Experimental Study on the Impact of Physical Fitness Class on College Students' Physical Health Level——Taking Beijing Foreign Studies University as an Example

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Abstract: In this study, experimental classes of physical fitness are set for college students, and experimental and mathematical statistics methods are used to evaluate the physical health of students in the class. It studies the impact of physical fitness class on the physical health of college students, analyzes and discusses the course intensity and movement characteristics, and evaluates the implementation effects of the course, to help students fully understand the characteristics of physical fitness class, so that students can reasonably choose the course based on their own conditions. The research results show that physical fitness class has obvious effects on students' cardiopulmonary quality and endurance quality, but its improvement effects on students' BMI index and flexibility quality are general.

1 Introduction

With the advancement of society, strengthening of national strength, and continuous improvement of people's living standards, the physical quality of Chinese young students has improved significantly, but there are still some problems that cannot be ignored, especially the physical quality of college students that has gained increasing attention. College students are excellent backup force for China's modernization construction. While paying attention to the cultural knowledge and technical theory level of college students, we should also take notice of the changes in their physical quality. Although the physical quality of a person is related to heredity, it is more closely related to his/her nutrition acquisition and physical exercise afterwards. Physical quality can be improved from all aspects through correct method and proper exercise.

In different historical stages of social development, China has successively formulated and promulgated a series of standards for measuring and evaluating students' physical health status, such as *Labor and Health System*, *National Physical Exercise Standard* and *Student Physical Fitness Standard*, making measurement and evaluation standards on students' physical fitness gradually developed and improved. The national physical health standards for students have achieved multi-purpose goal, and add the indicators for evaluating health quality on the basis of retaining some physical quality testing indicators.

This research evaluates the physical health conditions of college students in physical fitness class, studies the impact of physical fitness class on the physical health of students in Beijing Foreign Studies University, analyzes and discusses the course intensity and movement characteristics, and evaluates the implementation effects of the course, to help students fully understand the characteristics of physical fitness class, so that students can reasonably choose the course based on their own conditions. We take ordinary college students as the research object, and conduct two tests at the beginning and the end of the semester to observe the changes in students' BMI index, cardiopulmonary endurance quality, muscle quality and flexibility quality.

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2. Research Object and Method

2.1 Experimental Object. Experimental class of physical fitness in Beijing Foreign Studies University has 45 boys and 90 girls. They are aged between 18 and 22 years old and are in good health without any history of cardiopulmonary disease.

Tab.1 List of Subjects' Basic Conditions

	Age	Height/m	Weight/Kg
Boys in physical fitness class	20.20 ± 1.62	1.77 ± 0.04	70±8.39
Girls in physical fitness class	20.87 ± 0.94	1.66 ± 0.16	64±11.34

2.2 Experimental Method. The subjects are tested based on physical fitness indicators, and height, weight, sitting flexion, grip strength (male), standing long jump (female), and one-mile walk are measured. The physical testing equipment specified by the State Sports General Administration are applied, the subjects are tested with the same inspector and same equipment, and inspectors are also trained before testing.

The meaning of each test indicator is listed as follows.

Muscle strength quality makes the neuromuscular movement control ability increase, and is an indispensable element of physical fitness, one of the basic qualities for the human body to engage in sports, the basis for obtaining sports skills and achieving excellent sports performance, and also a key factor for the development of other physical qualities. Muscle strength quality is influenced by factors such as heredity, age, gender, physiological factors and exercise.

Body mass index is also known as physical fitness index and weight index, referred to as BMI, is the number of kilograms of body weight divided by the square meters of height, and is currently used internationally to measure the weight and health condition of human body. It is an index closely related to total body fat, and it takes into account the two factors of weight and height, which is simple and practical and can reflect systemic overweight and obesity.

Flexibility quality is the measure of the extent of joint motion and is usually expressed in terms of the flexibility of the joint being tested. The magnitude of joint motion depends, on the one hand, on the structure of the joint itself and on the other hand on the elasticity and extensibility of the muscles, tendons, ligaments, skin and other tissues of the joint. In addition to heredity, nutrition and lifestyle, it is also closely related to sports, so that it is a fundamental factor in determining physical fitness. Flexibility fitness is affected by physiological factors, age, gender, body temperature, exercise, heredity and so on.

