

Relationship between functional motor performance and physical health level of college students in Henan Polytechnic University

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Abstract: In order to explore the relationship between functional performance and physical health level of college students in Henan Polytechnic University, enrich the methods of physical health test results of college students in Henan Polytechnic University. Taking 60 college students of Henan Polytechnic University (non-physical education majors) as the research objects, the FMS function performance and physical health test scores were tested by the test method, and the related analysis and discussion were carried out. The relationship between sub-scores and total scores of FMS test and physical health test scores and total scores of FMS test were analyzed by using literature, questionnaire and mathematical statistics, and the corresponding correlation data (r) were calculated and analyzed, so as to explore and solve the problems in the purpose of this study.

Keywords: FMS; Functional motor performance; College students; Physical health

1. Introduction

1.1 Basis of topic selection

Basis for topic selection Physical health is the basis for all-round development of people, and the physical health level of college students is more related to the future development and future of the country, in order to thoroughly implement the spirit of the National Education Conference and the "China Education Modernization 2035", on September 2, 2019, The General Office of the State Council issued the "Sports Power Construction Outline", "Outline" proposed that by 2035, The number of people participating in physical exercise has reached more than 45%, the per capital sports field area has reached 2.5 square meters, and the pass rate of the "National Physical Fitness Test Standard" has exceeded 92%^[1].The State Council, the State General Administration of Sport. The Outline of Building a powerful Country in Sports [N].2019-09-2.] Subsequently, the Ministry of Education issued the "Opinions of the Ministry of Education on Deepening the reform of undergraduate education and teaching to comprehensively improve the quality of talent training" document, emphasizing that school education should especially strengthen the assessment of students' physical health level, for those who fail to meet the "National students' physical health standards" passing standard students will face the hopeless fate of graduation. With the revision and continuous supplement and improvement of the national students' physical health standards, the "National Students' Physical Health Standards" issued by the Ministry of Education has become an important standard to evaluate the physical health level of college students. Our attention should be paid to the level of its index data.

With the rapid development of science and technology, people's quality of life is gradually improved, physical health is the basic guarantee of our happy life, people pay more and more attention to their own physical health level. The rapid development of science and technology has also provided convenient conditions for academic exchanges and dissemination. In recent years, the rise of physical motor function performance test has been applied to various fields such as medical rehabilitation, competitive sports, leisure sports, etc. Domestic and foreign research on FMS test has also penetrated into all aspects of the sports field. However, it is found that the correlation analysis between FMS test scores and physical health test scores of college students is relatively lacking. According to a large number of literature data, the overall physical fitness level of college students in China is slightly low^[3],the performance ability of physical movement function is insufficient, the overall sports level is not good, and the daily sports injury rate is high. In order to improve the current situation, this paper analyzes the correlation between the athletic function performance and physical health level of college

students in Henan Polytechnic University. Provide a more reasonable and based reference data and suggestions, and analyze this, explore a more feasible plan to solve the problem, for the reference of peers.

1.2 Research significance

Through the analysis and research of various sub-results of physical motor function performance of college students in Henan Polytechnic University, this paper provides a directional teaching reference for physical education teachers in Henan Polytechnic University. In view of weak physical function, more reasonable daily teaching is arranged to improve the physical function of college students in Henan Polytechnic University more efficiently. It is more targeted to improve the physical health level of college students, strive to reduce sports injuries in daily sports of college students in Henan Polytechnic University, and improve the physical health level and campus life happiness of college students in Henan Polytechnic University.

2. Definition of related concepts

2.1 FMS (Functional Motion Screening)

Functional movement screen (FMS), the full name of which is "Functional movement Screen", is a method to evaluate basic movement ability^[2]. The test equipment is portable and the operation method is simple and easy to understand. It consists of 7 simple test actions and 3 exclusion tests. These include squat tests, hurdle tests, straight lunges, shoulder flexibility tests, active straight knee lifts, trunk stability push-up tests, and rotational stability tests, where the shoulder flexibility test, trunk stability push-up test, and rotational stability test are each accompanied by a pain elimination motion^{[4][5]}.

2.2 Physical health

The connotation of "National Students' Physical health Standard" is the evaluation standard for measuring students' physical health status and exercise effect, the basic requirements of the state for students of different ages in physical health, and the individual evaluation standard for students' physical health. The concept of health includes physical health, mental health and social adjustment. The National Students' Physical Health Standard covers the category of students' physical health which is closely related to school sports. In order to define its connotation and avoid being confused with the three-dimensional concept of health, "physique" is taken as the attribute of "health" to show its connotation.

3. Research object and research method

3.1 Research object

The relationship between functional motor performance and physical health level of college students in Henan Polytechnic University was studied.

