

Analysis of the Influence of Sports Teaching Factors on Different Types of College Students

—Unordered multi-class Logits model based on survey data of 6 universities in Hubei

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Abstract—Based on the data of 2250 questionnaires from 6 universities in Hubei Province, the problem was analyzed by using the unordered multi-class Logit model. Research shows that college students satisfaction with physical education is negatively related to their familiarity with teachers, urban students are less satisfied with the sports teaching than those from rural areas, a more science-based physical education curriculum and sense of responsibility from physical education teachers have a significant positive impact on student satisfaction. Currently, college and university administrations have not paid enough attention to the teaching of physical education. In order to improve the health of Chinese citizens, we should attach great importance to the impact of college physical education. To do this, it is necessary to strengthen the supervision and management of college physical education; and improve the design of the content and structure system of university physical education curriculum.

Keywords—physical education in colleges and universities; satisfaction; influencing factors

I. INTRODUCTION

Health has become a common pursuit of all humankind. Then, where should everyone begin to improve their health? We must start with youth, and emphasize young people's healthy habits at the university stage. Physical education courses have a direct bearing on college students' health habits, and how satisfied college students' are in their physical education courses has a direct impact on their enthusiasm of college students to participate in sports activities. In developing countries, many college students are dissatisfied with college classroom education, especially physical education. Therefore, improving college students' satisfaction with physical education is of great significance for improving their healthy habits.

II. THE SATISFACTION OF COLLEGE STUDENTS' PHYSICAL EDUCATION TEACHING

As the standard of living in China improves, the physical health of teenagers has declined. According to the national "National Physique Monitoring Bulletin", the university student physical quality trended downward, rates of poor eyesight remain high, and continued to be detected at young ages, and the prevalence of obesity in all age groups continued to rise. [1]In addition, the urbanization of is contributing to a

drastic increase in the average standard of living. Within this context, improving college physical education as part of the "healthy China" initiative has become a reality that must be faced. In fact, during the period of urbanization, developed countries generally reformed their physical education curricula. At the inflection point of the urbanization process, the governments of both Britain and the United States of America put forward the same measures of physical education reform, achieving the goal of multicultural development of social sports.[2] Previous studies have shown that physical exercise has a significant impact on the physical and mental health of college students. Liu Lixin (2017) sampled 450 college students from 8 universities in the capital city, demonstrating that the psychological quality of students engaged in physical training was better than that of students who did not participate in physical exercise, and their social adaptability was stronger.[3] Fang Rui and Chen Ruihua (2017), studied 1029 questionnaires from 9 universities within the China University of Petroleum, and showed that physical exercise can provide college students with environments for social interaction , and is conducive to building good interpersonal relationships, enhancing social skills, and improving self-esteem.[4] Therefore, improving college students' satisfaction with physical education and stimulating their interest in physical education is an important topic to improve the health of college students nationally. Throughout the existing studies, scholars pay attention to the impact of physical education on College Students' sports behavior from various points of view. Chen Jianfeng (2017) focuses on the subjective factors affecting college students' participation in sports. Through structural equation modeling, it is understood that behavior intention and behavior control cognition of college students have a direct impact on college students' exercise behavior. Based on the cognitive ability and level of college students, [5]Pang Minhui (2016) applied a logistic model to discover students are not strongly aware of what opportunities are available, and their cognition and understanding of physical exercise is not thorough. In short, that participation in sports organizations is not enough. [6]According to Li Jing (2016)and Wang Shitao's research, college students do not fully understand of the importance of physical exercise, and this deficit has a direct bearing on how effective physical education is in colleges and universities. [7]Wang Yizhi (2016) began to reform physical education, proposing that modern educational ideas and

methods be promoted to enhance the level of physical education in colleges and universities, so as to help students progress in their physical education. [8[2]]The above research from various perspectives discuss the important role of physical education in colleges and universities, suggest of physical education reform, but ignore the initiative of students in physical exercise, and the students' satisfaction with their physical education. Only when college students have high satisfaction in physical education and enthusiastically participate in physical exercises can physical education courses be improved, and students' health improved. Therefore, it is of great significance to study the factors influencing college students' satisfaction with their physical education, and guide the physical education teachers in colleges and universities in meeting the needs of the students.

