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Development of Physical Exercise Prescription Application for Reduction of Functional Movement Limitation in College Students

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Abstract

Background and Aims: The physical decline of college students is greatly affected by the modern lifestyle. College students sit in bad posture for a long time and use electronic products for a long time, and at the same time lack exercise, resulting in increasingly serious restrictions on the functional movement of the body. In this regard, we hope to use modern advanced technology to build an application that can guide college students with functional movement limitations to perform physical training. This paper aims; (1) To investigate the limitations of functional movements among college students. (2) To design physical exercise prescriptions for reduction of functional movement limitation. (3) To construct an application for physical exercise prescription for reduction of functional movement limitation. (4) To experience the application to compare the reduction of functional movement limitation with pre-test and post-test.

Materials and Methods: In the two flexible test movements of active straight leg raise and shoulder flexible in FMS, we added 4 and 12 observation factors by Modify Delphi. After the physical exercise prescription was investigated by the expert IOC, all the content was recognized by the expert. Based on the preliminary content, we have built the Physical Exercise Prescription Application for Reduction of Functional Movement Limitation with an exact validity value equal to 1 and reliability while conducting the Chi-Square test of the application and expert group, we found that the application and experts are consistent. For physical exercise prescriptions, we compared the application and experts to find that the Chi-Square value is between 1 to 3 and has a large consistency. The Chi-Square Value of the evaluation process is 0.087, and the consistency evaluated by the application and experts is as high as 76.8%.

Results: We used the application to conduct an 8-week experimental intervention of 35 college students. Using the physical exercise prescriptions recommended by the application, through the t-test, students' shoulder flexibility and active straight leg raise are raised significantly ($P < 0.05$).

Conclusion: The application can solve the problem of functional movement limitation of college students. In the future, with the increase of capital investment and the expansion of data volume, the application will be able to solve the basic problems of functional movement limitation to more different levels of motion pyramids. To encourage to exanthem case more healthily.

Keywords: Application; Physical Exercise Prescription; Functional Movement Limitation; College Students; FMS

Introduction

With the popularization of convenient software, the daily life of college students has undergone tremendous changes (Lepp et al., 2014). Sitting at a desk for a long time and the use of electronic products have seriously affected the functional movement of today's college students (Baker et al., 2018). The main manifestations are sports injuries, ineffective exercise, lack of assessment, insufficient

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exercise guidance, and lack of systematic training plans (Kastelic et al., 2018; Wright et al., 2023; Castro et al., 2021). In addition to the type differences, different functional movement limitations also show differences in degrees. In terms of degree, the lightest one is dysfunction but no pain, and, the severe one is painful and even affects the self-care ability (Peebles & Jonas, 2017; Tahran & Yeşilyaprak, 2020). How to identify the causes of functional movement limitations of college students and taking active measures to deal with them may improve the status quo of college students' physique that continues to decline.

Functional Movement Screening (FMS) originated in the United States (Cook et al., 2006) and is internationally recognized as a screening that can effectively test athletes' overall movement control stability, body balance, flexibility, and proprioception. This method guides corrective training primarily by discovering motor deficits. Its methods are widely used in sports training (Tee et al., 2016; Smith et al., 2017; Chimera et al., 2017). The operation of FMS is mainly carried out in the form of corporate training. In addition to the high multi-level training fees, learners are also required to have a certain accumulation of professional knowledge. Many factors limit the popularization of FMS. At the same time, numerous studies have shown that functional movement limitation can be solved by physical training (Wu Fan et al., 2021; Zhang Luyang et al., 2022; Zhang Xiang, 2009; Yan Qi et al., 2012; Li Tongming et al., 2018; Wang Yinhui, 2017) but these studies are based on the judgment of people's subjective will. Affected by the level and experience of testers, there is a lack of practical, convenient, fast, and accurate tools to improve the efficiency of testers.

By constructing various impact indicators of FMS, this study evaluates and deals with the flexibility problem, and builds a training program to solve the functional limitations affecting college students. After experimental practice research, we will carry out the experimental process to build Applications. Take each impact FMS index as the content of data collection. Use various effective training programs as machine learning materials, and finally construct a training set through various effective targeted training programs to form an expert system (Fan Liping, 2022). After training with a certain amount of data, we can design a more targeted physical exercise program based on the evaluation and diagnosis results of students' physical characteristics through the integration of FMS and AI analysis technology. Among them, through mathematical modeling and AI algorithm analysis (Alves & Silvestrini, 2020), the content of physical training is formulated, including the awakening, activation, and training of target muscles, and the treatment of single joint problems in different positions, then rebuild from power mode to strength training chain. Promote the development of AI technology in the daily sports of college students

Objectives

1. To investigate the limitations of functional movements among college students.
2. To design physical exercise prescriptions for the reduction of functional movement limitation.
3. To construct an application for physical exercise prescription for the reduction of functional movement limitation.
4. To experience the application to compare the reduction of functional movement limitation with pre-test and post-test.

