 2019), and interdisciplinary theories, including sports medicine and sports training science. Third, domestic and international research references: domestic studies focus on university students' aerobics dance sports injury prevention (Luo et al., 2024), while international studies emphasize evidence-based prevention and multi-stakeholder collaboration (Dhahbi et al., 2025).

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The final component is policy support from the guidelines for public art courses in institutions of higher education (General Office of the Ministry of Education of China, 2022) and Opinions on comprehensively strengthening and improving school physical education in the new era (Ministry of Education of China, 2024).

Existing studies provide valuable references but leave notable gaps. Domestic research by Yao (2021) found that university students had limited understanding of aerobics and inadequate facilities, while Luo et al. (2024) provided methodological references by integrating technical and management frameworks into sports injury prevention research. Internationally, Ericksen et al. (2021) verified the effectiveness of strength, balance, and psychological interventions for sports injury prevention, and Stephenson et al. (2021) identified adolescents as a high-injury-risk group and proposed targeted programs. However, none of these studies focus on Henan colleges, with no systematic management research or localized standardized guidelines for aerobics dance sports injury prevention in the region, highlighting the necessity and innovation of this study.

In summary, this study aims to address the high incidence of aerobics dance injuries, inadequate prevention management systems, and the absence of systematic guidelines in Henan colleges, filling the local research gap. It also implements national aesthetic and physical education policies, responds to the Healthy China Initiative, integrates interdisciplinary theories and recent research advances, and develops a standardized sports injury prevention management guideline, with extensive application value for local students, instructors, and related academic fields.

Research Objectives

To develop the managerial guidelines for sports injury prevention for university students in Henan province.

Literature Review

Against the backdrop of fully implementing the Outline of the "Healthy China 2030" Initiative, aerobic dance has become one of the core programs in college physical education (PE) curricula and extracurricular exercise for Chinese students, given its dual fitness and artistic value. As a fitness paradigm integrating aerobic exercise physiology and dance artistry, it centers on aerobic metabolism and diverse dance styles, with a core feature of symbiotic fitness and artistic functions. It has the advantages of low equipment dependence and high site adaptability, and can achieve multi-dimensional goals of physiological improvement, body shaping, psychological regulation, and physical literacy cultivation (Wang & Lv, 2019).

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Existing research has reached a clear consensus that aerobic dance effectively improves college students' physical function, self-cognition, and social connection, with multiple positive effects on their holistic physical and mental health (Chen et al., 2021). However, its development in Chinese colleges still faces notable structural bottlenecks. For participation, significant gender differentiation exists: women are the absolute majority of participants, while male participation is extremely low, with systematic gaps in targeted male-focused research. Students' core participation demands center on body shaping, fitness enhancement, and physical and mental well-being (Wen & Wang, 2023). For teaching, three core pain points persist: structural shortage of teaching staff, mismatched venue and time resource allocation, and poor alignment between curriculum content and students' personalized needs (Cheng et al., 2024).

Meanwhile, current research in this field has three core limitations. First, unbalanced geographical sample coverage: most existing data focus on economically developed eastern regions, with a severe lack of empirical research and basic data from central and western Chinese colleges. Second, intervention studies are generally short-term and lack long-term follow-up, making it hard to verify the sustained effects of short-term interventions. Third, research subjects have a severe gender imbalance, with specialized research on male participants nearly non-existent (Bo & Lei, 2024).

Aerobic dance involves frequent dynamic movements (flexion-extension, torsion, jumping) that demand high limb coordination, joint stability, and muscle control, creating inherent sports injury risks. Existing studies show clear site-specific concentration of common injuries: knee and ankle injuries account for over 85% of total lower extremity injuries (Zhao, 2023), with lumbar injury incidence at approximately 15%. Injury severity is also significantly positively correlated with movement difficulty (Long, 2024), with primary myotendinous injuries including strains, tendinitis, and muscle spasms.

Existing studies have summarized injury-related high-risk factors into four core dimensions. First, individual differences: students have stark polarization in sports foundation, with a high proportion of zero-baseline participants. Insufficient muscle strength, poor flexibility, and deficient neuromuscular control are core intrinsic injury risk factors (Zhou, 2025). Second, high-risk behaviors: non-standard warm-up, lack of post-exercise recovery, and inattention during training are the three key behavioral drivers of elevated injury risk (Zhu & Qiu, 2024). Third, curriculum design flaws: unreasonable difficulty gradients, lack of stratified teaching, unscientific load arrangement, and teachers' insufficient injury prevention expertise are prevalent (Wang, 2024). Fourth, venue and environmental shortcomings: substandard flooring, insufficient training space, and incomplete protective facilities directly increase injury risk (Ren, 2022).