Cardiopulmonary endurance quality reflects that blood transport system delivers oxygen and energy to the muscles, to maintain body's ability to engage in physical activity. As people with good cardiopulmonary endurance quality usually have better ground exercise tolerance and aerobic exercise capacity, cardiopulmonary fitness is also known as cardiovascular endurance or aerobic fitness. Cardiopulmonary fitness is affected by the function of visceral organs, heredity, age, gender, movement, body fat and the like.

3 Influence Results of Physical Fitness Class on Various Physical Health Test Indicators of College Students and Related Analysis

3.1 Results of Exercise Intensity Arrangement in Physical Fitness Class and Related Analysis. In the follow-up survey of the class, we have sampled the heart rate changes of the students in the class for many times and get the following diagram.

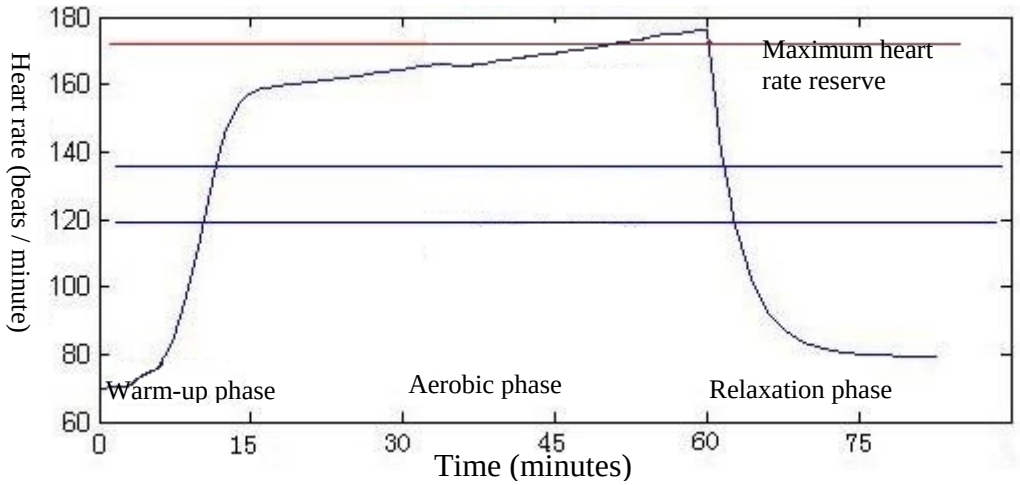

Fig. 1 Heart Rate Change Diagram in Physical Fitness Class

We divide the course into three phases, namely warm-up phase, aerobic phase and relaxation phase, with warm-up phase ranging from 0 minute to 15 minutes, aerobic phase starting from the 15th minute to 60th minute, and relaxation phase starting from the 60th minute to 75th minute. As can be seen from the above figure, heart rate in warm-up phase increases from 70 beats per minute to 160 beats per minute; the body enters aerobic phase when the heart rate reaches 160 beats per minute, and 45-minute aerobic exercise is conducted during the aerobic phase, thus reaching 80% of the maximum heart rate reserve; the recovery exercise is performed during the relaxation phase, so that the heart rate can slowly drop to the normal level.

3.2 Influence Results of Physical Fitness Class on the Muscle Strength of Boys and Girls and Related Analysis. The survey results show that after a semester of physical fitness class, the average score of boys' grip strength index increases from 58.7 at the beginning of the course to 77.3. The upward trend is obvious and the score is nearly excellent. The score of girls' standing long jump was raised from 1.65 meters at the beginning of the course to 1.78 meters. The difference test results show a significant difference ($P<0.01$).

Muscle strength quality includes muscle strength, muscle endurance, explosiveness, speed, flexibility, balance, sensitivity and coordination. Due to endocrine, men's muscle strength and quality are usually stronger than women's, reaching the peak of muscle growth at the age of 20, which later slowly declines until 60 years old.

