

## RESEARCH

# Research on Linkage and Path Selection of College Students' Physical Health Quality Improvement System

Fang-fang Shi

Zhejiang Institute Science and Technology, Hangzhou, CN

737272683@qq.com

---

**Background:** The status of college students' physical health in China is not optimistic. The specific conditions, influencing factors, related obstacles and promotion mechanism of college students' physical health quality have yet to be discriminated.

**Purpose:** This study was from the perspective of system linkage of "sports management and student management", focused on the internal and external factors that affect the quality of college students' physical health, then targeted combing the theoretical errors and operational difficulties of current college students' physical health problems and their quality improvement.

**Method:** The literature collection, experimental comparison, expert interviews, and logical reasoning methods were used in this study.

**Result and Conclusion:** The proper introduction of featured physical education courses and continuous improvement of teaching quality; strengthening of guidance, systematic linkage and actively promoting the extracurricular fitness activities; adapting to the school appropriately and promoting the balanced fusion of academic performance points and physical fitness; adapting a multi-pronged approach to work together to improve the quality of physical health.

---

**Keywords:** physical health; system linkage; path selection

---

## 1. Introduction

At present, the status of college students' physical health in China is not optimistic. It is mainly manifested in several aspects including the seriously poor aerobic respiratory capacity of college students, the expanding trend of obese people among the college students; college students lacked of sufficient attention and consciousness to physical health combined with weak initiative and enthusiasm; they were unable to master scientific fitness methods effectively and lacking the effective regulation of follow-up examinations and exercise prescriptions; the problems of college students physical health were lack of comprehensive management of multiple departments and lack of integrity and continuous improvement strategies of students' physical health quality (Dai & Lin, 2012). The previous literatures shown that, during the 20 years prior to 2010, the physical fitness of Chinese college students continued to decline. Although in recent years, there were some data (2010) showing that the physical indexer of some age groups had "stopped decline", there was no clear evidence supported that decline was the "inflection point" of the decline in the health of adolescents physical health, and the related improvement strategies was slightly weak due to lack of system linkage and effectiveness (Yang, Tang, & Zhang, 2014). Therefore, there is more urgent to research on the improvement of college students' physical health quality and the breakthrough path.

Twenty universities in Hangzhou were investigated in this study. We established classification fitness programs for them. Based on mustering their baseline physical health condition, through the collected literature, questionnaire, interview investigation and logic analysis and other methods especially riled on FG/AG contrast experiment and the results of the analysis, from the "physical education and labor system linkage" and "integration of sports lesson inside and outside" the dual Angle of view, analyzed and argued the current measures to improve the quality of students' physical health, to explore the quality of the possible path of ascension, and finally to provide the feasible plans for the promotion strategy.

## 2. Methods

### 2.1. Literature collection

This paper summarized and collected the articles about the influencing factors and path selections of the college students' physical health quality improvement.

### 2.2. Questionnaires

This study designed concerned questionnaires to investigate the physical health condition of college students and obstacles. Total of 376 questionnaires were issued. 342 questionnaires were recollected, recovery rate was 91%. The effective questionnaires among them was 261, effective rate was 76%.

### 2.3. Field method

We field visited to some colleges and universities to master the current status of college students' physical fitness test system and analyze the influencing factors.

### 2.4. Expert interviews

We visited some university sports department heads to discuss the existing problems and analyze the improvement and promotion paths.

### 2.5. Mathematical statistics

All data in this study were storage, arrangement, Operation, processing and analysis in excel system and SPSS 13.0 (SPSS Inc., Chicago, IL, USA).

### 2.6. Experimental method

This paper conducted the comparative test, questionnaire survey and comparative analysis on the basis of FG/AG platform.

## 3. Results and analysis

### 3.1. Conventional physical education is faced with difficulties in reality and featured physical education adapts to objective demands

#### 3.1.1. Experimental design of college students' physical health FG/AG management platform

The US Cooper University FG (FITNESSGRAM)/AG (ACTIVITYGRAM) management platform-the report of physical fitness test and physical activity- refers to the integration of physical health assessment, sports tracking, information feedback and physical education courses, after-school fitness, and reward programs for adolescents, which is an adolescent physical fitness monitoring and physical activity promotion system based on computer technology (Zhang, 2010). This system could statically analyze and evaluate and dynamically intervene to improve the health of students which has gained internationally recognized (Cheng, 2012).

