

Study on the Effect of Health Promotion Program on Physical Health Students in Changchun Normal University

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Received: 2025-3-29; Revised: 2025-10-31; Accepted: 2025-10-31

Abstract

This study aims to explore the impact of a physical fitness promotion program on the physical fitness of college students who failed the physical fitness test. The research sample consists of 885 students. Through G-Power software and restricted stratified sampling, 76 students were selected and divided into two groups as the final experimental subjects. After a 12-week exercise intervention, within-group one-way ANOVA and between-group T-test were conducted using SPSS data statistics software. The results show that the physical fitness promotion program can effectively improve the physical fitness of college students who failed the physical fitness test, and the exercise intervention effect of the experimental group is significantly better than that of the control group. This study provides a theoretical and practical basis for improving the physical fitness of college students who failed the physical fitness test. Based on the above findings, several suggestions for promoting the physical fitness of college students who failed the physical fitness test are proposed.

Key words: Circuit Training, Interval Training, Physical Health of College Students, Traditional Physical Education Courses

Introduction

Accelerated social development characterized by science and technology has increased public awareness of personal health and sustainable society. Students' physical health as the future of the country has long been the focus of policy and guidance. On December 20, 2006, to further improve the level of student health nationwide, China's Ministry of Education, General Administration of Sport, and the Central Committee of the Communist Youth League jointly issued the Decision on Carrying Out the Sunshine Sports for Hundreds of Millions of Students to ensure that students enjoy sports and maintain good health (Ministry of Education [MOE], General Administration of Sport of China [GASC], & Communist Youth League Central Committee [CYL], 2006). College students are considered the mainstay of social progress, and sports teachers at universities must take the holistic quality of college students with health as the core.

College students are the backbone of the country's development, the mainstay of the cultivation and development of talents in higher education, and an important force for social progress. In the Outline of the 14th Five-Year Plan and Long-Range Objectives Through 2035,

we must further meet the people's growing and multi-level health needs and build a higher-level public service system for national fitness (Government of the People's Republic of China, 2021). Student physical health has long been regarded as an important pillar of national development by the national government and related departments. In 2002, the Ministry of Education implemented the National Student Physical Health Standard for trial implementation, marking the first step toward the establishment of China's student physical health examination system (MOE, 2002). Based on the in-depth promotion of the national student physical health standard and the characteristics of adolescent growth and development and the training needs of high-quality talents, the MOE promulgated the National Student Physical Health Standard (Revised in 2014). The specific indicator system includes body shape, physiological function, physical fitness, and health status, and the scores are divided into excellent, good, passing, and failing grades (MOE, 2014a). This document is still in force.

Regular national student physical health surveys have been carried out every five years since 1985. In the eight rounds of surveys, the monitoring data from 2000 to 2014 show that the physical health indicators of body shape have continued to improve and the detection rate of obesity has increased year by year. Lung capacity and most physical fitness indicators showed a downward trend before 2005, which has slowed down around 2010, with a trend of turning around. However, the national student physical health survey report for the eighth round of physical health surveys also pointed out that the physical health level of middle-school students has continued to rise, but the overall trend of decline in college students has not yet turned around. In 2021, the proportion of those meeting the physical health standards of the three age groups (13–15, 16–18, 19–22) increased by 5.1%, 1.8%, and 2.0%, and the proportion of students who met the standard in the university group was still the lowest among the three groups (Chinese Journal of School Health, 2021).

In order to solve the problem of a long-term decline in health level, The Basic Standards for Physical Education Work in Higher Education Institutions (2014) stipulates that for students with poor physical fitness who cannot reach the graduation standard, appropriate arrangements can be made according to the conditions of the school to finish their course requirements (MOE, 2014b). In accordance with the regulations of the Ministry of Education, Changchun Normal University requires students with a total score of less than 50 in the physical health monitoring examination to fail to meet the academic requirements. Each year, the school implements the physical health monitoring, and students who fail to meet the standard will take the course again the following year. This method has been used for many years and can effectively raise the attention of students to PE classes and physical health monitoring (MOE, 2008; Changchun Normal University, 2023).

