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Research on the Influence Mechanism of Physical Health Tracking on the Sustainability of Physical Exercise under Big Data

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Abstract: This study uses questionnaire survey and SPSS 26.0 software factor analysis to deeply explore the sustainability of college students' physical exercise. The study found that physical health tracking under big data directly affects the continuity of exercise, including personal health data tracking and personalized exercise recommendations. In order to improve the sustainability of exercise, universities need to establish student health databases, use big data analysis to monitor students' physical fitness, develop personalized exercise plans, strengthen the construction of campus sports culture, and provide adequate sports facilities to promote students' physical and mental health. The study highlights the importance of big data technology in improving the sustainability of college students' physical exercise and provides data-based strategies for colleges and universities to promote physical exercise.

1. Introduction

General Secretary stressed in his speech at the National Conference on Physical Education in Colleges and Universities that “improving the affinity and pertinence of college students to meet the needs and expectations of students’ growth and development is the key to improving the effectiveness of sports in colleges and universities under the new situation”. College students are the backbone of college sports, and now college students are becoming more and more professional. The team construction of college students has achieved remarkable results in rules and regulations, team size, professional level, development channels, work treatment, and professional identity. College students not only shoulder the responsibility of ordinary college sports but also the safety and stability of the whole campus. Strong work pressure, imperfect career development channels, unfixed work hours, etc., lead to low learning satisfaction among college students. Based on this, through questionnaire survey and SPSS 26.0, correlation analysis, factor analysis, etc. This paper analyzes and studies the influence mechanism of physical health tracking on the sustainability of physical exercise under big data [1-2].

2. Research hypotheses

Physical exercise the performance of some activity to develop or maintain physical fitness and overall health, exerts an important influence on the ideological establishment of college students. The sustainability of physical exercise plays an irreplaceable role in the development of ordinary colleges and universities. At the same time, the sense of security has a significant positive impact on both the well-being and self-sympathy of college students. The physical health tracking of college students reflects the physical health balance, value demands, psychological experience, and growth bottlenecks of college students. Based on the above considerations, this paper establishes the following assumptions:

H0: There is a positive relationship between the sustainability of physical exercise and various influencing factors.

3. Research methods and data sources

For the sustainability of physical exercise and the influencing factors, the 5-point Likert scale is made: ranges from the least satisfying level 1 to the most satisfying level 5. This paper is designed and completed on the well-known questionnaire design and survey analysis website. A total of 24 questions were designed, covering all aspects of the sustainability of physical exercise. To analyze them, all the multiple-choice questions were adopted. A total of 415 questionnaires were recovered, unqualified questionnaires were eliminated, and 392 complete questionnaires were obtained [3].

4. Descriptive statistics

The college students who participated in the survey were mainly from Anhui University. They are very representative. By collecting the questionnaires, we first made descriptive statistics on the respondents. The details are shown in Table 1 [4]:

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std.Deviation	Variance	Skewness	Kurtosis
Stature	23157	143.0	203.0	170.331	8.3684	70.030	-.002	-.669
Weight	23156	31.0	185.0	62.076	12.9535	167.793	1.933	8.748
Vital capacity	23124	166	8924	3631.94	905.462	819861.587	.265	-.221
Valid N (listwise)	22800							

As can be seen from Table 1, the distribution of the students participating in this survey is as follows: For stature, the maximum value is 203, the minimum value is 143, the mean value is 170.331, the standard deviation is 8.3684, and the variance is 70.030. For weight, the maximum value is 185, the minimum is 31, the mean is 62.076, the standard deviation is 12.9535, and the variance is 167.793. For spirometry, the maximum is 8924, the minimum is 166, the mean is 3631.94, the standard deviation is 905.462, and the variance is 819861.587. From the skewness and kurtosis, all the data fit the normal distribution.

5. Correlation analysis

It can be seen from Table 2 that there is a strong correlation between physical health tracking and the sustainability of physical exercise. To verify the relationship between physical health tracking and the sustainability of physical exercise, this paper makes a factor analysis [5].