This study used the FG/AG management platform to set the experimental design. The experimental period was 15 weeks. The subjects of this experiment were college sophomores with a total of 200 students divided into 5 groups of 40 people each. The first group was the control group, which was conducted according to the conventional school teaching. The second group was a quality intervention group for regular teaching and quality exercises. The third group was a technical intervention group for conventional teaching and physical testing exercises. The fourth group was a mixed group of quality and technical interventions for conventional teaching and technical exercises. The fifth group was a featured course group, which consists of "Featured Projects + Quality Skills Training + Extra-curricular Fitness Program + Academic Performance Point Plan + Self-Physical Health Check-up and Feedback". It was centric on featured items mainly including quality development, sports games, team formation and other contents. The extra-curricular fitness program included 1–3 extra-curriculum exercises per week. About the reward plan, it was needed to consult with the student's school to score points for outstanding students. The self-constitution health check feedback refers to inputting student information into physical fitness management software. Students can make appointments at any time, and they can get their test results and test reports and exercise prescriptions immediately after testing. After the experiment, the system conducts a comparative analysis.

#### 3.1.2. Featured physical education could effectively promote college students' physical health consciousness

According to the research of Liang Jianxiu, college students' health awareness is an internal motivation to promote their participation in sports, enhance their athletic ability and physical fitness level, Therefore, it is of great significance for college students to improve their physical health awareness and form good fitness

habits (Liang, 2005). Dou Jian proposed that sports intervention could improve the college students' health awareness and level (Dou, 2013). As the **Table 1** shown, after the experiment, the students' attention to their own health was significantly increased, they were willing to acquire fitness knowledge, and their acceptance to physical education was increased; the proportion of people who comparable and fully understood the definition of "health" increased from 27% to 72%; the proportion of mastering in physical health education increased from 21% to 61.5%; the awareness of physical education in phl education was also raised to 61.5%; more than 3/4 participants had some understanding of physical fitness, and began to pay attention to its concept, definition, connotation and denotation, and began to distinguish the similarities and differences between "health" and "physical health", which indicated that the featured curriculum -had achieved corresponding results, and? a positive impact on participants' health consciousness. Yu Lan et al (Yu, 2013). reported that the sports health knowledge and awareness of all of experimental groups have improved after exercise intervention for 15 weeks or more- The **Table 2** indicated that featured courses had the most significant effects on physical fitness awareness among participants: The proportions of people who were very willing to understand and recognize their own physical health were 93.5%, 63%, 66.5%, 69.5%, and 44.5% for the partition of characteristics, quality, technology, and mix and contrast respectively. The proportions of pretty known the physical health knowledge were 76%, 45.5%, 71.5%, 69% and 58.5% for the partition of characteristics, quality, technology, and mix and contrast respectively. There was no significant difference from the featured course group to the technical intervention group and the quality-technical mixed intervention group, but there was a significant relationship between the quality intervention group and the control group, which showed that the distinctive physical education

**Table 1:** Survey statistics comparison table of college students' physical health consciousness before and after experiment (n = 200, unite: %).

Items	Completely unknown	A little known	Unsure	Relatively known	Completely known
Understanding of the health definition	11.0/3.0	51.5/23.5	10.5/1.5	14.5/37.5	12.5/34.5
Understanding of the health standards	42.5/17.0	31.0/24.5	10.5/3.5	10.5/43.5	5.5/11.5
Understanding of the health acknowledge	13.5/4.5	50.5/33.0	9.5/5.5	19.5/38.5	7.0/18.5
Understanding of the fitness guidance of sports course	12.0/6.0	38.5/13.5	23.5/13.5	14.5/38.5	11.5/28.5
Understanding of the health improvement of sports course	7.5/6.0	54.0/21.0	16.5/11.5	15.5/41.0	6.5/20.5

(Note: X/Y and XY represents the questionnaire data before and after the experiment respectively.)

**Table 2:** Survey statistics comparison table of college students' physical health consciousness of control group (n = 200, unit: %).

Items	Featured group	Quality intervention group	Technique intervention group	Quality and technique mixed intervention group	Control group
Understanding of the health standards	88.5	66.5	63	61.5	45.5
Understanding of the health acknowledge	76	45.5	71.5	69	58.5
Understanding of the fitness guidance of sports course	72.5	66	71	64.5	63
Understanding of the health improvement of sports course	70.5	57.5	56.5	74.5	58.5
Pretty willing to know the personal health condition	93.5	63	66.5	69.5	44.5
Great interested in the sports movement	78.5	56.5	72.5	66.5	47.5

curriculum had a different impact on the participants. In terms of generating strong interest, the proportion of featured courses reached 92.5%, far exceeding the proportions of 56.5%, 72.5, 66.5%, and 47.5% in the other four groups, showing significant correlations. Fu Dong et al., put forwarded a similar view- There was a positive correlation between the overall assessment of college students' sports attitudes and physical health ( $r = 0.485$ ,  $P < 0.01$ ), but the correlation between sports cognition and physical health is not significance, there was a moderate to strong correlations among the sports emotions, behavioral intentions and physical health of college students (Dong, 2014). ( $0.40 \leq r < 0.80$ ,  $P < 0.05$  or  $P < 0.01$ ). The conclusion was that training a correct and active sports attitude was conducive to improving the physical health of college students, and it was necessary to pay attention to stimulating and cultivating students' sports emotions and improving their intention of sports behavior.