In this context, the current study selected non-physical-education undergraduates in Changchun Normal University (graduation year 2023) who failed to meet the physical health monitoring standards and volunteered to exercise as the participants. A training scheme was conducted combining interval and circuit training, and the outcomes were compared with the

traditional PE classes. The purpose was to find a more efficient and health-oriented exercise method that can help students who failed the fitness test get back into shape and graduate on time.

Research objectives

1.To study effect of health promote program on physical health students in chinese non-physical education students.

2.Compare the effects of the combination of circuit training and interval training with traditional physical education courses on non-physical education major college students who have not passed the physical health monitoring.

Literature Review

Interval Training and Circuit Training in Physical Education and Sports Essay

Shi (2022) administered a 10-week strength-training intervention to college students who played football. The training sessions were 70 minutes in length and took place three times per week. There were seven fixed training movements, including barbell squat, straight-leg deadlift, standing heel raise, barbell bench press, prone row, seated press, and dumbbell shrug. There were 4 rounds of training cycle. 1RM was used to test before and mid-experiment to determine the appropriate load. The training intensity was 60% maximal strength, 15 reps/set, 30-second rest period between sets, and 2-minute rest between circuits.

Results indicated that the participants of the experimental (circuit-training) group improved in the post-test on muscle volume, maximal muscle strength, and strength endurance. When compared to the traditional strength-training group, the circuit-training participants gained more muscular endurance, while the traditional group fared slightly better in maximal strength (Shi, 2022).

HIIT began in the late 1950s, when it was first advanced as an organized way of alternating high- and low-intensity exercise intervals to improve athletic performance by Hans Reindell and co-researchers (Reindell et al., 1959). HIIT was first utilized in a competitive sport setting to condition elite athletes before being expanded to the general fitness industry (Voss, 2010).

Research Methodology

Research Subjects

Through relevant experimental research, it can be seen that the number of samples selected to participate in the experiment will vary depending on the different sample screening methods (Yan Chunmiao, Shi Haiao, Du Jianxin, Wu Leling, Zhang Siqi, 2022). Exercise intervention experiments usually take 8 to 12 weeks to complete (Dou Li, Chen Huawei, Zhang Lingling, 2021). This study selected 885 students from the 4801 non-physical education major undergraduates of the 2023 grade at Changchun Normal University who failed the college students' physical health monitoring for research. The minimum sample size was determined

to be 76 through G-Power, and 76 people were finally selected as the experimental subjects using the restricted stratified sampling method, and a 12-week exercise intervention was conducted.

Research Tools

The experimental test tools were used. The Tsinghua Tongfang University Student Physical Fitness Testing System was strictly applied to conduct tests on students in accordance with the operation procedures of the instruments and equipment.

Data and Analysis

The researchers conducted the following statistical analyses using the data obtained from the experimental group and the control group before the exercise intervention, 6 weeks after the intervention, and 12 weeks after the intervention. They used SPSS statistical software for these analyses.

1. The mean and standard deviation of age, height, weight, and student physical health monitoring data were calculated for each of the two sample groups.
2. The Shapiro-Wilk test was used to test the normal distribution of the data.
3. The changes in the scores of each test item and the total score of student physical fitness monitoring before the intervention, 6 weeks after the intervention, and 12 weeks after the intervention were compared. One-way ANOVA was used within groups, and T-test was used between groups.