Table 2: Correlations

		Total points	Stature	Weight	Vital capacity	50-meter dash	Standing long jump	Sit-and-reach	800-meter running	1000-meter running	One-minute sit-up	Pull-up
Total points	Pearson Correlation	1										
	Sig. (2-tailed)											
Stature	Pearson Correlation	-.157**	1									
	Sig.(2-tailed)	.000										
Weight	Pearson Correlation	-.293**	.620**	1								
	Sig.(2-tailed)	.000	.000									
Vital capacity	Pearson Correlation	-.035**	.734**	.587**	1							
	Sig.(2-tailed)	.000	.000	.000								
50-meter dash	Pearson Correlation	-.116**	-.609**	-.362**	-.617**	1						
	Sig.(2-tailed)	.000	.000	.000	.000							
Standing long jump	Pearson Correlation	.101**	.645**	.368**	.626**	-.800**	1					
	Sig.(2-tailed)	.000	.000	.000	.000	.000						
Sit-and-reach	Pearson Correlation	.368**	-.236**	-.159**	-.134**	.200**	-.166**	1				
	Sig.(2-tailed)	.000	.000	.000	.000	.000	.000					
800-meter running	Pearson Correlation	-.616**	.005	.118**	-.059**	.401**	-.281**	-.030**	1			
	Sig.(2-tailed)	.000	.583	.000	.000	.000	.000	.002				
1000-meter running	Pearson Correlation	-.658**	-.026**	.190**	-.006	.332**	-.297**	-.080**	.b	1		
	Sig.(2-tailed)	.000	.003	.000	.477	.000	.000	.000	.			
One-minute sit-up	Pearson Correlation	.404**	.013	-.066**	.168**	-.315**	.239**	.045**	-.157**	.b	1	
	Sig.(2-tailed)	.000	.196	.000	.000	.000	.000	.000	.000	.		.
Pull-up	Pearson Correlation	.487**	-.101**	-.287**	-.106**	-.278**	.333**	.077**	.b	-.284**	.b	1
	Sig.(2-tailed)	.000	.000	.000	.000	.000	.000	.000	.	.000	.	
**. Correlation is significant at the 0.01 level (2-tailed).												
b.Cannot be computed because at least one of the variables is constant.												

6. Factor analysis

6.1. Results of the KMO and Bartlett's Test

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.717
Bartlett's Test of Sphericity	Approx.Chi-Square	10175.535
	df	45
	Sig.	.000

As can be seen from Table 3, the value of KMO is 0.717, indicating that doing factor analysis is ok, but the effect is general. The significance level of the Bartlett test was 0.000, indicating that the overall sample was in normal distribution and suitable for further analysis by the factor analysis method [6].

6.2. Variable communalities analysis

Table 4: Communalities

	Initial	Extraction
Stature	1.000	.997
Weight	1.000	.997
Vital capacity	1.000	.997
50-meter dash	1.000	.999
Standing long jump	1.000	.996
Sit-and-reach	1.000	.997
800-meter running	1.000	.999
1000-meter running	1.000	.998
One-minute sit-up	1.000	.997
Pull-up	1.000	.996
Extraction Method: Principal Component Analysis.		

As can be seen from the communalities table of Table 4, the variables of stature, weight, vital capacity, 50-meter dash, standing long jump, sitting forward flexion, 800-meter running, and 1000-meter running are more than 85%, and the common degree of one-minute sit-up and pull-up is 100%, so the extracted public factors have strong effect to interpret the variables.

6.3. The total variance explained

Table 5: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	84.589	98.359	98.359	84.589	98.359	98.359
2	.799	.929	99.288	.799	.929	99.288
3	.289	.337	99.624	.289	.337	99.624
4	.110	.128	99.752	.110	.128	99.752
5	.078	.090	99.843			
6	.033	.038	99.881			
7	.026	.030	99.911			
8	.017	.019	99.931			
9	.009	.011	99.942			
10	.009	.010	99.952			

As can be seen from Table 5, four principal components were selected according to the PCA method, and their variance contribution rates were 98.359%, 0.929%, 0.337%, and 0.128% respectively. The cumulative variance contribution of the four principal components was 99.752%. This shows that the selection of the four principal components can already represent all the original factors, and simultaneously cover the information about all the original factors. At the same time, the factor extraction results after the rotation, and there is little difference between the rotation and no rotation.

6.4. Scree plot

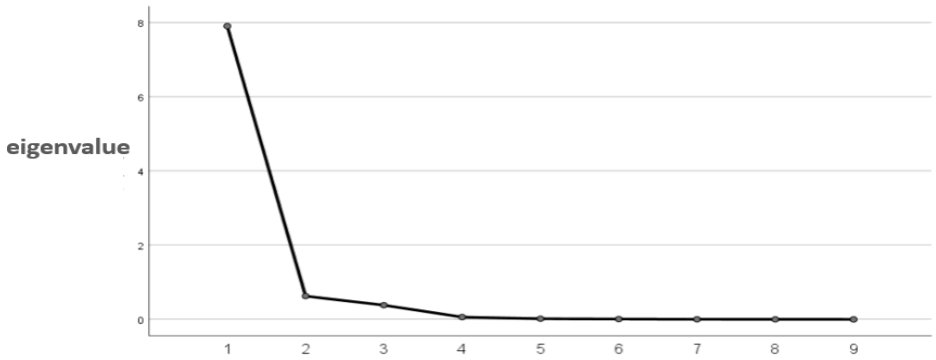

Figure 1: Scree plot

As can be seen from the factor gravel diagram in Figure 1, the eigenvalues of the four components are already greater than 1, so considering only four factors already can represent all information.

6.5. Component matrix

Table 6: Component Matrix

Component Matrix				
	Ingredient			
	1	2	3	4
Stature	.994	.016	-.064	-.066
Weight	.994	.093	-.015	.024
Vital capacity	.970	.197	-.101	.090
50-meter dash	.993	-.106	-.016	.049
Standing long jump	.998	.048	.009	-.004
Sit-and-reach	.997	-.040	-.007	.006
800-meter running	.995	.040	-.076	-.007
1000-meter running	.997	.029	-.060	-.010
One-minute sit-up	.987	-.158	-.008	-.008
Pull-up	.984	.159	.038	-.023
Extraction Method: Principal Component Analysis.				
a.4 components extracted.				

