



Effects of Physical Training on Student Health in Ordinary Universities

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Abstract

Following functional physical training, college students' physical condition, shape, and other indicators were compared and carefully studied, demonstrating the effectiveness of the training program recommended in this article. This study is predicted to offer a set of practical functional physical training programs for college students, helping to promote the improvement of physical quality and general studies of health development.

Physical fitness index evaluation. In terms of physical fitness, after 12 weeks of functional fitness training, there were significant differences in muscle endurance (planks and sit-ups), explosive power (vertical jump), accuracy and sensitivity (hexagonal jump sensitivity), balance (standing on one foot with eyes closed), flexibility (sitting forward) and maximum strength (squatting and bench press) compared with before experiment ($P < 0.05$). There were no significant differences in Male pull-ups, standing long jumps, cardiovascular endurance (1000, 800 meters), speed quality (50 meters), and coordination (one minute rope skipping) were all better than they were before the trial ($P > 0.05$), although not significantly. These are the conclusions: Functional physical training may significantly improve typical college students' FMS and Y-balance test results as well as minimize their risk of sports injuries by equating the two sides of the body more evenly. Although the maximum oxygen uptake index was somewhat promoted, the impacts on college students' height, weight, and BMI were not immediately apparent. Muscle endurance, explosive power, accuracy, agility, balance, and other maximum strengths have all been drastically raised, yet they haven't been greatly improved.



Introduction

A strong youth makes the country strong, and strong sports make China strong. After the founding of New China, especially since the 18th National Congress of the Communist Party of China, the party and the country have always paid close attention to the physical health and physical education of young people. The sports of young people in our country have achieved rapid development and their physical fitness has been significantly improved; wind, 2007The “Opinions on Strengthening Youth Sports and Strengthening Youth Physiques” issued in 2009 pointed out that [1], to further strengthen youth sports and enhance youth physique. In 2019, the “Outline for Building a Sports Powerful Country” issued by the State Council proposes to promote the improvement of young people’s physical literacy and the development of a healthy lifestyle as an important part of school physical education, and to incorporate students’ physical health into the assessment of the government, education administrative departments, and schools System, fully implement youth sports activity promotion plan. The 2020 “Opinions on Comprehensively Strengthening and Improving School Physical Education Work in the New Era” pointed out that school physical education training should be strengthened, and the school physical education model of “health knowledge + basic sports skills + special sports skills” should be gradually improved to teach students scientific exercise and Health knowledge, guiding students to master basic sports skills such as running, jumping, and throwing. In recent years, the physical fitness of college students in my country has shown a downward trend [2]. For this reason, college students’ physical health problems still need to highly valued. At this stage, some conventional physical education courses in colleges and Universities struggle to successfully increase college students’ physical fitness due to issues including an inadequate exercise load and solitary techniques. In addition, students in college are limited in their ability to develop specialized skills in physical education due to their lack of physical health. For instance, if college students don’t have the necessary upper body strength when studying tennis, technical motions will be distorted and create injuries, which will impair learning quality and potentially result in sports injuries. Gray Cook’s “Functional Training” It was initially suggested in “Body Functionality and Training,” a novel training theory and approach created to fulfill the demands of professional sports, which also includes physical treatment and training in sports function. The second is physical training for those who do not have mobility disorders as a form of compensation. The idea and methodology of physical function training have become increasingly popular in recent years, especially in the teaching and training of school sports and mass fitness. Which is different from traditional physical training [3]. Selectively introducing functional movement training into public physical education classes in colleges and universities will greatly enrich the teaching content of physical education classes, and it is beneficial to supplement traditional special skill teaching with advanced training methods and concepts [4]. Research has confirmed that functional training pays more attention to the role of the complete kinematic chain of the body, avoids training a single link or single movement of the body, and regards the movement of the human body as a complete kinematic chain. Functional training is a good interpretation of the idea of comprehensive physical development, not only helps to improve students’ strength, speed, cardiorespiratory endurance, muscular endurance, flexibility, coordination, explosiveness, flexibility, balance, accuracy, etc. The level of physical fitness indicators also helps to improve students’

performance in special sports.

- Research PurposeStudy the principles and methods of functional physical fitness training for ordinary college students at the China University of Mining and Technology.
- Establish a physical training program for ordinary college students.
- To analyze the effect of functional physical fitness training on reducing the risk of sports injuries in general college students.
- Combined with the analysis results, developmental suggestions are put forward for the functional physical fitness training of college students.

Research Significance

Based on the physical characteristics of ordinary college students, this study explores the introduction of functional physical fitness training theory into ordinary college students’ physical education classes. By clarifying the principles of physical fitness training, refining the operation methods of different physical training sections, and realizing the risk assessment of sports injuries based on action screening, which enriches the theoretical system of functional physical fitness training for ordinary college students and ascertains its theoretical significance.