### 3.1.3. The featured course could moderately improve the college students' physical health quality. (should adopt n)

The advanced physical education teaching mode should be dominated by cultivating students' positive emotional experience, focus on cultivating students' sports awareness, interests and habits, guide students to participate in enjoying sports, and enhance physical fitness so as to achieve the goal of physical education, physical education and educating people (Liu & Zheng, 2015). According to the experimental design, featured course teaching is highly interesting, puzzled, competitive, and challenging. The learning atmosphere of the classroom is strong and the team interaction is frequent, which greatly stimulates the participants' interest in learning and passion for sports. According to **Table 3**, the participants of the distinctive course group – had significantly changed in terms of physical form, physical function, and athletic quality. The increase in endurance quality was greatest, the speed of sensitiveness was slightly improved, and the increasing rate of girls was higher. That was mainly manifested in following aspects: both male and female students had a decrease in body weight, indicating that sports were suitable for intensity and exercise which could achieve corresponding weight loss. Males' body fat rate dropped from  $17.82 \pm 4.46$  to  $15.99 \pm 5.73$ , and the number of declines was as high as 2.0. Females also decreased from  $29.10 \pm 3.87$  to  $26.87 \pm 3.59$ , and the number of declines was 2.23, which was higher than that of males, –indicated that similar sports played more obvious role for females than males. The vital capacity significantly increased 58 (3745–3687) for males and 59 (2377–2318) for females, which were basically the same, and the vital capacity index also increased. The number of step tests for boys increased from 52.83 to 54.27, an increase of 1.44, and females increased from 47.29 to 48.19, an increase of 0.9. In contrast, males' growth was more pronounced. The reaction speed was improved both of them, the reductions in response time were 0.01 seconds for males (0.39–0.38) and 0.03 seconds for females (0.48–0.45). The decrease rate for females was 3 times that of males, indicating that the experiment was more effective in improving girl response. It shows that female college students could

**Table 3:** A list of physical form, function and quality test indexes of students in the special course group after the experiment (n = 200).

Items	Male	Female
Height (cm)	$172.57 \pm 5.71$	$159.97 \pm 5.07$
Weight (kg)	$61.43 \pm 7.90$	$52.33 \pm 4.65$
Body fat percentage (%)	$15.99 \pm 5.73$	$26.87 \pm 3.59$
BMI	$21.14 \pm 2.16$	$21.26 \pm 2.01$
Waist-to-hip ratio	$0.77 \pm 0.06$	$0.69 \pm 0.53$
Vital capacity (ml)	$3745 \pm 870$	$2377 \pm 546$
Vital capacity and body mass	$60.97 \pm 9.76$	$45.42 \pm 10.31$
Exponent step trail	$54.27 \pm 9.92$	$48.19 \pm 7.65$
50m (s)	$7.37 \pm 0.67$	$9.74 \pm 0.74$
Standing long jump (cm)	$224.83 \pm 22.34$	$153.38 \pm 15.41$
Reaction time (s)	$0.38 \pm 0.07$	$0.45 \pm 0.11$
Grip force (kg)	$44.61 \pm 6.98$	$27.47 \pm 6.2$
Grip force body mass index	$72.61 \pm 11.03$	$52.49 \pm 8.75$

improve their space more than males. Changes in grip strength, the added value of males and females were 1.36 and 1.59 respectively, and females' growth was slightly higher than that of males. The grip strength and weight ratio also changed accordingly.

According to **Table 4**, the results of physical fitness tests of featured courses, especially the explosive power and strength, were greatly improved, the body fat rate was decreased, the physical form had been optimized, and the vital capacity and body mass index had shifted from passing to well. Specifically, the training of aerobic and anaerobic respiration, bouncing ability, and strength flexibility coordination what is mean in specialty courses could effectively improve the quality of students' performance and the ratio of height to weight (2.809 for males, 3.056 for females) and body fat percentage (15.99 for males, 26.87 for females), improvement in vital capacity, female vital capacity (2377), vital capacity body mass index (60.97 for males, 45.42 for females), step test index (54.27 for males, 48.19 for females), and dominant ratio for reaction time (7.37 for males and 9.74 for females). In the other four groups, the quality intervention

**Table 4:** Comparison of body shape, function and quality test indexes among students in each group after the experiment (n = 200).