In order to obtain multiple sets of physical conformity test data for each student to ensure that the physical conformity test results of the selected college students are non-accidental and valid, 60 college students (non-sports majors) aged 20 to 23 years old in Henan Polytechnic University were randomly selected, with a male to female ratio of 1:1, in which the ratio of the total number of engineering and science majors and the ratio of male to female students were 1:1. All subjects had no history of major diseases such as heart, cardiovascular and cerebrovascular diseases, and had no history of major motor disorders or disabilities. Very few isolated chance factors were excluded to influence the final study data and results. The selected subjects volunteered to participate in this study, and their basic physical conditions are shown in Table 1.

Table 1: Basic physical condition of subjects

Gender	Age (years)	Height (cm)	Weight (kg)
man	21.80±0.91	178.20±6.84	73.03±7.07
woman	22.13±0.81	161.9±5.60	55.1±5.91

3.2 Research Methods

3.2.1 Literature method

Through borrowing relevant books from the library of Henan Polytechnic University and through the master's degree thesis database of CNKI, a large number of relevant papers with keywords such as "college sports", "physical health of college students", "functional action performance" and "FMS" are consulted to provide reference, investigation and help for the topic selection of this paper.

3.2.2 Questionnaire survey method

(1) Questionnaire design

According to the content and purpose of the study, the basic information and physical health level of the individuals in the study group were investigated, and the understanding degree of the students in Henan Polytechnic University on the functional performance of sports body and the training of motor function was analyzed. Based on the purpose of this questionnaire, it is designed according to the methods of sports scientific research and social investigation

The Questionnaire on College students' Understanding of functional Movement Performance in Henan Polytechnic University was conducted by interviewing and consulting 5 experts in Henan Polytechnic University with the method of expert interview, and the content and format of the questionnaire were finally determined by revising the questions raised.

(2) Validity test

The validity of the questionnaire was tested by 5 professors from the School of Physical Education of Henan Polytechnic University. The test statistical results are shown in the following table.

In order to ensure the reliability of the data in this study, after the questionnaires were collected, some apparently intentional questionnaires were considered to be invalid and not used as reference for this study. A total of 300 copies of the questionnaire on the understanding of functional Motor Performance of college students in Henan Polytechnic University were distributed and 289 copies were recovered. The number of effective questionnaires was 281 with an effective rate of 97.23%. Therefore, the efficiency of the questionnaire on the understanding of functional movement performance of college students in Henan Polytechnic University in this study meets the requirements of sociological investigation and research.

According to the data of the Questionnaire on the understanding of functional movement performance of college students in Henan Polytechnic University, there are 3 people who understand it very well, accounting for 1.1% of the whole; The number of people with basic knowledge was 27, accounting for 9.6% of the total; There were 251 people who had only heard about it and those who had not, accounting for 89.3% of the total proportion, accounting for a large proportion of the valid questionnaire. According to the research data, college students in Henan Polytechnic University have a poor understanding of functional motor performance.

3.2.3 Test method

(1) Functional motor performance test scheme

This test is scheduled to be completed within a week, and the test time is between 17:30 and 18:30 every day.

Before each FMS test, the subjects conducted warm-up training with a heart rate intensity of about 120 beats/min for 5 minutes to prevent test damage and reduce the influence of temperature factors on the test. Before the test, each subject can have one chance to try the test action, but not many consecutive times to ensure the reliability of the test results. After the test began, each movement was tested three times, with a 30-second interval for each test. All tests in the study were tested by the same tester to avoid differences in test standards.

(2) Test method

The test scores were 0, 1, 2 and 3 points on four scales: if the subjects were able to complete the test actions very rigorously, they received 3 points. Subjects who complete the action as well as they can, but perform other actions that compensate for standard actions, receive 2 points. Subjects who are unable to complete basic movements receive 1 point. If the subject experienced any abnormal body pain while performing the test, 0 points were scored, and pain on the exclusion test was also scored.

Among them, the following movement tests need to be tested on the left and right side of the body: hurdle test, kneeling test, shoulder flexibility test, lower limb flexibility test and body rotation test. The two tests are corresponding to their respective test scores, and the score of the project is the smaller of them.

3.2.4 Mathematical statistics

In this study, FMS test scores were used to represent the student's comprehensive functional motor performance ability.

National physical health test: The test is based on the students' physical health standards at school. The scoring standard is based on the "National Students' Physical Health Standards" as a reference, and the data show the physical health level of the college students.

Through Excel and SPSS20.0, the FMS test data of 60 accepted students in Henan Polytechnic University and their physical fitness test data were statistically sorted out, relevant databases were established, in-depth statistical analysis was carried out, and corresponding conclusions were drawn.