III. EMPIRICAL INVESTIGATION AND ANALYSIS

A. Data sources

In order to gain a representative sample, multiple colleges and universities located in provincial capital cities, universities located in sub provincial cities, and universities located in prefectural and municipal levels were selected for this study. The questionnaires were administered in the classroom, and collected immediately after. Because freshman students tend not to have much experience with college physical education, only sophomores, juniors and seniors were selected to participate. From March to May 2017, 2250 questionnaires were sent to colleges and universities, and 2250 questionnaires were collected. The completion rate was 100%. Sample specific data sources: 4 universities located in the provincial

capital city, Wuhan University of Technology 300, accounting for 13.3%; Hubei University 450, accounting for 20%; South-Central University For Nationalities 300, accounting for 13.3%; Wuhan Textile College of Yangtze University 300, accounting for 13.3%; Yangtze University 300, accounting for 13.3%; China Three Gorges University 450, accounting for 20.05%. 32.5% of the students were male and 67.5% female. According to the grade structure of the survey sample, the students' grades are evenly distributed, and each grade was represented equally. From the survey of the professional composition of the sample, non-sports majors accounted for 73.3% of the total sample, and sports majors account for 26.7%. (TABLE I)

B. Selection and description of variables

The factors affecting students' satisfaction with physical education are divided into five categories: First, students' personal characteristics, in addition to gender, grade, professional and student origin, sports participation and sports preferences are closely related to the theme of the study. Second, the sports curriculum, including needs, content, and teaching form three variables; third, teacher's characteristics play a role, including the responsibility and the level of teaching competence. Fourth, the system arrangement; including the college/university administration's degree of attention, the national degree of attention, and the facility composition. Fifth is the examination standard, including credit proportion and examination fairness. In view of the differences between teachers and students in different levels and different cities, the characteristics of each school are added to the analysis, namely, the administrative attributes of the school's location. All variables are nominal variables.

TABLE I. DESCRIPTION OF VARIABLES AND STATISTICAL CHARACTERISTICS

	Descriptive statistics	Variable specification	Proportion
	Physical education satisfaction	Dissatisfied=1	56.2%
		Basically satisfied=2	35.8%
		Satisfied=3	8.0%
Student personal characteristics	Gender x1	Male=0,	32.5%
		Female=1	67.5%
	Grade	Sophomore(x2) Yes=1, No=0	31.1%
		Junior(x3) Yes=1, No=0	33.3%
		Senior Control Group	35.6%
	Major x5	Non-P.E. Major=0	73.3%
		P.E. Major=1	26.7%
	Student source	Rural Senior School(x6), Yes=1, No=0	26.4%
		County High School(x7), Yes=1, No=0	56.9%
		Medium City(x8), Yes=1, No=0	13.1%
		Big City Control Group	3.6%
	Participate in sports activities	Low participation(x9), Yes=1, No=0	18.0%
		Average Participation (x10), Yes=1, No=0	57.0%
		High Participation Control Group	25.0%
	Fond of sports	Low interest(x11), Yes=1, No=0	8.8%
Average(x12), Yes=1, No=0		57.5%	
High Interest Control Group		33.7%	
Physical education curriculum	Teaching needs	Not Satisfied(x13), Yes=1, No=0	24.4%
		Average(x14), Yes=1, No=0	68.5%
		Completely Satisfied Control Group	7.1%
	Content of courses	Unscientific(x15), Yes=1, No=0	15.2%
		Average(x16), Yes=1, No=0	77.7%
		Very Scientific Control Group=3	7.0%
	Teaching form	Unscientific(x17), Yes=1, No=0	13.9%
		Average(x18), Yes=1, No=0	77.0%
		Very Scientific Control Group	9.1%

Cont. to TABLE I			
Teacher characteristics	Conscientiousness	Poor Responsibility(x19), Yes=1, No=0	4.2%
		Average(x20), Yes=1, No=0	44.3%
		Very Responsible Control Group	51.5%
	Teaching level	Approval Not Recognized(x21), Yes=1, No=0	14.1%
		Average(x22), Yes=1, No=0	62.8%
		Full Recognition Control Group	23.1%
System arrangement	School attention	Indifference(x23), Yes=1, No=0	36.5%
		Average(x24), Yes=1, No=0	52.0%
		Make Much Account Control Group	11.5%
	Facility satisfaction	Low(x25), Yes=1, No=0	44.2%
		Average(x26), Yes=1, No=0	47.8%
		High=3	8.0%
	National attention	Low(x27), Yes=1, No=0	31.0%
		Average(x28), Yes=1, No=0	54.3%
		High=3	14.7%
Assessment standard	Examination fairness	Unfair(x29), Yes=1, No=0	16.1%
		Average(x30), Yes=1, No=0	69.0%
		Very Fair Control group	14.9%
	Credit ratio	Inappropriate(x31), Yes=1, No=0	19.0%
		Average(x32), Yes=1, No=0	69.7%
		Appropriate Control Group	11.3%
School geographical features	Provincial capital	Provincial capital(x33), Yes=1, No=0	20.0%
		Vice provincial capital(x34), Yes=1, No=0	20.0%
		Other Control Group	60.0%
	211 Project(x35)	Yes=1,	13.3%
		No=0	86.7%

