

Analysis of the Physical and Health Status of Chinese College Students from 2020 to 2022 and Improvement Measures

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Abstract

Physical health is the foundation for the comprehensive development of college students, and with the development of social economy and changes in lifestyle, the physical health level of college students is facing various challenges and problems. Therefore, conducting a comprehensive analysis of the current situation of college students' physical health level and proposing corresponding improvement strategies has important theoretical and practical significance. Using various research methods such as literature review, mathematical statistics, and measurement, this study focuses on the physical health test data of students from Liaoning University of International Business and Economics from 2020 to 2022. The study aims to conduct statistical analysis on five aspects of students' grades, overall results, body shape, physical function, and physical fitness. The research results show that the body shape level of school girls shows a "two headed bias, and the middle is equivalent"; The overall respiratory system function of female students is slightly better than that of male students; The explosive strength and flexibility of male lower limbs are higher than the "pass or above" level specified in the National Student Physical Health Standards. Based on this, a causal analysis was conducted on the problems existing in students' physical health, and corresponding improvement measures were further proposed: to improve physical monitoring work and play the role of physical testing; Accelerate the reform of physical education teaching and implement the "four year consistent system" teaching; Strengthen extracurricular physical exercise and set up extracurricular physical education credits; Relying on sports associations to carry out various forms of sports activities; Guided by the construction of high-level sports teams, we aim to create a school sports brand.

Keywords: Physical health; College students; Causal analysis; Countermeasure.

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1. INTRODUCTION

The physical health level of college students has always been widely concerned by the education, scientific research, and society, as it not only directly affects the physical and mental health and academic performance of students, but also is closely related to the development of the country and social stability. As an important component of the national physical fitness monitoring system, the physical fitness and health testing of college students plays an important role in school

sports, hygiene, and health education [1]. The results of the 8th National Student Physical Fitness and Health Survey released by the Ministry of Education in 2021 also clearly indicate that the overall physical fitness of college students has declined [2]. Therefore, taking the current situation of the physical health level of students at Liaoning University of International Business and Economics as a case study has certain practical significance for promoting the physical health of college students nationwide.

Table 1: Physical Fitness and Health Test Indicators for Chinese College Students

Body shape indicators	Body function indicators	Physical fitness indicators
Height	Lung capacity	Sit and reach
Weight		One minute sit ups (female), pull up (male)
		800m(female), 1000m(male)
		Standing Long Jump
		50m

Liaoning University of International Business and Economics has a physical fitness testing center and

a teaching and research department for curriculum and physical fitness monitoring. According to the National

Student Physical Health Standards issued by the Ministry of Education, the school's physical fitness testing team conducted comprehensive tests on students in strict accordance with the requirements. The test indicators are shown in Table 1. However, the process mainly emphasizes the assessment of students' physical and health status, which fails to effectively promote the comprehensive evaluation of students' physical fitness by the school.

The purpose of this study is to conduct mathematical statistics on the test data of students at Liaoning University of International Business and Economics from 2020 to 2022, comprehensively understand the physical health status of students in the school, and conduct in-depth exploration and analysis of the problems displayed in the results. Reasonable suggestions are proposed to provide useful guidance for students and the physical education work of the school, and to provide strong support for promoting the improvement of the physical health level of Chinese college students.

2. RESEARCH OBJECTS AND METHODS

2.1 Research subjects

This report analyzes and selects three years of testing data from 2020 to 2022 among students participating in the testing at school as the survey subjects. Except for students approved by the school for exemption from the test, the actual recorded test population in 2020 was 3549 males and 8007 females. In 2021, the test population was 3313 males and 8243 females, and in 2022, the test population was 3438 males and 7594 females.

2.2 Research Methods

2.2.1 Physical Health Testing

The school's physical health testing team provided professional guidance and strict supervision throughout the testing process, strictly following the requirements of the "National Student Physical Health Standards" and the "Implementation Measures for the National Student Physical Health Standards" of Liaoning University of International Business and Economics (Trial)".