4. Research Results

4.1 Theoretical analysis of physical health level of college students in Henan Polytechnic University

The physical health level of college students in Henan Polytechnic University referred to in this study depends on the National Physical Health Standard for Students, and the research data are all from the data analysis of the final score of the physical health standard test of college students in Henan Polytechnic University. The total score of the students' physical conformity test is: 90.0 points and above are rated as excellent, 80.0-89.9 points are rated as good, 60.0-79.9 points are rated as passing, and 59.9 points and below are rated as failing. The sub-indicators in the "National Physical Health Standards for Students" include 7 indicators such as body mass index index, vital capacity index, 50-meter running index, standing long jump index, sitting forward bend index, 800 meters (women) or 1000 meters (men) running index, pull-up (men) sit-up (women) and so on. The distribution of subjects' total physical test scores is shown in Table 2.

Table 2: Distribution of subjects' total physical test scores

Score (points)	number of people	Proportion (%)
≥90.0	14	23.33
80.0-89.9	24	40.00
60.0-79.9	20	33.33
≤59.9	2	3.33

According to the data in the above tables, the overall physical health status of the subjects selected in this study is at a good level, and the total score is rated as excellent and good, accounting for 63.33% of the overall proportion. All students in the body mass index standard have passed or above, and the proportion of excellent and good is 85.00%, accounting for most of the proportion. This data shows that the body proportion of students in Henan Polytechnic University is relatively excellent. In the vital capacity score, the proportion of excellent and good is 75%; Among the 50 meter running scores, the proportion of excellent and good was 71.67%, and the 50 meter running reached the passing standard; The proportion of excellent and good in standing long jump is 70%, all of which meet the passing standard; The proportion of excellent students in the seated forward bending project is 43.33%, but the proportion of students at the edge of passing is also 45.00%, which is a serious polarization. In the teaching arrangement, targeted training should be strengthened for students at the edge of passing score. In 800 meters (girls) /1000 meters (boys) running events, only 38.33% reached the excellent and good standards, accounting for a small proportion of the whole, there is a large room for progress; In the pull-up/sit-up project, only 33.33% achieved good or above, while 58.33% did not meet the passing standard. The two levels of differentiation are extremely serious, and need to further strengthen their targeted training.

4.2 Relevant theoretical analysis of functional motor performance of college students in Henan Polytechnic University

The basic information of subjects' FMS scores and total FMS scores in this study is shown in Table 3. The basic table of subjects' FMS scores shows: Among the 60 college students of Henan Polytechnic University, the score of shoulder joint flexibility was the highest, with an average score of 2.67, and the

score of trunk rotation stability and hurdle stride was the lowest, with an average score of 2.35.

Table 3: Basic information of subjects' FMS scores

Test action	Test score
Deep squat	2.63±0.55
Shoulder flexibility	2.67±0.54
Trunk stability push-ups	2.58±0.64
Walk in a straight lunge	2.57±0.64
Stride over hurdles	2.35±0.65
Active straight leg lift	2.62±0.54
Trunk rotation stability	2.35±0.54
FMS total score	17.88±2.82

It can be seen from the basic distribution of subjects' total FMS scores (Table 4) that the total FMS scores of Henan Polytechnic University students are mainly distributed between 15 and 19 points, accounting for 63.33% of the total proportion. There are 53 students with total FMS scores greater than 15 points, accounting for 88.33% of the total proportion. The data show that the physical function performance of college students in Henan Polytechnic University has shown a good level.

Table 4: Basic distribution of subjects' total FMS scores

Score (N)	Number of people	Proportion (%)
N≤10	2	3.33
10<N≤15	5	8.33
15<N≤19	38	63.33
19<N≤21	15	25.00

4.3 Discussion and analysis of correlation between FMS test scores and physical conformity test scores

The correlation results of FMS test scores and physical health test scores of subjects in this study show that $|r| \geq 0.40$ in three groups, which are respectively the correlation between active straight leg lift scores in FMS test and standing long jump scores in physical health test, girls' sit-ups scores and total scores in FMS test. $0.40 > |r| \geq 0.30$ in 9 groups, They are the correlation between linear lunge walking test and body mass index score, hurdle stride test score and vital capacity score, 800/1000 meters running test score and squat score, squat score and total physical test score, the correlation between sitting forward bending score and shoulder joint flexibility score, 800/1000 meters running score and straight lunge score Sex, the correlation between linear lunge walking performance and total physical test score, the correlation between female sit-ups and active straight leg lifts, the correlation between 800/1000 meter running performance and trunk stability performance; For the other groups, the value of $|r|$ is less than 0.20, showing a low correlation, so we will not conduct too much research here. The correlation (r) between subjects' FMS test scores and physical test scores is shown in Table 5.