C. Descriptive statistical analysis of variables

(1) Through appropriate questionnaires, we can both investigate students' satisfaction with their physical education and their personal characteristics: Of the respondents, 67.5% were female, and 32.5% were male. Sophomores, juniors and seniors each accounted for 1/3 of the sample population; Sports majors accounted for 26.7% of the sample, and non-sports majors accounted for 73.3%; The majority of the sample population (56.9%) attended county high schools, accounting for , followed by rural secondary school students (26.4%), and medium-sized and large cities accounted for 16.7%. Students who participate in sports 57% of the sample participated in sports regularly and 25% had a high participation rate. The rate of low participation in sports was 18%. 33.7% of the sample population had a high interest in sports activities, 57.5% were generally interested, and 8.8% had low interest in sports activities.

(2) Views on the sports curriculum matching the students' needs: 24.4% of the students do not think the courses meet the needs of the students, 68.5% of which think the courses are generally acceptable, and only 7.7% of them believe the curriculum meets the needs of the students. From the evaluation of the content of the teaching, 15.2% of the students' rate the curriculum as unscientific, 77.7% thinks the curriculum is acceptably scientific, and only 7% think the content is very scientific. When evaluating the form of teaching, 13.9% of students think the course is unscientific ones, 77% think the courses are generally scientific, 9.1% believe the courses are scientific.

(3) Evaluation of the characteristics of physical education teachers: 51.5% of the students surveyed perceive the physical education teachers to have a strong sense of responsibility, 44.3% see a general sense of responsibility, and very few (4.2%) the students perceived a lack of responsibility in their

teachers. 23.1% of student fully accept the total teaching level of PE teachers, 62.8% generally accepted, and 14.4% of which are not recognize their teachers as acceptable.

(4) The evaluation of sports education system arrangement: only 11.5% of students think their school attaches great importance to physical education, 52% generally believed their school values physical education, 36.5% think there is a lack attention. Only 8% of students were highly satisfied with their sports teaching facilities, 47.8% were generally satisfied, and 44.2% were not satisfied. 14.7% believe the country's emphasis on PE is high, 54.3% think the nation attaches some importance to physical education, 31% think the country lacks attention to physical education.

(5) Physical education examination standards: 14.9% of students believe their academic evaluation in physical is very fair, while 16.1% believe it is unfair. The rest (69%) find the evaluation generally appropriate. The majority of students (69.7% find the allocation of academic credit for PE generally appropriate, with 11.3% believing it is very appropriate and 10% finding it inappropriate.

(6) To investigate the school characteristics of the sample: classification is according to the location of the school. The survey sample is based on the universities in the provincial capital cities, the specific ratio of the capital city, deputy provincial capital city: non capital city =4:1:1; according to whether the school is 211 to 211 Engineering School of engineering, non-ordinary schools, 211 ordinary non engineering the school accounted for 83.3%.

D. Model building

This paper explores college students' satisfaction in their physical education courses, the explanatory variable physical education satisfaction is an ordinal variable, and In general, multivariate ordered Logit models can be selected and found to

be not checked by horizontal lines, thus using the unordered multi-class Logit model. Because the explanatory variable has been set at three levels, 2 multi-class unordered Logit regression models should be established:

$$\text{Logit} \left[\frac{\pi_1}{1 - \pi_1 - \pi_2} \right] = \alpha_1 + \sum_{i=1}^n \beta_{1i} x_i \quad (1)$$

$$\text{Logit} \left[\frac{\pi_2}{1 - \pi_1 - \pi_2} \right] = \alpha_2 + \sum_{i=1}^n \beta_{2i} x_i \quad (2)$$

There were three levels of explained variables in physical education curriculum satisfaction, with "very satisfactory" as the control level, with which other levels were compared. 2 Logit models were established, respectively (1) and (2). Among them, π_1 , π_2 and $1 - \pi_1 - \pi_2$ respectively, "dissatisfaction", "general" and "satisfaction" three levels of probability. α is the intercept of the model, β is the regression coefficient, indicating the influence direction and influence degree of the explanatory variable on the explanatory

variable, x_i is the factor affecting the university student's degree of satisfaction with their physical education.