2.2.2 Literature method

Using databases such as CNKI and Web of Science to search for literature and information, using keywords such as "physical health," "college students," and "physical exercise," relevant research literature was selected to summarize the viewpoints of different experts and scholars, providing a theoretical basis.

2.2.3 Mathematical Statistics

Detailed statistics were conducted on the test results, and mathematical analysis was conducted using Excel 2021 and IBM SPSS Statistics 26.0 to further understand the current status of physical health among male and female students over the past three years. Strategies and suggestions were proposed to address the existing problems.

3. RESULTS AND DISCUSSION

3.1 Overall testing situation

As shown in Figure 1, overall, the passing rate of the school's physical examination for three years has reached over 90%, and the overall test results of students are good. The results in 2021 and 2022 are similar, and the proportion of students with good or above grades in 2020 is about 10 percentage points lower than the latter two years.

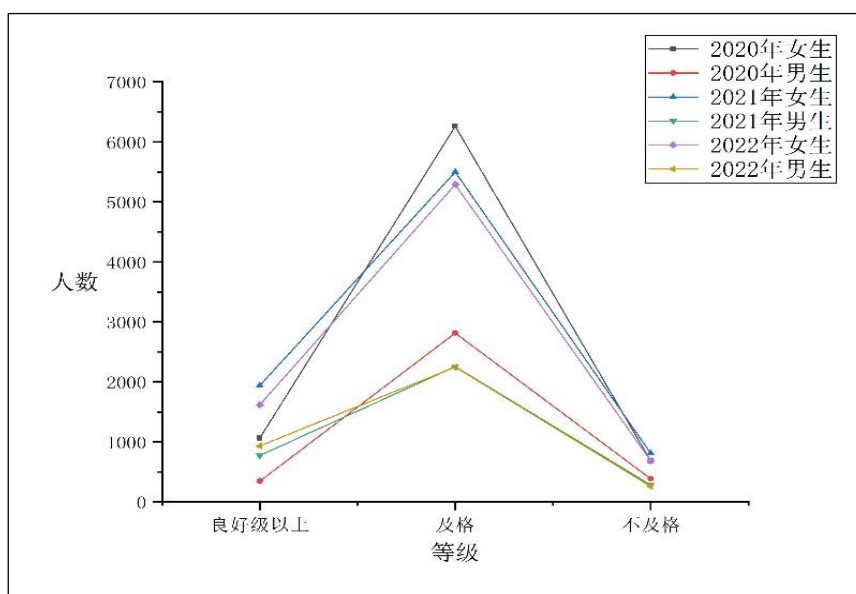


Figure 1: Student Test Level Results from 2020 to 2022

Analyze and introduce coefficient of variation to compare the dispersion of various test data between male and female students, and improve scientificity [3]. From the results of Table 2-4, it can be seen that the overall physical fitness of male students is better than that of female students. The coefficient of variation of height and weight of male students in school is greater

than that of female students, while the coefficient of variation of lung capacity is smaller for male students than that of female students. The coefficient of variation of standing long jump and sitting forward bending for male and female students are slightly higher than that of female students, with no significant difference.

Table 2: Average Values, Standard Deviations, and Coefficients of Variation for Male and Female Test Items in 2020

	Average Values		Standard Deviations		Coefficients of Variation /%	
	male	female	male	female	male	female
Height	168.310	164.910	5.285	4.189	3.14	2.54
Weight	64.120	59.990	8.528	6.359	13.3	10.6
Lung capacity	3518.09	3345.52	591.04	649.03	16.8	19.4
Standing Long Jump	1.838	1.691	0.149	0.132	8.11	7.79
Sit and reach	20.020	20.970	4.645	4.634	23.2	22.1

Table 3: Average Values, Standard Deviations, and Coefficients of Variation for Male and Female Test Items in 2021

	Average Values		Standard Deviations		Coefficients of Variation /%	
	male	female	male	female	male	female
Height	173.210	164.860	5.802	4.418	3.35	2.68
Weight	67.270	59.620	9.619	6.797	14.3	11.4
Lung capacity	3327.26	3016.01	585.59	618.28	17.6	20.5
Standing Long Jump	2.225	1.580	0.182	0.126	8.18	7.97
Sit and reach	21.500	22.400	5.461	5.443	25.4	24.3

