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Research on the Effect of TABATA High-Efficiency Fat-Burning Training on Improving the Health of Obese College Students

HehuaTang [1], Lei Zhang[2]
[1]Xi'an Fanyi University, Xi'an 710105, Shaanxi, China
[2]Qingshuitou Primary School, Wangmang Street, Chang'an District, Xi'an 710000, Shaanxi, China

Abstract:

The period from 2024 to 2027 has been officially designated as the "Global Weight Management Year" by the World Health Organization (WHO), marking that weight management has become a top priority in the global public health field [1]. On March 9, 2025, at a press conference during the Third Session of the 14th National People's Congress, Lei Haichao, Director of the National Health Commission, stated that China will continue to advance actions during the Weight Management Year, calling on the whole nation to scientifically manage weight, develop good living habits, and jointly embrace a new healthy life. During the 2025 Two Sessions, Director Lei Haichao spent 7 minutes specifically explaining the urgency of weight management: obesity has become an increasingly severe health problem nationwide and a key threat to human health. The overweight rate among Chinese adults reaches 34.3%, and the obesity rate among adolescents is nearly 20%. Obesity has become a core trigger for chronic diseases such as hypertension and diabetes. Under the advocacy of the "Weight Management Year," more and more people are paying attention to the relationship between weight and health. However, weight management is not just about diet and exercise but also a long-term balance of psychology and behavior. Many focus on diet control and exercise but often overlook a key factor - psychology. In fact, there is a close connection between weight management and mental health, which influence and interact with each other, jointly shaping our physical condition and quality of life. Health should be discussed comprehensively in terms of physical health, mental health, and good social adaptability, rather than just pursuing a normal BMI range. In recent years, TABATA high-efficiency fat-burning training has gained increasing attention among young people. Previous studies have shown that TABATA training has significant effects on physical health indicators. This study recruited 26 obese college students (BMI > 25) as research subjects and conducted a 12-week exercise intervention experiment of TABATA high-efficiency fat-burning training, guided by coaches. Each session included a 5–10-minute warm-up, progressive-intensity continuous training, and a 10–15-minute cool-down. Using a within-subject pre-post control design, the study tested 9 mental health indicators of obese college students through psychological scales to provide new perspectives for future physical education curriculum development and offer directions and paths for improving the health-related physical fitness of obese college students in colleges and universities. After 12 weeks of TABATA training, significant changes were observed in somatization, obsessive-compulsive behavior, interpersonal communication, depressive symptoms, anxiety, hostility, fear, paranoia, and psychotic symptoms compared with pre-intervention levels. Both males and females showed significant changes in expressiveness and anxiety.

Keywords:

TABATA high-efficiency fat-burning training
obese college students
health-related physical fitness

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1. Introduction

1.1. Research background

With the development of social economy and changes in lifestyle, the global obesity rate has been increasing year by year. According to the World Health Organization (WHO), more than 1.9 billion adults worldwide are overweight, and about 650 million of them are classified as obese [2]. In China, the obesity problem is also becoming increasingly serious [3]. As a special group, college students face rising obesity rates due to academic pressure, lack of exercise, unhealthy eating habits, and other factors. Relevant studies show that the obesity rate among Chinese college students has exceeded 10%, showing a trend of youthfulness and rapid growth.

Obesity not only causes many harms to physical health but is also closely related to mental health. Studies have found that obese people are more prone to negative emotions such as anxiety and depression, and their self-esteem and confidence are significantly affected. Obese college students often face more psychological pressures in social interaction, study, and life, such as being laughed at by others and low self-identity, which may lead to a decline in their mental health level.

Exercise has been widely recognized by the academic community as an important way to improve mental health. Many studies have shown that regular physical exercise can regulate neurotransmitter secretion, relieve anxiety and depression, and enhance individual psychological resilience and stress resistance. At the same time, exercise can promote the secretion of endorphins, making people feel happy and thus improving overall mental health.

1.2. Purpose and significance

1.2.1. Research purpose

As a classic form of HIIT, TABATA training is widely used in fat loss and health improvement due to its unique cycle mode of 20 seconds of high-intensity exercise and 10 seconds of rest [4]. However, regarding the specific effects of TABATA training on obese college students, this study aims to assess its impact on body composition indicators (such as weight, body fat percentage, fat mass, and muscle mass) and mental health of obese college students.

1.2.2. Research significance

By analyzing the comprehensive effects of TABATA training on physical indicators, cardiopulmonary function, and mental health, this study further improves the application theory of high-intensity interval training (HIIT) in obese populations. It provides a reference for the design of physical education curricula in colleges and universities, promotes the development of college physical education teaching toward a more scientific and effective direction, and helps obese college students improve their health status.

1.3. Conceptual definition

(1) Definition of obesity: From a nutritional perspective, obesity is a manifestation of overnutrition, which is a state in which excess fat stored in the body occurs due to the supply of energy exceeding energy consumption.