E. An empirical analysis of the influencing factors of students' satisfaction with physical education courses

a) Multivariate multicollinearity and model likelihood test

Considering the possible correlation between each explanatory variable, therefore, it is necessary to advance the multicollinearity test before model estimation. This paper uses the tolerance statistical index (tolerance) to examine multicollinearity problems. The results show that the tolerance index values of all explanatory variables are near 1, and the coefficient of variance expansion is far less than 10, therefore, there is no serious multicollinearity problem in the model. Simultaneously, through the likelihood ratio test of the total model, it is shown that the model is meaningful ($P < 0.01$).

The empirical part of this paper uses SPSS24 software for data analysis and processing, and the regression results are shown in TABLE II.

TABLE II. THE RESULTS OF MULTIPLE DISORDER REGRESSION ANALYSIS ON THE INFLUENCING FACTORS OF STUDENTS' SATISFACTION WITH PHYSICAL EDUCATION CURRICULUM

Variable	Model one Satisfied VS unsatisfied			Variable	Model two General VS unsatisfied		
	B	Significance level	Exp(B)		B	Significance level	Exp(B)
Sophomore(x2)	0.659	0.014	1.933	Sophomore(x2)	0.877	0.001	2.403
Junior(x4)	0.594	0.013	1.810	Junior(x4)	0.752	0.002	2.121
Rural high school(x6)	2.065	0.000	7.885	Major(x5)	0.554	0.011	1.741
County high school(x7)	1.877	0.000	6.536	Rural high school(x6)	1.102	0.014	3.010
Medium city(x8)	1.630	0.001	5.103	County high school(x7)	1.135	0.009	3.113
Teaching needs generally met (x14)	0.951	0.017	2.588	Degree of interest in sports generally(x12)	0.520	0.026	1.065
The scientific nature of the teaching content is general(x16)	1.157	0.003	3.181	Teaching needs met in general(x14)	1.143	0.007	3.136
Poor sense of responsibility(x19)	-0.882	0.050	0.414	The scientific nature of the teaching content is generally acceptable(x16)	0.957	0.018	2.604
General sense of responsibility(x20)	-1.029	0.000	0.357	teaching form is generally scientific(x18)	0.784	0.037	2.190
Credit ratio is average(x32)	-0.978	0.022	0.376	General sense of responsibility(x20)	-0.591	0.025	0.554
Vice provincial capital(x34)	-0.636	0.008	0.530	The teaching level is generally accepted(x22)	0.743	0.011	2.102
211project(x35)	-0.785	0.016	0.456	General satisfaction with facility(x26)	0.851	0.044	2.342
				National attention is low(x27)	0.847	0.025	2.332
				211 project(x35)	1.230	0.001	3.420
Cox and Snell R ²		0.292					
Nagelkerke R ²		0.351					
McFadden R ²		0.193					

b) Test result analysis

Model one: Students' satisfaction with physical education courses and analysis of unsatisfactory results

Analysis of the college students' individual characteristics show that the sophomore and the third year of the college passed the significant test of the 5% level, and the regression coefficient is positive, demonstrating that sophomores and

juniors are more satisfied with physical education than senior students. As compared to senior students, sophomores and juniors are nearly 3 times as likely (193.3% and 181%, respectively) to be satisfied with physical education than seniors. There may be two factors contributing to this disparity: on the one hand, younger college students have more reverence for university PE teachers, and they lack the comparison between PE and other classes. Therefore, the satisfaction

degree of physical education teaching is high. As they rise in seniority and become more familiar with college life, the true teaching level of physical education teachers may become more obvious to them, and their dissatisfaction increases. Conversely, physical education teachers may become more casual with students as the students rise in class standing, resulting in the decreased rate of students' satisfaction with physical education.

The analysis of college students' place of origin shows that the influence of college students' place of origin on the satisfaction of sports curriculum has passed through the significant level of 1%, among them, students from rural high schools are 788.5% more satisfied with sports courses than urban high schools, This proportion is very alarming, which reflects that the rural high school do not take physical education seriously, the physical education teachers are relatively low level, and there is a great shortage of sports infrastructure. Therefore, students from rural high schools are far more likely to be satisfied with college physical education. The study found that the students' satisfaction with physical education gradually decreased with the development from rural to county to secondary cities. This also confirms the view that the rural middle school physical education is not enough and facilities are scarce. Students' satisfaction did not correlate significantly students' personal characteristics (i.e., sex and grade).

