

การสร้างรูปแบบการจัดการความฉลาดรู้ทางกายนอกหลักสูตร เพื่อปลูกฝังความตระหนักรู้  
ในการทำกิจกรรมทางกายตลอดชีวิตของนักศึกษามหาวิทยาลัยในมณฑลเหอหนาน  
CONSTRUCTION OF EXTRACURRICULAR PHYSICAL LITERACY MANAGEMENT MODEL  
TO CULTIVATE LIFELONG PHYSICAL ACTIVITIES AWARENESS  
OF UNIVERSITY STUDENTS IN HENAN PROVINCE

โหล หยวนเหอ<sup>1\*</sup> ปรีชา พงษ์เพ็ง<sup>1</sup> และ ประกิต หงษ์แสนยธรรม<sup>1</sup>

Lou Yuanhe<sup>1\*</sup>, Preecha Pongpeng<sup>1</sup> and Prakit Hongsanyatham<sup>1</sup>

<sup>1</sup>คณะวิทยาศาสตร์และเทคโนโลยีการกีฬา มหาวิทยาลัยกรุงเทพธนบุรี กรุงเทพมหานคร

<sup>1</sup>Faculty of Sports Science and Technology, Bangkokthonburi University, Bangkok

\*Corresponding Author: louyuanhe@126.com

Received: March 25, 2026

Revised: May 7, 2026

Accepted: May 9, 2026

## บทคัดย่อ

การวิจัยครั้งนี้มีวัตถุประสงค์เพื่อสร้างรูปแบบการจัดการความฉลาดรู้ทางกาย เพื่อปลูกฝังความตระหนักรู้ในการทำกิจกรรมทางกายตลอดชีวิตของนักศึกษามหาวิทยาลัยในมณฑลเหอหนาน งานวิจัยนี้เป็นการวิจัยแบบผสมผสาน โดยมีขั้นตอนการดำเนินการวิจัยดังต่อไปนี้ 1) การสำรวจด้วยแบบสอบถาม โดยมีกลุ่มตัวอย่างเป็นนักศึกษามหาวิทยาลัยจำนวน 400 คน และครูพลศึกษาจำนวน 380 คน 2) การสัมภาษณ์เชิงลึกกับผู้เชี่ยวชาญจำนวน 7 คน 3) การลงฉันทามติของผู้เชี่ยวชาญจำนวน 19 คน ด้วยเทคนิคเดลฟาย 4) การสนทนากลุ่มผู้เชี่ยวชาญจำนวน 7 คน 5) การสนทนาอิงผู้เชี่ยวชาญกับผู้เชี่ยวชาญจำนวน 9 คน การวิเคราะห์ข้อมูลใช้ทั้งวิธีการทางสถิติและเชิงคุณภาพหลายรูปแบบ ได้แก่ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน การวิเคราะห์เนื้อหา คำมัธยฐาน และค่าพิสัยระหว่างควอไทล์ ผลการวิจัยพบว่า นักศึกษามหาวิทยาลัยในมณฑลเหอหนานมีความรู้ความเข้าใจด้านสุขภาพในระดับที่เพียงพอและมีประสบการณ์ทางอารมณ์เชิงบวกต่อการเข้าร่วมกิจกรรมทางกายนอกเวลาเรียน อย่างไรก็ตาม นักศึกษาที่มีความตระหนักรู้ด้านพลศึกษาตลอดชีวิตในระดับต่ำ และขาดการมีส่วนร่วมอย่างต่อเนื่องในระยะยาว โดยแรงจูงใจในการเข้าร่วมกิจกรรมส่วนใหญ่ยังคงขับเคลื่อนด้วยปัจจัยเชิงหน้าที่หรือประโยชน์ใช้สอยเป็นหลัก จากผลการวิจัยดังกล่าว ได้มีการสร้างรูปแบบการจัดการความฉลาดรู้ทางกายในมหาวิทยาลัยขึ้น ซึ่งประกอบด้วยตัวชี้วัดหลัก 4 ด้าน ตัวชี้วัดรอง 12 ด้าน และตัวชี้วัดย่อย 49 ด้าน โดยมีเป้าหมายเพื่อปลูกฝังความตระหนักรู้และพฤติกรรม การออกกำลังกายตลอดชีวิตของนักศึกษาอย่างเป็นระบบ งานวิจัยนี้เสนอกรอบนโยบายเชิงวิทยาศาสตร์สำหรับการพัฒนาความฉลาดรู้ทางกายนอกหลักสูตรในระดับอุดมศึกษาของประเทศจีน และสนับสนุนการดำเนินยุทธศาสตร์ Healthy China 2030 และ Sports Henan

**คำสำคัญ:** ความฉลาดรู้ทางกายนอกหลักสูตร, รูปแบบการจัดการ, ความตระหนักรู้ในการทำกิจกรรมทางกายตลอดชีวิต, นักศึกษามหาวิทยาลัย

## Abstract

The objective of this research was to construct the extra physical literacy management model to cultivate lifelong physical activities awareness of university students. This research was a mixed method research, and the specific research procedures were as follows: 1) A questionnaire survey was conducted involving 400 university students and 380 physical education teachers; 2) In depth interviews with 7 experts; 3) Delphi consensus with 19 experts; 4) Focus group discussions with 7 experts; 5) Connoisseurship discussion with 9 experts. For the data analysis, multiple statistical and qualitative methods were employed, including mean values, standard deviations, content analysis, Median, and Inter Quartile Ranges (IQR). The results shown that university students in Henan Province have sufficient health cognition and positive

emotional experiences regarding extra physical activities, yet they exhibit a weak lifelong physical education awareness and insufficient long-term engagement, with their participation motivation dominated by functional drivers. A management model for extra physical activities in universities was constructed, which comprises 4 first-level indicators, 12 second-level indicators, and 49 third-level indicators, aiming to systematically cultivate students of lifelong physical activity awareness and habits. This study provides a scientific policy framework for cultivating extracurricular physical literacy in Chinese higher education and supports the implementation of the Healthy China 2030 and Sports Henan strategies.

**Keywords:** Extracurricular physical literacy, Management model, Awareness of lifelong physical activity, University students

## Introduction

With the in-depth implementation of the "Healthy China" strategy and the comprehensive advancement of the integration of sports and education, university physical education has become increasingly prominent in its strategic value as a core vehicle for fostering students' physical and mental health and shaping lifelong physical activity awareness. As a major educational province in China, Henan had 174 regular higher education institutions as of 2024, with over 4 million enrolled students (Henan Provincial Department of Education, 2025). The quality of university physical education not only bears on the lifelong health and all-round development of millions of students but also directly influences regional sports culture construction and the elevation of national physical literacy, thereby providing crucial talent support and a social foundation for realizing the "Sports Henan" strategy.