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For aerobic dance injury prevention and control, existing studies have initially established a full-chain prevention system: 1) Curriculum optimization: implementing phased, progressive teaching with stratified grouping and dynamic adjustment, and balancing training and rest ratios (Wang, 2023); 2) Standardized warm-up and recovery: establishing standardized warm-up protocols and targeted post-exercise static stretching to reduce acute and chronic injury risk (Luo, 2024); 3) Equipment and venue adaptation: standardizing scientific selection of footwear and protective gear, prioritizing professional sports flooring, and ensuring adequate per capita training space (Huang, (2020); 4) Environmental optimization: improving venue ventilation and temperature control to create a safe, suitable exercise atmosphere.

Classic management theories provide a core framework for systematic injury prevention system construction. Henri Fayol's Planning, Organizing, Leading, and Controlling (POLC) theory, with its closed-loop management logic, aligns closely with the needs of full-cycle sports injury prevention and control (Wang et al., 2024). Domestic studies have preliminarily explored POLC's application in aerobic dance teaching, confirming its effectiveness in optimizing teaching quality and reducing sports risks (Yang, 2022). Internationally, researchers have developed specialized neuromuscular preventive training programs for dance's high injury rate, verifying that systematic intervention significantly reduces lower extremity injury risk and providing a key reference for domestic college aerobic dance injury prevention (Kolokythas et al., 2022).

In summary, based on the current status of aerobic dance development and injury prevention in Henan Province colleges, this study constructs a full-cycle aerobic dance injury prevention and control model using the POLC theory, with targeted measures designed across its four core dimensions. It aims to fill the research gap in central and western China and provide practical guidance for the safe delivery and quality improvement of aerobic dance in Chinese colleges.

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Conceptual Framework

In the research title "Managerial guideline to promote injury prevention for aerobics dance of university students in Henan Province", we designed the Conceptual Framework as follows:

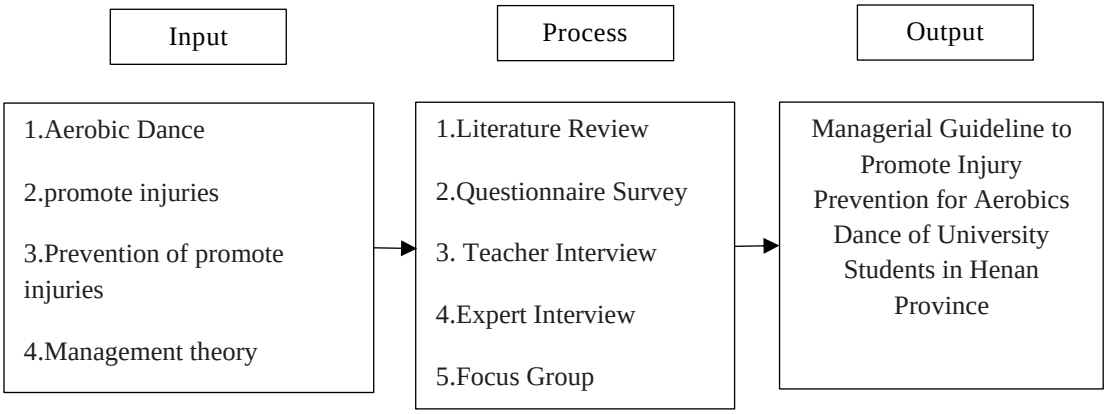


Figure 1 Conceptual framework

Methodology

This study was conducted as part of the Master of Education (Physical Education Track) thesis research at the School of Sports Science and Technology, Thonburi University, Bangkok. The full research workflow was completed during the 2026 academic year across 5 representative higher education institutions in Henan Province, namely Zhengzhou University, Henan University, Henan Normal University, Henan Polytechnic University, and Henan Medical University. A mixed-methods research design integrating quantitative and qualitative approaches was adopted for this study. The research process was strictly followed using a standardized workflow to ensure the scientific rigor and standardization of the entire research process.

(1) Population and Sample

The study population consisted of three cohorts from the 5 aforementioned higher education institutions in Henan Province: 2431 enrolled university students participating in aerobic dance courses, 8 full-time teachers undertaking aerobic dance teaching, and 27 experts involved in the research.