The results show that the muscle strengths of boys and girls in the physical fitness class are both improved. Full and planned practice is the key to improving the endurance quality of muscles, while teachers' rational teaching and training methods are also important factors to improve students' muscle endurance quality.

3.3 Influence Results of Physical Fitness Class on the BMI of Boys and Girls and Related Analysis. The results of the survey show that after a semester of physical fitness class, the BMI of boys changes from the initial 25.4 to 21.3, showing a downward trend and reaching an ideal index range, but there is no significant difference; the BMI of girls changes from the initial 23.77 to 22.64, there is no significant change in range and no significant difference, but it is always within the appropriate range and even tends to be lean.

The BMI greater than or equal to 24 indicates overweight, and the BMI greater than or equal to 28 indicates obesity; male waist circumference greater than or equal to 85 cm and female waist circumference greater than or equal to 80 cm indicate waist obesity.

The initial test of the semester shows the BMI of most students in the test are kept in a proper range, some are at a critical value, while still some are in overweight range. In the second test at the end of the semester, the students' weight is significantly improved, the BMI of all students are kept within an appropriate range, some are at the critical value, but there is no risk of overweight. Therefore, the course exercises have a certain effect on the weight control of students.

3.4 Influence Results of Physical Fitness Class on the Flexibility Quality Level of Boys and Girls and Related Analysis. The results of the survey show that after a semester of physical fitness

class, the average score of the male body sitting flexion increases from the initial 7.13 to 9.13 cm, showing an upward trend, but the difference test has no significant difference; the average score of the female body sitting flexion increases from the initial 13.77 cm to 17.12 cm, also showing an upward trend, but there is also no significant difference.

People with high training level can better relax muscles at will, which is related to the inhibition depth of nerve cells that administer skeletal muscles in the central nervous system.

The study finds that the flexibility quality of students in the class is slightly improved. Through the records of the class, it is found that there are few targeted exercises for students' flexibility quality in the physical fitness class, with only a small amount of flexibility quality exercises inserted in the preparation and recovery activities. The method combining both active stretching and passive stretching and the method of static stretching are mainly applied in the exercises, indicating that scientifically strong exercises play a certain role in improving students' flexibility quality.

3.5 Influence Results of Physical Fitness Class on the Cardiopulmonary Endurance Level of Boys and Girls and Related Analysis. The results of the survey show that after a semester of physical fitness class, the average score of boys' maximal oxygen uptake increases from 59.35 ml/kg/min at the beginning of the course to 64.50 ml/kg/min, and the difference test shows significant difference ($P<0.01$). The average score of girls' maximal oxygen uptake increases from initial 48.75 ml/kg/min to 56.73 ml/kg/min, and the difference test shows a very significant difference ($P<0.01$).

Long-term adherence to moderate physical exercise can cause a variety of good adaptive changes in the shape, function and regulation of cardiovascular system, thereby improving body's exercise capacity and physical health level. Good cardiopulmonary endurance quality is the basis for developing various functions and qualities of the human body.

The study finds that the maximum oxygen uptake of boys in the physical fitness class is in the excellent range, which has been further improved through exercises in the course; the maximum oxygen uptake of girls is at an excellent level. The cardiopulmonary fitness of the boys and girls in the physical fitness class is excellent, and there is still room for improvement on the basis of maintaining the original level. In the training of physical fitness class, the maximum oxygen uptake has been greatly improved, indicating that the course has a good effect on the improvement of cardiopulmonary fitness.

4 Conclusion and Suggestions

4.1 Conclusion. Physical fitness class plays an effective role in improving students' cardiopulmonary fitness and muscle fitness; the flexibility fitness of girls is better than that of boys; the muscle fitness of boys is more prominent; the flexibility fitness of students still needs to be improved to a large extent.

4.2 Suggestions. Targeted exercises are required for improving different physical qualities, and the exercise time accumulated by the course alone is not enough to ensure the improvement of students' physical fitness. It is necessary to carry out planned and consistent physical exercises to gain good health. Students should fully consider their own physical condition while choosing courses, to lay a good foundation for lifelong sports and provide healthy body for study and life.

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