The "Healthy China 2030" Planning Outline (Central Committee of the Communist Party of China & State Council, 2016) explicitly incorporates school physical education into the core domain of the "Healthy China" strategy, proposing to "establish the educational philosophy of health first, offer sufficient and well-delivered physical education courses, and help students enjoy themselves, enhance physical fitness, cultivate sound personality, and temper their will through physical exercise." Subsequently, Henan Province issued the Implementation Plan for Accelerating the Construction of a Strong Sports Province (Henan Provincial People's Government, 2022), which calls for "deepening the integration of sports and education, improving the school physical education teaching system, and cultivating students' lifelong physical activity awareness and habits," thus forming a policy system that combines national strategy with local characteristics. Against this backdrop, universities such as Henan University and Zhengzhou University have conducted beneficial explorations in reforming physical education curricula and innovating extracurricular physical activities, accumulating practical experience for the refined development of university physical education.

Although certain achievements have been made in physical education and the cultivation of lifelong physical activity awareness in Henan's universities, existing research still exhibits notable deficiencies. First, the research scope is limited, mostly focusing on a single university or specific institutions while neglecting differences between urban and rural areas and across different types of higher education institutions, resulting in insufficient sample representativeness (Yu, J. 2022). Second, the depth of research is inadequate; the effects of most policy implementations have been described only qualitatively, and no scientific quantitative evaluation system has yet been established (Guo, Y. D., 2023). Third, the analysis of influencing factors is partial, focusing solely on hardware resource conditions without fully exploring the interactive mechanisms among cognitive, motivational, managerial, and other multidimensional factors, and

lacking long-term tracking data (Wang, J. W., 2022). Fourth, the theoretical perspective is monolithic, confined within the discipline of physical education and failing to integrate multidisciplinary theories such as management and sociology (Zhang, Z., et, al, 2024). Fifth, the management model is disjointed; the existing management system lacks a full-process closed-loop design, lags behind in digital and intelligent applications, and has not formed a replicable and scalable implementation plan at the provincial level (Wang, Z. et, al, 2019).

These research gaps directly lead to a lack of systematic guidance for conducting extracurricular physical activities in Henan's universities, making the problem of "knowing but not acting, acting but not persisting" prominent among college students, whose lifelong physical activity awareness is difficult to transform into stable behavioral habits. Against this background, this study introduces the classic POLC (planning, organizing, leading, controlling) theory from management and focuses on the core question: "How can scientific extracurricular physical literacy management enhance university students' lifelong physical activity awareness?" A multidimensional empirical study was conducted. The core research questions of this study include: (1) What are the current situation and core constraining factors of extracurricular physical literacy and lifelong physical activity awareness among university students in Henan Province? (2) How can an extracurricular physical literacy management model applicable to universities in Henan Province be constructed based on POLC theory? (3) What is the feasibility and applicability of this management model? By answering these questions, this study aims to provide a scientific basis for universities to optimize extracurricular physical management and for education authorities to formulate policies, thereby contributing to the effective implementation of the sports-education integration strategy.

## Literature Review and Theoretical Framework

### 1. Concept and Dimensions of Extracurricular Physical Literacy

Physical literacy is a core concept in the field of international physical education. Margaret Whitehead defines "the integrated embodiment of motivation, confidence, physical competence, knowledge, and understanding required to maintain appropriate physical activity throughout the life course." This concept transcends the traditional notion of physical fitness, emphasizing the integrated development of multiple dimensions as physical, cognitive, affective, and social, and serves as a crucial foundation linking school sports with societal sports and realizing lifelong physical activity (Dong, Q. et, al 2024).

In this study, "extracurricular physical literacy" represents an extension and concretization of the concept of physical literacy within the extracurricular physical activity's context, referring to the comprehensive competency demonstrated by university students in sports activities outside formal classroom instruction. Building on the early research of Professor Lai Tiande, he constructed a six-dimensional structure of extracurricular physical literacy for Chinese university students, comprising: (1) the physical competence dimension, i.e., the level of basic motor skills and specialized sports skills; (2) the health knowledge dimension, i.e., knowledge of physical exercise, nutrition and hygiene, sports injury prevention, etc.; (3) the sports motivation dimension, i.e., intrinsic drives and extrinsic incentives to participate in physical activities; (4) the affective experience dimension, i.e., feelings of pleasure, achievement, and belonging during physical activity participation; (5) the social interaction dimension, i.e., the ability to engage in interpersonal communication and teamwork through physical activities; and (6) the behavioral habit dimension, i.e., a stable behavioral tendency to regularly engage in physical activities. These six dimensions are interrelated and mutually reinforcing, together forming a complete system of extracurricular physical literacy (Cheng, G. 2021).

## 2. Connotation and Formation Mechanism of Lifelong Physical Activity Awareness

Lifelong physical activity awareness refers to an individual's stable cognition, affective attitude, and behavioral disposition toward the lifelong value of physical activity, and is the precursor to lifelong physical activity behavior. This concept originates from Paul Lengrand's theory of lifelong education, which emphasizes that education should run through a person's entire life, and that physical education, as an essential component of education, should also achieve full coverage from infancy to old age (Lengrand, 1970). Liu, X. (2025) summarized the connotation of lifelong physical activity awareness into three levels: (1) the health level, namely recognizing the significant value of physical activity in promoting physical and mental health and preventing diseases; (2) the educational level, namely recognizing the educational function of physical activity in shaping personality and cultivating willpower; and (3) the social level, namely recognizing the positive role of physical activity in promoting social interaction and building a harmonious society.

The university stage is a critical period for the formation and consolidation of lifelong physical activity awareness. Zhou, W. et, al (2021) noted that university students are at a maturing stage of physical and psychological development, possessing the ability and conditions to independently engage in physical exercise, and the sports behavioral habits formed during this period are most likely to extend into adulthood. However, the formation of lifelong physical activity awareness is not a spontaneous process; rather, it is a spiral progression from cognition to emotion and then to behavior (Guo, Y. C. et, al 2024). Scientific management and guidance are key factors in facilitating this transformation process, effectively paving the way from "knowing the importance of sports" to "actively participating in sports" and ultimately to "persisting in sports throughout life."