The sample size for the student cohort was calculated using the Taro Yamane sample size formula, with a 95% confidence level and a 5% margin of error, resulting in a planned sample size of 345 participants. Simple random sampling was adopted for student recruitment. A total of 318 valid questionnaires were finally collected, with a valid response rate of 92.17%.

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Cluster sampling was employed for the teacher cohort, which covered all 8 aerobic dance instructors at the selected institutions, with no samples excluded from the analysis.

Purposive sampling was used for the expert cohort, with participants screened based on their professional field, work experience, and professional title. The expert sample was divided into four subgroups: 3 IOC validation experts, 7 interview experts, 10 focus group experts, and 7 evaluation experts.

(2) Instrument Development

Adopting a mixed-methods research design integrating quantitative and qualitative approaches, this study designed and applied five sets of standardized research instruments, as detailed below: Questionnaire on the current status of aerobic dance sports injury prevention for university students. This instrument adopted a 5-point Likert rating scale, with the scoring criteria defined as 1=very poor, 2=poor, 3=moderate, 4=high, and 5=highest (Lou & Praphanbundit, 2023). It was used to collect quantitative data on participants' sports participation, injury history, protective behaviors, teaching evaluation, and injury prevention awareness. Semi-structured Interview Outline for Aerobic Dance Instructors, which was used to obtain qualitative data on frontline teaching practice, implementation of injury prevention measures, and teaching dilemmas. Multi-disciplinary Expert Interview Outline, designed to conduct in-depth consultations around core issues, including the causes of injury risk, establishment of prevention systems, and optimization of management strategies. Focus Group Discussion Outline was used for collective demonstration of the scientific validity, comprehensiveness, and operability of the guideline indicator system. An Expert Evaluation and Assessment Outline was applied to conduct a comprehensive review and validity verification of the final managerial guidelines.

These instruments collectively form a complete research instrument system covering the entire research workflow, including current situation investigation, expert validation, guideline development, and effect verification.

(3) Instrument Quality Validation

All instruments in this study were developed in accordance with existing literature and the core research objectives, and a uniform content validity test was conducted using the Item Objective Congruence index, rated by 3 senior multidisciplinary experts. The rating criteria consisted of three levels: highly relevant, uncertain, and irrelevant. The results showed that all items of the student questionnaire, instructor interview outline, expert interview outline, focus group discussion outline, and expert evaluation outline obtained an IOC value of 1.00. This indicates that all research instruments are highly consistent with the research objectives, with scientific, standardized, and representative content. They meet the stringent quality requirements of academic research and can be formally applied for data collection and analysis.

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Data Collection

The data collection process followed 6 sequential steps in strict accordance with the standardized research protocol, all completed within 5 selected higher education institutions in Henan Province. First, a systematic literature review was conducted to collect domestic and international literature on aerobic dance, sports injury prevention, and the POLC management theory, establishing the theoretical and empirical foundation of the study. Second, 345 paper-based questionnaires were distributed to eligible students on-site during aerobic dance classes, with on-site completion and immediate collection; 318 valid questionnaires were finally obtained for subsequent analysis. Third, face-to-face or telephone semi-structured interviews were conducted with 8 aerobic dance instructors to document frontline teaching practice and injury prevention implementation. Fourth, in-depth interviews were carried out with 7 multidisciplinary experts to obtain professional recommendations on injury prevention management and guideline development. Fifth, a focus group discussion with 10 experts was organized to supplement and refine the draft guideline's indicator system. Sixth, 7 experts were invited to comprehensively evaluate the final draft guideline in terms of scientific validity and operability, completing its validity verification.

Data Analysis

An integrated analytical approach combining quantitative and qualitative methods was adopted, with corresponding statistical methods applied to ensure rigor.

(1) Quantitative Data Analysis

Descriptive statistics were used to process valid student questionnaire data, including the mean ($\bar{x}$) to measure the overall level of each questionnaire dimension and the standard deviation (S.D.) to assess data dispersion and participant response consistency. The 5-point Likert scale used in the questionnaire adopted the following evaluation criteria:

Average Score Range	Level
4.20 – 5.00	Highest
3.40 – 4.19	High
2.60 – 3.39	Moderate
1.81 – 2.59	Poor
1.00 – 1.80	Very Poor

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(2) Qualitative Data Analysis

The content analysis method was applied to the verbatim transcripts of instructor interviews, expert interviews, focus group discussions, and expert evaluations. Coding, categorization, and thematic extraction were conducted to summarize the current status, existing problems, expert recommendations, and guideline optimization directions, further constructing the indicator system of the POLC-based managerial guideline.