Items		SG	QG	TG	QTG	CG
H (cm)	M	172.57 ± 5.71	170.67 ± 5.67	170.13 ± 11.48	169.93 ± 4.37	171.05 ± 5.46
	F	159.97 ± 5.07	160.53 ± 4.17	160.93 ± 5.25	158.06 ± 3.04	159.61 ± 7.22
W (kg)	M	61.43 ± 7.90	59.35 ± 3.37	58.64 ± 1.39	60.11 ± 4.58	58.25 ± 5.43
	F	52.33 ± 4.65	51.25 ± 4.32	51.24 ± 2.35	51.47 ± 3.46	50.76 ± 3.18
BFR (%)	M	15.99 ± 5.73	16.01 ± 3.65	16.86 ± 5.55	16.16 ± 4.77	16.70 ± 4.34
	F	26.87 ± 3.59	27.23 ± 2.99	27.45 ± 5.51	26.98 ± 3.43	29.25 ± 3.44
BMI	M	21.14 ± 2.16	22.21 ± 1.05	21.98 ± 3.46	20.09 ± 4.33	20.32 ± 1.94
	F	21.26 ± 2.01	21.01 ± 2.38	20.67 ± 5.69	19.73 ± 6.71	20.82 ± 4.28
WHR	M	0.77 ± 0.06	0.76 ± 0.05	0.78 ± 0.05	0.76 ± 0.06	0.75 ± 0.05
	F	0.69 ± 0.53	0.68 ± 0.78	0.71 ± 0.51	0.69 ± 0.38	0.67 ± 0.66
VC (ml)	M	3745 ± 874	3778 ± 803	3688 ± 761	3723 ± 605	3666 ± 594
	F	2377 ± 546	2332 ± 676	2211 ± 627	2299 ± 356	2214 ± 740
VMI	M	60.97 ± 9.76	59.52 ± 8.18	58.45 ± 7.77	59.79 ± 8.46	57.17 ± 8.89
	F	45.42 ± 10.31	45.33 ± 10.79	45.12 ± 10.31	44.46 ± 9.55	44.99 ± 6.54
SE	M	54.27 ± 9.92	56.36 ± 7.94	52.03 ± 8.17	53.84 ± 6.99	51.76 ± 10.66
	F	48.19 ± 7.65	50.15 ± 6.75	42.46 ± 6.67	46.45 ± 7.89	42.95 ± 7.33
50m (s)	M	7.37 ± 0.67	7.17 ± 0.53	7.58 ± 0.78	7.46 ± 0.62	7.57 ± 0.93
	F	9.74 ± 0.74	9.55 ± 0.56	9.88 ± 0.64	9.66 ± 0.36	9.91 ± 0.78
LJ (cm)	M	224.83 ± 22.34	227.18 ± 26.17	220.65 ± 22.34	225.66 ± 20.28	223.35 ± 19.88
	F	153.38 ± 15.41	152.65 ± 12.35	154.03 ± 13.96	154.56 ± 11.19	155.47 ± 14.73
RT (s)	M	0.38 ± 0.07	0.40 ± 0.04	0.39 ± 0.11	0.39 ± 0.08	0.41 ± 0.23
	F	0.45 ± 0.11	0.47 ± 0.09	0.46 ± 0.05	0.45 ± 0.35	0.49 ± 0.57
GS (kg)	M	44.61 ± 6.98	46.36 ± 8.21	41.47 ± 6.06	43.61 ± 5.41	41.88 ± 6.63
	F	27.47 ± 6.2	28.14 ± 5.6	26.47 ± 7.3	27.55 ± 4.6	29.87 ± 3.4
GWI	M	72.61 ± 11.03	78.11 ± 10.77	70.71 ± 9.93	72.55 ± 11.03	71.89 ± 11.03
	F	52.49 ± 8.75	52.49 ± 8.75	52.49 ± 8.75	52.49 ± 8.75	52.49 ± 8.75

SG: The group of special course; QG: The group of quality; TG: The group of technology; QTG: The group of quality and technology; CG: The group of control.

M: Male; F: Female.