Constructing a functional physical fitness training program for ordinary college students

By constructing a set of functional physical fitness training programs suitable for ordinary college students, the training methods of specific sections are clarified. This method can introduce the concept of functional training into the teaching of college physical education courses and provide a reference for improving the teaching quality of college physical education courses and innovating the methods of physical training for college students, which has certain practical significance. The promotion of this program will help promote the improvement of college students’ physical fitness, reduce the occurrence of sports injuries in college students’ physical exercise, and lay the foundation for college students to engage in more sports exercises and develop good habits for lifelong sports.

Literature Review

Functional training

Functional training comes from the field of rehabilitation. After the patient undergoes surgery, the rehabilitation therapist designs some rehabilitation actions according to the patient’s working and living environment to help them meet their living and working needs as soon as possible. With the development and evolution of functional training, it has been introduced from the field of rehabilitation to mass fitness and competitive sports. In order to distinguish it from functional training in the field of rehabilitation, it is called “functional physical training” in the field of competitive sports. Pointing out that functional training involves the body’s movements being regarded as a complete movement chain. Instead of repeated exercises for a single link or movement of the body, targeted training can be carried out by looking for the weak links in the human movement chain. With the popularity of this training concept, more experts in the field have defined it. Michael Boyle [5]. It is considered that functional training is the training of body function

as its essence, emphasizing stable control and proprioception, overcoming one's own body weight, light equipment, and multi-plane continuous exercises in standing position. It is believed that functional training involves acceleration, deceleration, and stability exercises; it requires the active participation of the nervous system and proprioception; and it requires the practitioner to overcome the influence of factors such as instability, think of functional training as training designed to unify physical function with specific goals. Steven [6]. By summarizing the above three definitions, it is believed that the exercises designed by functional training should be able to improve the biomechanics, coordination, and coordination of human daily life movements. Tonality and energy metabolism [7]. A table is used to clearly distinguish the characteristics of functional training and non-functional training. It is worth noting that traditional training also includes the concept of functional training, and the relationship between functional training and functional training is mutually inclusive rather than separate. The table is only meant to sort out the characteristics of functional training, and does not criticize other training tendencies. The study argues that the body's unique adaptations can improve structural integrity without physical changes. In other words, most people can improve their overall athletic performance without adding muscle. Functional training integrates body structure by improving coordination and motor skills. This change is based on the nervous system Occurred due to the improvement of adaptability [8]. Charles Staley In his book, he describes functional training as "the use of props to create an environment of unstable support, thereby exercising more stable muscle groups and control of small muscle groups [9]." He believes that functional training advocates the recruitment of small muscle groups and stable muscle groups, and this ability is the key to determining competitive ability.

- Research Status of Functional Training

Functional training works on the basis of body structure and is designed according to the work tasks that need to be performed, so it requires muscles to work in a natural way. The simplest squatting and throwing movements of the human body require the use of multiple muscles to complete, so the exercise of arm flexion and extension has little practical significance [1]. The muscle fiber and strength adaptations induced by training have clear target targeting, which indicates that the adaptation of muscle structure is highly specific, and the changes in muscle structure induced by training will enhance its function and thus improve the whole-body exercise capacity. The specificity of muscle training can be used in functional training to improve the performance of movements closely related to life [10]. Human functional anatomy and human sports biomechanics are the theoretical basis for designing functional physical training programs. There are 600 muscles in the human body, most of which are long-distance action muscles that span multiple joints. Higashihara believes that training these multi-joint muscles plays a more important role in improving the speed of movement. In addition, they can also effectively adjust the power ratio between different links in the human body's kinematic chain to improve the body's overall function. Coordination of body movements. The training of these muscles is the focus of functional training [9]. Spennewyn It is believed that muscle movement is very complex, requiring multiple muscles in the human body to cooperate and fight against each other on three planes to produce effects together, thus responding to

gravity, ground force, and other external forces [11]. In order to achieve the best training effect, functional training needs to pay attention to the coordination of sports-related systems. Among the three planes of motion of the human body, horizontal plane motion plays the most important role in the chain of motion of the human body. The main muscles of the human body are connected to the ischial tuberosity, located below the suprasternal plane, of which 87.5% are distributed horizontally or obliquely, which is consistent with the "shawl effect" of the muscle tendency of the central region of the human body. In life or in competitive competitions, no matter how complicated the movements are, they are composed of the basic movements of the human body. Become. Foreign experts have made a high-level summary of these basic human movements. Newton divided basic human movements into six "primitive movement modes", namely pushing, pulling, rotating, lunging, squatting, and flexing [12]. The basic movements of the human body are summarized into four types: rotation, push-pull, horizontal, and vertical movements, which are called "four pillar movements [13].