Table 4: Average Values, Standard Deviations, and Coefficients of Variation for Male and Female Test Items in 2021

	Average Values		Standard Deviations		Coefficients of Variation /%	
	male	female	male	female	male	female
Height	173.151	164.867	5.402	4.336	3.12	2.63
Weight	67.390	59.500	9.299	6.307	13.8	10.6
Lung capacity	3332.90	2984.70	623.25	620.82	18.7	20.8
Standing Long Jump	2.228	1.573	0.183	0.128	8.21	8.12
Sit and reach	21.389	22.443	5.647	5.790	26.4	25.8

Male students have a wide range of body types, with varying height and weight development, which may be due to differences in genetic factors and nutritional conditions; The fluctuation of male students' cardiopulmonary function is more stable than that of female students, and there is a similar difference in the development of physical fitness such as lower limb burst and flexibility between male and female students. The reason may be that there is not much difference in their sports behavior and dietary habits on campus, leading to

a similar trend of same-sex differences in the development of cardiopulmonary function and physical fitness.

3.2 Body shape testing situation

According to the Body Mass Index (BMI) rating table of the National Student Physical Health Standards (see Table 5), draw a BMI rating distribution map for male and female students (see Figure 2).

Table 5: Body Mass Index (BMI) Level Table of the National Student Physical Health Standards

Level	Normal	Low weight	Overweight	Obesity
Female	17.2-23.9	≤17.1	24.0-27.9	≥28.0
Male	17.9-23.9	≤17.8	24.0-27.9	≥28.0

From Figure 2, it can be seen that over the past three years, approximately 65% of boys and 71% of girls have a normal body mass level index each year; The number of people living in low weight does not exceed 10%, with more girls having a lower proportion than

boys. In 2020, the total proportion of people living in low weight was even lower than in the following two years, only 6.2%; The proportion of overweight boys has remained around 17% for the past three years, with a significant change for girls. Especially in 2020, the

proportion of overweight girls reached 15.1%, which is 9 percentage points higher than the following two years; The proportion of male and female students with obesity

is relatively stable except for 2020, accounting for about 11% of the total number of participants.