H: Height; W: Weight; BFR: Body fat rate; BMI: Body mass index; WHR: Waist-to-hip ratio; VC: Vital capacity; VMI: Vital mass index; SE: Step experiment; LJ: Long jump; RT: Reaction time; GS: Grip strength; GWI: Grip weight index.

group had lead in individual data such as body weight, males' vital capacity (3778), males' gripping strength (46.36), male grip strength index (78.11) and step test index (56.36). The waist-to-hip ratio (0.78 for males, 0.71 for females) and body mass index (21.98 for males, 20.67 for females) in the technical intervention group slightly prevailed, and the difference in height and weight was not significant. The comprehensive index of the quality and technology mixed intervention group was superior to the quality intervention group and the technical intervention group but with -(CHN). The control group ranked first in the standing and long jump project, and the females' grip strength also ranked in the front row, indicating that the experiment had a greater impact on the improvement of students' cardiopulmonary function, but did not substantially improve the ability to bounce, and had less impact on absolute power. Dou Jian's research results are similar to the above results.

### **3.2. Extra-curricular fitness plans and academic rewards can accelerate the impact on college students' physical health**

The school, family, and community have a well-recognized model of intervening in adolescents' physical health. The family is the guarantee for the promotion of adolescent health, the school is the foundation for health promotion and the community is the link for health promotion (Liu, 2008). For undergraduates who are studying in school for a long time, universities can provide the most important external driving force for their health promotion<sup>11</sup>. Therefore, the role of universities and their management departments on the improvement of college students' physical health quality are indispensable and irreplaceable. The academic achievement point reward program, which is affiliated to the college student management department, is not only innovative but also decisive in the current situation in the promotion of university students' fitness and even the function of supervision and management.

Under the premise of being constrained, the special course group carried out several times of extra-curricular collective fitness every week, and was led by the teacher or the designated group leader. In the later period, the students carried out extra-curricular collective fitness according to gender and interest, and their consciousness gradually increased. According to a questionnaire survey, the participants in this group generally feel that the extra-curricular fitness brings physical and mental pleasure. According to the experiments and interviews, physical fitness skills have been generally improved, and all the results have been better than the other four groups. At the same time, the concepts of sports, curriculum, health, and lifelong sports of this group have been improved. They also become more interesting in sports. These students learned the pleasure from hardships, they felt that they had grown up in the uncertainty and had made progress in their efforts and their fitness consciousness had become self-conscious. According to **Table 5**, participants in this group generally expressed that they would like to continue with the experimental intervention, which means that this intervention has a positive and continuous effect. After the experiment, participants in each group held positive views on sports, curriculum, extra-curricular fitness, rewards, and self-examination and feedback. However, there were significant differences in the ratio: the main indicators of the special course group were relatively leading. While there is a difference in the control group, the quality group, the technical group and the quality-technical mixed group, the significance is lower than that of the special course group, which means that the special course is rich in content, effective in measures, and highly stimulating. Substantial progress has been made in both exercise awareness and function enhancement. 40 students in the special course group recognized the academic reward program. Although they showed a certain degree of utilitarianism, with the development of activities and the establishment of

**Table 5:** The attitude of college students to sports after the experiment (n = 200, unit: %).

Items	SG	QG	TG	QTG	CG
1	94.5	71.5	73	80.5	67.5
2	83.5	62.5	63.5	70	64.5
3	91.5	76	85	87.5	76
4	97	84.5	91.5	89.5	78.5
5	95.5	81	82.5	83	64.5

1: Positive views on sports; 2: Positive views on physical education curriculum; 3: Positive views on extracurricular fitness activities; 4: Positive views on linking academic grade points with physical health; 5: Positive opinion on self-physique health check and feedback.

the team, the advantage of the team's activities and the characteristics of collective ownership prompted the participants to shift from "external promotion" to "Intrinsic drive", and "Matthew effect" had faded in. It can be concluded that extra-curricular fitness programs with additional academic reward program have had a positive impact on the physical health of college students, and the actual results have been significant.

### **3.3. The improvement of college students' physique and health quality needs comprehensive management of "In-Class and Extra-curricular Activities"**

According to **Table 6**, 20 universities under investigation have combined physical education with physical fitness testing. On the whole, the physical fitness test system for college students is well-established and the test methods are flexible. The physical education and its quality integrated into the physical fitness test have become the key to the development of the system, and they are also important parts that need to be improved (Zong & Cai, 2008). According to Liu Haiyuan's investigation<sup>13</sup>, regular physical education curriculum that is short of interesting and attraction can no longer satisfy the current need of college students for physical health and quality improvement, which lays a foundation for the demanding of special physical education (Faqiang & Fan, 2014).