- Empirical Research on Functional Training

Putting forward that "the essence of sports is movement", he created the World Athlete Multifunctional Training Center with his own scientific research achievements, and made brilliant achievements in the World AP Athlete Physical Training Center. In 2005, Mark's fitness team worked with German national football team coach Klinsmann, helping the German team to third place in the 2006 World Cup. During the London Olympic Games, we cooperated with many sports teams of the Chinese delegation and made important contributions to the Chinese delegation's outstanding achievements of 38 gold medals. The 2008 World Cup in Brazil continued to help Germany win the World Cup. Later, it changed its name to EXOS Fitness Training Center [14]. In 2009, researchers conducted a study that compared functional and traditional training systems for the first time. Studies have found that after training, the functional training group performed far better than the traditional strength training group. The functional training group gained 58% more strength and nearly doubled their balance than the control group, while reducing joint pain by 30%. Random selection 19 male college students aged 19-25 underwent functional training 3 times a week for 8 weeks, and found that their speed, endurance, muscle strength, explosive power, flexibility, and sensitivity were significantly improved [4]. Divided golf players into two groups for 6 weeks of functional strength training and the original golf strength training plan, and found that the original plan significantly improved the athletes' squats and supine leg lifts while improving their vertical jump and swing speed there were no significant changes, whereas functional strength training produced significant improvements in all stats. The FMS test was created based on basic proprioceptive and kinesthetic principles of awareness. Each test is a specific sport. A dynamical linkage system of the body is needed, i.e., a linkage system for analytical dynamical linkage models depicting the body as an interdependent refinement. These refinement links typically move in a proximal-to-distal sequence in order to generate the desired motion at the distal segment. An important aspect of this system is the body's proprioception. Proprioception can be defined as a specialized variation of the sensory modality of touch, which includes the sensation of joint movement and joint position sensation. Proprioceptors in each segment of the kinetic chain must function properly for efficient movement patterns to occur [15].

Related Research on College Students' Physical Health

Taking "college students' physical health" as the subject search term, I searched on CNKI 4187 Articles about College Students' Physique Health-Related Literature Review. In 1980, after reviewing relevant literature, he began to pay attention to the physical health of college students. It was only in 1987 that he began to pay attention to the research on the physical health of college students, and the published articles were also increasing year by year. It can be seen from the existing research results that the current research on the physical health of college students mainly focuses on the analysis of the current situation and countermeasures for college students' physical health; there are also studies on factors that affect the physical health of college students; different interventions in different regions or universities have also been studied. The impact of content and means on the physical health of undergraduates; on the contrary, there are fewer studies on the intervention of functional training on the physical health of undergraduates.

Research on the Current Situation of College Students' Physical Health

Neumark-Sztainer conducted statistical and comparative analysis on the results of the physical health test of college students. The results showed that there were a large number of overweight and underweight students in terms of weight. College Students. The 50-meter running performance is poor, and it is urgent to improve the quality of speed. In terms of endurance quality, the aerobic quality of boys and girls needs to be improved. The good news is that the vital capacity of boys and girls is at a good level [5]. Etyang 2018 The analysis of the overall physical health test situation of college students in Jiangsu Province in 2010 shows that although in recent years indexes such as height, weight, body mass index, and bust that reflect the body shape of students are gradually improving, the scores that reflect the physical function level of college students, the muscle strength and speed quality that reflect the physical fitness of college students, and the quality of physical flexibility are all constantly improving. The physical fitness of college students needs to be improved urgently [10]. It is shown that in the physical health test of college students, the pull-ups and pull-ups reflect the strength quality of college students. 1-minute sit-ups had the highest failure rate, reaching 60.2%, and the failure rate of vital capacity was the lowest, at only 14.86%. The failure rate of the 1000-meter run, which reflects the aerobic endurance of male college students, was 23.86%, and the failure rate of the long jump, which reflects the explosive power of the lower limbs of college students, was 16.39% [16]. The physical health of college students has become a global problem. At present, some foreign countries, such as Japan, the United States, and some European countries, have reported the related problems and current situation of the serious decline in the health of college students in recent years. The author also analyzed the physical health status of college students in China. The analysis shows that the health status of college students in our country is worrying and shows a clear downward trend. Right the physical fitness test indicators of 3691 2018 students of Wanton Medical College were compared and analyzed. Among them, there was no significant difference in vital capacity between male and female students; boys were better than girls in standing long jump; boys scored higher than girls in 50 meters; female) The overall performance of female students is better than that of male students; the BMI of female students

is also higher than that of male students; 91% of the total number of male students failed in pull-ups. In the study, we found that boys performed better than girls in power events, but not in endurance events, and had lower upper body strength. At the same time, there are more and more overweight and underweight people; the physical shape and fitness of freshman students are better than those of other grades, and the endurance quality shows a downward trend year by year from freshman to senior year. Suggestions were put forward to support and encourage sports associations to carry out sports activities and cultivate students' awareness of exercise [17].