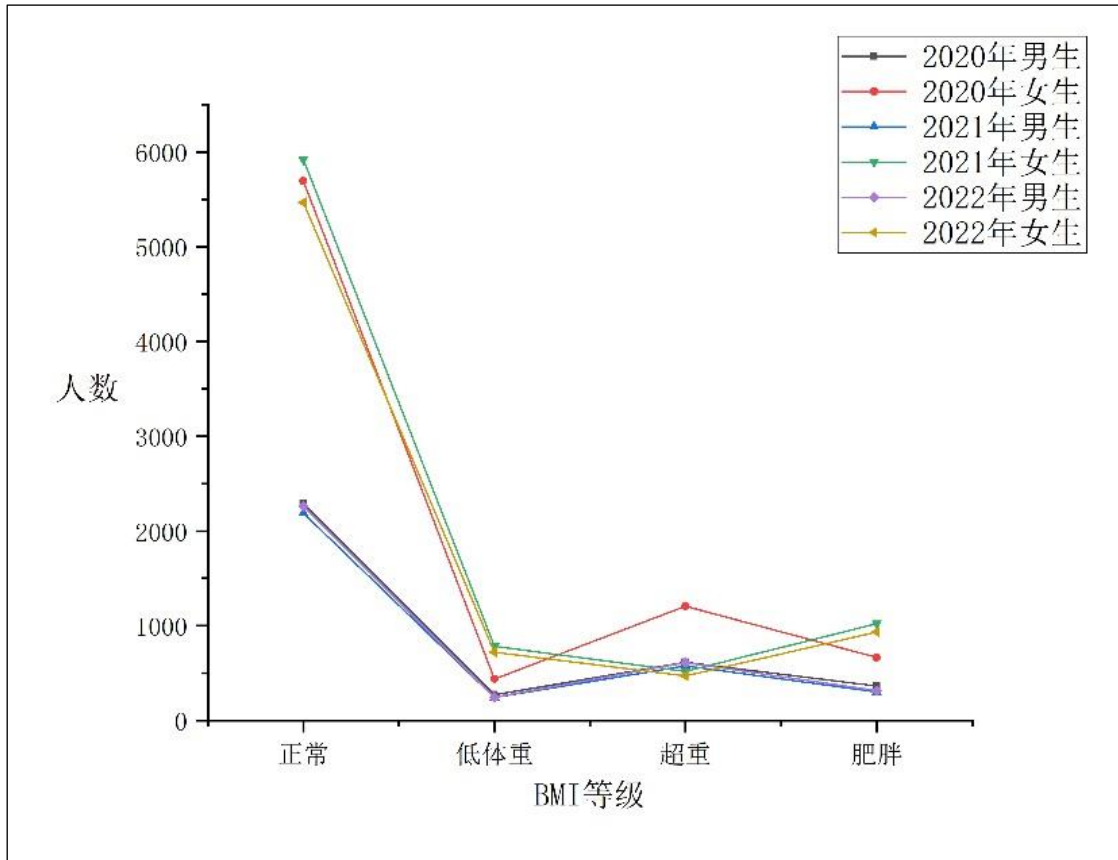


Figure 2: Distribution of Body Mass Index Levels for Male and Female Students

The BMI level of students is mostly at a normal level, with more girls being thin and obese. One possible reason is that boys prefer to participate in sports activities, and their daily exercise volume is larger than girls, resulting in healthier development compared to girls. However, the intensity of most female students participating in sports activities is limited, resulting in a higher number of obese individuals. In addition, a few

girls use unscientific weight loss methods, such as dieting, which leads to more cases of underweight.

3.3 Physical function testing situation

The lung capacity body mass index is used to evaluate the physical function of both males and females, which can objectively evaluate the respiratory function of the human body.

Table 6: List of lung capacity/body mass index grade distribution for male and female students in the National Student Physical Health Standards

Level	Excellent	Good	Pass	Fail
Male	>78	68-77	55-67	<54
Female	>64	54-63	43-53	<42

According to the distribution table of lung capacity/body mass index grades for male and female students in the National Student Physical Health Standards (Table 6), the collected data was analyzed. From Figure 3, it can be seen that the passing rate of lung

capacity/body mass index grades for female students is higher than that for male students, and the overall passing rate for three years has exceeded 82% of the total number of students that year.