According to investigations, 20 college students' physical health monitoring system in Hangzhou is in lack of communication and correlation with college students' extra-curricular fitness, and it is also short of linkage with their student management systems. As a result, the former one leads to the lack of physical activity and exercise intensity in the scientific sports fitness of college students and the latter one is reflected in the failure to effectively supervise and ensure the quality of physical fitness. Wu Zongxi proposed that the promotion of college students' physical health by college student management systems, especially the development of extra-curricular fitness activities, lacks strong support and related systems (Xie, 2013). And there is also a rare "system linkage" between sports departments and student management departments. Therefore, the improvement of path and strategy of college students' physical health requires urgent breakthroughs in both practice and theory. In addition to providing targeted special physical education courses, the cooperation between academic achievement points and extra-curricular fitness programs can effectively promote the improvement of students' physical fitness quality. This requires the linkage and integration of college sports courses "in and out of class".

### **3.4. The linkage management system between college sports and students has yet to be built**

According to Du Faqiang's research and the results of this study, the physical condition, function and exercise quality of subjects have a big gap with the requirements of the "Standards", and the physical health of students is not optimistic (Du, 2014). According to interviews and surveys, the fears and evasion of female college students for the 800-meter and other endurance projects are very common and representative, which is an important link that afflicts the improvement of female college students' physical fitness. According to **Table 7**, the height, weight, waist-to-lumbar ratio and body fat ratio of all subjects were within the normal range, and the weight was within the lower limit of normal and between the lower body weight and the normal body weight. The body fat rate of male college students is close to 18, which is an overweight range. The body fat rate of female college students is as high as 28.48, and it is nearly obese. Although the subjects' body weight was normal, the body fat rate was in the overweight range, which was close to the edge of obesity, indicating that there was a serious imbalance between the body fat and the muscles of the subjects, and there was a lack of aerobic exercise. The middle and long distance exercises should be strengthened to increase the muscle mass and reduce fat weight. From the analysis of functional data, the average level of vital capacity index and step test of college students only reached the lower limit of the "Standards", indicating that college students generally have poor cardiopulmonary function. Female college students are below the pass line in terms of speed, strength and endurance, which are serious shortcomings.

**Table 6:** Student physical health test system in schools that are under investigation.

<b>Number of School</b>	<b>Test method in class/after class/both</b>	<b>Number of schools with dedicated laboratories</b>	<b>School's average number of subjects per year</b>	<b>The average amount on the system/total amount/set (Ten thousand yuan)</b>	<b>The average number of teachers in sport physiology or biochemistry</b>
20	12/5/3	9	11273	12.55./251/4.18	1.57

**Table 7:** Body shape, function and quality test of the students before the experiment (n = 200).

Items	Male	Female
H (cm)	171.54 ± 6.34	160.18 ± 5.42
W (kg)	60.38 ± 7.47	54.76 ± 5.87
BFR (%)	17.88 ± 5.26	28.48 ± 5.16
BMI	20.19 ± 2.86	21.79 ± 2.61
WHR	0.78 ± 0.15	0.75 ± 0.42
VC (ml)	3637 ± 646	2294 ± 539
VMI	60.23 ± 9.85	41.89 ± 10.63
SE	51.45 ± 10.83	43.56 ± 7.44
50m (s)	7.58 ± 0.44	9.88 ± 0.65
LJ (cm)	223.26 ± 21.91	148.47 ± 14.76
RT (s)	0.38 ± 0.05	0.47 ± 0.08
GS (kg)	41.65 ± 5.88	25.46 ± 4.49
GWI	68.97 ± 11.56	46.49 ± 8.22

H: height; W: weight; BFR: Body fat rate; BMI: Body mass index; WHR: Waist-to-hip ratio; VC: Vital capacity; VMI: Vital mass index; SE: Step experiment; LJ: long jump; RT: Reaction time; GS: grip strength; GWI: Grip weight index.

Chen Peiyou pointed out that the diversity of subjects and objects in management determines the complexity of physical fitness promotion system (Chen, 2014). A single organizational structure obviously cannot meet the needs of diversification and specialization of physical health management. In terms of organizational strategy, a mixed matrix organizational structure is more conducive to work. The study also pointed out that the expert-led project, the linear organization and the physical health management rectangular organizational structure can actively intervene in the physical health of adolescents, which lays a theoretical foundation for the development of special sports courses and extra-curricular fitness programs. From the reality of colleges, the lack of enthusiasm for college students' after-class fitness and the lack of health awareness is obviously not a problem that can be solved only by a physical education teacher or a sports department. According to the jurisdictional authority and affiliation analysis, the responsibility of guiding ideological and political work of college students and the jurisdiction of extra-curricular activities belong to the college student management department and counselor system, rather than the jurisdiction of the sports department, and these require both the sports department and the student management system. Therefore, the improvement of the quality of college students' physical health calls for the construction of the management system of "sports-study interaction" in college sports departments and student-work systems.

