

EXPERIMENTAL STUDY OF EXERCISE PRESCRIPTION INTERVENTION ON THE UNIVERSITY STUDENTS' HEALTH



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ESTUDO EXPERIMENTAL DE INTERVENÇÃO POR PRESCRIÇÃO DE EXERCÍCIO FÍSICO NA SAÚDE DE ESTUDANTES UNIVERSITÁRIOS

ESTUDIO EXPERIMENTAL DE LA INTERVENCIÓN DE PRESCRIPCIÓN DE EJERCICIO SOBRE LA SALUD DE ESTUDIANTES UNIVERSITARIOS

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ABSTRACT

Introduction: Disparate to the development of society, health indices in Chinese college students have shown a pronounced decline in recent years. Government concern over this recent challenge has encouraged research for practical solutions, including optimized physical activity protocols. **Objective:** Explore the effects of an exercise intervention on the health of Chinese university students. **Methods:** Full-time university students (80 males and 55 females) were selected and randomly assigned into two groups. Before and after the experiment, the college students' body composition scale and exercise experience were tested, focusing on the relationship between exercise prescription and changes in physical and mental health indicators. **Results:** The body fat percentage of male and female students decreased significantly after the experiment. After eight weeks of the exercise prescription experiment, the weight of male and female college students was controlled or reduced. The suggested exercise prescription achieved a good moderating effect on the weight of the volunteers. There was a significant difference between the two groups, indicating that the experiment had a beneficial effect on vital capacity ($p < 0.01$). **Conclusion:** The suggested exercise prescription proved to be feasible to guide and intervene in the physical exercise of college students aiming at a beneficial impact on the physical health of college students. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Students; Obesity; Management Exercise; Student Health.

RESUMO

Introdução: Dísparos ao desenvolvimento da sociedade, os índices de saúde nos estudantes universitários chineses apresentam uma queda acentuada nos últimos anos. A preocupação governamental sobre esse recente desafio tem incentivado pesquisas para soluções práticas, incluindo protocolos de atividades físicas otimizados. **Objetivo:** Explorar os efeitos da intervenção por exercícios físicos na saúde dos estudantes universitários chineses. **Métodos:** Universitários de período integral (80 homens e 55 mulheres) foram selecionados e distribuídos aleatoriamente em dois grupos. Antes e depois do experimento, foi testada a escala de composição corporal e experiência de exercício dos universitários, com foco na relação entre prescrição de exercício e mudanças nos indicadores de saúde física e mental. **Resultados:** O percentual de gordura corporal de estudantes do sexo masculino e feminino diminuiu significativamente após o experimento. Após 8 semanas de experimento de prescrição de exercícios, o peso de estudantes universitários do sexo masculino e feminino foi controlado ou reduzido. A prescrição de exercícios sugerida alcançou um bom efeito moderador no peso dos voluntários. Houve diferença significativa entre os dois grupos, indicando que o experimento teve efeito benéfico sobre a capacidade vital ($p < 0,01$). **Conclusão:** A prescrição de exercícios sugerida demonstrou-se viável para orientar e intervir no exercício físico dos universitários visando um impacto benéfico sobre a saúde física nos universitários. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Estudantes; Manejo da Obesidade; Exercício Físico; Saúde do Estudante.

RESUMEN

Introducción: A diferencia del desarrollo de la sociedad, los índices de salud de los estudiantes universitarios chinos muestran un fuerte descenso en los últimos años. La preocupación de los gobiernos por este reciente desafío ha fomentado la investigación de soluciones prácticas, entre ellas la optimización de los protocolos de actividad física. **Objetivo:** Explorar los efectos de la intervención de ejercicio en la salud de los estudiantes universitarios chinos. **Métodos:** Se seleccionaron estudiantes universitarios a tiempo completo (80 hombres y 55 mujeres) y se asignaron al azar en dos grupos. Antes y después del experimento, se analizó la escala de composición corporal de los estudiantes universitarios y su experiencia con el ejercicio, centrándose en la relación entre la prescripción de ejercicio y los cambios en los indicadores de salud física y mental. **Resultados:** El porcentaje de grasa corporal de los estudiantes masculinos y femeninos disminuyó significativamente después del experimento. Tras 8 semanas del experimento de prescripción de ejercicio, el peso de los estudiantes universitarios de ambos sexos se controló o redujo. La prescripción de ejercicio sugerida logró un buen efecto moderador en el peso de los voluntarios. Hubo una diferencia significativa entre los dos grupos, lo que indica que el experimento tuvo un efecto beneficioso sobre la capacidad vital ($p < 0,01$).



INTRODUCTION

As an academic idea and health promotion project, sports is jointly sponsored by American Sports Medical Association and American Medical Association in November 2007. The core idea is to promote the concepts of promoting sports and physical activities to the whole world, such as "the human body can benefit a lot from sports, and it is necessary to formulate and use sports prescriptions correctly."¹ Starting from the influence of cervical spondylosis on college students in all aspects, this paper analyzes its possible pathogenic factors and biomechanical pathogenesis, and studies the effective control and prevention of cervical spondylosis by exercise prescription.² At the same time, in the research of other groups, some results show that exercise prescription can alleviate a series of bad emotions such as depression and anxiety, and can make taxi drivers feel happy and quick-thinking.