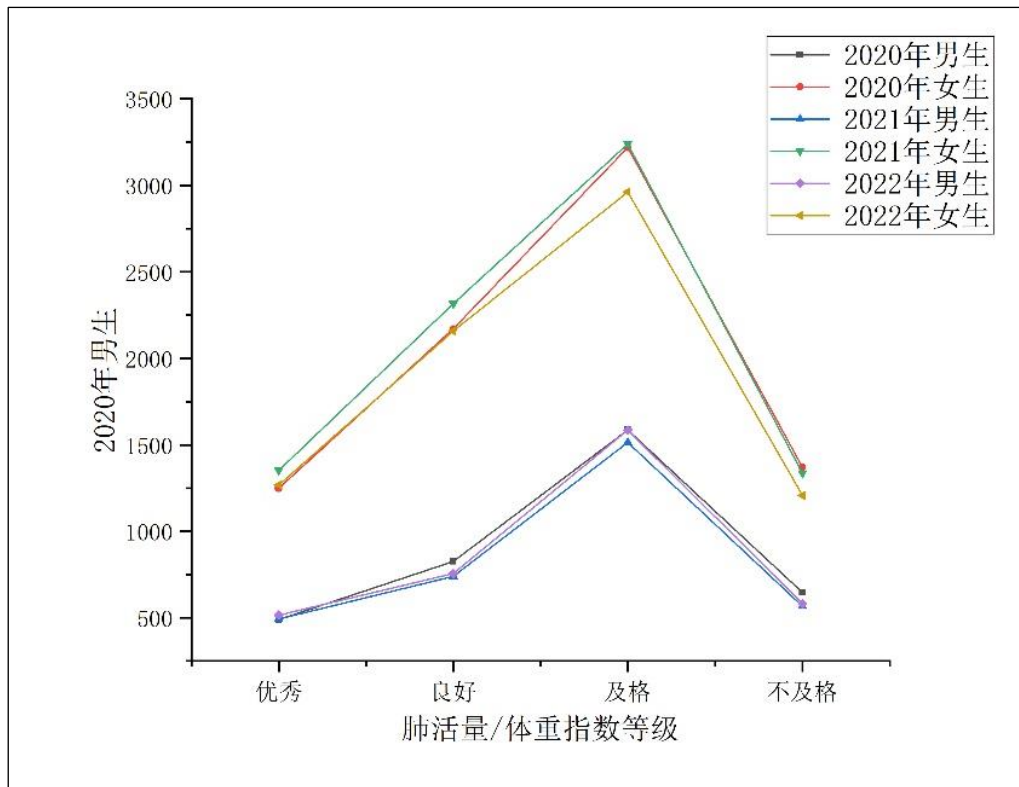


Figure 3: Distribution of the number and proportion of male and female students with lung capacity/body mass index levels

The respiratory function of students is generally good, and there is no significant difference in the distribution of lung capacity levels. The overall situation of girls is slightly better than that of boys. Regarding this difference, it can be discussed that boys may have unhealthy habits such as staying up late, which may cause harm to their respiratory function. In addition, some boys may have less physical exercise, which may lead to a decrease in their respiratory function.

3.4 Physical Fitness Test Status

Referring to the rating table of the National Student Physical Health Standards (see Tables 7 and 8), compare the average values of the school's standing long jump and sitting forward bending test data from 2020 to 2022 with the levels of the National Student Physical Health Standards.

Table 7: "National Student Physical Health Standards" Standing Long Jump (m) Level

Level	Excellent	Good	Pass	Fail
Male	> 2.63	2.48-2.63	2.08-2.48	< 2.08
Female	> 1.95	1.81-1.95	1.51-1.81	< 1.51

Table 8: "National Student Physical Health Standards" Sitting Forward Bend (cm) Level

Level	Excellent	Good	Pass	Fail
Male	> 21.3	17.7-21.3	3.7-17.7	< 3.7
Female	> 22.2	17.7-22.2	6.0-19.0	< 6.0

As shown in Figures 4 and 5, the average value of male standing long jump in 2021 and 2022 was higher than the passing level, while in 2020, they failed; The average level of female standing long jump for three years is higher than the passing level of female students.

In addition, in 2020, the average sitting forward flexion of both males and females did not reach the excellent level, while in 2021 and 2022, they were both in the excellent level.