Research on Factors Affecting College Students' Physical Health

The main factors affecting the health of students are the lack of necessary physical exercise, an unscientific diet structure, bad life and rest patterns, a single-minded focus on physical education, the mechanization of sports organization and training, and extracurricular sports activities. Move less. Through a comprehensive analysis of the current situation of college students' physiques and on the basis of the analysis, a variety of influencing factors for the decline of college students' physiques are summarized. Orientation problems of curriculum reform, lack of sports equipment, and other factors, and put forward corresponding suggestions. Among them, self-awareness factors include not paying enough attention to physical health problems, not developing a good awareness of consciously carrying out physical activities, the influence of daily life habits, unscientific exercise methods, and exercise arrangements. Objective factors include imperfect school sports equipment and venue facilities, a lack of family sports awareness training, and the institutional constraints of school physical education courses [18].

Study on Functional Physical Training Program

In order to improve the physical health of college students and meet the different needs of college students, colleges and universities carry out various sports activities to improve the physical fitness of college students. According to the specific situation of the school teachers, the actual situation of the students, and the school facilities, the choice of sports intervention methods is also different. Generally speaking, experimental classes, control classes (general physical education classes), and after-school time both take the form of physical education interventions. After reviewing 198 previous relevant academic and journal articles, and when using sports as the basis for classification, it mainly analyzes from the following aspects: 33 Articles Ball Sports. (Basketball, volleyball, soccer, tennis, badminton, etc.) as a means of physical intervention. Specifically, long-term Tai Chi practice can reduce BMI indicators, enhance strength, improve balance, develop cardiopulmonary function, and promote body metabolism [19]. The influence of sports and dance on the physical health of college students has been studied. Sports dance has taken into account the perfect combination of dynamism and softness while exercising. It has a good fitness effect and enhances another student's understanding and feeling of art. Healthy growth. In order to further enhance the physical health of college students, we should optimize the teaching mode of sports dance, innovate teaching methods, strengthen the construction of sports dance teachers, improve the course content and arrangement design, and pay attention to the cultivation of college students' innovative ability, so as to realize the overall optimization of college students' physical health [20].

Research Object and Research Method

Research Object

This experiment chooses 40 undergraduates from China University of Mining and Technology aged 19~24 was taken as the research objects.

Research Method

Documentation method

Full-text Database of China Journal Network (CNKI), Google Scholar, Baidu Academic, Web of Science, Elsevier, and other databases, respectively, for "college students", "physical fitness training", "functional training", "body movement functional training", "physical quality indicators" and "physical fitness training." Chinese keywords such as "training methods" and "strength training" were searched for relevant Chinese and English literature with English keywords such as college students, physical training, functional training, physical movement functional training, physical quality indicators, physical training methods, and strength training. By reading a large amount of literature, one can grasp the basic theory and the latest research progress in the functional physical fitness training of college students as a whole and, at the same time, find the defects and deficiencies in the physical fitness training of college students at the present stage, find solutions and countermeasures, and then lay a solid foundation for the research in this paper. Solid theoretical foundation.

Interview method

By mail, face-to-face, etc., using the interview outline (See Appendix 1) to understand their views on the use of functional training concepts to guide the physical training of college students, and this article sorts out the 6 training principles through the literature, whether the division of training cycles is reasonable, training methods, and other issues for consultation, and accepts questions about college students. Suggestions for physical training are organized and recorded.

Expert survey

After reviewing the literature and interviewing experts' suggestions on the physical quality indicators of college students, 38 candidate indicators of physical fitness and body shape were sorted out and designed into Likert scales. Mark five levels of importance (very important, relatively important, average, less important, and unimportant) after each alternative indicator. According to the formula $\Sigma = (f_1 \cdot v_1 + f_2 \cdot v_2 + f_3 \cdot v_3 + f_4 \cdot v_4 + f_i \cdot v_5) / (f_1 + f_2 + f_3 + f_4 + f_5)$ which calculates the score of each candidate index, if the index score is ≥ 4 , then the candidate index is determined as the test index, and the validity of the index is determined through expert scoring.

- Experimental Method Purpose

Verify that functional physical training can reduce the risk of sports injuries for college students and improve the physical quality of all aspects of the body. Up effect.

- Test subject

Randomly selected from the School of Mining, School of Information and Control, School of Civil Engineering, etc., the China University of Mining and Technology is part of a college 2020.

Undergraduates: 40 people, including 30 boys and 10 girls.

Inclusion criteria: age >18 years old and ≤ 24 years old; in good health in the past three months, without serious sports injuries or disabilities; sign the informed consent; and actively cooperating with the experiment.

Exclusion criteria: age >24 years old; obvious and serious abnormalities in body structure; major surgery in the past six months; a chronic medical history of serious sports-related hidden dangers such as heart disease.

① Sports injury risk indicators and physical function indicators

Test time and place: 2021 At 9 a.m. on March 4, 2019, 40 subjects were tested for sports injury risk indicators and physical function indicators in the second track and field field of the China University of Mining and Technology, including height and weight measurement; FMS test, the Y-balance test, the Cooper 1.5-mile VO₂max test, sports injury history checks, and looking for poor body posture.