In Table 6, the four factors are expressed as follows:

Considering the above, the relationship between the dependent and independent variables can be expressed as follows:

$$F1 = 0.994X_1 + 0.994X_2 + 0.970X_3 + 0.993X_4 + 0.998X_5 + 0.997X_6 + 0.995X_7 + 0.997X_8 + 0.987X_9 + 0.984X_{10} \quad (1)$$

$$F2 = 0.016X_1 + 0.093X_2 + 0.197X_3 - 0.106X_4 + 0.048X_5 - 0.040X_6 + 0.040X_7 + 0.029X_8 - 0.158X_9 + 0.159X_{10} \quad (2)$$

$$F3 = -0.064X_1 - 0.015X_2 - 0.101X_3 - 0.016X_4 + 0.009X_5 - 0.007X_6 - 0.076X_7 - 0.060X_8 - 0.008X_9 + 0.038X_{10} \quad (3)$$

$$F4 = -0.066X_1 + 0.024X_2 + 0.090X_3 + 0.049X_4 - 0.004X_5 + 0.006X_6 -$$

$$0.007X_7 - 0.010X_8 - 0.008X_9 - 0.023X_{10} \quad (4)$$

$F_{1\text{-}4}$: factor
$X_{1\text{-}10}$: variable

7. Interpretation of results

Physical condition and sustainability of physical exercise were positively correlated. This also indirectly illustrates a problem, the stability and health of a college student's physical state will directly affect the sustainability of physical exercise of college students. This also indirectly proves a famous Chinese saying that "exercise is the source of health and the secret of longevity". At the same time, the weight and sustainability of physical exercise of college students are also positively correlated. This shows that with the growth of weight, college students' energy is lower and lower, and the pressure of physical exercise is greater when the sustainability of physical exercise will gradually decrease. The stature of college students is positively related to the sustainability of physical exercise, which shows that the stature of college students will bring good sustainability of physical exercise to college students. The vital capacity and the sustainability of physical exercise are positively correlated, indicating that college students are very concerned about their vital capacity exercise. This may be determined by the nature of college students engaging in physical exercise work: good vital capacity is the basic standard of college students as excellent college physical education students.

In contrast, the running volume and sustainability of physical exercise showed a positive correlation. Through face-to-face interviews with college students, we can conclude that the 50-meter dash, 800-meter run, and 1,000-meter running are directly proportional to the academic pressure of college students. This shows that by running, the brain can supply blood and oxygen by 25 percent, which can improve the quality of sleep at night. During running, the average vital capacity increases from 5. 8 liters to 6. 2 liters, and the amount of oxygen carried in the blood increases greatly. During exercise, the frequency and efficacy of the heart beating are greatly increased, including the heartbeat, blood pressure, and the elasticity of the blood vessel wall. Running promotes the generation of white blood balls and thermoplastic, which eliminate many viruses and bacteria in our bodies. Regular jogging exercises, increasing the resistance to injury of tendons, ligaments, and joints, can reduce the chance of sports injury. At the same time, the skin, muscle, and connective tissue can also become more firm.

The sustainability of physical exercise and physical training among college students are highly positively related. This shows that college students are very concerned about their physical training. Physical fitness evaluation is the evaluation of the physical state of athletes' physical sports ability and the logical starting point of physical training. Athletes' physical fitness evaluation is to obtain the basic information of athletes' physical fitness through the physical fitness test, and then it is completed through the data analysis. As a reflection of the basic physical fitness state of athletes, physical fitness evaluation not only plays an important role in making coaches' physical fitness training plans but also is an important basis for coaches to determine the content of athletes' physical fitness training.

The persistence of endurance training and physical exercise showed a positive correlation. Since it's physical training, one of the benefits, is enhancing physical fitness. Whether it's endurance training, strength training, flexibility, balance, or any other training, as long as it is related to physical fitness, after you persist for a while, you will naturally see that your physical strength is enhanced. In life, heavy things are more convenient to do, more easy to hurt. Physical fitness is also a part of measuring physical fitness. The physical quality is improved, nature will also be healthier, and can be said to be beneficial and no harm to themselves. Another benefit of physical training is

that it can make the body stronger because it can enhance a person's physical strength. Of course, if the original physical strength is very good, this may not be very obvious. But if a person is relatively thin, physical training can indeed achieve the purpose of muscle growth.

8. Conclusion and discussion

For the first time, this paper studies the problems related to physical health tracking and the sustainability of physical exercise under the big data. To study these problems, we took college students as an example, selected the sustainability of physical exercise and the influence of physical health tracking as the explanatory variables.

Through this study, we found that physical health tracking monitoring is related to the sustainability of physical exercise, and the impact of physical health tracking monitoring on the sustainability of physical exercise is not temporary. This shows that to further improve the sustainability of physical exercise, it is necessary to pay more attention to physical health tracking.

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