## 3. POLC Management Theory and Its Application in University Physical Education Management

The POLC theory is the most classical management function framework in the field of management. It was first proposed by the management scholar Henri Fayol and later systematically refined by (Robbins, S. P. et, al 2022) in Management (15th ed.). This theory divides the management process into four interrelated and cyclically recurring core functions: Planning: determining organizational goals and formulating strategies and specific action plans to achieve those goals. Organizing: designing the organizational structure, clarifying the division of authority and responsibility, and allocating human, material, financial, and other resources. Leading: motivating and guiding organizational members, creating a positive organizational atmosphere, and promoting goal achievement. Controlling: monitoring organizational activities, evaluating performance, and promptly correcting deviations to ensure that goals are accomplished as planned.

Due to its advantages of being structured, systematic, and providing full-process control, the POLC theory has been widely applied in various areas of university education management. Wang, Z. et, al (2019) pointed out that introducing the POLC theory into university extracurricular physical activities management can effectively address problems such as unclear objectives, incomplete organization, insufficient motivation, and untimely monitoring that currently exist in management. This study adopts the POLC theory as the core framework to construct a management model for university students' extracurricular physical literacy. Through the synergy of these four dimensions, it aims to achieve full-process and refined management of extracurricular physical activities, ultimately enhancing university students' lifelong physical activity awareness.

## 4. Research Conceptual Framework

Based on the literature analysis above, this study constructed the following conceptual framework (Figure 1).

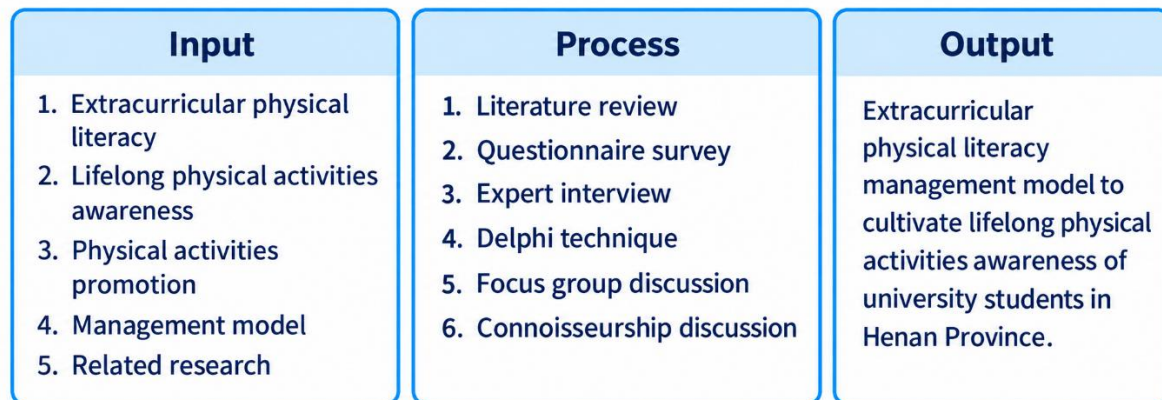


Figure 1. Conceptual Framework

## Research Methodology

This research ethical approval has been granted by the Bangkokthonburi University ethical committee, certificate no. 2568/403 (4), and issued on November 10, 2025.

### Population

This study adopted a multistage stratified sampling method and selected five representative universities in Henan Province as the research sites, namely Henan University, Henan Normal University, Henan University of Science and Technology, Henan Medical University, and Henan Agricultural University. The target population comprised all undergraduate students (a total of 193,507) and all physical education teachers (a total of 380) at these five universities.

### Sample

For the student population, the Taro Yamane (Li et, al 2025) formula was employed to calculate the sample size, with a 95% confidence level and a permissible sampling error of 5%, yielding a minimum required sample size of 384. Considering the possibility of invalid questionnaires, 400 questionnaires were ultimately distributed. For the teacher population, cluster sampling was adopted, and all 380 physical education teachers at the five aforementioned universities were included in the research.

This study employed purposive sampling to select experts based on dimensions such as professional field, work experience, and academic title, thereby ensuring the representativeness and authority of the experts. The specific composition of the expert panel is as follows:

- (1) 5 physical education experts conducted the content validity evaluation of the research instruments using the Item-Objective Congruence (IOC) index;
- (2) 7 professors in the field of university physical education participated in in-depth interviews
- (3) 9 experts in university physical activity management and teaching participated in the Delphi consensus-building process.
- (4) 7 front-line core physical education teachers from universities participated in the focus group discussions.
- (5) 9 senior experts in physical education and management participated in the expert connoisseurship validation of the model.

### Research Instruments

This research employed six standardized research instruments covering the entire process of

current situation investigation, model construction, and model validation. All instruments were evaluated for content validity by five experts using the Item-Objective Congruence (IOC) index, with individual item  $IOC \geq 0.60-1.00$ .

(1) Questionnaire on Extracurricular Physical Activity for University Students was designed using a five-point Likert scale and encompassed eight dimensions. It was used to investigate the current status of university students' extracurricular physical literacy and lifelong physical activity awareness.

(2) Questionnaire on Extracurricular Physical Activities Management for University Physical Education Teachers was designed using a five-point Likert scale and comprised four dimensions. It was used to investigate teachers' evaluations of the current status of extracurricular physical activities management and their suggestions for improvement.

(3) Expert Interview Protocol adopted a semi-structured, open-ended design centered on three core topics. It was used to preliminarily distill the core elements of the extracurricular physical literacy management model.

(4) Delphi Method Questionnaire was designed using a five-point Likert scale, covering the four first-level dimensions of POLC. It was used to construct and screen the indicator system of the management model through expert consensus.

(5) Focus Group Discussion Protocol adopted an open-ended design, focusing on three core areas. It was used to optimize and refine the draft model derived from the Delphi method.

(6) Expert Connoisseurship Evaluation Framework was constructed based on (Li et al, 2025) expert connoisseurship approach, combining open-ended interviews and a Likert scale to verify the feasibility and applicability of the final management model from four dimensions. This evaluation was independently conducted by nine senior physical education experts.

### **Data Collection and Analysis**

The research adopted the exploratory sequential mixed-methods design proposed by Creswell, J. W. et al (2018). Data analysis was conducted using SPSS 26.0 and NVivo 12.0 software. All research instruments underwent content validity evaluation by five physical education experts using the Item-Objective Congruence (IOC) index, yielding an overall IOC mean of 0.95 with all individual item  $IOC \geq 0.60$ , thus meeting academic standards. The full process was as follows:

(1) A systematic search of relevant domestic and international literature was conducted to map the research progress, and content analysis was employed to clarify the core research questions and the POLC theoretical framework.

(2) A total of 400 extracurricular physical literacy questionnaires for university students and 380 physical activities management questionnaires for teachers were distributed online successively. Valid responses collected were 387 (96.75%) and 353 (92.89%), respectively. Descriptive statistical analysis was performed using the mean ( $\bar{x}$ ) and standard deviation (S.D.).