Research Scope

This study focuses on the following aspects: The research subjects are students from non-physical education majors of the 2024 grade at Changchun Normal University who failed the college students' physical health monitoring. Statistical analysis indicates that it is significant at the 0.05 significance level, with a test power of 0.70 and an effect size of 0.85. These values were calculated using the G*Power program to determine the appropriate sample size required for the study. The results of G*Power show that the minimum sample size required for this experiment is 76 participants, with 38 in the experimental group and 38 in the control group. They will undergo a 12-week exercise intervention, and the "Student Physical Health Monitoring" will be conducted before the intervention, 6 weeks after the exercise intervention, and 12 weeks after the exercise intervention. The differences between groups and within groups will be analyzed using SPSS 26.0. Therefore, the restricted stratified sampling method was used to select students from different total score segments, as detailed in the following table:

Table 1 Matched Pairs for Sample Grouping

	Experimental Group (Using interval training and circuit training) (n=38)		Control Group (using the regular program) (n=38)	
Score range	Male	Female	Male	Female



	Experimental Group (Using interval training and circuit training) (n=38)		Control Group (using the regular program) (n=38)	
59-50	5	5	5	5
49-40	5	5	5	5
39-30	5	5	5	5
<30	4	4	4	4

Research Results

1.Comparison of basic data between the experimental group and the control group

Table 2 Comparison Table of Basic Data between the Experimental Group and the Control Group

	Experimental group (n=38)		control group(n=38)		P	
	Male	Female	Male	Female	Male	Female
Height (CM)	176.59±16.23	162.21±13.79	177.31±17.52	71.28±38.72	0.893	0.99
Weight (KG)	70.13±29.87	57.93±41.07	71.28±38.72	58.11±50.89	0.917	0.08
Age (Year)	19.42±2.37	19.45±2.15	19.68±1.97	19.35±2	0.99	0.97
BMI (kg/m ²)	82±15.36	80±16.73	74±15.62	82±14	0.47	0.47
Vital capacity (ML)	68.25±22.99	69.55±11.86	66±39.77	67.7±26.85	0.837	0.924
50 M (Sec)	65.8±11.03	32.2±25.06	56.8±11.03	25.1±24.74	0.5	0.5
1000M/8 00M(Sec)	31.50±15.58	8.5±11.08	29.9±17.41	12±14	0.3121	0.3121
Seated forward bend(CM)	55.9±22.45	56.45±29.27	53.45±29.45	64±22.07	0.1167	0.1167
Long jump(CM)	22±24.8	23.7±25.66	30.3±25.86	27.8±26.12	0.4267	0.4267

Pull-ups/Sit-ups (Times)	6.5±17.97	48.8±23.03	5±21.79	53±24	0.198	0.198
Total score	49.67±0.61	45.85±0.4	49.35±1.01	45.67±0.84	0.0145	0.0145

(* P<0.05)

From the above table, it can be seen that the students in the experimental group and the control group were compared in terms of height, weight, age and various data of physical fitness monitoring. There was no significant difference ($P > 0.05$), indicating that the basic conditions of the two groups of students were consistent and they could be used as research subjects for the study.

Table 3 Test scores of each item before the exercise intervention in the experimental group, after 6 weeks of exercise intervention, and after 12 weeks of exercise intervention. Summary analysis table of test scores.

Experimental group male (n = 19)	Time		Mean		Comparison	P	
			Grade	Score		Grade	Score
BMI(kg/m ²) (A)	pre-test	A _E 1	26.28±4.25	82±15.36	A _E 1-A _E 2	0.0834	0.139
	After 6 weeks	A _E 2	22.51±3.1	84±12	A _E 1-A _E 3	0.0493*	0.0294*
	After 12 weeks	A _E 3	21.26±3.03	89±9.95	A _E 2-A _E 3	0.4598	0.2047
Vital capacity (ML) (B)	pre-test	B _E 1	3821.5±761.62	68.25±22.99	B _E 1-B _E 2	0.3878	0.3073
	After 6 weeks	B _E 2	3949±714.02	68.4±20.51	B _E 1-B _E 3	0.2871	0.3501
	After 12 weeks	B _E 3	4554.05±865.09	79.9±21.07	B _E 2-B _E 3	0.199	0.4527
50 M (Sec) (C)	pre-test	C _E 1	8.29±0.7	65.8±11.03	C _E 1-C _E 2	0.0337*	0.03*
	After 6 weeks	C _E 2	7.96±0.46	71.4±4.57	C _E 1-C _E 3	0.0495	0.03*