(3) Validity Data Analysis

The Item Objective Congruence index was calculated for all research instruments to verify their psychometric quality, serving as a core statistic for content validity evaluation to test the relevance between instruments and research objectives and determine their academic qualification.

Results

1. Current Status and Existing Problems of Aerobic Dance Sports Injury Prevention Among University Students in Henan Province

(1) Basic demographic information from the university student questionnaire

To gain an in- depth understanding of the current status and existing problems of aerobic dance sports injury prevention among university students in Henan Province, a total of 345 student questionnaires were distributed. The results are presented as follows:

Table 1 Basic demographic information of university students questionnaire respondents (n=318)

Content		No.	Percentage
Gender	Male	53	16.67%
	Female	265	83.33%
Type of specialty	Sports-related Majors	48	15.09%
	Non-sports-related Majors	270	84.91%
Exercise foundation	Zero Foundation (no prior dance/sports experience)	127	39.94%
	Beginner Level (participation ≤ 6 months)	95	29.87%
	Intermediate Level (participation: 6-12 months)	63	19.81%
	Advanced Level (participation > 12 months)	33	10.38%
Form of activity	University Physical Education Courses	143	44.97%
	Campus Club Activities	79	24.84%
	Off-Campus Training Institutions	31	9.75%
	Self-study (videos/live streams)	52	16.35%
	Others	13	4.09%

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As shown in Table 1, the survey results indicated that a total of 345 student questionnaires were distributed, with 318 validly recovered, yielding a recovery rate of 92.17%, which met the research requirements. The participants in this program exhibited significant gender differences, academic major type, and foundational proficiency: females accounted for 83.33% of the total, non-sports majors for 84.91%, participants with zero foundational proficiency for 39.94%, and those at the proficient level for only 10.38%. The main forms of participation were university physical education courses (44.97%) and campus societies (24.84%). This distribution not only reflects the shaping effect of cultural cognition on gender-based participation and the screening of audiences by the popularization orientation of the program, but also manifests the significant impacts of time cost and situational convenience on the sustainability of participation and the selection of participation forms.

(2) Current status of aerobic dance among university students in Henan Province

Table 2 Investigation on the current status of aerobic dance (n=318)

Content	$\bar{x}$	S.D
Participation frequency	3.58	1.32
Single training session duration	3.61	1.17
Stretch after exercise	1.3	0.45
Sports protection	1.42	0.48
Injury of the joint	2.97	1.49
Muscle injury	2.57	1.39
Differentiated instruction	1.75	0.76
Prevention knowledge dissemination	1.98	0.94
Personalized guidance	3.85	1.39
Emergency first aid training	3.76	1.53

As shown in Table 1, the frequency of aerobic dance participation among students ($\bar{x}$= 3.58, S.D = 1.32) and the duration of a single training session ($\bar{x}$= 3.61, S.D = 1.17) were at a high level, while significant individual differences were observed in participation intensity. Behaviors including post-exercise stretching ($\bar{x}$= 1.3, S.D = 4.45) and proactive injury protection ($\bar{x}$ = 1.42, S.D = 0.48) were generally absent among participants, and the corresponding risks of joint injury ($\bar{x}$= 2.97, S.D = 1.49) and muscle injury ($\bar{x}$ = 2.57, S.D = 1.39) were at a moderate level. In terms of teaching support, the provision of personalized guidance ($\bar{x}$ = 3.85, S.D = 1.39) and first aid skill training ($\bar{x}$= 3.76, S.D = 1.53) were satisfactory, while differentiated instruction ($\bar{x}$= 1.75, S.D = 0.76) and the popularization of injury prevention knowledge ($\bar{x}$ = 1.98, S.D = 0.76) were

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insufficient. Overall, the results demonstrated a certain degree of persistence in students' aerobic dance participation, while their protective awareness and the adaptability of teaching still need to be improved.

2. Current status and problems of aerobic dance sports injury prevention and management among university students in Henan Province

To explore the current status and existing problems of aerobic dance sports injury prevention and management among university students in Henan Province, a semi-structured interview outline for aerobic dance instructors was developed, which had passed the expert validity test (IOC = 1.00, with good content validity). Interviews were conducted with 8 aerobic dance instructors from 5 higher education institutions in Henan Province. The interviewed instructors generally adopted progressive and differentiated stepwise teaching models, and attached great importance to movement standardization, joint stability training, and injury risk awareness education. Their core recommendations included: incorporating injury prevention knowledge into compulsory courses, revising the teaching syllabus to add dedicated class hours for injury prevention, carrying out specialized training for instructors, improving sports venues and equipment, implementing small-class teaching, establishing an injury incident communication mechanism, unifying standardized safety teaching protocols, and incorporating the incidence of sports injuries into teaching performance assessment. Although student-centered individualized teaching was implemented in current teaching practices, there were still prominent challenges, including large individual differences among students, oversized class sizes, weak safety awareness of students, and insufficient sports venues and training equipment. Common sports injuries were concentrated in the ankle, knee, and lumbar regions, indicating that multi-pronged measures are required to improve the injury prevention and management system.

