

# WEIGHT LOSS EXERCISE PRESCRIPTION EFFECTS ON OBESE FEMALE COLLEGE STUDENTS PHYSICAL HEALTH



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EFEITO DA PRESCRIÇÃO DE EXERCÍCIOS DE EMAGRECIMENTO NA SAÚDE FÍSICA DE ESTUDANTES UNIVERSITÁRIAS OBEAS

EFFECTO DE LA PRESCRIPCIÓN DE EJERCICIOS PARA ADELGAZAR EN LA SALUD FÍSICA DE ESTUDIANTES UNIVERSITARIAS OBEAS

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## ABSTRACT

**Introduction:** The discussion about the impact on the physical and mental health of obese college students is a current issue. The implementation of “weight loss exercise prescription” seeks to discuss weight loss techniques and their effects, problems most faced by obese girls. **Objective:** Explore the effect of sports intervention on the physical and mental health of obese female students. **Methods:** 20 female college students with simple obesity were selected for an 18-week intervention experiment of fitness exercise associated with long-distance running. The physical and mental health of the volunteers was measured before and after the experiment for statistical analysis. **Results:** After 18 weeks of exercise, it was observed that interpersonal sensitivity, depression, anxiety, and SCL-90 scores decreased significantly, indicating that the implementation of the exercise prescription had a positive impact on the mental health of obese girls. Across the study, compared to a single exercise method, associated aerobic exercise had a significant effect on improving BMI indicators, body weight, and body fat rate in obese adolescent girls. **Conclusion:** By prescribing exercise for weight loss, one can significantly improve the cardiopulmonary function of obese college students and promote physical health, manifesting in the indices of vital capacity and cardiopulmonary function. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

**Keywords:** Exercise Therapy; Obesity; Students; Woman's Health.

## RESUMO

**Introdução:** A discussão sobre o impacto na saúde física e mental de estudantes universitárias obesas é um tema atual. Através da implementação da “prescrição de exercícios de emagrecimento”, busca-se discutir tópicos sobre as técnicas de perda de peso e seus efeitos, problemas mais enfrentados pelas meninas obesas. **Objetivo:** Explorar o efeito da intervenção esportiva sobre a saúde física e mental das estudantes obesas. **Métodos:** 20 estudantes universitárias com obesidade simples foram selecionadas para uma experiência de intervenção de 18 semanas de exercício físico de aptidão física associada a corrida de longa distância. A saúde física e mental das voluntárias foi medida antes e depois do experimento para uma análise estatística. **Resultados:** Após 18 semanas de exercícios observou-se que a sensibilidade interpessoal, a depressão, a ansiedade, e a pontuação de SCL-90 diminuíram significativamente, indicando que a implementação da prescrição de exercícios teve um impacto positivo sobre a saúde mental das meninas obesas. Através do estudo, comparado com um único método de exercício, o exercício aeróbico associado apresentou um efeito significativo na melhoria dos indicadores de IMC, no peso corporal e na taxa de gordura corporal das adolescentes obesas. **Conclusão:** Através da prescrição de exercício para perda de peso, pode-se melhorar significativamente a função cardiopulmonar de estudantes universitárias obesas e promover a saúde física, resultado manifestado nos índices de capacidade vital e função cardiopulmonar. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

**Descritores:** Terapia por Exercício; Obesidade; Estudantes; Saúde Feminina.

## RESUMEN

**Introducción:** El debate sobre el impacto en la salud física y mental de las estudiantes universitarias obesas es un tema de la actualidad. A través de la aplicación de la “prescripción de ejercicios para adelgazar”, se pretende debatir temas sobre las técnicas de adelgazamiento y sus efectos, los problemas a los que más se enfrentan las chicas obesas. **Objetivo:** Explorar el efecto de la intervención deportiva sobre la salud física y mental de las estudiantes obesas. **Métodos:** Se seleccionaron 20 estudiantes universitarias con obesidad simple para un ensayo de intervención de 18 semanas de ejercicio físico asociado a carreras de larga distancia. Para el análisis estadístico se midió la salud física y mental de los voluntarios antes y después del experimento. **Resultados:** Tras 18 semanas de ejercicio se observó que las puntuaciones de sensibilidad interpersonal, depresión, ansiedad y SCL-90 disminuyeron significativamente, lo que indica que la aplicación de la prescripción de ejercicio tuvo un impacto positivo en la salud mental de las chicas obesas. En todo el estudio, en comparación con un único método de ejercicio, el ejercicio aeróbico asociado mostró un efecto significativo en la mejora de los indicadores del IMC, el peso corporal y el índice de grasa corporal