	After 12 weeks	C _{E3}	7.42±0.49	71.6±6.10	C _{E2} -C _{E3}	0.3901	0.98
1000 M (Sec) (D)	pre-test	D _{E1}	331.8±37.34	31.5±15.58	D _{E1} -D _{E2}	0.0885	0.015
	After 6 weeks	D _{E2}	296.25±27.44	47.6±13.34	D _{E1} -D _{E3}	0.0035*	< 0.001*
	After 12 weeks	D _{E3}	273.35±19.92	51.1±11.39	D _{E2} -D _{E3}	0.0803	0.012*
Seated forward bend(CM) (E)	pre-test	E _{E1}	7.13±5.47	55.9±22.45	E _{E1} -E _{E2}	0.0825	0.2698
	After 6 weeks	E _{E2}	10.53±7.51	62.85±25.8	E _{E1} -E _{E3}	0.0213*	< 0.001*
	After 12 weeks	E _{E3}	14.72±4.63	74.5±7.68	E _{E2} -E _{E3}	0.0183*	< 0.001*
Long jump(CM) (F)	pre-test	F _{E1}	177.9±27.42	22±24.80	F _{E1} -F _{E2}	0.03*	0.097
	After 6 weeks	F _{E2}	208.85±17.8	55.5±17.19	F _{E1} -F _{E3}	0.0118*	0.003*
	After 12 weeks	F _{E3}	216.25±16.98	57±14.92	F _{E2} -F _{E3}	0.4175	0.174
Pull-ups (Times) (G)	pre-test	G _{E1}	1.05±3.11	6.5±17.97	G _{E1} -G _{E2}	0.0376*	0.0339*
	After 6 weeks	G _{E2}	2.05±3.34	8.2±16.36	G _{E1} -G _{E3}	< 0.001*	0.0042*
	After 12 weeks	G _{E3}	3.75±7.89	15±33.24	G _{E2} -G _{E3}	0.0002*	0.0013*
Total score (H)	pre-test	H _{E1}		49.67±0.61	H _{E1} -H _{E2}		< 0.001*
	After 6 weeks	H _{E2}		58.62±0.17	H _{E1} -H _{E3}		< 0.001*
	After 12 weeks	H _{E3}		63.50±0.19	H _{E2} -H _{E3}		< 0.001*
	Time		Mean			P	

Experimental group female (n = 19)			Grade	Score	Comparison	Grade	Score
BMI(kg/m ²) (A)	pre-test	A _{E1}	26.24±2.59	80±16.73	A _{E1} -A _{E2}	0.1065	0.059
	After 6 weeks	A _{E2}	21.66±1.95	90.75±10.28	A _{E1} -A _{E3}	0.0288*	0.007*
	After 12 weeks	A _{E3}	19.32±2.94	95±10.72	A _{E2} -A _{E3}	0.0368*	0.433
Vital capacity (ML) (B)	pre-test	B _{E1}	2451.5±564.68	74.55±11.86	B _{E1} -B _{E2}	0.0359*	0.313
	After 6 weeks	B _{E2}	3654±520.47	76.5±10.62	B _{E1} -B _{E3}	0.0131*	0.3077
	After 12 weeks	B _{E3}	4332.5±943.96	77.5±13.29	B _{E2} -B _{E3}	0.0053*	0.162
50 M (Sec) (C)	pre-test	C _{E1}	11.15±1.25	32.2±25.06	C _{E1} -C _{E2}	0.1741	0.207
	After 6 weeks	C _{E2}	9.41±1.01	45.4±21.84	C _{E1} -C _{E3}	0.0117*	< 0.001*
	After 12 weeks	C _{E3}	8.49±0.74	64.35±12.92	C _{E2} -C _{E3}	0.0864	0.008*
800 M (Sec) (D)	pre-test	D _{E1}	330.4±34.77	8.5±11.08	D _{E1} -D _{E2}	0.0493*	0.009*
	After 6 weeks	D _{E2}	301.5±49.69	25.2±20	D _{E1} -D _{E3}	0.0412*	< 0.001
	After 12 weeks	D _{E3}	278.55±33.07	45.2±18.10	D _{E2} -D _{E3}	0.038*	0.007
Seated forward bend(CM) (E)	pre-test	E _{E1}	8.22±6.94	56.45±29.27	E _{E1} -E _{E2}	0.4847	0.1534
	After 6 weeks	E _{E2}	11.64±6.88	66.35±23.2	E _{E1} -E _{E3}	0.044*	0.0317*
	After 12 weeks	E _{E3}	15.28±6.71	70.25±19.11	E _{E2} -E _{E3}	0.0456*	0.1966

