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# *Thinking of Physical Fitness Training for Physical Education Students in Colleges and Universities under the Concept of Public Health*

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***Keywords:*** Public health concept; Big data; BP neural network; Physical training ideas

***Abstract:*** Under the concept of public health, physical fitness training is an indispensable basic athletic ability for physical fitness training of students in colleges. It is also an important part of physical education students in sports training. For athletes, body training is especially important. On the one hand, it helps to improve the athletes' body shape and organ system skills, and on the other hand, contributes to the all-round development of athlete's quality. Judging from the actual situation of physical training carried out by physical education majors in most colleges and universities, although physical training for students has been strengthened, the results are not satisfactory. This is because there are still many problems in physical training in most colleges and universities. This situation also restricts the development of physical education students and schools. Based on this, this paper selects the collected data using the "BP neural network", and establishes a reasonable theoretical system of physical fitness training by analyzing the filtered data.

## 1. Introduction

Physical fitness training under the concept of public health Because the meaning of physical fitness is expressed by many factors, the theory of physical fitness training under the concept of public health is also affected by many aspects, and many scholars have made a summary of the characteristics of physical fitness training Induction [1]. Maldari[2] and others made a very detailed summary of the special points of foreign physical training by drawing on the theory and practice of current international modern physical training. Maldari and others believed that the physical training theory in the United States today has the following characteristics: First, it is advanced. The concentrated expression of the system is mainly a new system, new concept, new model, and new process. "The essence of sports is the movement pattern in physical training" is a new concept [2-4], which requires participating athletes to use economical, reasonable, and effective movement patterns when completing technical movements, to reduce the probability of sports injuries [5] ; the pre-exercise preparation activities are a new model, and the preparation activities also contain rich content: dynamic stretching, activation of nerves, combination exercises of simple movements, and movement activation of special sports [6]. The third is the close combination of theoretical research and practical exercises of composite physical training, physical training professionals pay equal attention to theory and practice. This is the embodiment of the complex. [7]. The fourth is specificity

to simulate the movement patterns closest to special sports through the movement patterns of special sports training [8].

Based on the selection of valid data by the BP neural network model, this paper analyzes the factors affecting the physical fitness training of physical education students in colleges using questionnaires, and compares and analyzes the statistical results of various indicators before and after training in the experimental group, and the indicators before and after training in the control group. The comparative analysis of the statistical results and the comparative analysis of the statistical results of various indicators between the test group and control group after training, to draw the idea of physical training for college physical education students under the concept of public health. Therefore, the analysis of physical fitness training methods in this paper is of great significance.

## 2. Development of a physical training plan

### 2.1 Theoretical basis for the design of the physical training program

According to the new standard of the "Public Health Concept Physical Education Curriculum Model". There are three key points in the "Public Health Concept Physical Education Curriculum Model". The first is the requirement of exercise load, and the optimal density of exercise in each class is about 75%; the second is to require 10 minutes of physical exercise in each class; the third is to require students to master sports skills while also using sports. Skills to make timely expressions when faced with the same situation. Different changes have also been made in the form of physical fitness. To improve the quality of physical fitness training, we should inherit good things, throw away old things, and pay attention to live learning and practical application.

### 2.2 Contents of Physical Training

Physical education courses contain a large number of physical exercises. The ultimate goal of physical training is to promote the improvement of physical fitness of physical education students and to cultivate lifelong physical training habits. This determines that the purpose of physical education is to master and use the motor skills of various activities, to lay a better foundation for physical training in the future.

According to the different manifestations of physical training movements, three basic movement types can be divided into displacement movement skills (with a certain displacement), non-displacement movement skills (relatively no large displacement), and operational movement skills (with significant operational control ability).

Figure 1 shows the structure of basic movement skills.