(3) Semi-structured, in-depth interviews, each approximately 60 minutes in duration, were conducted with seven experts. All interviews were audio-recorded and transcribed verbatim. Content analysis was applied to complete three-level coding and to extract the core elements of the management model.

(4) Two rounds of the Delphi method were conducted with 19 experts. Indicator evaluation data were collected through anonymous feedback and analyzed using the Median (M) and interquartile range (IQR), with  $M \geq 3.50$  and  $IQR \leq 1.50$  serving as the consensus criteria. A draft model was subsequently formed.

(5) A 90-minute focus group discussion was first organized with seven experts, and content analysis was used to refine the model details. Following this, nine experts were invited to conduct an expert connoisseurship evaluation, in which the mean and standard deviation were applied to verify the scientific validity and applicability of the model.

## Results

1) Survey Results on the Current Status of Extracurricular Physical Activities among University Students in Henan Province

A total of 387 valid student questionnaires were collected in this survey. The basic demographic information of the sample is presented in Table 1.

**Table 1.** Sample Distribution of the Student Questionnaire (n = 387)

| Category |             | Sample | Percentage |
|----------|-------------|--------|------------|
| Gender   | Male        | 152    | 39.28%     |
|          | Female      | 235    | 60.72%     |
| Grade    | Grade one   | 242    | 63.02%     |
|          | Grade two   | 123    | 32.03%     |
|          | Grade three | 12     | 3.13%      |
|          | Grade four  | 10     | 2.60%      |

2) Participation Characteristics of University Students in Extracurricular Physical Activities

The participation characteristics of university students in extracurricular physical activities are presented in Table 2.

**Table 2.** Current Participation Status of University Students in Extracurricular Physical Activities

| Item                                                          | Category                                        | Percentage |
|---------------------------------------------------------------|-------------------------------------------------|------------|
| Weekly participation rate                                     | 2–3 times per week                              | 43.41%     |
| Duration per participation                                    | 30–90 minutes                                   | 60.47%     |
| Time period of participation                                  | Afternoon (12:00–22:00)                         | 71.57%     |
| Types of physical activities participated                     | Ball games and recreational activities          | 59.52%     |
| Main venues for physical activities                           | Sports field/Playground                         | 65.13%     |
| Purpose of participating in physical activities               | Relieving stress and enhancing physical fitness | 50.45%     |
| Perception of the impact of physical activities on the future | Reducing diseases and improving mood            | 58.46%     |

3) Cognitive Dimension Scores of University Students on Extracurricular Physical Activities

This study examined university students' cognitive levels regarding extracurricular physical activities across eight dimensions. The results are presented in Table 3.

**Table 3.** University Students Awareness of Participating in Extra Physical Activities

| Dimension                         | $\bar{X}$ | S.D. | Result   |
|-----------------------------------|-----------|------|----------|
| Cognitive Understanding           | 3.58      | 0.89 | High     |
| Attitude and Emotion              | 3.36      | 1.35 | Moderate |
| Intrinsic Motivation              | 3.58      | 1.06 | High     |
| Self-efficacy                     | 3.18      | 1.33 | Moderate |
| Subjective Norms                  | 3.58      | 0.93 | High     |
| Resource Allocation               | 2.42      | 1.44 | Poor     |
| Barrier Factors                   | 2.95      | 1.71 | Moderate |
| Management and Service Evaluation | 2.88      | 1.72 | Moderate |

The results showed that the dimensions of cognitive understanding, intrinsic motivation, and subjective norm scored relatively high, indicating that university students possess a clear cognition of the value of extracurricular physical activities. The resource allocation dimension scored the lowest, constituting the core objective bottleneck constraining the implementation of these activities. The dimensions of attitude and affect, self-efficacy, and management and service evaluation scored at a moderate level, representing key factors that hinder the transformation of cognition into behavior.

#### 4) Survey Results from Physical Education Teachers in Henan Universities

##### 4.1) Basic Information of the Teacher Sample

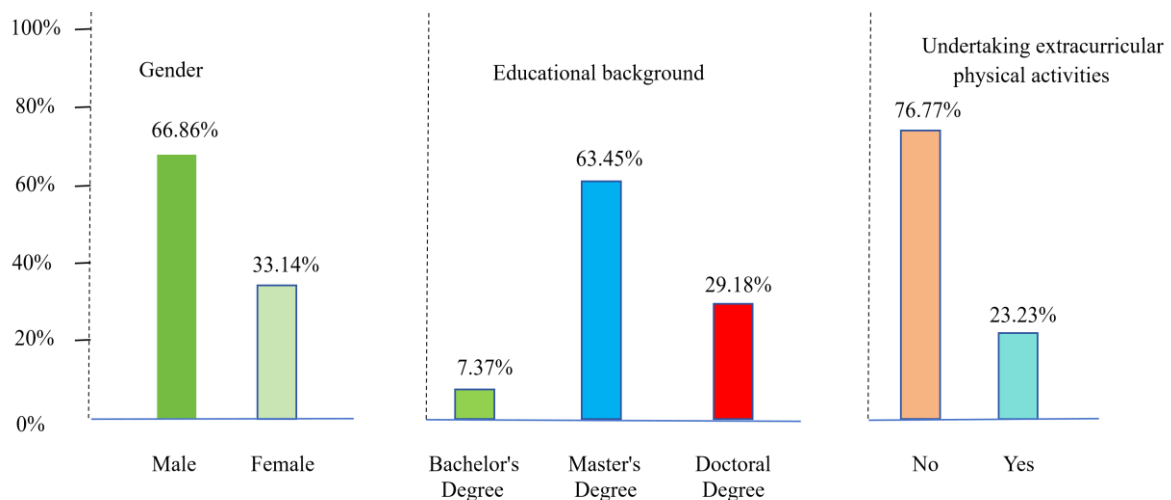


**Figure 2.** Basic Information of The Teacher Questionnaire

The results showed that a total of 353 valid teacher questionnaires were returned, yielding a valid response rate of 92.89%. Male teachers accounted for 66.86% of the sample, which is consistent with the gender structure of physical education teachers in domestic universities. Teachers with a master's degree or above constituted 92.63%, ensuring the professionalism of the responses. Only 23.23% of the teachers were responsible for extracurricular sports work, reflecting a serious lack of teacher participation. The sample covered different genders and educational levels, demonstrating good representativeness and providing empirical support for subsequent research.

#### 4.2) Teachers' Evaluation of the Current Status of Extracurricular Physical Activities Management

The results of teachers' evaluations on the four dimensions of extracurricular physical activities management are presented in Figure 3.