Long jump(CM) (F)	pre-test	F _{E1}	166.75±21.51	23.7±25.66	F _{E1} -F _{E2}	0.2113	0.624
	After 6 weeks	F _{E2}	188.7±17.93	27.4±23.65	F _{E1} -F _{E3}	0.0327*	< 0.001*
	After 12 weeks	F _{E3}	212.8±14.09	54±19.79	F _{E2} -F _{E3}	0.1447	< 0.001*
Sit-ups (Times) (G)	pre-test	GE1	25.8±11.77	48.8±23.03	GE1-GE2	< 0.001*	0.137
	After 6 weeks	GE2	35.65±1.93	61.1±14.57	GE1-GE3	< 0.001*	0.006*
	After 12 weeks	GE3	41.35±2.17	68.5±10.27	GE2-GE3	0.3026	0.182
Total score (H)	pre-test	HE1		45.85±0.40	HE1-HE2		< 0.001*
	After 6 weeks	HE2		54.05±0.49	HE1-HE3		< 0.001*
	After 12 weeks	HE3		65.57±0.69	HE2-HE3		< 0.001*

*P<0.05

Table 4 Summary analysis table of test scores for each item before exercise intervention, after 6 weeks of exercise intervention and after 12 weeks of exercise intervention in the control group

Control group male (n = 19)	Time	Mean		Comparison	P		
		Grade	Score		Grade	Score	
BMI (kg/m ²) (A)	pre-test	A _{E1}	26.96±1.75	74±15.62	A _{E1} -A _{E2}	0.2564	0.053
	After 6 weeks	A _{E2}	25.93±2.03	84±17.43	A _{E1} -A _{E3}	0.278	0.004*
	After 12 weeks	A _{E3}	25.71±2	89±13.38	A _{E2} -A _{E3}	0.4738	0.326
Vital capacity (ML) (B)	pre-test	B _{E1}	3784±1014.92	66±39.77	B _{E1} -B _{E2}	0.794	0.01*
	After 6 weeks	B _{E2}	3916.5±735.75	71.5±19.2	B _{E1} -B _{E3}	0.2893	0.0342*
	After 12 weeks	B _{E3}	3906±1151.1	71.55±26.17	B _{E2} -B _{E3}	0.0559	0.0873