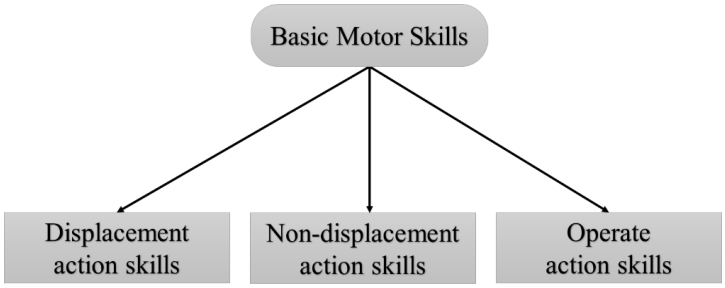


Figure 1: Structure diagram of basic movement skills

Operation skills are the action skills of changing the displacement of other external objects and controlling various sports such as balls. This includes a range of skills including grasping, throwing,

catching, kicking, rolling, slapping, and more. Non-displacement motor skills usually do not have large-scale displacement motor skills, such as twisting, flexion, and extension.

Most of the physical training in this paper gives full play to the lower limb movement performance of college physical education students, allowing students to compensate for the relatively less exercised parts. Compensation, adding different postures such as supine and prone, standing and climbing. Change from a single movement form to a full range of movement forms so that students can get exercise. The physical training program is shown in Table 1.

Table 1: Physical exercise program

| Stage | Content | Organization | Frequency | Number | Exercise Function |
|---|---|---|---|---|---|
| Prepare | stretching activities | Kick between runs; side lunge press; shoulder loops; | 1-2 | 2 | Further, improve the body's metabolic capacity and prepare for subsequent physical training |
| | activate related muscle groups | Kneeling push-ups; kneeling elbow support; squat | | | |
| Practice | baby crawling; spider crawling | Two teams | 2 | 2 | Promoting joint multi-dimensional |
| | Calf Raise; Sumo Squat; Inch Run | Opposite of two | 1 | 2 | sports, all-round development. |
| | Long, medium and short distance running; full speed, slow speed, variable speed running; uphill and downhill running | Queue | 1 | 1 | Running can inhibit the probability of bacteria and virus damage to the body; store energy; promote the secretion of growth hormone HGH; and lose weight and shape. |
| | Running up and down steps, zigzag running, sliding running, forefoot running, knee-back driving, high-leg running, etc. | Queue | 1 | 1 | |

## 3. Big data processing and analysis

### 3.1 Data collection

To obtain more accurate and representative research data. First, this paper uses multi-direction and multi-methods to collect data, including actual school tests and outdoor questionnaires. In this paper, the experiment is divided into 10 training groups by random number method, and each training group selects 15 students and then tests their physical fitness. Secondly, through the form of an outdoor survey, students can scan the code to view their physical fitness test results and fill in our pre-set questionnaires according to the results they have found. Among them, for the data we do not need, we eliminate it through BP neural network mathematical mode.

### 3.2 Data processing

Organizing data is data culling, eliminating the useless data and leaving only the useful parts. Described in professional language, it is to obtain the parts required for the physical training of this

article from all the data collected by the big data method and eliminate the problematic parts. In the process of data processing, we need to pay attention to the following points: First, we must ensure that the filtered data is complete. The integrity of the data refers to the integrity of the data points, and all data processing must be based on the preservation of core data. The second is to ensure the real-time nature of the data. In the process of data processing, data points cannot be missing in the process of data culling, and the basic correctness of the core data must be ensured.

### 3.3 BP neural network model

BP-neural network is a multi-layer feedback algorithm to train the network which is mainly through the back-propagation of errors. It has good curve feedback ability, simulation ability of all mathematical functions, and generalization ability. The BP-neural network model is shown in Figure 2.

