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Research on Physical Characteristics of Chinese College Students of Different Physical Activity Levels

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Abstract

Through a investigation of the physical activity status of 1794 undergraduates who were non-sports majors from freshman to senior in Jiangxi Normal University, to analyze physical fitness status of college students with different physical activity levels. The results showed that in physical activity, high-intensity physical activity of male was higher than female, while medium-intensity and low-intensity (insufficient) physical activity of female was higher than male. College students' high-intensity physical activity group's physical test scores were better than the medium-intensity physical activity group, and the medium-intensity physical activity group was superior to the low physical activity group. In terms of physical fitness, among the test indicators of body shape and physiological function, the vital capacity and body mass index of male and female were ranked at a pass level. In the physical fitness test indicators, the performance of college students' endurance qualities was better while the overall performance of strength qualities was lower. The overall fitness of college students was ranked at a pass level, and the physical test scores of female were better than male.

Keywords: College students, Physical activity, Physical characteristics, Endurance, Strength.

1. Research background

Physical activity refers to physical movement caused by contraction of skeletal muscle [1]. In the past two or three decades, the incidence of obesity among young people in the world has risen rapidly. Decrease in physical activity and increase in static lifestyle were important potential risk factors [2]. One of the main reasons for this status was the decline in physical activity of college students. Many studies have shown that physical activity played an extremely important role in controlling and reducing weight and improving physical fitness [3]. However, with the change of people's life rhythm and lifestyle, the static activity mode increased, and the physical activity decreased, which seriously threatened people's health. College students were the mainstay of the country's development. At this stage, the health status of college students has became the focus of social attention. In order to took effective measures to promote college students to actively participate in physical activities, it was necessary to understand their physical activity patterns. The International Physical Activity Questionnaire was one of the most common and practical methods for large groups to evaluate physical activity. This article will explore the current status and physical characteristics of different physical activity levels of college students, and provide theoretical support for the reasonable formulation of college

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students' daily exercise prescriptions and physical activity promotion.

2. Research subjects and methods

2.1 Research subject

In this study, taking Jiangxi Normal University as the sampling unit, stratified random sampling and cluster sampling were used to select 1794 non-sports undergraduates. The basic situation was shown in the following <Table 1.>.

Table 1. Sample composition （N=1794）

Grade	Male（N）	Female（N）	Total（N）
Freshman	157	341	498
Sophomore	144	303	447
Junior	222	323	545
Senior	105	199	304
Total	628	1166	1794

2.2 Research methods

This study used the International Physical Activity Questionnaire-long which was widely used internationally and has high reliability and validity. Under the premise of quality control and assurance of the answers to the questionnaire, a total of 2002 questionnaires were distributed to non-sports undergraduates of Jiangxi Normal University, and 1941 copies were recovered, with a recovery rate of 96%. After reviewed the questionnaires, 82 invalid questionnaires were removed, and 1,859 valid questionnaires, with an effective rate of 92%. In the later physical health test, 65 students failed to perform the physical health test on time due to illness, injury, or incident, so the final sample size for the random test was 1794 students.

The assignment of each physical activity attribute and metabolic equivalent (MET) [4] in the "International Physical Activity Questionnaire-long" was as follows:

The formulation for calculating the amount of physical activity consumed by an individual in a week was as

Table 2. Various physical activity attributes and MET assignments in the International Physical Activity

(Unit: MET-min)

Types of physical activity	Physical activity intensity	MET assignment
Career-related	Low intensity (insufficient)	3.3
	Medium intensity	4
	high intensity	8
Related to transportation	Sit down (drive / ride)	1
	Low intensity (insufficient)	3.3
	ride a bike	4
Related to housework	Medium-intensity homework	3
	Medium-intensity outdoor homework	4
	high-intensity outdoor homework	5.5
leisure time	Low intensity (insufficient)	3.3
	Medium intensity	4
	high intensity	8

follows:

MET assignment corresponding to the physical activity × weekly frequency (day / w) × time per day (min / d).

The three kinds of intensity physical activity levels in each type of physical activity obtained were added to the total physical activity level. In this study, the formulation will be used to analyze the physical activity of various types and intensities surveyed in the questionnaire into specific physical activity.

In this study, the data processing principles and methods of the "International Physical Activity Questionnaire-long " and the calculation methods of physical activity energy consumption were based on the research of Fan Mengyu [5] and other scholars.

2.3 Mathematical statistics

Adopting Microsoft Excel 2007 and SPSS21.0 for Windows system software package to carried out mathematical statistical analysis and logical proofreading of the content of the international physical activity questionnaire, using descriptive analysis, the normal distribution of the measured values using the average ± standard deviation (M ± S.D.) to indicated that non-normally distributed measurement values were expressed as rank averages, and analyzed the basic situation of college students with different levels of physical activity; Independent sample t-test and rank sum test were used to analyze the differences of various physical activities of college students.