Test process: First, establish the subject's test file, and measure the subject's height and weight. There is no warm-up or stretching exercise before the functional movement screening test. Wear your usual sports shoes for the test. Start from the standing position and transfer to the ground test to perform squats, hurdles, lunges, shoulder joints, and active straight leg raises. High-stability push-ups, rotational stability tests try to complete the test at one time. Before starting the test, ensure that the starting position and posture are correct. If pain occurs, stop the test immediately. If you do not understand the movement during the process, stop the test immediately and relearn. Repeat each movement three times, and perform the test with the best score. The Y-balance test also does not perform any heat or stretching exercises. Standing barefoot on the test instrument, measure the subject's leg length (the medial side of the ankle joint to the anterior superior iliac spine) and record it. The tester can try three directions. During the test, align the thumb with the red starting line on the slider, pinch the waist with both hands, and push the test board forward, posterior medial and posterior lateral, with the other foot as far as possible, and then return to the starting position. On the starting line, record the farthest distance (accurate to 0.5cm) of pushing the test board in different directions, and repeat three times. Repeat the above test with the other supporting foot and record the results. During the test, it is required that the supporting heel cannot be lifted or moved. When pushing the slider, the slider or the test rod cannot be used as a support and cannot touch the ground. When pushing the slider, it should always fit the slider and not rely on inertia. A professional sports physician will investigate the history of sports injuries and observe the bad posture of the body.

Data Analysis Method

Data before and after the experimental intervention were sample paired using SPSS 26 statistical software, which was utilized to create a database out of the obtained data using Excel 2016. The impact of the experimental intervention was assessed and examined using the T-test.

Research Results

Taking the functional training concept as the guide and the functional physical fitness training system as the template to carry out empirical research, at the China University of Mining and Technology, 30 males and 10 females were randomly

selected from the first-year undergraduates from six colleges, including the School of Mining, the School of Information and Control, and the School of Civil Engineering. The basic information about the subjects is shown in **Table 4-1**. The names are abbreviated. The search time is selected as From March 2021 to June 2021, the first collection of information and data will be in March 2021.

Table 4-1: Collecting basic information for the first time

Gender	Number of people	Age	Height	Weight
male	30	18.55 ± 0.56	1.75 ± 0.05	65.19 ± 10.91
female	10	18.10 ± 0.54	1.62 ± 0.03	52.90 ± 4.89

Sports injuries

College students sometimes suffer from different degrees of sports injuries during their participation in sports. From the analysis of injury types, there are many cases of slipping and falling injuries, which are generally only minor abrasions that do not affect the normal study and life of students, but sometimes serious falls or even bone injuries occur that seriously affect health. From the analysis of the injured parts, the limbs are the parts with the highest exercise frequency, and the skin is the part that people contact with the outside world during intense exercise. Therefore, the limbs and skin are the most frequently injured parts of college students, and the lower limbs are more likely to be injured during exercise. Injuries include ankle sprains; in comparison, the proportion of trunk injuries in sports is the lowest, which is determined by exercise habits and sports events; from the perspective of injury frequency, the probability of sports injuries for college students is 53.9% [21].

- Material energy metabolism

Material and energy metabolism take maximum oxygen uptake as the core index, and cardiorespiratory endurance is measured by maximum oxygen uptake (VO₂ max), which mainly reflects the aerobic metabolism capacity of the human body, and has many functions in sports. Obtain the maximum oxygen uptake data of the tester. Due to limited conditions, Cooper 1.5 is used in the mile run test, the tester runs as hard as he can for 1.5 miles (2.4 kilometers), and the time (in minutes) is recorded.

- Body composition test

Body composition testing is of great significance to the growth and health of the human body and is important for large-scale population nutrition. In the evaluation of this status, scholars at home and abroad generally divide the nutritional status of people into five levels: malnutrition, underweight, normal weight, overweight, and obesity. Human body weight is composed of fat weight and fat-free body weight. The test of human body fat weight and body fat percentage can reflect the nutritional status of the human body to a certain extent. Body composition was calculated by measuring height and weight using the body mass index method, and compared with the national student physical health standards, among the 30 boys, 2 were overweight, 2 were obese, and 1 was underweight. Among the 10 girls, only one was underweight, and the overall condition was good. When performing strength physical training, reduce the number of sets or loads for students with a high body mass index and adjust or change other low-impact training items during high-impact training to avoid sports injuries to the knees, ankles, and other joints (**Table 4-2**).

Table 4-2: Body shape data of college students before the experiment.