Table 5: Correlation between subjects' FMS test scores and physical test scores (r)

Test action	BMI	Vital capacity	50m race	standing broad jump	sit and reach	800/1000 meters	Pull-ups (male)	Sit-ups (female)	Total physical test score
Deep squat	0.194	0.245	0.137	0.199	0.008	0.342	0.079	0.031	0.301
Shoulder flexibility	0.222	0.252	0.008	0.033	0.351	0.283	-0.030	0.259	0.156
Trunk stability push-ups	0.247	0.056	0.003	0.038	0.036	0.071	0.031	0.085	0.094
Walk in a straight lunge	0.348	0.193	0.008	0.220	0.084	0.302	0.202	0.121	0.346
Stride over hurdles	0.211	0.321	0.190	0.107	-0.037	-0.124	0.093	0.293	0.246
Active straight leg lift	0.279	0.196	0.048	0.409	0.199	0.269	0.102	0.686	0.440
Trunk rotation stability	0.220	0.040	0.123	0.240	0.014	0.305	0.086	0.067	0.252

According to the above data and the correlation values of other groups, the three groups with the highest correlation all included the active straight leg lift test in the FMS test, and its total score in the physical health test.

There is also a high correlation, it can be seen that the active straight leg lift test scores and physical health level is closely related; At the same time, there is a high correlation between the active straight leg lift and the standing long jump performance in the physical health test. From the function of the

active straight leg lift test, it can be seen that the stability of the pelvis and the active flexibility of the major muscle group of the leg have a great impact on the physical health level of college students. Among the 9 groups of $0.40 > |r| \geq 0.30$, the straight leg lift was related to the supine test of female college students. It was found at the time of data collection that: Due to the different test indexes of male and female students, the correlation between male pull-up test and active straight leg lift is small, while the sit-up test of female students has a high correlation with the active straight leg lift in FMS test, and the correlation between the sit-up test data and the active straight leg lift performance data of female students is as high as 0.686. This data shows that the level of active lift body function in FMS has a great correlation with the score of the sit-up test of female college students in Henan Polytechnic University. The main muscle function of sit-up muscle group is hip flexion, so it can be seen that the score of active straight leg lift test can indirectly evaluate the muscle ability of hip flexion. The results of linear lunge walking in the FMS test showed a high correlation with body mass index, 800/1000 meter running test and total physical fitness test, respectively. From the physical function test of linear lunge walking, it can be seen that the flexibility and stability of hip, knee and ankle as well as the flexibility of quadriceps have a great correlation with the total scores of 800/1000 meters running and physical fitness test of Henan Polytechnic University students. Meanwhile, the height and weight of the subjects also have a great correlation with the performance of linear lunge walking in the physical function test. There is a high correlation between squat test scores and 800/1000 meter running test scores. It can be seen that bilateral symmetry, flexibility and trunk stability of shoulder, thoracic vertebra, hip, knee and ankle joints have a great correlation with 800/1000 meter running test scores of Henan Polytechnic University students. There is a high correlation between the performance of sitting forward flexion and the performance of shoulder joint flexibility test. The preliminary analysis may be that the higher the flexibility of shoulder joint, the stronger the arm extension ability in sitting posture, and the trunk rotation stability also has a greater correlation with the 800/1000 meter running test performance of college students. It may be related to the energy loss caused by the instability of the torso during running, which needs to be further studied.

5. Conclusion

5.1 Physical health level of college students in Henan Polytechnic University

The overall physical condition of college students in Henan Polytechnic University is at a good level, but there are two levels of differentiation in individual physical health test items.

5.2 Physical function performance level of Henan Polytechnic University

College students in Henan Polytechnic University have poor understanding of physical function performance and lack relevant knowledge of physical function performance. The physical function performance of college students in Henan Polytechnic University also showed a good level on the whole.

5.3 Correlation between FMS test scores and physical conformity test scores

There is a positive correlation between the score of active straight leg lift in FMS test and the total score of physical health test and standing long jump test. Meanwhile, active body function level of active leg lift also has a great correlation with the score of sit-up test of female college students in Henan Polytechnic University. The ability of linear lunge walking in FMS showed a high correlation with the score of body mass index and the total score of physical health test, and its ability also had a high correlation with the score of 800/1000 meters running test of Henan Polytechnic University students. The results of linear lunge walking in FMS test are related to height and weight, and their ability level is highly correlated with the results of 800/1000 meter running test and the total scores of physical health test of Henan Polytechnic University students. There is a high positive correlation between the performance of shoulder joint flexibility test and the performance of seated flexion. The stability of trunk rotation also has a great correlation with the results of 800/1000 meter running test of college students.

6. Suggestions

At present, the relevant functional training in FMS has been relatively mature. According to the data

of this paper, some test abilities in FMS have a greater impact on the scores of students' corresponding physical health level tests; Therefore, students with lower scores in the physical health test can use corresponding functional training to improve the performance of the corresponding items more efficiently.

In addition, in some individual physical health test items, students' test results are more seriously divided. It is hoped that school physical education workers can strengthen the functional training of students at the bottom of these items, strengthen the knowledge of students' functional training, and further improve the physical health level of Henan Polytechnic University students.

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