3. Research results and discussions

3.1 Difference test of different physical activity levels of college students

It can be seen from <Table 3> that in the low-intensity physical activity, the difference between males and females was very significant ($p<0.01$), and the low-intensity physical activity of females was higher than males. In the medium-intensity physical activity, the difference between male and female students was significant ($p<0.05$), and the medium-intensity physical activity of females was higher than males. In high-intensity physical activity, the difference between male and female students is significant ($p<0.01$), and the high-intensity physical activity of males is higher than females.The survey results were consistent with the results reported by scholar Peng Guoqiang [6] on the level of physical activity of college students in Jiangxi Province. It can be seen that the low-intensity physical activity and the medium-intensity physical activity of females were higher than males. The intensity of sports exercises for females is generally low, mostly with walking, yoga, dancing, and other low-intensity exercises, while high-intensity physical activities were few. On the contrary, the amount of high-intensity physical activity of males was significantly higher than that of females, because males preferred to fast speed and antagonistic sports.

Table 3. Different physical activity level test （MET-min/w）

Different intensity	Male	Female	p
	Rank mean		
Low intensity (insufficient)	827.61	935.14	0.001**
Medium intensity	859.88	917.76	0.023*
high intensity	1035.73	823.05	0.001**

** $p < 0.01$, * $p < 0.05$

3.2 Physical fitness of college students

It can be seen from <Table 4> that the height, weight, BMI, vital capacity and body mass index of males and females was significantly different after independent sample t-test ($p <0.01$). The overall average height and weight of males and females were basically consistent with the national college student survey data in the 2014 National Physical Health Monitoring [7]. The BMI values of males and females were within the normal range, but the vital capacity and body mass index of males and females were only at the passing level. In recent

years, the proportion of overweight and obese students on campus has increased year by year. Whether it was increased BMI or weight gain has become an important reason for the physical health of college students at this stage [8], and it was also a hot issue of concern for schools and society.

Table 4. Survey results of body shape and physiology

Test index	Male （N=628）	Female（N=1166）
Height（cm）	172.35±6.25	160.60±5.40**
Body weight（kg）	63.37±9.88	52.49±8.06**
BMI（kg/m²）	21.31±2.97	20.31±2.67**
Vital capacity body mass index	62.19±12.05	49.39±10.77**

** $p < 0.01$, * $p < 0.05$

It can be seen from <Table 5> that there were significant differences in speed quality (50m), flexibility quality (sitting forward), strength quality (standing long jump), endurance quality (1000m / 800m) and the total score of physical fitness test ($p < 0.01$). In terms of passing rates, females were higher than males.

Among the test results of various physical fitness test indicators, there were significant differences between males and females at 50m, sitting forward, standing long jump and endurance. Test data with "National Physical Health Monitoring 2014" [7] showed that in terms of 50m test results, males and females were higher than the national level. In terms of pliability, the test scores for the male seated flexion were lower than the national average, and the test scores for the females were basically the same as the national test scores; In terms of strength and quality, the standing long jump performance of males and females was lower than the national average. Related research [9] also confirmed that the standing long jump performance of college students in Jiangxi Province was declining year by year, and the failure rate was higher. The test results for pull-ups (male) and sit-ups (female) were the same as the national average, but the pull-ups for males did not meet the passing standard. In terms of endurance, the test scores of males and females were higher than the national average.

In general, the physical health level of undergraduates in jiangxi normal university was higher among female students than male students. The research results of related research [10] pointed out that the total test scores of female students in colleges and universities of science and technology in Jiangxi Province were higher than male students, and the physical condition of male students was moderate, which was slightly lower than the national standard, which was basically consistent with the results of this research survey.

Table 5. Results of physical fitness test survey

Test index	Male （N=628）	Female（N=1166）
50M（s）	7.55±0.7	9.04±0.59**
Sit and reach（cm）	9.36±7.78	14.1±7.45**
Standing long jump（cm）	212.4±22.3	158.3±16.9**
Pull-ups（T）	4.29±3.8	----------
Sit-ups（T/min）	----------	29.8±8.59
1000m/800m(s)	247.62±30.54	230.28±24.42
1000m/800m(s)（score）	65.76±15.43	75.19±11.97**
Total score of physical fitness test	65.17±7.88	71.80±7.37**
Passing rate	76.5%	92.3%

3.3 Differences in physical characteristics of different physical activity levels of different genders

<Table 6> showed for the grouping of physical activity levels of college students in Jiangxi Normal University.94.7% of college students

have reached the level of physical activity at or above the middle level, and only a few 5.3% have insufficient physical activity; Among them, in terms of insufficient physical activity, 12.4% were males and 1.3% were females, the ratio of males was higher than females. Females had higher percentage of physical activity at the middle and higher levels than males. There were significant differences between males and females at different ** $p < 0.01$, * $p < 0.05$

levels of physical activity grouping ($p < 0.05$).

