

Original Research Article

## Practical research on aerobic exercise promoting the physical fitness of college students

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**Abstract:** Aiming at the problems of declining physical fitness and insufficient participation in sports activities among contemporary college students, this study takes four types of aerobic exercises (rope skipping, jogging, yoga, and swimming) as the carriers, combines the innovation of intelligent equipment with the optimization of teaching models, and explores the practical effect of aerobic exercise on improving college students' physical fitness. Adopting literature research method, field investigation method, group experiment method and other research approaches, the study conducted physical fitness assessment and demand analysis on 300 college students, and designed a practical model of "Personalized Program + Intelligent Monitoring + Interactive Incentive". Through 1 to 3 months of intervention experiments, the significant effectiveness of innovative aerobic exercise in improving core physical fitness indicators such as cardiopulmonary function, endurance and flexibility was verified. The results show that scientific aerobic exercise intervention can increase college students' vital capacity by 5%~15% and endurance indicators by 5%~12%, with the exercise adherence rate reaching more than 70%. The integration of intelligent equipment and interesting exercise forms can effectively stimulate students' interest in participation and solve core problems such as irregular exercise and unscientific training methods. The closed-loop model of "Physical Fitness Assessment - Program Customization - Dynamic Adjustment - Achievement Transformation" constructed in this study can provide a reference for the reform of college physical education teaching and the implementation of the National Fitness Strategy in colleges and universities.

**Keywords:** college students; aerobic exercise; physical fitness; intelligent sports; teaching innovation

## 1. Introduction

### 1.1. Research background

With the intensification of social competition and the transformation of lifestyles, contemporary college students are facing the dual pressures of academic study and employment, resulting in the continuous compression of exercise time and a marked decline in physical health. The 2022 National Student Physical Health Monitoring Report shows that core physical fitness indicators such as vital capacity and endurance of college students in China have been declining for many years. Phenomena such as "26 students fainting within 1 hour of military training" occur frequently, which directly reflect the severe current situation of college students' weak sports foundation and poor physical fitness. At the same time, the traditional physical education teaching in colleges and universities has problems such as a single model, lack of interesting content and insufficient personalized guidance, leading to students' low interest in sports participation and difficulty in forming long-term and stable exercise habits.

### 1.2. Research purposes and significance

#### 1.2.1. Theoretical significance

It enriches the theoretical system of the reform of college physical education teaching, constructs a theoretical framework for the correlation between aerobic exercise and the improvement of college students' physical fitness, clarifies the influence mechanism of different types of aerobic exercise on college students' core physical fitness indicators, and provides academic support for the application of intelligent sports technology in college physical education teaching.

### **1.2.2. Practical significance**

First, it effectively solves practical problems such as college students' declining physical fitness and insufficient sports participation, targetedly improves students' core physical fitness indicators such as cardiopulmonary function, endurance and flexibility, and enhances college students' physical health. Second, it innovates the teaching forms and technical implementation means of aerobic exercise, breaks through the development bottleneck of traditional physical education teaching, and effectively stimulates college students' interest in sports participation. Third, it forms a replicable and promotable practical program of aerobic exercise in colleges and universities, which helps the implementation of the National Fitness Strategy in colleges and universities and promotes the overall improvement of the quality of college physical education teaching.

### **1.3. Research status at home and abroad**

Foreign universities have formed mature operation models in the teaching and practice of aerobic exercise: Stanford University in the United States has launched an "Intelligent Jogging Course", which realizes real-time tracking of students' sports data and personalized guidance through heart rate monitoring equipment and a campus exclusive APP, with the overall course adherence rate reaching 85%. Waseda University in Japan has incorporated yoga into the compulsory physical education curriculum system and established a progressive hierarchical teaching system, which has increased students' physical fitness compliance rate by 20% after implementation.