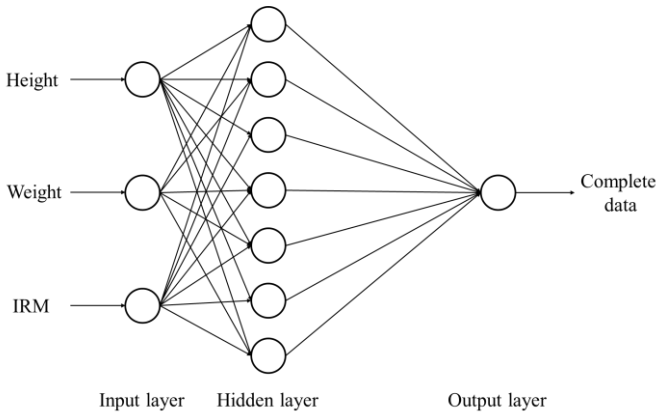


Figure 2: BP neural network model structure

The BP-neural network is based on the basic structure of the human brain neural organization as a prototype, which involves two disciplines mathematics and computers. Assuming that the BP-neural network has a three-layer mapping algorithm, the number of input layers is N at the beginning. The number of points output by the final outermost layer is M, and the number of points in the output of the hidden layer is H. Whether the model algorithm can reach the optimal step mainly depends on the size of H, and the size of H is realized by the values of M and N, and the values of M and N can be adjusted up and down. Assuming that the input data is $x_1, x_2, \cdots, x_n$, the output data is $y_1, y_2, \cdots, y_n$, and the number of hidden layer nodes is $S_1, S_2, \cdots, S_h$, in this article, $x_1, x_2, \cdots, x_n$ represents the endurance, student height, student weight, student sprint performance, student long-distance running performance, body forward bending performance and other training item parameters, The $y_1, y_2, \cdots, y_m$ state of the representative test object is divided into three states: good, general and poor. According to the BP-neural network data algorithm $S_J$, the hidden node can be output and the calculation formula is as follows.

$$S_J = f\left(\sum_{i=1}^{n} w_{ij} x_i + a_j\right) \tag{1}$$

$$y_k = g\left(\sum_{j=1}^{h} w_{jk} s_j + b_k\right) \tag{2}$$

In the formula: y is the data output value; g is the activation function; h is the generation number;

j is the generated number. In this study, the function $g(xi)$ is used as the activation function from the input layer to the hidden layer, as shown in the following formula.

$$g(xi)=\frac{1}{1+e^{xi}} \tag{3}$$

Use the logistic regression function $g(z_i)$ as the activation function, as shown in the following equation.

$$g(z_i)=\frac{e^{z_i}}{\sum_{j=1}^{h} e^{z_i}} \tag{4}$$

where: $z_i$ is the training iteration weight function. Select an appropriate amount of data as training samples. To solve the problem of different orders of magnitude between different data in logging, the selected data should be normalized first to ensure that all data to be processed are in the range of 0-1.

$$[p_n, \min(p), \max(p), t_n, \min(t), \max(t)] = \text{premnmx}(p,t) \tag{5}$$

In the formula, $p$ is the input data; $t$ is the target output data. $t$ is the normalized data; $p_n$ is the p-normalized data.

According to the Kv theory, it can be known that the main function of the 3-layer BP-neural network is to complete the multi-angle curve mapping, so the number of network layers considered first is 3 layers.

The reference calculation formula for the number of neurons in the hidden layer is as follows:

$$n=\sqrt{n_i+n_o}+a \tag{6}$$

In the formula, a is a constant value between 1 and 10; $n_0$ is the number of neurons in the outermost layer; $n_i$ is the number of neurons in the initial layer, and $n$ is the number of neurons in the middle layer. This neural network model takes all abnormal data as input value and all standard data as output value, and initially establishes the 4-8-4 BP neural network model, as shown in Figure 3.

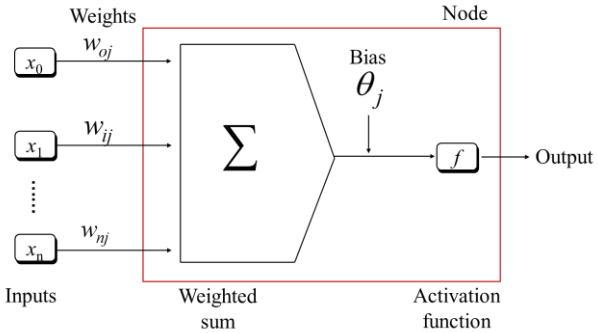


Figure 3: BP neural network model

## 4. Results and analysis

Based on the selection of valid data by the BP neural network model, this paper analyzes the factors affecting the physical fitness training of physical education students in colleges and

universities using questionnaires.