3. Development of the draft managerial guideline for the prevention of sports injuries in universities of Henan Province

(1) In-depth expert interviews for the development of the guidelines were conducted with a total of 7 experts from 4 fields, namely sports medicine, management science, education science, and sports training science. The interview outline had passed the Item Objective Congruence test, with an IOC value of 1.00 and good content validity. The experts identified core problems, including insufficient orientation towards teaching safety, poor standardization of movement execution, disconnection between injury prevention and rehabilitation, and fragmentation of the management system. Experts from each field put forward targeted construction priorities from their respective professional dimensions. Based on the comprehensive synthesis of all expert opinions, it was clarified that the guidelines should take a standardized curriculum as the core, establish a three-level collaborative guarantee mechanism at the

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provincial, university, and college levels, implement a closed-loop management of monitoring, evaluation, and rectification, integrate interdisciplinary theories and multi-stakeholder collaborative governance, and form a full-process management system. On this basis, the draft guidelines were compiled in accordance with the POLC management framework.

(2) Focus group validation to ensure the scientific validity, systematicness, and operability of the draft guidelines. 10 experts from 5 fields were organized to conduct validation of the indicator system of the draft guidelines based on the POLC framework. All experts unanimously agreed to retain all original indicators and only put forward suggestions for indicator refinement and addition, with experts from each field providing targeted optimization directions from their professional perspectives. Ultimately, 6 tertiary indicators were added, namely rehabilitation guidance, rehabilitation assessment, adaptation guidance for special groups, policy inclination, risk notification, and insurance guarantee. The practical operation standards, quantitative parameters, and responsible subjects were systematically refined. After optimization, a complete indicator system consisting of 4 primary indicators, 14 secondary indicators, and 48 tertiary indicators was formed, which significantly improved the scientific validity and operability of the guidelines.

Planning	Organizing	Leading	Controlling
Hierarchical Goal Setting	**Establishment of a Management System**	**Incentive and Guidance Mechanisms**	**Establishment of Monitoring Mechanisms**
1. Setting differentiated goals based on university type	1. Provincial-level management structure	1. Incentive mechanisms for students	1. Injury monitoring
2. Setting goals according to students' physical foundation and ability levels	2. University-level management structure	2. Incentive mechanisms for teachers	2. Teaching process monitoring
Curriculum System Design	3. Class-level management structure	3. University-level incentive mechanisms	3. Environmental monitoring
1. Phased	**Coordination of Resource**	4. Policy inclination and institutional	4. Teacher performance monitoring
			Establishment of an Evaluation System

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Planning	Organizing	Leading	Controlling
curriculum planning 2. Integration of injury prevention and protection content into the curriculum 3. Scientific management of training load **Resource Guarantee Planning** 1. Budget allocation and financial support 2. Planning of venues and facilities 3. Allocation of teaching and instructional resources 4. Provision of injury insurance	**Integration** 1. Integration of teaching staff resources 2. Linkage with medical and health resources 3. Promotion of student autonomous organizations **Establishment of Collaboration Mechanisms** 1. Interdepartmental collaboration 2. University–local collaboration 3. Teacher–student collaboration	support **Communication and Feedback Channels** 1. Online communication channels 2. Offline communication channels 3. Rapid response mechanisms **Guidance for Safety Atmosphere Construction** 1. Cultural infiltration of safety awareness 2. Dissemination of injury prevention concepts 3. Gender-appropriate guidance 4. Adaptive guidance for special groups **Professional**	1. Process evaluation 2. Outcome (effect) evaluation 3. Hierarchical evaluation 4. Rehabilitation evaluation **Standards for Emergency Disposal** 1. Emergency response procedures 2. Skill preparedness and capability assurance 3. Principles of emergency disposal 4. Risk notification mechanisms **Closed-loop Optimization Mechanism** 1. Problem identification and