Gender	Height(cm)	Weight (kg)	BMI(kg/m ²)
male	175.07 ± 4.91	65.37 ± 11.24	21.35 ± 3.35
female	162 ± 3.16	52.9 ± 5.15	20.16 ± 1.77

Sports Injury Risk Diagnosis

The Y-balance Test (YBT) is a highly comprehensive upper and lower extremity mobility test. The test can comprehensively test the range of motion of the subject's upper and lower limbs, proprioception and core, upper and lower limb strength, etc. It can tell the tester as a whole the potential risk of injury to the subject. Functional motion screening (functional motion screening) can screen the human body's motor control ability and the ability to complete basic movements through simple movements. Limits and asymmetry, and they can be corrected according to the inspection results. The Functional Movement Screen consists of seven basic movements that require the coordination of stability and flexibility and places the subject in a specific movement pattern that reflects imbalances, asymmetries, and restricted areas of motion.

Functional movement screening

Studies at home and abroad have shown that the risk critical point of the total score of functional movement screening is 14 points; if the total test score is less than 14 points, it is considered that the tester has a higher risk of sports injury, which is lower than that of boys. 14/share/12 number of males: 40%; 18 people with ≥14 points, accounting for 60% of boys; compared with boys, the average total score of functional screening for girls is higher than that of boys, and lower than that of boys. There are only 2 test takers with a score of 14, accounting for 20% of the number of girls, and 9 people with a score of ≥14, accounting for 80% of the number of girls. See **Table 4-3** for details.

Table 4-3: Functional motion screening scores of college students before the experiment.

Functional Movement Index		boys(n=30)	girl(n=10)
Squat test (deep squat)		2.03 ± 0.72	2.2 ± 0.63
hurdle test	Left	2.2 ± 0.41	2 ± 0.47
(Hurdle step)	right	2.4 ± 0.5	2.3 ± 0.48
straight lunge	Left	2.2 ± 0.41	2.2 ± 0.42
(Inline lunge)	right	2.47 ± 0.51	2.6 ± 0.52

Plan Making and Adjustment of Functional Physical Training

The ultimate goal of functional physical fitness training is to help college students improve their physical fitness, reduce sports injuries, and achieve excellent sports performance. In the whole training program, college students should first be built into a healthy and strong person, then they should be equipped with excellent physical fitness, and finally they should be combined with special events. Looking at the development of sports skills in college students from the perspective of development, this chapter designs the basic principles, cycle division, means, and methods of functional physical fitness training based on the previously summarized physical fitness test content of college students, common sports injuries, and the essential attributes of functional training. According to the functional training pyra-

mid model, the physical training of this program mainly focuses on the two layers of basic motor function training and general motor function training, and adopts different training methods according to different periods. Before the basic motor function development cycle, the basic situation of the students' physical exercise and physical fitness have been collected to evaluate the students' physical condition, and it was found that the students' sports performance is generally weak, so the basic training cycle It is set to last 8 weeks, which means it will consolidate the basic sports abilities of students. The focus of training is to reduce the risk of sports injuries, improve aerobic endurance, and enhance basic strength. The main training methods include trunk stability training, flexibility training, basic movement pattern training, basic strength training, and other basic training, highlighting the underlying construction of the pyramid structure. After 8 weeks of basic motor function construction, enter the general motor function development cycle, which focuses on the development of students' anaerobic endurance, speed, and agility, advanced strength training, trunk stability training, and injury prevention training. Highlight the development of the middle layers of the pyramid model.

Analysis on Changes of Physical Function Indicators

Body shape evaluation

The height and weight data of 40 subjects were collected for the second time, and the BMI was calculated by the height and body mass index method, and the paired sample T test was performed on the data before and after the experiment using SPSS software. It can be seen from Table 4-4 that after 12 weeks of functional physical training, the average weight of girls decreased by 0.4kg, the average BMI index decreased by 0.15, the average weight of boys decreased by 0.54kg, and the average BMI index decreased by 0.17. From the T test results it can be seen that there is no significant difference in the height, weight, and BMI values of male and female students before and after the experiment. However, a separate T-test was performed on four overweight and obese male subjects, and it was found that there was a significant difference in BMI index before and after the experiment, with a T value of 3.795 and a P value of 0.032. To sum up, functional physical fitness training has no significant improvement on the body shape of college students as a whole, but it has a significant effect on obesity, there was a significant improvement in the body shape of overweight students.

Table 4-4: Body shape data of college students after the experiment.

Gender	Height(cm)	Weight (kg)	BMI(kg/m ²)
male	175.07 ± 4.91	84.83 ± 9.04	21.15 ± 2.70
female	162 ± 3.16	52.50 ± 4.92	20.00 ± 1.76

Table 4-5: Comparative analysis of male body shape before and after the experiment.

Index	Boy student		T	P
	Before the experiment	after experiment		
Height	175.07 ± 4.91	175.07 ± 4.91	---	---
Weight	65.37 ± 11.24	84.83 ± 9.04	1.09	0.284
BMI	21.35 ± 3.35	21.15 ± 2.70	1.11	0.278

Table 4-6: Comparative analysis of female body shape before and after the experiment.

index	Girl students		T	P
	Before the experiment	after experiment		
height	162 ± 3.16	162 ± 3.16	---	---
weight	52.9 ± 5.15	52.50 ± 4.92	0.89	0.4
BMI	20.16 ± 1.77	20.00 ± 1.76	0.87	0.41

Table 4-7: Comparative analysis of BMI of overweight and obese students.