## 4.1 Factors Affecting Physical Fitness Training of College Sports Major

### 4.1.1 Analysis of the necessity of physical training

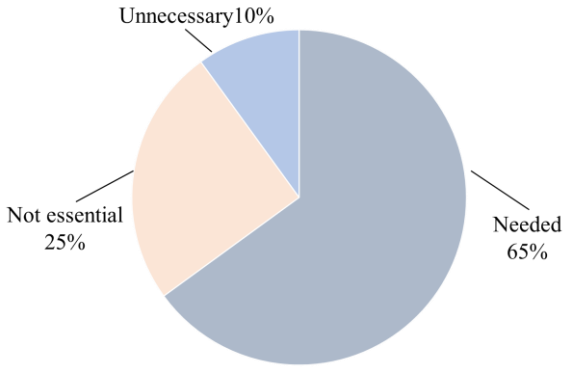


Figure 4: The necessity of physical training

According to Figure 4, 10% of students majoring in body education in college sports believe that it is unnecessary to continue body training, and 25% of students believe that physical training can be provided or not, but 65% of college physical education students believe that Physical training is important for students majoring in physical education. It can be found that only a small number of physical education students do not pay attention to physical fitness training. What is worth celebrating is that most students think physical fitness training is very important, which shows that most college physical education students still recognize the benefits brought by physical fitness training and think physical fitness training can be effective in enhancing their sports performance, which will be of great benefit to their later sports careers.

### 4.1.2 Knowledge of physical training professional skills

As shown in Figure 5, it can be seen that most of the p body education in college sports majors are relatively familiar with the idea of physical fitness training. It shows that most college students majoring in physical education can carry out physical training scientifically and effectively. For those students who have not mastered and understood the idea of physical fitness training, they should strengthen their learning-related physical training ideas, so that they can effectively carry out physical training.

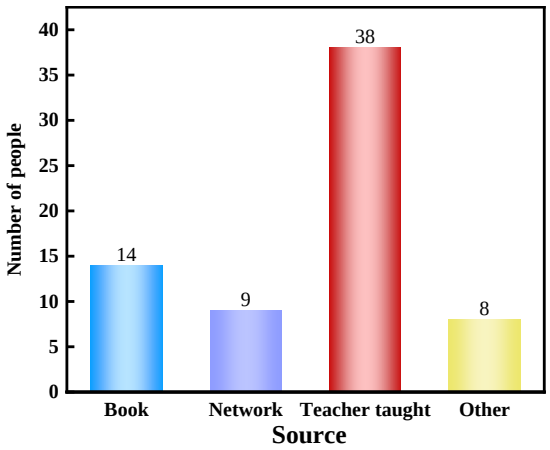


Figure 5: Learn about the source of physical training

From Figure 7, it can be found that only a small number of college physical education students do not have clear ideas about physical fitness training. Schools should vigorously strengthen this part of students' understanding and attention to physical training ideas. Relevant courses that can increase their expertise. All college physical education students can effectively understand the professional knowledge and skills of physical fitness training so that the physical fitness training effect is the best.

### 4.2 Comparative analysis of the statistical results of various indicators before and after training in the experimental group

According to the training results (Table 2), it can be seen that the total performance of the experimental group in the 50-meter running after physical training was significantly improved ($P<0.05$), and the 50-meter running in the experimental group before and after physical training was significantly improved ($P<0.05$). The performance has an obvious correlation; the total score of sitting forward flexion after physical training and before physical training was significantly improved ($P<0.05$), and the sitting forward flexion performance of the experimental group before and after physical training was also significantly improved. There is a significant correlation; the total score of the experimental group is also significantly improved before and after physical training ($P<0.05$), and the FMS total score of the experimental group before and after physical training also has a relatively obvious correlation.

Table 2: Comparison of scores before and after training in the experimental group

| Physical training program | before training | after training | P value |
|---|---|---|---|
| 50-meter run (seconds) | 11.45±1.02 | 11.09±0.99 | 0.005 |
| Forward Bend (cm) | 11.4±4.02 | 12.75±3.02 | 0.012 |
| FMS (points) | 10.21±1.52 | 14.45±1.13 | 0.008 |

The experimental results show the improvement of various abilities of body education in college sports majors, indicating that under the body fitness program design of the experimental group of physical education students in universities, the physical abilities of college sports students have been significantly improved.

The physical fitness development of college students specializing in physical education, the arrangement of regular course content, and the design of physical training should be considered from multiple perspectives. First of all, we should not only summarize the traditional and excellent exercise methods but also develop the existing physical training methods, which are in line with the students' existing conditions. Second, we must grasp the students' interest in physical training and actively mobilize students to actively participate in physical training, must put an end to forced physical training.