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Planning	Organizing	Leading	Controlling
coverage		**Leadership and Support** 1. Expert guidance 2. Teacher demonstration 3. Peer leadership 4. Rehabilitation guidance	rectification 2. Guideline updating and revision 3. Experience summarization and promotion

4. Validation of the managerial guideline to sports injury prevention for aerobics dance of university students in Henan Province

7 experts from the fields of education science, physical education science, physical education pedagogy, sports training science, management science, and sports medicine were invited to conduct a comprehensive evaluation and assessment of the draft managerial guideline to sports injury prevention for aerobics dance of university students in Henan Province. All experts unanimously agreed that the managerial guidelines have a rigorous system and clear logical framework, covering key management dimensions including organizational coordination and resource integration, with a reasonable and comprehensive indicator system. The guidelines lay a fundamental foundation for the safe implementation and scientific management of aerobic dance courses in universities, and no suggestions for adding or deleting core indicators were put forward. Meanwhile, experts from various fields put forward targeted optimization recommendations as follows: (1) Incorporate an observation and recording mechanism for students safety behaviors to implement differentiated education;(2) Refine monitoring indicators and develop standardized assessment instruments;(3) Strengthen tiered prevention and improve the hierarchical implementation path;(4) Supplement the monitoring of high-risk movements, refine the integration of teaching faculty, and incorporate injury-related indicators into the performance assessment system;(5) Establish a university-level coordinating body, and clarify the rights, responsibilities, and resource allocation mechanisms;(6) Develop emergency rehabilitation

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protocols for acute injuries, and establish a sharing mechanism for electronic health records of sports injuries.

Conclusion: Taking university students participating in aerobic dance and their course instructors in universities of Henan Province as the research subjects, this study adopted a mixed-methods research design. It elucidated the current status that the overall level of aerobic dance sports injury prevention among university students in the region is at a moderate level, and identified that the fragmentation of the management system is the core crux restricting the effectiveness of prevention and control. Based on the POLC management theory, this study developed and established the managerial guideline to sports injury prevention for aerobics dance of university students, which consists of a complete indicator system with 4 primary dimensions, 13 secondary indicators, and 48 tertiary indicators. These guidelines effectively address the core problems in current aerobic dance sports injury prevention, including the absence of a closed-loop prevention and control system, non-standardized teaching and training, inadequate resource allocation, and poor multi-stakeholder collaboration, and realize systematic and standardized management and control of the entire process of injury prevention. Evaluated by multidisciplinary experts, the guidelines combine scientific rigor and high operability, and are highly aligned with the actual teaching context of universities in Henan Province and the physical fitness characteristics of local university students. They fill the regional research gap in the relevant field and provide a theoretical reference and practical paradigm for the safe teaching of aerobic dance in universities, as well as injury prevention and control for similar fitness dance programs.

Discussion

This study discusses the construction of injury prevention management guidelines for college students' aerobic dance based on the POLC framework. In terms of planning, hierarchical goals and phased curricula are adopted in line with the tiered teaching strategy of Li et al. (2021), while the overall allocation of funds, venues, and insurance fills the research gaps of Yang (2022) and Li & Han (2024). For an organization, a three-level management system solves management fragmentation, integrates faculty and medical resources, optimizes site allocation, deepens the studies of Cao (2024) and Yao, X. J. (2021), and adapts to local conditions in Henan (Bo & Lei, 2024). Regarding leading, a three-level incentive mechanism is established, gender-adapted guidance is provided in response to low male participation, referring to Jiang & Xu (2021), and a safety culture is constructed drawing on Feng & Wang (2024) to reduce subjective injury risks. In the control, a full-dimensional monitoring system is built to make up for the deficiencies of traditional mechanisms (Yang, 2020), and a monitoring-evaluation-rectification-updating closed

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loop is formed consistent with the closed-loop management of Zhang et al. (2024). and the PDCA cycle to ensure dynamic effectiveness.

Recommendations

For practical implementation, multi-party cooperation should be strengthened to guide students in standard warm-up, mastering prevention knowledge, and controlling exercise intensity; teachers should receive professional training to implement hierarchical teaching and dynamically monitor students' fitness and injuries; universities should optimize venues, implement hierarchical management and establish injury tracking, while education departments should include the guidelines in provincial policies and carry out training and promotion. For future research, the sample scope should be expanded, especially for males and long-term exercisers; longitudinal tracking designs should be used to verify long-term intervention effects; and in-depth research should be conducted on gender adaptation and interdisciplinary cooperation, comparing different teaching models to enrich research methods.

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