### ***3.5. Self-examination feedback on the comprehensive effects of college students' physical health***

Grasping their own physical health status can effectively guide the college students' after-class fitness, so as to benefit their physical health. According to the experimental design, the self-physique health check and feedback of the special course group mainly means that all the subjects' information is entered into the management software so that the subject can make an appointment test at any time, and after the test, the test report and a professional exercise prescription can be obtained immediately. According to **Table 8**, subjects in the special course group have a greater increase in sports views, especially these subjects before the experiment who believed that sports are much important have shifted to the opinion that sports are very important, and the change of views on self-physical examination feedback is also similar.

## **4. Conclusion and suggestion**

### ***4.1. Properly introducing sports special courses and continuously improving teaching quality***

The sports special courses have played a certain role in promoting the health consciousness and level of college students. Suggestion: first of all, we should ensure the priority of arranging courses for the compulsory majors in the first and second year of physical education; secondly, we must meet the requirements of

**Table 8:** The attitude towards sports and self-physique feedback of the special course group after test (n = 40, unit: %).

Items	VI	MI	NM	UI	EU
Views on sports	77 (35)	17.5 (40)	2.5 (17.5)	2.5 (5)	0.5 (7.5)
Views on self-physique feedback	32 (15)	63.5 (37.5)	0 (12.5)	5 (15)	0.5 (22.5)

VI: Very important; MI: Much important; NM: Not to matter; UI: unimportant; EU: Extremely unimportant.

students' "four-self" in choosing courses, namely, "self-selected teachers, self-selected semester, self-selection time, and self-selected projects"; thirdly, we should adjust course content appropriately according to the learning interests, and also we should focus on "sports games" and design appropriate amount of special sports items and teaching contents that can arouse interest in exercise and meet various needs of students; Fourthly, optional course content should be as rich as possible to satisfy needs; Finally, according to the specific circumstances, we will strive to establish elective courses in the third year and the contents should be flexible and diverse so that students' participation and enthusiasm would be improved.

#### **4.2. Strengthening guidance, system linkage, and actively promoting extra-curricular fitness activities**

Although the extra-curricular fitness program is an artificially imposed exercise content, it can gradually become internalized as the subjects' self-conscious behavior. Especially in the later period, students have been separated from supervision and are seriously involved in exercise. This fitness program can be used as a continuation of classroom teaching to supplement effectively in terms of exercise volume and intensity. However, the premise of consciously involving in extra-curricular fitness is that students are awarded grade point average for their performance. If this is not the case, the fitness continuity is doubtful. Therefore, in the promotion of extra-curricular fitness program, four aspects of work must be done well: First, we should pay close attention to whether the premise of experimental design is feasible; Second, whether the hardware and software can meet the relevant requirements; Third, we must strictly control the experimental process to ensure quality; The fourth is to gradually explore the establishment of a long-term cooperation mechanism for after-class fitness.

#### **4.3. The appropriate integration of academic grade points and physical fitness should be promoted according to the situation of school**

Judging from the experimental process, students are fully committed and their enthusiasm is unprecedentedly high when combining academic grade points with extra-curricular fitness activities. However, Xie Hongguang pointed out that physical health beliefs do not affect healthy behaviors with simple direct relationships, but influence the behavioral intentions and habits in a progressive and cumulative manner (Xie, 2013). The reward of academic grade point is driven by external forces, and has not yet completely formed as a consciously inner motivation. After the experiment, the subjects exhibited certain withdrawal behavior. With the time pass, the number of withdrawers gradually increased, which means that the conscious exercise has not yet formed as a fixed and continuous role both in the psychology and the action and it is still need to be strengthened and cured. The proposal consists of two points as follow: first, the communication and coordination of student management departments should be well done in an effort to reach consensus; second, overemphasis on the award of academic grade point may lead to the formation of speculative psychology among participants, resulting in the formation of non-benign mentality, and finally misleading the experimental results.

#### **4.4. A multi-pronged approach working together to improve physical health**

In summary, the FG/AG platform can be used as one of the path to improve physical health of college students. We use its "sports special program" in physical education classrooms to stimulate students' sports enthusiasm and interest and use "quality skills training" to improve the quality of sports and technical skills in the short term. In the same time, we also use "extra-curricular fitness program" to effectively supplement the classroom teaching and use the academic grade points to guide and motivate students to exercise after class and then use "self-physique health check and feedback" to keep abreast of the static status and dynamic changes in their physical health. However, as a new thing, the platform still needs to be based on the actual situation in the domestic universities. And after the implementation of local experiments, it will continue to be adjust, and will steadily advance after a stable effect is achieved.