en chicas adolescentes obesas. *Conclusión: Mediante la prescripción de ejercicio para la pérdida de peso, se puede mejorar significativamente la función cardiopulmonar de las estudiantes universitarias obesas y promover la salud física, resultado que se manifiesta en los índices de capacidad vital y función cardiopulmonar. Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.*

**Descriptores:** Terapia por Ejercicio; Obesidad; Estudiantes; Salud Femenina.

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## INTRODUCTION

Obesity on the growth and development of young students, painstaking efforts Tube system function, respiratory system function, and mental health may all be produced Adverse effects, such as obesity may increase through the total blood volume, cardiac transfusion Increased output, left ventricular hypertrophy, left ventricular diastolic dysfunction, and metabolic organization Disorder occurs earlier with diabetes, coronary heart disease and hypertension.<sup>1</sup> With the continuous improvement of China's economic level, the obesity rate of students has also increased rapidly. The results of the national student physique and health survey show that adolescents in China are generally in the early epidemic stage of obesity, which represents the characteristics of developing countries, and at the same time progresses more rapidly than the early epidemic of obesity in most developed countries.<sup>2</sup> Studies have shown that the exercise of the A Weight loss can effectively improve the human body composition, thus improving the body shape. Adolescence is a healthy life In the most critical period, the prevention and control of adolescent obesity has gradually become our country The key points and difficult points of preventive medicine and physical fitness. Overweight and obesity had adverse effects on the physiological functions of adolescent students, and cardiorespiratory endurance, muscle explosiveness, muscular endurance and flexibility of obese students showed a significant downward trend.<sup>3</sup> Want to achieve the ideal weight loss effect is not easy, need a comprehensive understanding of self Physical condition and appropriate weight loss methods, in order to be in the persistent weight loss experiment After obtaining a good weight loss effect, shaping a beautiful body shape.<sup>4</sup> Exercise prescription is a guide for fitness activity participants to perform physical activity.<sup>5</sup> Paragraph, is formulated according to the physical condition and physical fitness of the activist Eye-order, exercise intensity, exercise time, exercise frequency, etc., as clinicians do The patient's condition is prescribed in different amounts of drugs and drugs, so it is called an exercise prescription.<sup>6</sup> Because adolescence is a critical period in a person's life, growth and development are sudden increases, obesity in adolescence has a greater risk than adult hidden dangers, and the impact is longer-term, and the risk of obesity in adolescence developing into obese adults is extremely high, and many obesity-related chronic diseases will occur early and will affect life. Obesity has become one of the important public health problems facing China and even the world.<sup>7</sup> In the past 20 years, the physical fitness of college students has continued to decline, especially the proportion of overweight and obesity has increased significantly, and obesity has become one of the important factors affecting the comprehensive physical and mental development of college students.<sup>8</sup> Obesity not only affects physical beauty, easily causes a variety of chronic diseases, but also has a negative impact on students' mental health, mainly manifested as lack of social enthusiasm, self-confidence, etc.<sup>9</sup> Recent studies have found that obesity, especially obesity with a high waist-hip ratio, may be associated with brain atrophy, while lower brain volume or brain atrophy is associated with an increased risk of memory loss and dementia.<sup>10</sup> Therefore, it is necessary to strengthen interventions

for obese students, and sports have a role in promoting students' physical fitness and mental health, but it is worth exploring which exercise methods are more effective.

## RESEARCH OBJECT AND METHOD

### Subjects of study

According to the document "Asia-Pacific Outlook: Redefining Obesity and Its Treatment" published in Hong Kong by the International Committee of Leading Research Obesity Experts in the Asia-Pacific Region, a study of the domestic population determined that when a female youth BMI  $\geq 23$  body type is obese. Using the principle of cluster sampling, 20 obese female college students ( $23 \leq \text{BMI} \leq 38$ ) were selected in the first year and sophomore year of a university, aged 18~22 years old. They were randomly divided into experimental group and control group.