Control group male (n = 19)	Time		Mean		Comparison	P	
			Grade	Score		Grade	Score
50 M (Sec) (C)	pre-test	C _{E1}	8.28±0.7	56.8±11.03	C _{E1} -C _{E2}	0.0704	0.064
	After 6 weeks	C _{E2}	8.06±0.5	70.8±6.11	C _{E1} -C _{E3}	0.0273*	0.015*
	After 12 weeks	C _{E3}	7.92±0.45	72.45±6.39	C _{E2} -C _{E3}	0.321	0.536
1000 M (Sec) (D)	pre-test	D _{E1}	330.05±33.28	29.9±17.41	D _{E1} -D _{E2}	0.1446	0.021*
	After 6 weeks	D _{E2}	307.25±26.15	42.3±12.95	D _{E1} -D _{E3}	0.4567	< 0.001*
	After 12 weeks	D _{E3}	290.15±34.11	50±17.49	D _{E2} -D _{E3}	0.1216	0.146
Seated forward bend(CM) (E)	pre-test	E _{E1}	6.82±7.52	53.45±29.45	E _{E1} -E _{E2}	0.3839	0.3243
	After 6 weeks	E _{E2}	10.57±8.04	63.25±26.56	E _{E1} -E _{E3}	0.0488*	0.0859
	After 12 weeks	E _{E3}	14.51±7.57	64.8±21.56	E _{E2} -E _{E3}	0.3951	0.1793
Long jump(CM) (F)	pre-test	F _{E1}	174.3±12.71	30.3±25.86	F _{E1} -F _{E2}	0.2436	0.013*
	After 6 weeks	F _{E2}	207.45±14.88	49.6±19.33	F _{E1} -F _{E3}	0.0404*	0.006*
	After 12 weeks	F _{E3}	211.3±18.97	51.8±23.72	F _{E2} -F _{E3}	0.1429	0.77
Pull-ups (Times) (G)	pre-test	G _{E1}	0.95±4.14	5±21.79	G _{E1} -G _{E2}	0.0032*	0.0018*
	After 6 weeks	G _{E2}	0.7±2.19	3±11	G _{E1} -G _{E3}	0.0172*	0.0458*
	After 12 weeks	G _{E3}	2.3±3.34	8.7±15.94	G _{E2} -G _{E3}	0.033*	0.0256*
Total score (H)	pre-test	H _{E1}		49.35±1.01	H _{E1} -H _{E2}		< 0.001*
	After 6 weeks	H _{E2}		57.54±0.42	H _{E1} -H _{E3}		< 0.001*
	After 12 weeks	H _{E3}		60.16±0.69	H _{E2} -H _{E3}		< 0.001*
	Time		Mean			P	



Control group male (n = 19)	Time		Mean		Comparison	P	
			Grade	Score		Grade	Score
Control group female (n = 19)			Grade	Score	Comparison	Grade	Score
BMI(kg/m ²) (A)	pre-test	A _{E1}	25.16±1.26	14±00	A _{E1} -A _{E2}	0.0025*	0.102
	After 6 weeks	A _{E2}	22.34±2.43	89±14.80	A _{E1} -A _{E3}	<0.001*	0.012*
	After 12 weeks	A _{E3}	20.31±3	93±9.54	A _{E2} -A _{E3}	0.1769	0.346
Vital capacity (ML) (B)	pre-test	B _{E1}	2464±904.12	67.7±26.85	B _{E1} -B _{E2}	0.1021	0.0564
	After 6 weeks	B _{E2}	2562.5±676.92	71.25±18.68	B _{E1} -B _{E3}	<0.001*	<0.001*
	After 12 weeks	B _{E3}	2743.5±366.38	75.45±10.8	B _{E2} -B _{E3}	0.0042*	0.009*
50 M (Sec) (C)	pre-test	C _{E1}	11.59±1.18	25.1±24.74	C _{E1} -C _{E2}	0.0559	0.595
	After 6 weeks	C _{E2}	10.83±0.82	32.9±24.38	C _{E1} -C _{E3}	0.0087*	<0.001*
	After 12 weeks	C _{E3}	9.81±0.68	59.2±14.59	C _{E2} -C _{E3}	0.2048	<0.001*
800 M (Sec) (D)	pre-test	D _{E1}	336.8±26.06	12±14	D _{E1} -D _{E2}	0.4521	0.015
	After 6 weeks	D _{E2}	311.6±25.36	27.2±18.29	D _{E1} -D _{E3}	0.1515	<0.001*
	After 12 weeks	D _{E3}	289.95±32.94	43±22.85	D _{E2} -D _{E3}	0.1254	0.012*
Seated forward bend(CM) (E)	pre-test	E _{E1}	8.12±6.38	12±14	E _{E1} -E _{E2}	0.1324	0.012*
	After 6 weeks	E _{E2}	11±4.95	27.2±18.29	E _{E1} -E _{E3}	0.1334	0.0169*
	After 12 weeks	E _{E3}	12±4.96	43±22.85	E _{E2} -E _{E3}	0.5	0.0163*
Long jump(CM) (F)	pre-test	F _{E1}	166.45±62.92	40.7±23.32	F _{E1} -F _{E2}	0.0824	0.097
	After 6 weeks	F _{E2}	171.45±45.82	51.2±20.85	F _{E1} -F _{E3}	<0.001*	0.003*