Domestic universities have also carried out many beneficial explorations: Tsinghua University has built an "Intelligent Sports Venue", introducing intelligent equipment such as electronic counting and underwater motion analysis to realize the digitalization of physical education teaching and training. Zhejiang University has established an Aerobic Exercise Community Alliance, which stimulates students' enthusiasm for participation through intercollegiate leagues, community check-ins and other forms, and both have achieved good practical results.

## **2. Research content and methods**

### **2.1. Research content**

Investigation and analysis of college students' cognitive status, participation motivation and main influencing factors of aerobic exercise;

Correlation analysis between four types of aerobic exercises (rope skipping, jogging, yoga, swimming) and college students' physical fitness indicators such as cardiopulmonary function, endurance, flexibility and body fat rate;

Design of an innovative aerobic exercise model, including the application scenarios of intelligent equipment, the creation of interesting sports gameplay, and the formulation of personalized sports programs;

Construction of a risk prevention and emergency response mechanism in the development of aerobic exercise for college students;

Empirical verification and model optimization of the practical intervention effect of the innovative aerobic exercise model.

### **2.2. Core problems to be solved**

Explore targeted improvement paths for college students' declining physical fitness and weak sports foundation, and form scientific intervention methods;

Construct an effective incentive mechanism for college students' short exercise time, irregular exercise and insufficient adherence to improve the degree of sports participation;

Explore strategies to break through the sports "plateau period" and popularization paths of scientific training methods to improve the effect of sports training.

## **3. Design and implementation of the practical program**

### **3.1. Preliminary preparation stage (Weeks 1-2)**

Physical Fitness Assessment and File Establishment: Accurate tests on indicators such as vital capacity,

1000m/800m run, standing long jump, body fat rate and flexibility were conducted on 60 experimental subjects by using standardized physical fitness testing instruments. Personal health and sports files for students were established according to the test results to realize one file per person and dynamic management.

**Personalized Program Customization:** According to the results of physical fitness assessment and the preliminary demand survey, differentiated aerobic exercise programs were designed for different physical fitness groups — The Health Improvement Group mainly adopted the combination of "rope skipping + jogging", focusing on the improvement of basic physical fitness; the Fat Loss and Body Shaping Group mainly adopted the combination of "swimming + rope skipping", focusing on body fat rate control and body shape shaping; the Weak Physical Fitness Improvement Group mainly adopted the combination of "yoga + low-intensity jogging", focusing on the gradual improvement of physical flexibility and basic endurance.

**Preparation of Supporting Resources:** A professional team was organized to compile the College Students' Aerobic Exercise Guide and College Students' Sports Risk Prevention Guide to provide scientific guidance for students' sports activities. The debugging and calibration of intelligent equipment such as electronic skipping ropes, underwater photography and heart rate monitors were completed. Special training was carried out for the instructors of the research team and all experimental subjects to clarify sports requirements, operation specifications and safety precautions.

### **3.2. Mid-term practice stage (Months 1-3)**

**Implementation of Group Intervention:** A standardized training plan was formulated, with 4 to 5 special training sessions carried out every week, each lasting 20 to 40 minutes (20 minutes for the entry stage and gradually advancing to 40 minutes with the improvement of physical fitness). 1 to 2 rest days were reasonably arranged every week to achieve a balance between exercise and recovery.

## **4. Core innovations and practical effects**

### **4.1. Core innovations**

The single form of traditional aerobic exercise was broken through, and interesting and social elements were integrated to enhance sports attractiveness:

### **4.2. Model innovation**

A closed-loop teaching model of "Physical Fitness Assessment - Program Customization - Intelligent Monitoring - Interactive Incentive - Dynamic Adjustment" was constructed. Group teaching was carried out according to students' physical fitness types to realize "one policy for one person" personalized guidance, making aerobic exercise more targeted;

Combined with the characteristics of college students' heavy academic burden and fragmented time, "Fragmented Sports Packages" were created, and short-duration and high-efficiency sports programs such as 15-minute inter-class rope skipping, 20-minute pre-sleep yoga and 10-minute morning stretching were designed to adapt to college students' time characteristics and solve the core problem of college students "having no time to exercise".