BMI		T	P
28.53 ± 2.02	26.65 ± 1.12	3.8	.032*

Maximal oxygen uptake

After 12 weeks of functional physical training, the maximum oxygen uptake increased in all 40 subjects. According to the Cooper1.5 scoring standard, the maximum oxygen uptake was evaluated. In the first test, there were 17 people who were "very poor" and "poor", accounting for 42.5% of the total number; after the experiment, only 10 people were "poor" and "very poor", accounting for 25% of the total number; No one reached "very good" before the experiment, and the number of "very good" reached 4 after the experiment. It can be seen from Figure 4-7 that through functional physical training, the maximum oxygen uptake of the subjects was improved.

Figure 4-8 Comparative analysis of maximal oxygen uptake before and after the experiment Use SPSS software to carry out paired T test on the maximum oxygen uptake before and after the experiment. The results are shown in Table 4-8. There is no significant difference, but the average value is still higher than that before the experiment. To sum up, functional physical training can promote the increase of the maximum oxygen uptake of college students as a whole.

Table 4-8: Comparative analysis of male and female maximal oxygen uptake before and after the experiment.

Gender	VO2max		T	P
	Before the experiment	after experiment		
Male	39.75 ± 4.58	42.14 ± 4.73	-2.12	0.043
Female	31.87 ± 3.73	33.92 ± 4.32	-1.14	0.285

Analysis on Physical Fitness Index

Tian Mijiu pointed out in "Sports Training" that physical fitness can be divided into six categories: strength, speed, agility, coordination, flexibility, and endurance [81]. In foreign countries, physical fitness is divided into cardiopulmonary function, physical strength, muscle strength, flexibility, explosive power, speed, coordination, agility, balance, and accuracy. After summarizing the classification at home and abroad, this article will evaluate the physical fitness of college students from the following six aspects.

Strength Quality Evaluation

Strength quality is the foundation of other qualities and plays a major role in all qualities, so the analysis of strength quality is the most detailed, including three parts: maximum strength, strength endurance, and explosive power.

Evaluation of maximum strength index

Maximum strength is the highest force exhibited by a muscle against resistance through maximum voluntary contraction. We often use squat 1RM and bench press 1RM to test the maximum strength of human upper and lower limb muscles, and maximum strength is the basis of strength endurance. Table 4-9 and Table 4-10 respectively reflect the 1RM test of male and female college students before and after the experiment. and bench press. Changes in 1RM test scores. Using SPSS software to perform paired T-test on the data before and after the experiment, it can be seen that the mean values of squat and bench press of male and female college students after the experiment were significantly improved compared with those before the experiment ($P < 0.05$), while the maximum strength of the upper limbs of male students was significantly improved. Sexual improvement ($P < 0.01$). To sum up, functional physical fitness training has a significant effect on improving the maximum strength of upper and lower limbs of college students.

Table 4-9: Comparative analysis of the maximum strength of lower limbs before and after the experiment.

Gender	Squat 1RM (kg)		T	P
	Before the experiment	After experiment		
Male	86.32±17.15	90.26±17.52	-2.33	0.031*
Female	44.50±7.25	48.00±9.19	-3.28	0.011*

Table 4-10: Comparative analysis of the maximum strength of upper limbs before and after the experiment.

Gender	Bench press 1RM (kg)		T	P
	Before the experiment	After experiment		
Male	62.89 ± 8.22	66.05 ± 7.92	-4.03	0.001**
Female	35.50 ± 4.97	39.50 ± 4.97	-3.21	0.011*

Evaluation of strength and endurance indicators

Muscular endurance refers to the ability of the human body to perform continuous muscle work for a long time, that is, the ability to resist fatigue. When selecting indicators, we selected pull-ups (male), sit-ups (female), and plank support as strength and endurance indicators. Based on the physiological differences between males and females, different test items are selected. The body fat of women is generally higher than that of men, and the muscle content is lower than that of men; in terms of weight distribution, women tend to accumulate fat in their lower limbs, and most girls have 0 pull-up tests. Boys use pull-ups and girls use sit-ups as the muscle endurance test index. In order to further verify the effect of functional physical training on core muscle endurance, plank support is also selected as a supplementary test index. **Table 4-11** shows the mean standard deviation and paired T test results of sit-ups (female) and pull-ups (male) before and after the experiment. It can be seen that although the overall performance of the boys' pull-ups has improved after the test, there is no significant difference ($P > 0.05$); the scores of the girls in the first and second sit-up tests are extremely significant difference ($P < 0.01$). **Table 4-12** reflects the extremely significant difference in core endurance quality between boys and girls after 12 weeks of physical training ($P < 0.01$). To sum up, functional physical fitness training can significantly improve the core endurance of college students.