The report of the 19th National Congress of the Communist Party of China put forward the strategy of implementing healthy China, and the Opinions of the State Council on Implementing Healthy China put forward the action of promoting health in primary and secondary schools, requiring that students' physical health should be included in the performance appraisal of schools.³ The new physical health standard revolves around the central task of "strengthening students' physical fitness", which puts forward higher requirements for school physical education and school physical education workers. Combining with the physical education experiment in colleges and universities, and based on the scientific design of the experimental scheme, this study makes an empirical study on the influence of exercise prescription experiment on college students' physical and mental health, so that exercise prescription can play an active role in cultivating students' habit of consciously exercising, mastering the methods of physical exercise and promoting the improvement of physical and mental qualities.

Research objects and methods

Taking randomly selected full-time college students (80 boys and 55 girls) as the investigation object. The main purpose of this study is to analyze and compare the changes of physical health comprehensive rating, body shape (height, body mass, BMI index), body function (vital capacity, vital capacity mass index, quiet heart rate), physical quality (50m, 1 000 m for boys, 800 m for girls, sitting forward flexion) of 135 college students before and after the 8-week exercise prescription experiment. The study is Purely observational studies which no need to registry ID of ICMJE, and all the participants were reviewed and approved by Ethics Committee of Nanning College for Vocational Technology (NO. NCVT2021005).

Research technique

Through CNKI and the National Data Management Center of Students' Physical Health Standards, the related literature were consulted and summarized and analyzed.

Expert interviews were conducted on the test indexes before and after the experiment and the design of fitness exercise prescription, which increased the truthfulness and comprehensiveness of the research.

The experimental process is as follows:

1. Understand the basic situation of students and make health diagnosis. By inquiring about medical history, sports history and combining with the results of physical examination, we can get the basic situation of students' physical development, functional level and disease status, and make a diagnosis of their health status.
2. Before the experiment, the body shape, body function and body quality were measured. Using the new "Standard" test items to measure some indexes, make a diagnosis of physical function and physical strength, find out the load index of scientific exercise prescription, and implement exercise prescription in a targeted way.

According to the mandatory and optional items specified in "Standards for Students' Physical Health", the test indexes of the subjects before and after the experiment were tested respectively. Except for 50m running and 1000m running (women's 800m running), UOSIM intelligent physique testing system specified by the state is used as the testing instrument.

The raw data of physical fitness test, body composition test and SEES scale test were stored with Microsoft Excel 2000, and the database was established. All measurement data were analyzed by Microsoft Excel 2000 and SPSS1010. Paired t test was used for significance test.

Results and analysis

Generally speaking, prescription refers to the prescription given to patients by doctors according to their illness, and the most remarkable feature is to prescribe the right medicine. Exercise prescription is a medical prescription in the form of exercise for people with specific purposes or requirements such as scientific physical exercise, improvement of physical and mental health, prevention or treatment of diseases, etc., which also has different characteristics from person to person.

Studies have proved that regular participation in sports can obviously improve the individual's healthy physical fitness level, and make the healthy physical fitness test items of human body show obvious independence.⁴ Moreover, for individuals with psychological problems, after short-term low-intensity exercise intervention, the tension and anxiety are relieved, and the mental health level is improved.⁵ Therefore, using exercise prescription mode to guide college students' physical education teaching and extracurricular physical exercise, to promote health and master scientific exercise prescription as the foothold, and to make exercise prescription an important means for college students' physical fitness test and physical health evaluation, is a topic worthy of further study by sports workers.⁶

Results and analysis of physical diagnosis of college students

By transforming the test scores of each index of college students' physical fitness into the scores of each index, we can define the contribution of each index to the physical fitness scores by using the pareto cut set method. Because there is a consistent correspondence between the scores of college students' indicators and their values, it is convenient for college students' indicators to take the place of their values for pareto analysis.

The physique goal challenge model refers to the aggregate of the overall optimal values of the effective indicators of college students' physique.⁷ This model reflects the highest expectation for students'

physical development in a period of time. Because the weights of different indicators are different, the index weights are added when establishing the gap coefficient formula. The calculation formula is: gap coefficient = weight × (model value-actual value) ÷ model value ×100. Through the formula, the gap coefficient of each college student from the target model on each index can be obtained, and sorted according to the size of the index gap (Table 1 and 2).

Overall comparison, we can see the key differences in improving physical fitness between male and female college students in the future. Boys should pay attention to improving vital capacity body mass index and 1000m running performance (that is, endurance quality). Girls should pay attention to 50m running results (that is, speed quality). This reminds us that speed quality (50m running) is not the highest weight in female college students' physique index, but it is the most important factor restricting the improvement of this group's physique, which requires us to increase the training of speed quality of female college students in the future physical education process.