## Acknowledgements

This study was funded by the soft science project of Hangzhou Science and Technology Bureau (20130834M48).

## Competing Interests

The author has no competing interests to declare.

## References

- Chen, P. Y., & Sun, Q. Z.** (2014). A study of an innovative teenager physical health promotion management mode. *Journal of Physical Education*, 2, 34–39. DOI: <https://doi.org/10.16237/j.cnki.cn44-1404/g8.2014.02.014>
- Cheng, H. L.** (2012). The Enlightenment of FG/A G on Physical Fitness Management of Adolescents in China. *Theory and Practice of Education*, 26, 27–29. DOI: <https://doi.org/10.16470/j.csst.2012.03.016>
- Dai, X., & Lin, Z.** (2012). Reflection and Optimization on Evaluation Efficiency of National Student Physical Health Standard—Construction on Physical Fitness Early Warning System of College Students. *China Sport Science & Technology*, 466(26), 112–113. DOI: <https://doi.org/10.16470/j.csst.2012.03.016>
- Dong, F. U.** (2014). Investigation and Correlation Analysis on Sports Attitude and Physical Health of College Students. *Journal of Beijing Sport University*, 6, 76–79. DOI: <https://doi.org/10.19582/j.cnki.11-3785/g8.2005.10.029>
- Dou, J.** (2013). Study on the Effects of the P.E. Class Experiment On the University Students' Fitness. *Sichuan Sports Science*, 1, 134–137. DOI: <https://doi.org/10.13932/j.cnki.sctyx.2013.01.019>
- Du, F. Q.** (2014). The causation analysis of our Young Students' physique. *Sport & Science*, 3, 60–67. DOI: <https://doi.org/10.13598/j.issn1004-4590.2014.03.013>
- Liang, J. X.** (2005). Development and Practice of Student Physical Health Management Consulting System. *Journal of Beijing University of Sport*, 28(10), 1327–1374. DOI: <https://doi.org/10.19582/j.cnki.11-3785/g8.2005.10.029>
- Liu, H. Y.** (2008). Causes and solutions for the deterioration of physical health of students. *Journal of Physical Education*, 15(1), 67–71.
- Liu, M., & Zheng, J.** (2015). Department P E. The New Thinking of Public Physical Education Curriculum Reform in Common Colleges and Universities Based on The National Student Physical Health Standard (revised in 2014). *Hubei Sports Science*, 2, 177–179.
- Xie, H. G.** (2013). Effects of physical health belief on physical exercising behavior intentions and behavior habits. *Journal of Physical Education*, 4, 100–105. DOI: <https://doi.org/10.16237/j.cnki.cn44-1404/g8.2013.04.032>
- Yang, C. W., Tang, Y., & Zhang, H.** (2014). Study on Effective Execution Path of Adolescent Physical Health Policy— From the Perspective of Perform System Model of Meter-Horn Policy. *China Sport Science*, 34(8), 56–63. DOI: <https://doi.org/10.16469/j.css.2014.08.008>
- Yu, L.** (2013). Study on Personal Health Promotion of College Students—Based on the Perspective of Physical Education Reform. *Journal of Beijing University of Sport*, 5, 35–43. DOI: <https://doi.org/10.13932/j.cnki.sctyx.2013.01.019>
- Zhang, B. Q.** (2010). Measures taken by the United States to promote student fitness since the 1950s and enlightenment therein. *Journal of Physical Education*, 17(3), 52–56. DOI: <https://doi.org/10.16237/j.cnki.cn44-1404/g8.2010.03.012>
- Zong, W. U., & Cai, X. B.** (2008). The Research for Implementing the Students' Health Management in Higher School. *Journal of Nanjing Institute of Physical Education*, 22(1), 35–41. DOI: <https://doi.org/10.15877/j.cnki.nsic.2008.01.025>

**How to cite this article:** Shi, F. 2018. Research on Linkage and Path Selection of College Students' Physical Health Quality Improvement System. *Physical Activity and Health*, 2(1), pp.1–39, DOI: <https://doi.org/10.5334/paah.12>

**Submitted:** 16 June 2018    **Accepted:** 03 July 2018    **Published:** 26 July 2018

**Copyright:** © 2018 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <http://creativecommons.org/licenses/by/4.0/>.

]u[ *Physical Activity and Health* is a peer-reviewed open access journal published by Ubiquity Press.

OPEN ACCESS 