Control group male (n = 19)	Time		Mean		Comparison	P	
			Grade	Score		Grade	Score
	After 12 weeks	F _{E3}	181.84±13.66	53±24.00	F _{E2} -F _{E3}	<0.001*	0.174
Sit-ups (Times) (G)	pre-test	G _{E1}	25.6±11.77	53±24	G _{E1} -G _{E2}	0.0044*	0.091
	After 6 weeks	G _{E2}	28.6±6.39	55.8±17.7	G _{E1} -G _{E3}	0.0271*	0.0539
	After 12 weeks	G _{E3}	29.8±7.56	58.6±16.61	G _{E2} -G _{E3}	0.0229*	0.3895
Total score (H)	pre-test	H _{E1}		45.67±0.84	H _{E1} -H _{E2}		<0.001*
	After 6 weeks	H _{E2}		50.40±0.30	H _{E1} -H _{E3}		<0.001*
	After 12 weeks	H _{E3}		61.60±0.19	H _{E2} -H _{E3}		<0.001*

*P<0.05

Data Analysis

The experimental test results show that there is no significant difference between the experimental group and the control group in terms of height, weight, age, BMI, lung capacity, 50m, 1000m/800m, sit and reach, standing long jump, pull-ups/sit-ups and total score ($P > 0.05$). This indicates that the basic qualities of the students in the experimental group and the control group are consistent, and the research completed by them has practical significance.

After a 12-week exercise intervention, by comparing the test data before the intervention, after 6 weeks of intervention, and after 12 weeks of intervention, it was found that for the male subjects in the experimental group, significant differences were observed in BMI after 12 weeks, in the 50-meter dash after 6 weeks and 12 weeks, in the 1000-meter run after 6 weeks and 12 weeks, in the sit and reach test after 12 weeks and from 6 to 12 weeks, in the standing long jump after 12 weeks, in the pull-ups after 6 weeks, 12 weeks, and from 6 to 12 weeks, and in the total score after 6 weeks, 12 weeks, and from 6 to 12 weeks. For the female subjects in the experimental group, significant differences were observed in BMI after 12 weeks and from 6 to 12 weeks, in lung capacity after 6 weeks and 12 weeks, in the 50-meter dash after 12 weeks and from 6 to 12 weeks, in the 800-meter run after 6 weeks, 12 weeks, and from 6 to 12 weeks, in the sit and reach test after 12 weeks and from 6 to 12 weeks, in the standing long jump after 12 weeks and from 6 to 12 weeks, in the sit-ups after 6 weeks and 12 weeks, and in the total score after 6 weeks, 12 weeks,

and from 6 to 12 weeks. For the male subjects in the control group, significant differences were observed in BMI after 12 weeks, in lung capacity after 6 weeks and 12 weeks, in the 50-meter dash after 12 weeks, in the 1000-meter run after 6 weeks and 12 weeks, in the sit and reach test after 12 weeks, in the standing long jump after 6 weeks and 12 weeks, in the pull-ups after 6 weeks, 12 weeks, and from 6 to 12 weeks, and in the total score after 6 weeks, 12 weeks, and from 6 to 12 weeks. For the female subjects in the control group, significant differences were observed in BMI after 12 weeks, in lung capacity after 12 weeks and from 6 to 12 weeks, in the 50-meter dash after 12 weeks and from 6 to 12 weeks, in the sit and reach test after 6 weeks, 12 weeks, and from 6 to 12 weeks, in the standing long jump after 12 weeks and from 6 to 12 weeks, in the sit-ups after 6 weeks, 12 weeks, and from 6 to 12 weeks, and in the total score after 6 weeks, 12 weeks, and from 6 to 12 weeks.