(2) Body Mass Index (BMI): Proposed by the Belgian Quetelet in the 19th century, BMI refers to the body mass index and is an internationally widely used measurement parameter index for defining obesity and obesity grading standards. Known as the body mass index or weight index (calculation formula: BMI = weight ÷ height^2), it is currently a common indicator used internationally to measure human body fatness and nutritional status.

Table 1. Reference standards for obesity (BMI)

International criteria		Asia-Pacific (China) criteria	
BMI < 18	Underweight	BMI < 18.5	Underweight
18 ≤ BMI < 25	Normal weight	18.5 ≤ BMI < 24	Normal weight
25 ≤ BMI < 30	Overweight	24 ≤ BMI < 27	Overweight
30 ≤ BMI < 35	Mild obesity	28 ≤ BMI < 30	Mild obesity
35 ≤ BMI < 40	Moderate obesity	30 ≤ BMI < 35	Moderate obesity
BMI ≥ 40	Severe obesity	BMI ≥ 35	Severe obesity

Generally, the World Health Organization (WHO) developed relevant standards for Asians in 1998: a BMI > 24 kg/m² is considered overweight, and a BMI > 28 kg/m² is considered obese.

This study mainly refers to the Asia-Pacific (China) standards. The indicators involved in this paper are physical fitness scores (BMI = weight [kg]/height [m²]).

2. Research subjects and methods

2.1. Research subjects

This is an evidence-based study on the intervention effect of TABATA high-efficiency fat-burning training on the health-related physical fitness of obese college students. The subjects are 26 simple obese college students (11 males and 15 females) majoring in non-physical education at Xi'an Fanyi University.

2.2. Research methods

2.2.1. Literature review

To meet the needs of this study, a large number of professional books and materials are widely consulted in various fields such as health-related physical fitness, sports training, sports training methodology, modern sports training, and educational psychology. At the same time, using "obese college students & TABATA high-efficiency fat-burning training" as the search keyword, relevant literature is widely collected through the library mirror site to comprehensively grasp the current research status and development trends of interventions for obese college students. On this basis, the research contents involved (including intervention training methods and related indicators) are systematically collected, classified, and sorted out, and in-depth analysis and comparison are conducted.

2.2.2. Questionnaire survey

Questionnaires are designed to gain a deeper understanding of obese college students.

2.2.3. Mathematical statistics

The SPSS 26.0 software system is used to input the survey data one by one. The paired samples T-test method is adopted to process the data, and a database is established for the indicators set in the recovered valid questionnaires.

3. Results and analysis

After a 12-week high-intensity interval training intervention for obese college students, the changes in physical indicators of the subjects are shown in **Table 2**.

Table 2. Paired sample testing

		Paring difference					*t*	Degree of freedom	Sig. (Double Tail)
		Average value	Standard deviation	Average value	The difference is 95% confidence interval				
					Lower limit	Upper limit			
Pairing 1	Pre-measured vital capacity - Post-measured vital capacity	-222.154	203.057	39.823	-304.170	-140.137	-5.579	25	0.000
Pairing 2	Anterior weight measurement - posterior weight measurement	8.5192	4.4383	0.8704	6.7266	10.3119	9.787	25	0.000
Pairing 3	Pre-measured BMI - Post-measured BMI	2.934	1.417	0.278	2.361	3.506	10.556	25	0.000
Pairing 4	Measure the waist circumference in the front - measure the waist circumference in the back	5.000	3.567	0.699	3.559	6.441	7.148	25	0.000
Pairing 5	Measure the hip circumference at the front - measure the hip circumference at the back	6.808	3.868	0.759	5.245	8.370	8.974	25	0.000
Pairing 6	Measure the thigh circumference in the front and then in the back	2.577	1.815	0.356	1.844	3.310	7.240	25	0.000
Pairing 7	Measure the arm circumference in front - measure the arm circumference in rear	0.385	1.098	0.215	-0.059	.828	1.786	25	0.086
Pairing 8	Forward sit and reach - Backward sit and reach	-1.7731	1.0854	0.2129	-2.2115	-1.3347	-8.330	25	0.000

Vital capacity and sit-and-reach are important indicators for measuring human body functions, while weight, BMI, waist circumference, hip circumference, and thigh circumference are important indicators reflecting body characteristics. It can be concluded from the above that all indicators of the TABATA high-efficiency fat-burning training group for obese college students showed significant differences.

4. Conclusion

4.1. Physical health

After 12 weeks of TABATA high-efficiency fat-burning training, compared with before the intervention, the body function indicators were all enhanced, and the body circumference indicators were all reduced. Significant differences existed in all indicators except arm circumference.

4.2. Mental health

After TABATA high-efficiency fat-burning training, varying degrees of changes occurred in somatization, obsessive-compulsive behavior, interpersonal communication, depressive symptoms, anxiety, hostility, fear, paranoia, and psychotic symptoms [5]. Compared with males, females showed statistically significant differences in depression, anxiety, and fear ($P < 0.01$), while males had statistically significant differences in obsessive-compulsive symptoms, hostility, and fear indicators ($P < 0.05$).

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Disclosure statement

The authors declare no conflict of interest.

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