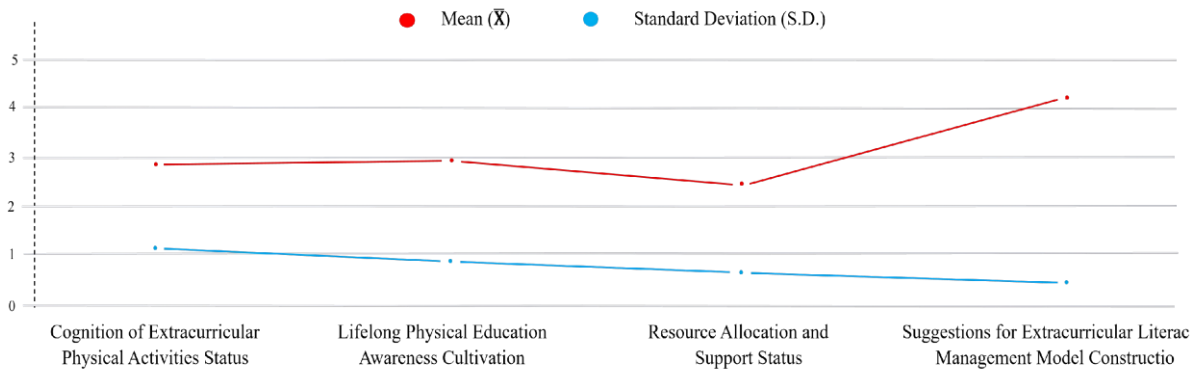


**Figure 3.** Current status of extracurricular physical activity management

The results showed that the three dimensions implementation of extracurricular physical activities, cultivation of lifelong physical activity awareness, and resource allocation and support were all at a moderate level, exposing core problems such as supply demand imbalances, disconnects between concepts and behaviors, and structural contradictions in resource allocation. In contrast, the dimension of "suggestions for constructing an extracurricular physical literacy management model" received the highest score, indicating that frontline teachers have reached a strong consensus on the need for tiered, collaborative, and intelligent management reforms.

#### 4.3) Development of the Extracurricular Physical Literacy Management Model

Through in-depth interviews with 7 experts, content analysis was employed to distill the core elements of the management model. Subsequently, two rounds of Delphi expert consultation ( $n=19$ ) were conducted to reach consensus, and five core principles were formulated:

Organizational collaboration principle: Establish cross-departmental linkage mechanisms and inter-university resource-sharing platforms.

Professional support principle: Strengthen the construction of the teaching staff and introduce external professional resources.

Differentiated design principle: Provide graded and classified activities based on students' academic year and physical fitness levels.

Health security principle: Establish a sound risk prevention, control, and health monitoring system.

Incentive mechanism principle: Improve the diversified evaluation system and incorporate physical activities into comprehensive assessments.

The statistical results of the first-level indicators from the Delphi method are presented in Table 4. The Median of all indicators was  $\geq 4.00$ , and the IQR range was  $\leq 1.00$ , indicating an extremely high degree of expert consensus.

**Table 4.** Statistical Results of the First-Level and Second-Level Indicators from the Delphi Method (n = 19)

| Level indicators                               | Median | IQR  | Result         |
|------------------------------------------------|--------|------|----------------|
| A: Planning                                    | 4.00   | 1.00 | Agree          |
| B: Organizing                                  | 5.00   | 0.00 | Strongly Agree |
| C: Leading                                     | 4.00   | 1.00 | Agree          |
| D: Controlling                                 | 5.00   | 0.00 | Strongly Agree |
| A1: Construction of target system              | 4.00   | 1.00 | Agree          |
| A2: Content planning and design                | 4.00   | 1.00 | Agree          |
| A3: Resource allocation planning               | 5.00   | 0.00 | Strongly Agree |
| B1: Construction of management structure       | 5.00   | 0.00 | Strongly Agree |
| B2: Collaboration among participating entities | 5.00   | 0.00 | Strongly Agree |
| B3: Operational mechanism optimization         | 4.00   | 1.00 | Agree          |
| C1: Sports atmosphere cultivation              | 4.00   | 1.00 | Agree          |
| C2: Incentive and guidance mechanisms          | 5.00   | 0.00 | Strongly Agree |
| C3: Personalized support                       | 4.00   | 1.00 | Agree          |
| D1: Monitoring and evaluation system           | 5.00   | 0.00 | Strongly Agree |
| D2: Feedback and improvement mechanism         | 5.00   | 0.00 | Strongly Agree |
| D3: Quality assurance system                   | 5.00   | 0.00 | Strongly Agree |

This study first organized a focus group discussion with seven experts to optimize the indicator rationality and implementation feasibility of the draft management model derived from the Delphi method. Subsequently, nine experts were invited to conduct an expert connoisseurship evaluation of the revised and finalized management model. The results are presented in Table 5.

**Table 5.** Expert Evaluation Results of the Extracurricular Physical Literacy Management Model (n = 9)

| Level indicators        | $\bar{X}$ | S.D. | Result  |
|-------------------------|-----------|------|---------|
| First level indicators  | 4.92      | 0.77 | Highest |
| Second level indicators | 4.95      | 0.12 | Highest |
| Third level indicators  | 4.95      | 0.13 | Highest |

The results showed that all indicators based on the POLC framework received high expert endorsement, demonstrating that the model possesses both theoretical scientific validity and practical applicability. The finalized Extracurricular Physical Literacy Management Model for university students in Henan Province is presented in Figure 4.