Table 6. Grouping of physical activity levels of college students

（N=1794）

Physical activity level	Male		Female		Total	
	amount	percentage	amount	percentage	amount	percentage
	(N)	(%)	(N)	(%)	(N)	(%)
insufficient	95	15.2	16	1.3	111	6.2
medium	236	37.5	630	54.2	866	48.2
high	297	47.3	520	44.5	817	45.6
P	0.001					

It can be seen from <Table 7> (see Appendix 1) that there were significant differences in BMI, vital capacity and body mass index, 50m, standing long jump, pull-ups, 1000m and the total score of physical fitness test in different physical activity groups of boys ($p < 0.01$) . From the rank average of the three groups, the BMI, 50m, and 1000m of the low physical activity group (insufficient) were higher than the medium physical activity group (appropriate) and the high physical activity group (active), and the total scores of vital capacity and body mass index were low in the middle group (suitable) and high group (active). Overall, the high physical activity group's performance was better than the medium physical activity group than the low physical activity group, showing a significant progressive relationship. But it was worth noting that in the pull-ups, the average rank

of the low physical activity group was higher than that the medium and high groups.

Table 7. Differences in physical fitness of male students with different physical activity levels

	BMI（Kg/m²）	Vital capacity body mass index	50M(s)	Sit and reach（cm）
	Rank mean			
insufficient（N=95）	381.06	214.56	404.54	298.41
Medium intensity（N=236）	302.16	333.44	307.93	310.13
high intensity（N=297）	303.02	331.42	290.92	323.12
χ^2	15.069	33.977	28.817	1.554
p	0.001**	0.001**	0.001**	0.46
	Standing long jump（cm）	Pull-ups（T）	1000/800(s)	Total score of physical fitness test
	Rank mean			
insufficient（N=95）	222.21	344.84	427.35	176.03
Medium intensity（N=236）	331.1	337.58	323.26	316.15
high intensity（N=297）	330.83	286.46	271.44	357.48
χ^2	28.973	13.727	54.109	72.027
p	0.001**	0.001**	0.001**	0.001**

** $p < 0.01$, * $p < 0.05$

It can be seen from <Table 8> that there were significant differences in the vital capacity and body mass index, 50m, standing long jump, 1000m and the total score of the physical fitness test in different physical activity groups of females ($p < 0.01$). Judging from the rank averages of the three groups, the low physical activity group (inadequate) has 50m and 1000m higher than the medium physical activity group (suitable) and the high physical activity group (active). The total scores of vital capacity, body mass index, standing long jump and physical fitness test were low in the middle group (suitable) and high group (active). In general, the high physical activity group's performance was better than the medium group than the low physical activity group, showing a clear progressive relationship.

Table 8. Differences in physical fitness of females with different physical activity levels

	BMI（Kg/m²）	Vital capacity body mass index	50M(s)	Sit and reach（cm）
	Rank mean			
insufficient（N=95）	540.31	415	788	516.09
Medium intensity（N=236）	577.14	567.18	596.18	589.87
high intensity（N=297）	592.53	608.46	561.85	577.85
χ^2	0.862	8.344	8.969	1.013
p	0.65	0.015	0.011	0.603
	Standing long jump（cm）	Pull-ups（T）	1000/800(s)	Total score of physical fitness test
	Rank mean			
insufficient（N=95）	340.94	480.38	891.66	282.09
Medium intensity（N=236）	584.84	595.14	615.99	562.9
high intensity（N=297）	589.34	572.57	534.65	617.74
χ^2	8.472	2.807	30.218	20.553
p	0.014	0.246	0.001**	0.001**

4. Conclusions

4.1 The amount of high-intensity physical activity of males was higher than females, while females had higher levels of medium-intensity and physical inactivity than males.

4.2 In the test indexes of body shape and physiological function, the average vital capacity and body mass index of males and females were 62.19 and 49.39, respectively. which were only at the pass level from the perspective of scoring standards. Among the physical fitness test indicators, the endurance qualities of college students were better, with 65.76 for male students and 75.19 for female students, which were higher than the national average. The overall performance of strength was low, with an average of 4.29 pull-ups for males, much lower than the national average of 6.3. In the overall score of the physical fitness test, although the pass rates of males and females have reached 76.5% and 92.3%, respectively, the overall health status of college students was still at the pass level, and only a small part of the scores were good and excellent. On the whole

** $p < 0.01$, * $p < 0.05$

the overall scores of females physical fitness tests were better than males .

4.3 94.7% of the students from Jiangxi Normal University have reached the level of physical activity at or above the middle level, and only a few 5.3% have insufficient physical activity.The scores of the physical fitness test of the high physical activity group of college students were better than the medium physical activity group and the low physical activity group.

5. Recommendation

4.1 In view of the differences in physical activity, first of all, college students should establish the concept of healthy sports, actively participate in physical exercise and extracurricular activities, and arrange learning, life and sports in their daily lives. Schools should also develop more promote physical activity after-school activities, increase the friendship between students and also increase the amount of physical activity.

4.2 For the test of physical fitness, college students should strengthen the practice of strength and flexibility. In daily physical education, teachers can appropriately arrange such exercises to promote the improvement of physical fitness test results.

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