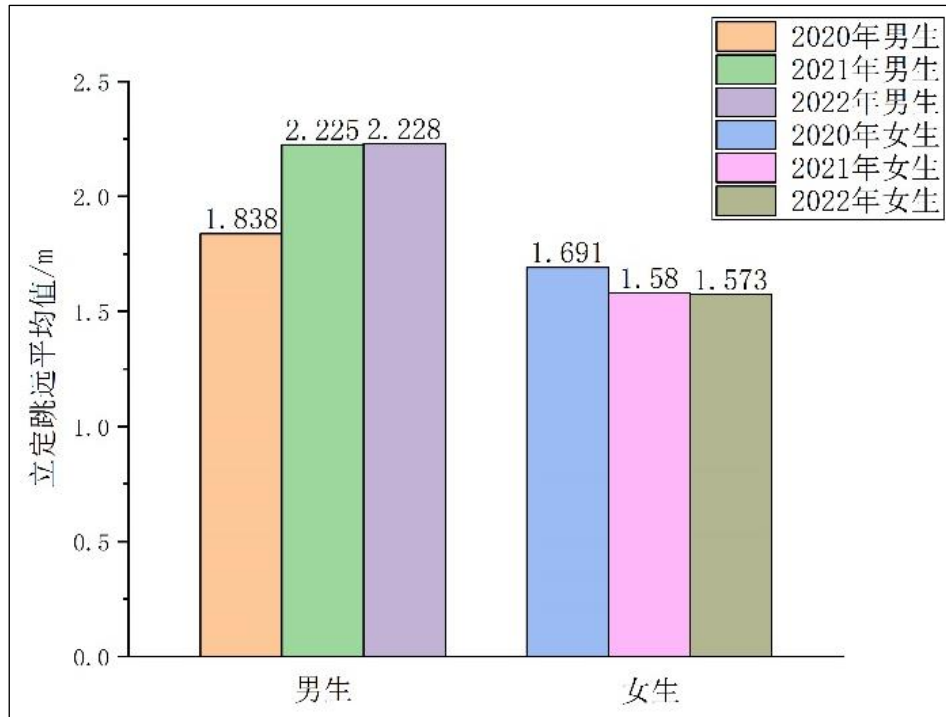


Figure 4: Comparison of Average Values of Standing Long Jump for Students from 2020 to 2022

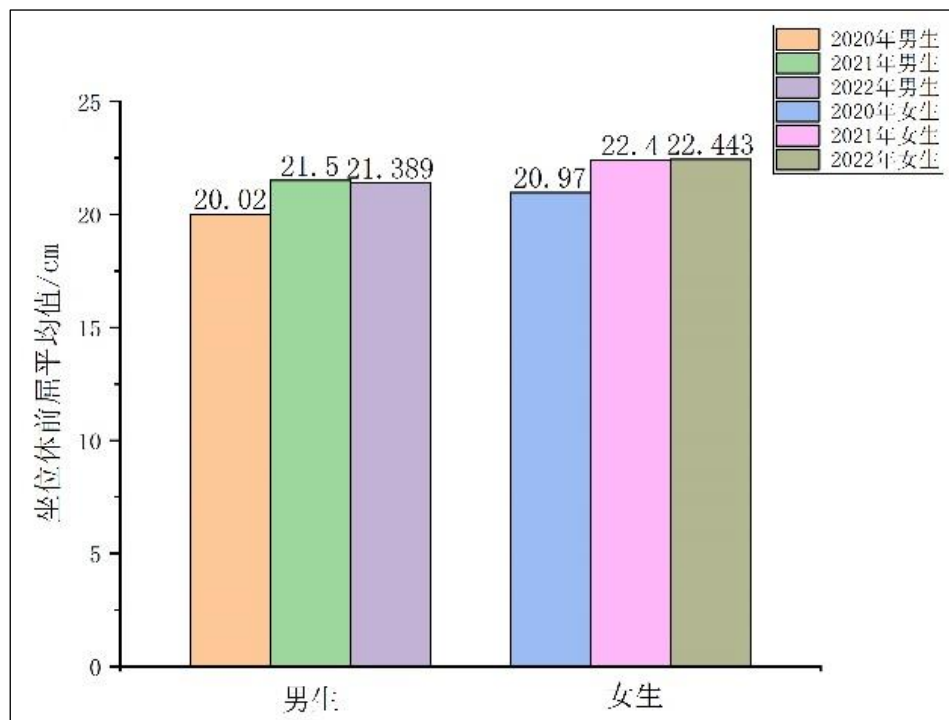


Figure 5: Comparison of Average Values of Forward Bending in Sitting Positions among Students from 2020 to 2022

It has been observed that boys perform better in terms of lower limb explosiveness and flexibility, especially in terms of flexibility, which has obvious advantages. This may be because the school has sufficient basketball courts, volleyball courts, and other venues, providing guarantees for boys to participate in high-intensity sports activities and promoting male students to improve their flexibility through long-term

exercise. However, although girls rarely participate in such intense sports, resulting in weaker lower limb explosiveness, they are more active in sports or activities such as gymnastics and dance, thus improving their flexibility more quickly. In addition, due to the low motivation of female students, it is relatively difficult to carry out lower limb explosive training for girls, which

may also lead to relatively weaker lower limb explosive strength for girls.