Table 4-11: Comparative analysis of strength endurance of upper and lower limbs before and after the experiment.

Gender	Pull-ups (male) / sit-ups (female)		T	P
	Before the experiment	After experiment		
Male	5.07 ± 3.93	5.33 ± 4.51	-0.249	0.85
Female	35.7 ± 8.77	41.20 ± 6.9	-7.492	0.001**

Table 4-12: Comparative analysis of core muscle group endurance before and after the experiment.

Gender	Pull-ups (male) / sit-ups (female)		T	P
	Before the experiment	After experiment		
Male	97.63 ± 41.75	103.83 ± 40.02	-3.36	0.002**
Female	76 ± 15.55	88.00 ± 16.51	-6.778	0.001**

Evaluation of the explosive power index

Explosive power is the instantaneous output power of the musculoskeletal motor system of the human or animal body during a certain action. In this part of the test, the standing long jump and vertical jump are selected as indicators for testing explosive power. Standing long jump can reflect students' explosive power and jumping power, but it is also affected by the swing coordination of upper and lower limbs, that is, coordination. **Table 4-13** shows that the standing long jump performance of male and female students has improved in the post-experiment test, but there is no significant difference ($P > 0.05$). At the same time, the vertical jump is used as a supplementary indicator for the explosive power test. It can be seen from **Table 4-13** that, after functional physical training, the vertical jump performance of both boys and girls has been significantly improved ($P < 0.05$). Standing long jump and vertical jump, as the test indicators of lower limb explosive power, have improved, but the difference in the test results of standing long jump before and after the experiment is far less than that of vertical jump. The muscles of the upper body coordinate and cooperate with the swing of the upper limbs and, at the same time, have higher requirements for the direction of force. The vertical jump is simple and less restricted by coordination. This conclusion will be verified again in the coordination part. In conclusion, the experimental results have demonstrated that performance physical training can effectively improve the explosive power of college students.

Coordination index evaluation

Coordination refers to the ability to integrate several differentiated movements into a single movement and complete the integrated movement. In the standing long jump event in the explosive force test, there are certain requirements for coordination. One-minute rope skipping was used to verify the effect of functional training on the coordination of college students. It can be seen from **Table 4-13** that although the number of 1-minute rope skipping college students increased after functional training, there was no significant difference ($P > 0.05$). Accordingly, it is believed that functional training has no significant effect on improving the coordination of college students.

Table 4-13: Comparative analysis of coordination before and after the experiment.

Gender	Before the experiment	After experiment	T	P
Male	127.77 ± 27.62	130.43 ± 27.52	-2.052	0.051
Female	126.4 ± 28.93	128.40 ± 27.51	-1.69	0.125

Evaluation of flexibility index

Flexibility is the ability of a single joint to maximize its range of motion. Good flexibility is an important guarantee to prevent sports injuries. Sitting forward flexion is a common indicator of the flexibility of the human body, and it well reflects the flexibility of the posterior chain of the body. Dynamic and static stretching in functional training can promote the improvement of students' flexibility. It can be seen from Table 4-13 that after functional training, the average score of boys increased by 5.65cm and the average score of girls increased by 5.34cm, and there was a very significant difference between before and after the experiment. The improvement of flexibility is conducive to reducing the probability of sports injuries in college students during physical exercise. Comparing with the "National Students' Physical Health Standards", it can be found that through functional physical training, the mean value of the sitting and forward bending test for boys has reached a good level, and the mean value of the sitting and forward bending test for girls has reached an excellent level. To sum up, functional physical fitness training can significantly improve the flexibility of college students.

Conclusions and Recommendations

FMS and Y-balance in the pre-experiment test, ordinary college students showed problems such as poor joint mobility, a high risk of sports injuries, and large differences in scores on both sides of the body in the two tests. After functional physical training, the total score of the FMS test and the YBT score can be improved. It can be seen that the above problems have been improved, the total score of the FMS test has increased significantly, and the number of people with a YBT test score <95% has decreased significantly, indicating that functional training can effectively reduce the risk of sports injuries for college students and improve joint mobility and other issues. In terms of physical function indicators, functional physical fitness training has relatively little effect on the BMI index of general college students, but it has a very significant improvement effect on the BMI indicators of obese and overweight students. In terms of maximum oxygen uptake, although there is no significant difference in the indicators, four students met the "very good" standard in the test after functional training. The experimental results show that functional training has no obvious effect on the height, weight, BMI, and other indicators of college students but has a partial promotion effect on the maximum oxygen uptake index of college students. Physical fitness index in terms of physical fitness, after 12 weeks of functional physical training, muscle endurance, explosive power, accuracy and sensitivity, balance, flexibility, and maximum strength were all significantly improved compared with those before the experiment. There were no significant differences in pull-ups, standing long jump, aerobic endurance, speed quality, or coordination compared with those before the experiment, but they all improved to a certain extent. Generally speaking, functional physical fitness training can effectively improve the physical fitness of ordinary college students.

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