## **5. Reference of domestic and foreign cases and experience enlightenment**

### **5.1. Typical domestic and foreign cases**

Stanford University, USA — Intelligent Jogging Course: Relying on intelligent technologies such as heart rate monitoring equipment and campus sports APP, it realizes real-time tracking, analysis and personalized guidance of students' sports data, and adjusts the jogging plan in a timely manner according to students' sports data to make jogging teaching more scientific. Its core experience is "Technology Empowerment + Data-driven", which realizes precise and personalized physical education teaching through intelligent technology.

Zhejiang University, China — Aerobic Exercise Community Alliance: Led by the School of Physical Education, a College Students' Aerobic Exercise Community Alliance was established to integrate various sports communities on campus such as rope skipping, jogging, swimming and yoga. It stimulates students' enthusiasm for sports participation by holding intercollegiate leagues, community exchanges, sports check-ins and other

activities. Its core experience is "Interest-driven + Social Empowerment", which makes sports a social way for college students through community and social forms and improves exercise adherence.

## 5.2. Experience enlightenment

Through the analysis of typical cases of aerobic exercise development in domestic and foreign universities and combined with the practical exploration of this study, three core experience enlightenments were summarized to provide a reference for the reform of aerobic exercise teaching in colleges and universities:

The in-depth integration of technology and physical education teaching is the key to improving teaching effectiveness: Intelligent technology can realize precise monitoring of sports data and personalized guidance, solve the problem of "experience-based teaching" in traditional physical education teaching, and make aerobic exercise teaching more scientific and precise;

Hierarchical teaching and personalized programs are the core to adapt to students with different physical fitness: There are obvious differences in college students' physical fitness levels and sports foundations. Only by implementing hierarchical teaching and formulating "one policy for one person" personalized sports programs can aerobic exercise be truly applicable to all students and realize "teaching students in accordance with their aptitude";

Interesting and social design can effectively stimulate students' participation interest: Breaking through the single and boring mode of traditional aerobic exercise and integrating interesting and social elements can make sports more attractive and fundamentally stimulate college students' intrinsic motivation for sports participation.

## 6. Research conclusions and promotion value

### 6.1. Research conclusions

Innovative aerobic exercise intervention can significantly improve college students' physical fitness level, among which the improvement effects of core physical fitness indicators such as vital capacity and endurance are the most obvious. Moreover, the differentiated sports programs designed for different physical fitness groups can enable all types of students to achieve adaptive improvement, and the improvement effect of students with weak physical fitness is particularly prominent. The closed-loop model of "Physical Fitness Assessment - Program Customization - Intelligent Monitoring - Interactive Incentive - Dynamic Adjustment" constructed in this study forms a scientific, standardized and operable teaching framework for college aerobic exercise, which effectively improves the pertinence and effectiveness of aerobic exercise teaching.

### 6.2. Promotion value

#### 6.2.1. Replicability

The venues and equipment required for the aerobic exercise practical program designed in this study are all conventional sports configurations in colleges and universities, without the need for high hardware investment. Intelligent equipment can be flexibly replaced according to the actual situation of colleges and universities (e.g., replacing electronic gravity skipping ropes with ordinary skipping ropes + mobile counting APP, and replacing professional underwater photography equipment with ordinary cameras). The operation process of the program is simple and easy to understand, and instructors can carry out teaching after simple training, which is convenient for colleges and universities of different levels and types to reference, learn and replicate.

#### 6.2.2. Social value

The practical program of this study can effectively improve college students' physical fitness level, cultivate their lifelong exercise habits, and help the implementation of the National Fitness Strategy in colleges and universities. At the same time, it can transport high-quality talents with physical and mental health and a strong physique to the society, providing a solid physical foundation for national talent training and social development, which has important social significance.

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