### 4.3 Comparative analysis of statistical results of various indicators before and after training in the control group

From the physical training results in Table 3, it can be seen that the comprehensive performance of the control group in the 50-meter running after training was significantly improved ($P<0.05$), and the 50-meter running results of the experimental group before and after training were significantly improved. However, there was no significant improvement in the average performance of seated forward flexion after training and before training ($P>0.05$), and the total performance of seated forward flexion of the experimental group before and after training had a significant correlation; The one-minute rope skipping performance of the experimental group was significantly improved

before and after training (P>0.05), and the one-minute rope skipping performance before and after training was also significantly correlated; the FMS total score of the experimental group was not significantly improved before and after training (P>0.05). , the control group's total FMS scores before and after training were significantly correlated. Figure 6 is a comparison chart of the results before and after training.

Table 3: Comparison of scores before and after training in the control group

| Physical training program | before training | after training | Pvalue |
|---|---|---|---|
| 50-meter run (seconds) | 12.45±1.01 | 11.29±0.89 | 0.005 |
| Forward Bend (cm) | 8.4±1.02 | 10.75±2.02 | 0.002 |
| FMS (points) | 10.11±1.62 | 11.24±1.53 | 0.001 |

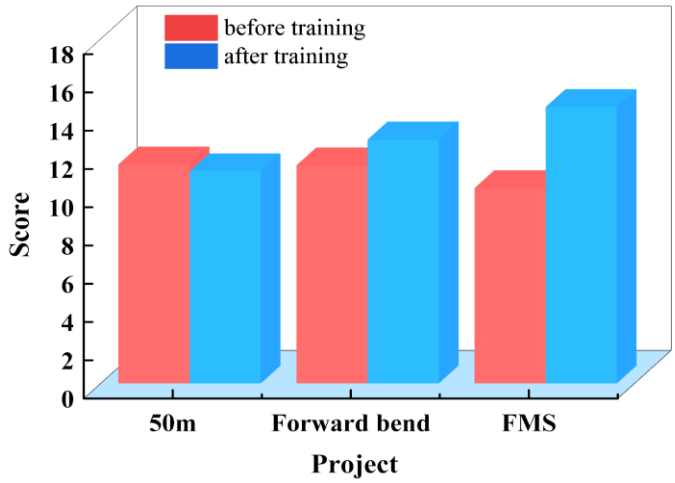


Figure 6: Comparison of results before and after training

From the training results, it can be reflected from the side that the first training content of the control group, 50 meters, has been significantly improved after training. It shows that the long-term systematic and comprehensive exercise of college students specializing in physical education under the idea of "the idea of physical fitness training for body education students in universities under the concept of common health" has improved the professional quality of physical education. The overall development is still not in place, and the diversity of physical training forms and the compensatory nature of physical training are lacking, which results in the control group's overall performance in sitting forward and bending after training not significantly improved. The same FMS test. There was no significant improvement in the overall grade point average. In the experimental group, the systematic, diverse, compensatory, and interesting physical training program for physical education students greatly increased the students' participation in physical training and improved the overall development of physical exercise ability.

## 5. Conclusion

Under the concept of public health, the body training of college students specializing in physical education is based on the structure of processing physical training data, and the analysis and research of physical training ideas are carried out according to the processed and analyzed physical fitness data. According to the reflection and summary of the effects of the physical training ideas designed in this paper, it is helpful to increase the physical performance of body education students. The following conclusions were drawn from physical training:

(1) Under the "Physical Fitness Training of body training of college students specializing in

physical education under the Concept of Public Health", the design of body fitness training programs for body training of college students specializing in physical education should follow the overall requirements of students' physical fitness development; the principles of physical fitness and physical fitness training of body training of college students specializing in physical education should be used as physical fitness. Guarantee of training train ideas. At the same time, according to the learning situation of physical education students' movement skills, design suitable basic movement skills as the main practice content.

(2) The selection of physical fitness training programs should fully consider the physical fitness development of physical education students, compensation for normal training content, program diversity, and combination of interests.

(3) It is very helpful to improve the physical fitness and practice interest of physical education students through practice tests.

## Data Availability

The experimental data used to support the findings of this study are available from the correspon ding author upon request.

## Conflicts of Interest

The authors declared that they have no conflicts of interest regarding this work.


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