The degree of conformity of curriculum and requirements and the scientific content of curriculum setting were respectively examined by the significance tests of 5% and 1% levels, and the regression coefficient is positive. When the satisfaction with teaching needs is generally acceptable and the classroom content is scientific, students are more satisfied with physical education. Teachers' sense of responsibility significantly influences students' satisfaction. Emphasis on the physical education curriculum from the administration also has a significant positive impact on student satisfaction with physical education, which has passed 1% significance test of level. In the analysis of the basic characteristics, more than 1/3 of the students think that the physical education curriculum is not deemed important by other academic departments. It shows that the importance of physical education in the nation, institution and individual departments greatly influences the satisfaction of students' physical education.

From the examination standard, credit rating passes 5% significance test of level, and the regression coefficient is negative, which shows that compared with the rational credit ratio, the students' satisfaction with PE is 37.6% lower than that of other academic subjects. Therefore, schools must not decrease proportion of PE teaching hours, and they should attach great importance to the appropriate physical education. From the analysis of characteristics of the school level, the degree of 211 project university students on physical education teaching satisfaction is lower than other universities, this may be because 211 project university of physical education teaching and insufficient attention, lead to low student satisfaction.

Model two: Analysis of the results of students perceived generally compared with satisfaction

In model two, the significance of each variable and its influence direction are approximately the same as the model of "dissatisfaction" to "satisfaction". However, students' sex, grade, teaching content, interest in sports activities and credit ratio did not pass the significance test. In the second model, the general teaching demand variable estimation results and the significant direction is positive, indicating that when this part of the students in the sports teaching face the "general" and "satisfaction" selection, the choice of general probability is 158.8% higher than that the teaching needs satisfy. Further shows that physical education in colleges and universities can not meet the needs of students well. The reason may be that schools pay more attention to the teaching of specialized courses, thus neglecting the teaching of physical education.

IV. CONCLUSION AND FUTURE WORK

College students' physical education is an important link in establishing college students' healthy habits. Indeed, it is time to fully investigate how college students feel about their physical education. Through the above quantitative analysis, we draw the following conclusions:

(1) College students satisfaction with physical education is strongly related to their familiarity with their teachers. As college students age, their satisfaction with physical education declined. Sophomore students have less experience with college and university-level physical education, and they do not have strong opinions about college teaching. As they rise in class standing, their feelings toward college physical education is more pronounced In addition, some teachers may have begun classes seriously, and become less formal as students progress in their degree, leading to a decline in student satisfaction. There were no statistically significant differences in the level of satisfaction with college and university physical education was similar in men and women, all majors, and students who love sports (and don't). At the same time, the degree of satisfaction of 211 school students in their PE teaching is lower than that of the other colleges and universities. These 211 colleges and universities seem to pay less attention to physical education.

(2) Students from urban areas are less satisfied with the sports teaching than those from the rural areas. From rural middle school, county middle school, middle city school to big city middle school, with the improvement of students' place of origin, the degree of satisfaction college students' physical education declined. This result indicates that in rural areas middle school sports receive little attention. Even when the university physical education condition is not good, the students from rural areas are easily satisfied, and large and medium-sized city high school students, physical education facilities is very good, after the University, some of the school sports teaching facilities are not as good as in high school, and university do not attach importance to physical education, which makes students feel more dissatisfied.

(3) The scientific nature of physical education curricula and the sense of responsibility of physical education teachers have a significant positive impact on students' satisfaction. The teaching of physical education in colleges and universities has long been criticized by the media, but it has not attracted the attention of colleges and universities themselves. The degree of

satisfaction college students in physical education is obviously positive influenced by both the setting of school physical education curriculum and the job responsibility of physical education teachers. Only by paying great attention to the teaching of physical education and enhancing the sense of responsibility of physical education teachers can students satisfaction with the teaching of physical education improve.

(4) The importance of teaching affairs in colleges and universities has not yet been put into practice. The educational administration departments of colleges and universities bear the responsibility of planning, checking and supervising the teaching work, and the quality of physical education is closely related to the educational administration departments. The relevant departments of the State Administration and the importance of physical education degree is not enough, the main stay in the general call, no specific research in the sports curriculum, lack of supervise and implement in the management of sports teaching, has caused most of the students are dissatisfied.

(5) The allocation of credit in physical education in colleges and universities influences the students' satisfaction with physical education. Physical education in and universities has not yet met the needs of students. College physical education should be emphasized, not only by the teachers, but also college and university administration. The best physical education curriculum will solicit and incorporate feedback from students, in order to increase the enthusiasm of students to learn sports, improve the level of student satisfaction, to promote the healthy development of the Chinese.

Research on how to improve the physical education curriculum for different types of college students, and improve

the level satisfaction with PE courses for all college students is necessary We hope to continue classification and investigation in the further research, as well as incorporating suggestions from college students themselves.

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