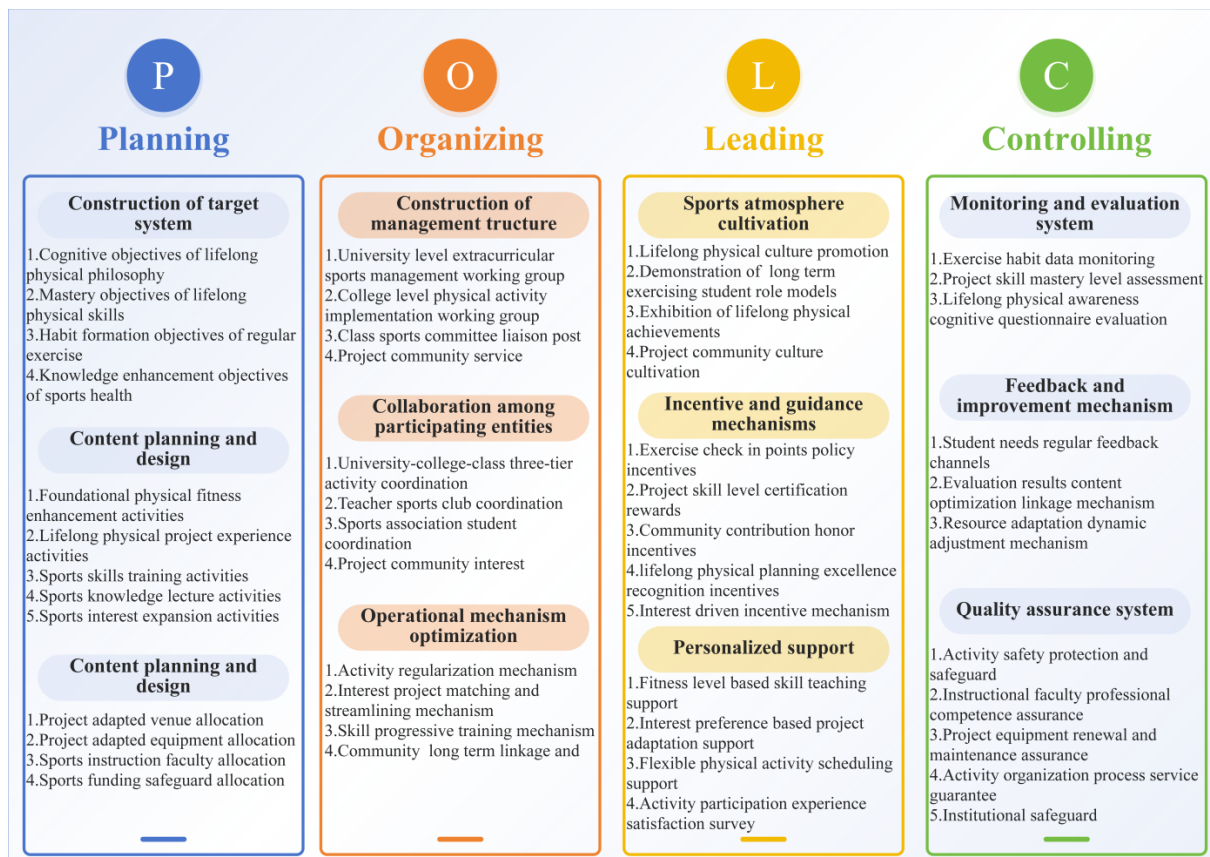


**Figure 4.** Extracurricular physical literacy management model to cultivate lifelong physical activities awareness of university students in Henan Province

## Discussion

### 1) Analysis of the Current Status of Extracurricular Physical Activities among University Students in Henan Province

The results of this study indicate that university students in Henan Province possess relatively high health cognition and intrinsic motivation toward extracurricular physical activities, yet their actual participation level and lifelong physical activity awareness still require improvement. This finding is consistent with the conclusion of Wang, J. W. (2022), suggesting that the problem of "knowing is easy, but doing is difficult" is prevalent in Chinese universities. The underlying reasons are, on the one hand, that students have low self-efficacy, lack scientific sports skills and exercise methods, and thus find it difficult to build the confidence necessary for long-term adherence. On the other hand, extracurricular physical activities management and services at universities are inadequate and fail to meet students' diverse needs.

It is particularly noteworthy that the resource allocation dimension scored the lowest ( $\bar{X} = 2.42$ ), which is corroborated by the results of the teacher survey ( $\bar{X} = 2.68$ ). The investigation revealed that universities in Henan Province generally suffer from insufficient sports venues and facilities, limited opening hours, and a shortage of professional instructors. Moreover, the resource gap between urban and rural universities is especially pronounced. Universities located in the provincial capital are relatively well-resourced, whereas those situated in prefecture-level and county-level cities are comparatively resource-poor, further exacerbating the inequality in students' participation in extracurricular physical activities.

## 2) Analysis of the Extracurricular Physical Literacy Management Model Based on the POLC Theory

The extracurricular physical literacy management model constructed in this study adopts the POLC theory as its core framework, achieving full-process closed-loop management of extracurricular physical activities. The Planning dimension emphasizes goal orientation and differentiated design. By setting four levels of goals cognition, skills, habits, and knowledge and providing diversified activity content such as basic physical fitness, specialized skills, and interest-based expansion, it caters to the needs of different students. This aligns with the differentiated goal-setting perspective proposed by Xiang, Z. B. et, al (2024).

The Organizing dimension establishes a four-level management system of "university college class community," clarifying the division of authority and responsibility among various entities and promoting cross-departmental and inter-university collaboration. This echoes the diversified collaborative management model proposed by Guo, Y. C., et, al (2024).

The Leading dimension focuses on stimulating students' intrinsic motivation through atmosphere building, diverse incentives, and personalized support. Research by Mo, Y. H. (2024) indicates that goal commitment and positive incentives can significantly promote university students' physical activity behaviors, and the design of this model fully embodies this concept.

The Controlling dimension establishes a closed-loop system encompassing data monitoring, process evaluation, outcome feedback, and continuous improvement, ensuring the effective implementation of management measures. This reflects the "check act" logic within the PDCA theory (Shi, J. et, al (2025)).

### 3) Policy Implications

The findings of this study carry important policy implications for the implementation of the "Healthy China 2030" and "Sports Henan" strategies at the university level: (1) improving top-level design, education authorities should issue specific guidelines for university extracurricular physical activities management and incorporate the cultivation of extracurricular physical literacy into the evaluation system of university physical education; (2) increasing resource investment, establish a provincial-level university sports resource-sharing platform to coordinate the allocation of venues, teaching staff, equipment, and other resources, thereby narrowing the gap between urban and rural universities; (3) deepening the integration of sports and education, strengthen collaboration with sports departments and social sports organizations, introduce professional coaching and competition resources, and enrich the content of extracurricular physical activities; and (4) advancing digital transformation, leverage technologies such as big data and artificial intelligence to build a university student sports health monitoring platform, enabling personalized exercise guidance and management.

### 4) Research Limitations

First, sample limitation. The sample was predominantly composed of first- and second-year students (95.05%), with insufficient representation of upper-year students, which may affect a comprehensive understanding of the developmental patterns of lifelong physical activity awareness.

Second, geographical limitation. The study was confined to Henan Province, where the policy environment and sports culture may differ from those in other regions. Therefore, the management model should be applied cautiously and adapted to local contexts.

Third, limitations inherent to the mixed-methods design. The exploratory sequential design may involve integration bias across the qualitative-quantitative-qualitative phases, and the Delphi method and expert connoisseurship evaluation are subject to subjective judgment. Moreover, the cross-sectional questionnaire does not support causal inference regarding long-term effects.