4. COUNTERMEASURES AND SUGGESTIONS

4.1 Improve physical fitness monitoring work and leverage the function of physical fitness testing

Taking students' physical health status as an individual evaluation standard for their physical health and an important part of their comprehensive quality evaluation, regular physical health assessments are conducted on students, including comprehensive assessments of body shape, physical function, and physical fitness, to promote the development of students' physical health and encourage them to actively engage in physical exercise. Establish a mechanism for analyzing and evaluating students' physical health status, develop intervention measures for different situations, such as classified teaching and individual counseling, and guide students to engage in targeted physical exercise. Strengthen the education and motivation of students' physical fitness test results, feedback adjustment, and guidance exercise functions, in order to improve the physical health level of all students. In addition, schools can also provide mental health support services, including psychological counseling and mental health promotion activities. This helps to cope with academic pressure, interpersonal issues, and emotional management, promoting students' overall health.

4.2 Accelerate the reform of physical education teaching and implement the "four year consistent system" teaching

One is to increase the reform of physical education curriculum, with the main focus on cultivating students' interest, mastering sports skills, developing exercise habits, and enhancing students' physical fitness. We will deepen the reform of physical education curriculum, improve and improve the design of physical education curriculum content, support students' physical fitness development, improve physical literacy and health level, increase content of health education such as nutrition and health management, and help students cultivate a healthy lifestyle. The second is to implement the "four year consistent system" of physical education curriculum teaching, which will be arranged throughout the four years of undergraduate education, reasonably arrange class hours and credits, cultivate students' habit of consciously participating in physical exercise, and promote students to form the concept of "lifelong physical education". The third is to enrich teaching content, highlight fitness, entertainment, and lifelong nature, and provide diversified sports projects to meet the development needs of different students. The fourth is to improve the level of physical education classroom teaching, standardize the teaching process, innovate teaching methods, provide rich teaching resources, pay attention to students' motor skill learning and practical practice, so that students can master multiple motor

skills. The fifth is to strengthen health education, pay attention to health education guidance, and combine classroom teaching with extracurricular activities to exert the overall educational effect, so that students can master health knowledge, possess health abilities, develop healthy habits, and a good lifestyle. The sixth is to enrich traditional ethnic sports courses, promote traditional Chinese sports culture, help students enhance national confidence, and achieve their physical and mental health development.

4.3 Strengthen extracurricular physical exercise and set extracurricular physical education credits

Firstly, it is necessary to improve and implement the system of extracurricular physical exercise for students, encourage them to participate in one hour of campus sports activities every day, and include the results of extracurricular physical exercise in their physical education class grades. Secondly, establish a file of students' extracurricular physical exercise, include extracurricular physical exercise in the total score of students' physical education classes, set extracurricular physical exercise credits, and include them in the elective credits of students' second classroom. Finally, utilizing relevant sports software and mechanisms, promote mass extracurricular physical exercise activities with the theme of the Sunshine Sports series, create a good sports atmosphere, and encourage students to participate in extracurricular physical exercise.

4.4 Relying on sports associations to carry out various forms of sports activities

Give full play to the role of campus sports associations, support and subsidize various activities that conform to the characteristics of college students and promote physical and mental health, and guide students to actively participate in sports activities. Provide various types of sports clubs, such as aerobic exercise, strength training, yoga, dance, etc., to meet the preferences and needs of different students. Support students from sports clubs to participate in various competitions at all levels, optimize the structure of sports club guidance teachers, and improve the level of club activities by introducing industry professionals to guide students in sports activities. Create sports brand activities, hold distinctive sports competitions and activities, and shape the brand image of campus sports activities.

4.5 Leading by the construction of high-level sports teams, creating a school sports brand

Give full play to the leading and exemplary role of existing high-level sports teams, and establish representative teams for different sports events and levels, encouraging students to actively participate in sports competitions. Establish a system and system for student sports competitions, carry out class and grade sports competitions, provide display platforms, activate the campus sports atmosphere, and promote students' participation in physical exercise. Create a sports brand

with school characteristics, promote the construction of campus sports culture and the popularization of sports knowledge. Organize school sports and cultural festivals, individual or comprehensive sports events, and other activities to enhance the school's visibility and influence in the field of sports.

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