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 Chongqing Water Resources and Electric Engineering, China (NO. 2022011)

### Measurement tools

The physiological index measurement tool adopts height, weight, body mass index, waist circumference, spirometry index, and step experiments. In addition to waist circumference measured by a tape measure, the other 5 physiological indicators were measured using the "Huihai Physical Health Measuring Instrument". Measure twice before and after the implementation of exercise prescription, height, weight, body mass index, spirometry index, step experiment is strictly measured in accordance with the requirements of the "Student Physical Health Standards (Trial Plan)", and the measurement of waist circumference requires natural standing and calm breathing. Use a soft ruler at the level of the umbilicus.

The Psychological Indicator Measurement Tool uses the Symptom Self-rating Scale (SCL-90), which is developed by L. D erogatisl 975 compiled, adapted by Chinese psychologists, has formulated the national norm and college student norm, with good reliability and validity. The SCL-90 uses group measurement, unified questionnaires, and unified instructional statements, completed independently, without counting names. Two days after the first measurement was completed, the scale retest reliability coefficient was 0.85, indicating that the retest reliability was good. Of the 20 questionnaires collected, some items were incomplete and supplemented, and all questionnaires were counted as valid questionnaires as psychometrics.

The study subjects were given an exercise intervention experiment under the guidance of a teacher using a weight loss exercise prescription for 100 minutes three times a week for 18 weeks. (Figure 1)

Before and after the exercise intervention experiment, the study subjects were tested for physical health, and a mental health questionnaire was conducted using the Symptom Self-rating Scale (SCL-90).

SPSS 22.0 statistical software was used to statistically process the data, and the t-test was used to compare the before and after data, and  $P < 0.05$  was statistically significant.



Figure 1. Changes in weight loss exercise prescriptions of college students.

### Implementation of prescription for weight loss exercise

Determination of exercise intensity: The subject's pulse per minute was tested before the test, the personal optimal heart rate was calculated, the exercise intensity was determined, and the relative intensity (RPE value) was determined. Experimental process: Before the formal experiment, a pre-experiment is carried out to test whether the content of the designed weight loss exercise prescription is feasible in terms of items, time, intensity and other aspects. The pre-experimental results showed that self-designed weight loss exercise prescriptions could be applied to obese female college students. The participants in the experimental group strictly followed the prescribed content, exercise intensity, frequency and time of weight loss exercise within 12 weeks, and paid attention to diet control. During the implementation of weight loss exercise prescription, an RPE table was affixed to the exercise site and the participants were self-referenced to the table for exercise intensity monitoring. The control group did not implement weight loss exercise prescription and arranged its own activities according to previous activities.

The method of formulating comprehensive prescription refers to the literature: (1) aerobic exercise: the activity is an extracurricular activity every afternoon, the frequency of activity is 5~7 times a week, and the duration of each activity is 40~60 min, according to the individual characteristics of each experimental subject, different comprehensive training content is formulated; (2) Reasonable diet: According to the daily food intake of the students before the subject, the subjects are now required to appropriately control the amount of food every day, and the daily calorie intake of mild or moderate obesity is 5054~6192 kJ; Supplied by 3 major nutrients protein, sugar, fat, in addition to a certain amount of vitamins and minerals, if hunger due to dieting, should be filled with vegetables or fruits; The daily calorie intake of severely obese people should be below 5054kJ, in addition to ensuring a certain amount of protein, vitamins, minerals, water, etc., reduce the amount of staple food (rice, noodles) as much as possible.

### Experimental result and analysis

Physical fitness test results before and after exercise intervention

After 18 weeks of comprehensive exercise intervention, the lung capacity and sit-ups of obese female college students were better than before the intervention, and there were very significant differences ( $P < 0.01$ ), and the vital capacity body mass index, standing long jump, 50 m running and 800 m running were better than before the intervention, and there were significant differences ( $P < 0.05$ ), see Table 1.