## Conclusion and Suggestion

This study adopted an exploratory sequential mixed-methods design to systematically investigate the current status of extracurricular physical literacy and lifelong physical activity awareness among university students in Henan Province. Based on the POLC management theory, an extracurricular physical literacy management model comprising 4 first-level indicators, 12 second-level indicators, and 49 third-level indicators was constructed, and its scientific validity and applicability were verified through the expert connoisseurship evaluation approach. The findings revealed that although university students in Henan Province possess relatively high health cognition and intrinsic motivation, their lifelong physical activity awareness remains weak and long-term participation is insufficient, with inadequate resource allocation identified as the core constraining bottleneck. The full-process refined management model, encompassing the four dimensions of planning, organizing, leading, and controlling, can effectively promote the enhancement of students' extracurricular physical literacy and the formation of lifelong physical activity awareness. Moreover, this model has reached a strong consensus among frontline physical education teachers and possesses a solid practical foundation and considerable promotion value in universities in Henan Province.

### Practical Suggestion

Pilot application and promotion: Select two to three universities of different types to pilot the model, track and monitor the implementation effects, and optimize and refine it based on feedback.

Strengthen teacher training: Regularly organize training in extracurricular physical activities management and instructional skills for physical education teachers, thereby enhancing their professional competence and management capabilities.

Improve incentive mechanisms: Incorporate students' participation in extracurricular physical activities into the comprehensive quality evaluation system, and simultaneously establish assessment and reward mechanisms for teachers' extracurricular physical activities work.

Cultivate a sports culture: Foster a vibrant campus sports culture atmosphere by organizing activities such as campus sports festivals, sports meetings, and sports star campus visits.

## References

- Central Committee of the Communist Party of China & State Council. (2016). Healthy China 2030 plan outline. [“健康中国 2030”规划纲要] Retrieved August 10, 2024, from [https://www.gov.cn/zhengce/2016-10/25/content\\_5124174.htm](https://www.gov.cn/zhengce/2016-10/25/content_5124174.htm) (in Chinese)
- Cheng, G. (2021). The Reform of Physical Education Teaching in Colleges and Universities and the Cultivation of College Students' Life long Physical Education Consciousness [高校体育教学改革与大学生终身体育意识的培养研究]. *Innovation and Practice of Teaching Methods [教学方法创新与实践]*, 4(1), 89-91. (in Chinese)
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage.
- Dong, Q., & Liu, Y. (2024). Digital Transformation of Education in Empowering the Development of Physical Education in Schools: History, Current Situation, and Future. *China Sport Science*, 44(8), 50-60. (in Chinese)
- Guo, Y. C., & Lu, C. F. (2024). Theoretical framework and promotion strategies for ideological and political construction in physical education curriculum [体育课程思政建设的理论框架与推进策略]. *Journal of Physical Education [体育学刊]*, 31(5), 80-87. (in Chinese)
- Guo, Y. D. (2023). Research on the current situation and optimization strategies of after school sports services in primary schools under the background of "double reduction" policy [“双减”政策背景下小学课后体育服务现状与优化策略研究]. [Master's thesis, Nanjing Sport Institute]. (in Chinese)
- Henan Provincial Department of Education. (2025). Notice on issuing the 2024 statistical bulletin on the development of education in Henan Province [河南省教育厅关于印发2024年河南省教育事业发展统计公报的通知]. Retrieved March 11, 2025, from <https://jyt.henan.gov.cn/2025/03-11/3135229.html> (in Chinese)

- Henan Provincial People's Government. (2022). Implementation plan for accelerating the construction of physical Henan [河南省人民政府关于印发加快建设体育河南实施方案的通知] Retrieved March 11, 2025, from <https://www.henan.gov.cn/2022/07-06/2481984.html> (in Chinese)
- Li, D., & Hongsaenyatham, P. (2025). A Development of Indicators and Physical Health Evaluation System for University Students in Guangzhou City. *International Journal of Sociologies and Anthropologies Science Reviews*, 5(2), 619-624. <https://doi.org/10.60027/ijssar.2025.5543>
- Mo, Y. H. (2024). A study on the influence of goal commitment on university students' exercise behavior and physical health: Based on goal setting theory [目标承诺对大学生锻炼行为和体质健康的影响研究——基于目标设定理论]. *Zhejiang Physical Science [浙江体育科学]*, (3), 106-111. (in Chinese)
- Robbins, S. P., & Coulter, M. (2022). *Management* (15th ed.) (G. Liu et al., Trans.). China Renmin University Press.
- Shi, J. & Niu, L. F. (2025) Quality Improvement Strategies in Higher Education Based on the PDCA Cycle [基于PDCA循环的高等教育质量提升策略]. *Innovative Education Research [创新教育研究]*, 13(3), 265-270. (in Chinese)
- Wang, J. W. (2022). Research on the governance mechanism of sunshine sports in Chinese colleges and universities based on the second classroom transcript system [基于第二课堂成绩单制度的我国高校阳光体育运动治理机制研究]. *Journal of Sports Science [体育学刊]*, (01), 124-129. (in Chinese)
- Wang, Z., & Hu, X. (2019). Reflections on Management Strategies for Practical Teaching in Higher Vocational Education Based on the POLC Concept [基于POLC理念的高职实践教学管理对策思考]. *Modern vocational education [现代职业教育]*, (2), 152-153. (in Chinese)
- Xiang, Z. B., Xie, S. Y., Ji, Y., Xu, Z., Zheng, H. Y., & Xi, H. J. (2024). Practical examination and optimization strategies of physical social organizations participating in school extra physical services [体育社会组织参与学校课外体育服务的现实审视与优化策略]. *China Sport Science [体育科学]*, 44(4), 72-80. (in Chinese)
- Yu, J. (2022). Investigation and analysis on the current situation of extra physical activities of middle school students in Shangqiu City [商丘市中学生课外体育活动现状的调查与分析]. *New Sports [新体育]*, (10), 95-97. (in Chinese)
- Zhang, Z., Hongsaenyatham, P., & Siriphan, C. (2024). The Construction of Wushu Teaching Strategy in Higher Education Based on WSR Theory. *International Journal of Sociologies and Anthropologies Science Reviews*, 4(3), 163-174. <https://doi.org/10.60027/ijssar.2024.4000>
- Zhou, W., & Zhu, Y. (2021). A study on the influencing factors of university students sports health literacy based on KAP theory [基于KAP理论的大学生运动健康素养影响因素研究]. *Journal of Southwest China Normal University [西南师范大学学报]*, 46(6), 145-149. (in Chinese)