When comparing the scores of various data between the experimental group and the control group, it can be seen that the male students in the experimental group have more significant improvements in lung capacity, 1000-meter run, sit and reach, standing long jump, pull-ups and the total score compared to the male students in the control group. The female students in the experimental group have more obvious improvements in BMI, lung capacity, 50-meter dash, 800-meter run, standing long jump, sit-ups and the total score compared to the female students in the control group. This indicates that the physical health promotion plan is more conducive to improving the physical fitness of students who have not met the standards in physical health monitoring.

Conclusion

1.The physical fitness promotion program can effectively improve the physical fitness of non-sports major college students who failed the college students' physical fitness monitoring.

2.Compared with traditional physical education courses, the physical fitness promotion program has a more significant effect on improving students' physical health levels and the sports intervention is more targeted.

Discussion

In the experimental group, after the exercise intervention of 12 weeks, all the experimental subjects had varying degrees of improvement. Compared with the baseline level, the male students were significant in 1,000-m run, sit-and-reach, standing long jump, pull-ups and total score, the female students were significant in sit-and-reach, sit-ups and total score; though the scores of each item in the control group increased by a small margin, the difference was not significant. On average, both groups of students reached the “qualified” standard in all tests, so it can be seen that either a targeted physical-fitness promotion plan or traditional physical-education classes can improve the physical fitness of college students who failed the monitoring standard, but the physical-fitness promotion plan has better comprehensive effectiveness (present study).

The results are consistent with a previous study that HIIT reduced abdominal visceral fat in young women as well or even better than work-matched MICT with a lower time investment (Zhang et al., 2017; Tong et al., 2018).

Moreover, randomized and meta-analytic evidence further suggests that HIIT (especially protocols with ≥ 2 -min work bouts) can be as effective or superior to MICT for body composition and cardiorespiratory fitness in adults with overweight/obesity (Su et al., 2019; Wen et al., 2019).

In young women with elevated BMI, 12-week interval-based programs (including SIT/HIIT) lead to comparable improvements in VO_{2peak} and body composition relative to MICT with similar enjoyment, supporting the practicability of higher-intensity exercise for this population (Hu et al., 2021).

In addition, circuit-style high-intensity training has been shown to improve body composition, peak oxygen uptake, muscular strength and selected quality-of-life domains in women, supporting multi-station formats for fitness improvements (Sperlich et al., 2017).

In summary, studies of interval and circuit methods have consistently reported improvements in BMI/adiposity, speed/power and strength, endurance, and overall fitness; in contrast, changes in flexibility or lung-function measures were often small or inconsistent, which is generally consistent with the results of this study (Hu et al., 2021; Su et al., 2019; Wen et al., 2019).

Suggestions:

1. Before conducting physical education teaching, teachers should conduct a questionnaire survey of the students in the class to understand whether the students have cardiovascular diseases, sports injuries, or other conditions that may affect their normal completion of physical education courses. At the same time, understand the students' exercise purposes and identify possible problems in their exercise methods, diet, and other aspects, and solve these problems in future courses.

2. The adoption of the physical health promotion plan helps students to exercise in a targeted manner. The plan includes interval training and circuit training, and the combination of the two is conducive to improving students' physical health.

3. The school can promote the training methods of the physical health promotion plan to college students who fail the physical health monitoring in each grade in a targeted manner, helping students reach the qualified standard of physical health monitoring in a short period of time, improving their physical health, and facilitating their graduation.

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