### Comparison of SCL-90 factor scores before and after exercise intervention

After 18 weeks of comprehensive exercise intervention, the somatization scores of obese female college students were lower than those

before the intervention, and there was a very significant difference ( $P < 0.01$ ), interpersonal sensitivity, depression, hostility, terror and other five factors were lower than those before the intervention, and there was a statistically significant ( $P < 0.05$ ), which showed that "fitness The "beauty + long-distance running" comprehensive exercise intervention improved the mental health of obese female college students. (Table 2)

Obese female college students are prone to inferiority, hostility, anxiety, and other bad emotions in the process of interacting with others. Coupled with the increase in academic pressure and employment pressure, it is easier to increase the psychological burden of obese students. Studies have shown that moderate-intensity exercise can improve the mental health of weak college students. The implementation of aerobic exercise and dietary intervention for obese students can not only lose weight and improve physical health, but also have a positive effect on the psychological state of obese students. The study adopted the "fitness bodybuilding + long-distance running" comprehensive exercise intervention for obese female college students, which increased lean body mass while reducing body fat, and the increase of lean body mass was conducive to fat metabolism during exercise and improved exercise efficiency. Some researchers have pointed out that exercise promotes individual mental health through the mediating variable of physical fitness. With the success of the study subjects' weight loss, the mental health of the students gradually improved, perhaps through mediating variables.

### CONCLUSIONS

After the "weight loss exercise prescription" in the experimental group, the weight, body mass index, waist circumference were significantly reduced, and the lung capacity index and step index were significantly improved. It shows that weight loss exercise prescription based on aerobic exercise, supplemented by strength exercises and diet control can not only effectively reduce fat, appropriately increase lean body mass, but also significantly improve cardiopulmonary function, and at the same time promote obese girls to shape a healthy body shape. After 18 weeks of 'Chengfei exercise prescription' exercise, interpersonal sensitivity, depression, anxiety, total average score, and total score of SCL-90 decreased significantly, indicating that the implementation of

Table 1. Physical fitness test results before and after exercise intervention (n=20).

Physical Fitness	Pre-intervention	Post-intervention
Spirometry (ml)	2584.57±562.75	2766.33±418.65*
Spirometry body mass index (ml/kg)	36.41±8.55	40.26±7.43*
Sit-ups (n)	28.71±10.65	32.52±10.34*
Standing Long Jump (cm)	163.14±12.25	168.63±12.37*
50m run (s)	11.60±4.72	10.91±0.56*
800m run (min)	4.35±1.18	4.11±1.25*

Note: Compared with the control group, \* indicates  $P < 0.05$ , \*\* indicates  $P < 0.01$ .

Table 2. Comparison of SCL-90 factor scores after exercise intervention (n=20).

Factor	Pre-intervention	Post-intervention
Somatization	1.63±0.65	1.44±0.38*
Compulsive symptoms	1.84±0.47	1.78±0.50
Interpersonal sensitivity	1.69±0.46	1.56±0.45*
Depression	1.67±0.45	1.53±0.39*
Anxiety	1.62±0.72	1.59±0.56
Hostile	1.58±0.49	1.45±0.52*
Terror	1.48±0.46	1.44±0.45*
Paranoia	1.49±0.51	1.45±0.44
Psychogenic	1.52±0.57	1.47±0.38
Other	1.77±0.51	1.64±0.47*

Note: Compared with the control group, \* indicates  $P < 0.05$ , \*\* indicates  $P < 0.01$ .

exercise prescription had a good impact on the mental health of obese girls. Through the study, compared with a single exercise method, “aerobic + resistance exercise” has a more significant effect on improving the BMI, body weight and body fat rate indicators of obese adolescents. Therefore, colleges and universities can improve the physical fitness of obese students by providing exercise prescriptions of “fitness and fitness + long-distance running”, guiding obese students to strengthen physical exercise, change bad living habits and other measures, and then improve students’ mental health.

The exercise content and intensity of the implementation of the ‘Chengfei Exercise Prescription’ should vary from person to person, and the combination of physical education classes and extracurricular activities, self-encouragement and positive evaluation, and finally form a healthy lifestyle, in order to achieve the purpose of fitness and weight loss in the true sense. Strengthen the education of female college students in

the “physical education and health class” of the school, guide students to form the concept of healthy physical beauty, guide them to scientific fitness and reasonable weight loss, and improve the physical and mental health level of female college students.

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