Effect of exercise prescription on body composition of students in experimental group

After the exercise prescription was implemented, both boys and girls gained weight, but there was a significant difference in fat-free weight between boys and girls before and after the experiment. Fat weight decreased by 1.38 kg for boys and 1.05 kg for girls, with significant difference before and after the experiment. With the increase of fat-free body weight and the decrease of fat weight, the percentage of body fat of male and female students decreased obviously after the experiment, and there was a very significant difference by statistical test.

Body shape index

Body shape marks the development level of human body's physique, body shape, body composition, etc., and is an important aspect to measure the quality of human body constitution.^{8,9} The main indexes of body shape in this research are height, body mass, body mass index and so on. The formula of BMI is BMI index = (body weight/kg) × (height/m)⁻². The World Health Organization thinks that keeping BMI around 22 is ideal. According to the physical characteristics of Chinese people, BMI

Table 1. Average difference coefficient of physical index scores between male and female students in experimental group.

Index	Male mean	Mean value of girls
Height and weight standard	2.81	2.01
Vital capacity body mass index	15.02	10.20
Grip strength and body mass index	11.22	9.53
Sit and reach	6.88	4.39
Standing long jump	5.03	11.20
50m	6.79	12.87
800m/1000m	14.24	10.96
Rope skipping	3.69	3.87

Table 2. Average difference coefficient of physical index scores between boys and girls in control group.

Index	Male mean	Mean value of girls
Height and weight standard	3.27	3.65
Vital capacity body mass index	14.62	11.21
Grip strength and body mass index	11.67	14.89
Sit and reach	6.71	4.32
Standing long jump	9.87	7.80
50m	8.74	13.62
800m/1000m	14.25	12.50
Rope skipping	5.66	5.72

index is less than 18. 5 is too light, at 18.5 ~23.9 is normal, between 24 and 27. 9 is overweight, and 28 or more is obese.

It can be seen from Table 3 that after the height of male and female college students passed the T test, the height changes of male and female college students in the experimental group had no statistical significance before and after the experiment, and there was no significant difference. However, the body mass and BMI index of male and female college students after T test were $P < 0.05$, which indicated that there were significant differences between male and female college students before and after the experiment. Therefore, after 8 weeks of exercise prescription experiment, the body mass of male and female college students has been controlled or reduced, and the exercise prescription has achieved better exercise effect in body mass.

Changes of vital capacity of physical function index

Vital capacity is an index reflecting the function of respiratory system. It can be seen from Table 4 that before the experiment, the vital capacity of male students in the experimental group was lower than that in the control group, and there was no significant difference ($P > 0.05$). With the progress of the experiment, the vital capacity of boys in the experimental group increased, while that of boys in the control group decreased, which exceeded that of the control group. Although there was no significant difference between the two groups after the experiment ($P > 0.05$), the vital capacity of girls in the experimental group increased, and there was a very significant difference before and after the experiment ($P < 0.01$). The weight and vital capacity of girls in the control group decreased slightly. There is a significant difference in vital capacity between the two groups ($P < 0.01$), which shows that experimental teaching has a certain effect on improving vital capacity.

CONCLUSION

The implementation of exercise prescription teaching has a certain effect on improving students' physical health in an all-round way, and has a certain influence on the change and improvement of students' physical shape, physical function and physical quality. After 8 weeks' teaching experiment, it shows that the improvement range of each physical index in the experimental group is obviously higher than that in the control group, indicating that the exercise prescription teaching based on diagnosis and evaluation is superior to the traditional physical education teaching. The implementation of exercise prescription is conducive to students' positive and benign emotional experience, reducing the degree of negative emotions, improving positive happiness, significantly reducing mental fatigue, forming stable psychological characteristics and promoting the improvement of mental health.

Table 3. Statistical table of body shape index of college students before and after experiment.

Index	Gender	Before the experiment	After the experiment	T	P
Height/cm	Man	169.02±6.33	169.71±7.10	-1.22	>0.05
	Woman	158.63±5.24	158.51±5.28	-0.91	>0.05
Body mass/kg	Man	67.52±10.24	65.90±10.38	4.05	<0.05
	Woman	54.39±6.72	53.01±4.87	3.28	<0.05
BMI index	Man	23.47±3.39	22.87±3.56	4.41	<0.05
	Woman	21.96±2.57	21.15±1.27	2.81	<0.05

Table 4. Results of vital capacity changes.

Group	Schoolboy			Girl student		
	N	\bar{X}	S	N	\bar{X}	S
Experimental group	42	3926.78	621.47	28	2708	365.20
Control group	46	4021.93	499.20	22	2416	37025

In the implementation of sports prescription, students, especially senior students, can be publicized and educated on sports prescription knowledge, strengthen exchanges and communication, and pay attention to the exertion of students' subjectivity and the excavation of individual initiative. When teaching exercise prescription, we should arrange exercise content, exercise intensity, exercise time, exercise frequency, etc. reasonably, so as to reflect the principle of different people. Exercise prescription has a remarkable effect on improving college students' physical and mental health, which is an effective way

to implement physical health education in colleges and universities, and is conducive to improving students' self-exercise diagnosis and exercise ability. It is suggested that it should be included in the teaching content, and the intervention measures should be strengthened so that the exercise prescription can play an applied role in promoting students' all-round development.

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