## APPENDIX 1

### The second round of the Delphi consensus

| First level indicators                                                | Median | IQR  | Level          |
|-----------------------------------------------------------------------|--------|------|----------------|
| A:Planning                                                            | 4.00   | 1.00 | Agree          |
| B:Organizing                                                          | 5.00   | 0.00 | Strongly Agree |
| C:Leading                                                             | 4.00   | 1.00 | Agree          |
| D:Controlling                                                         | 5.00   | 0.00 | Strongly Agree |
| Total                                                                 | 4.50   | 1.50 | Strongly Agree |
| Second level indicators                                               | Median | IQR  | Level          |
| A1: Construction of target system                                     | 4.00   | 1.00 | Agree          |
| A2: Content planning and design                                       | 4.00   | 1.00 | Agree          |
| A3: Resource allocation planning                                      | 5.00   | 0.00 | Strongly Agree |
| B1: Construction of management structure                              | 5.00   | 0.00 | Strongly Agree |
| B2: Collaboration among participating entities                        | 5.00   | 0.00 | Strongly Agree |
| B3: Operational mechanism optimization                                | 4.00   | 1.00 | Agree          |
| C1: Sports atmosphere cultivation                                     | 4.00   | 1.00 | Agree          |
| C2: Incentive and guidance mechanisms                                 | 5.00   | 0.00 | Strongly Agree |
| C3: Personalized support                                              | 4.00   | 1.00 | Agree          |
| D1: Monitoring and evaluation system                                  | 5.00   | 0.00 | Strongly Agree |
| D2: Feedback and improvement mechanism                                | 5.00   | 0.00 | Strongly Agree |
| D3: Quality assurance system                                          | 5.00   | 0.00 | Strongly Agree |
| Total                                                                 | 4.58   | 0.42 | Strongly Agree |
| Third level indicators                                                | Median | IQR  | Level          |
| A11: Cognitive objectives of lifelong physical philosophy             | 4.00   | 1.00 | Agree          |
| A12: Mastery objectives of lifelong physical skills                   | 4.00   | 1.00 | Agree          |
| A13: Habit formation objectives of regular exercise                   | 5.00   | 0.00 | Strongly Agree |
| A14: Knowledge enhancement objectives of sports health                | 4.00   | 1.00 | Agree          |
| A21: Foundational physical fitness enhancement activities             | 4.00   | 1.00 | Agree          |
| A22: Lifelong physical project experience activities                  | 5.00   | 0.00 | Strongly Agree |
| A23: Sports skills training activities                                | 4.00   | 1.00 | Agree          |
| A24: Sports knowledge lecture activities                              | 5.00   | 0.00 | Strongly Agree |
| A25: Sports interest expansion activities                             | 4.00   | 1.00 | Agree          |
| A31: Project adapted venue allocation                                 | 4.00   | 1.00 | Agree          |
| A32: Project adapted equipment allocation                             | 5.00   | 0.00 | Strongly Agree |
| A33: Sports instruction faculty allocation                            | 5.00   | 0.00 | Strongly Agree |
| A34: Sports funding safeguard allocation                              | 5.00   | 0.00 | Strongly Agree |
| B11: University level extracurricular sports management working group | 5.00   | 0.00 | Strongly Agree |
| B12: College level physical activity implementation working group     | 5.00   | 0.00 | Strongly Agree |
| B13: Class sports committee liaison post                              | 4.00   | 1.00 | Agree          |
| B14: Project community service responsibility system                  | 5.00   | 0.00 | Strongly Agree |
| B21: University-college-class three-tier activity coordination        | 5.00   | 0.00 | Strongly Agree |
| B22: Teacher sports club coordination                                 | 5.00   | 0.00 | Strongly Agree |
| B23: Sports association student coordination                          | 5.00   | 0.00 | Strongly Agree |
| B24: Project community interest coordination                          | 4.00   | 1.00 | Agree          |
| B31: Activity regularization mechanism                                | 4.00   | 1.00 | Agree          |
| B32: Interest project matching and streamlining mechanism             | 5.00   | 0.00 | Strongly Agree |

|                                                                     |      |      |                |
|---------------------------------------------------------------------|------|------|----------------|
| B33: Skill progressive training mechanism                           | 4.00 | 1.00 | Agree          |
| B34: Community long term linkage and exchange mechanism             | 4.00 | 1.00 | Agree          |
| C11: Lifelong physical culture promotion                            | 4.00 | 1.00 | Agree          |
| C12: Demonstration of long term exercising student role models      | 5.00 | 0.00 | Strongly Agree |
| C13: Exhibition of lifelong physical achievements                   | 5.00 | 0.00 | Strongly Agree |
| C14: Project community culture cultivation                          | 4.00 | 1.00 | Agree          |
| C21: Exercise check in points policy incentives                     | 5.00 | 0.00 | Strongly Agree |
| C22: Project skill level certification rewards                      | 4.00 | 1.00 | Agree          |
| C23: Community contribution honor incentives                        | 5.00 | 0.00 | Strongly Agree |
| C24: Lifelong physical planning excellence recognition incentives   | 4.00 | 1.00 | Agree          |
| C25: Interest driven incentive mechanism                            | 5.00 | 0.00 | Strongly Agree |
| C31: Fitness level based skill teaching support                     | 4.00 | 1.00 | Agree          |
| C32: Interest preference based project adaptation support           | 5.00 | 0.00 | Strongly Agree |
| C33: Flexible physical activity scheduling support                  | 5.00 | 0.00 | Strongly Agree |
| C34: Activity participation experience satisfaction survey          | 5.00 | 0.00 | Strongly Agree |
| D11: Exercise habit data monitoring                                 | 5.00 | 0.00 | Strongly Agree |
| D12: Project skill mastery level assessment                         | 5.00 | 0.00 | Strongly Agree |
| D13: Lifelong physical awareness cognitive questionnaire evaluation | 4.00 | 1.00 | Agree          |
| D21: Student needs regular feedback channels                        | 5.00 | 0.00 | Strongly Agree |
| D22: Evaluation results content optimization linkage mechanism      | 4.00 | 1.00 | Agree          |
| D23: Resource adaptation dynamic adjustment mechanism               | 5.00 | 0.00 | Strongly Agree |
| D31: Activity safety protection and safeguard                       | 5.00 | 0.00 | Strongly Agree |
| D32: Instructional faculty professional competence assurance        | 4.00 | 1.00 | Agree          |
| D33: Project equipment renewal and maintenance assurance            | 5.00 | 0.00 | Strongly Agree |
| D34: Activity organization process service guarantee                | 5.00 | 0.00 | Strongly Agree |
| D35: Institutional safeguard                                        | 5.00 | 0.00 | Strongly Agree |
| Total                                                               | 4.59 | 0.41 | Strongly Agree |