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Literature Review

1. Functional movement limitations

Joint function refers to the ability of each joint in the body to maintain daily activities in different positions. According to the original classification scheme proposed by Nagi (1976), functional limitations are defined as “limitations in performance at the level of the whole organism or person.” Verbrugge and Jette (1994) defined functional limitations as restrictions in performing vital situation-free physical actions needed in everyday life. Lee Yunhwan & Park Kyung-Hyee (2006) believe functional limitation is an intermediate from r of the process Illness to of disability. Liao, Li & Wang (2019) defined functional movement limitation mainly as deep squat (DS), hurdle step (HS), in-line, and lunge (ILL)<3 in FMS. Functional movement limitation in this study mainly refers to the performance of limited or restrained movement when the human body performs daily sports, including insufficient flexibility, stability, and, symmetry of the joints. With their development, it will break the coordination and homeostasis of various tissues and organs in the body, and the body shape will be abnormal. In severe cases, it will affect normal work and life.

In recent years, with the development of science and technology such as computers, mobile phones, the Internet, and artificial intelligence, the frequency and time of college students use of electronic products has increased significantly. The continuous extension of screen time has brought about tremendous changes in the lives and learning styles of college students (Song Rongxin et al., 2021). Due to the unhealthy lifestyles of college students such as indifference to health awareness, long desk time, insufficient physical exercise, insufficient sleep, and irregular work and rest, the physical condition of college students is not optimistic (Mao Zhenming et al., 2022). Xu, R et al. (2021) found that after the joint function is limited, the body will compensatory increase the activity level of surrounding muscles to maintain dynamic balance during exercise. Although the physical fitness test of college students is held every year, the content of the test cannot reflect the problems related to the joint function of college students, and the students were not aware of their joint function problems. Li Li et al. (2019) believed that the best way to deal with joint function problems was functional physical training, which could not only correct bad posture but also improve the health of the human body.

2. Functional movement screen

Functional Movement Screening (FMS) originated in the United States. It was invented by American athletic trainer and physical therapist Gray Cook (Cook et al., 2006). It is the product of practical exploration and experience summarization in the American physiotherapy industry. It is a commonly used assessment tool in the sports and rehabilitation field to assess an individual's basic movement patterns and motor function and to help identify potential movement disorders or imbalances. Its appearance fills the gap between traditional medical tests and athletic ability tests that ignore the quality of action completion. At the same time, it has also drawn the attention of physical therapy and strength training practitioners to movement flexibility and stability. It allows the correction of body compensation and asymmetry to be gradually incorporated into the scope of rehabilitation and strength training purposes.

Although there are many different voices for FMS, it proves that the test method still has some shortcomings to be perfected. Lynn et al. (2010) found that squats can be used to measure hip mobility in students through functional movement screening. His research shows that the higher the squat

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performance of the students, the better the hip mobility. Students with low squat scores will have different degrees of hip joint problems, such as snapping hips. Specific issues of the hip have not been studied in depth in the literature. Adding a single-joint range-of-motion test of the hip may provide a clearer picture of where the student's specific problem lies. In this regard, this study intends to add a single joint range of motion test to the functionally limited test content based on the FMS test, so as to identify the subject's functionally limited problems.

Since the specific operation methods of the FMS test at this stage can only be obtained by paying high training fees, learning is obtained through various operation-level trainings organized by the FMS Company. The high cost of learning and the need for learners to have certain practical experience and knowledge accumulation have resulted in many trainees not being able to use it well after returning to their jobs. Many reasons limit the use of FMS to better solve the problems people encounter in sports. In this regard, if AI technology can be used to systematize the entire evaluation process, it can greatly reduce the time for sports practitioners to learn knowledge of different disciplines. Use the energy of physical education teachers to guide students in training and realize the process of rapid diagnosis and targeted training.

3. Application Construction

Artificial intelligence (AI), as a disruptive technology, has been widely used in various fields. In the field of software engineering, the application of AI technology not only accelerates the software development process but also provides developers with new tools and methods. Application construction mainly includes key links such as problem definition, data collection, model selection, training optimization, and deployment. In terms of problem definition, in the process of building AI software, a clear problem definition is the key to success (Simon, 1988). Problem definition not only needs to clarify the surface characteristics of the problem, but also needs to consider the background, influencing factors, and expected solutions of the problem. With accurate problem definitions, researchers can better guide the model selection and development process. Since various application scenarios require different types of AI models, the problem definition has an important impact on the selection and design of the models. The problem definition phase covers the problem statement, goal setting, and identification of required data (LeCun et al., 2015). In terms of data collection and preparation, data is the foundation of AI. The quality and quantity of data have an important impact on the performance of the model. Data is the key to training AI models (Dong et al., 2023). We need to collect and prepare sufficient datasets in advance, including training data, validation data, and test data (Scannapieco, 2006). Data collection and preparation include collecting appropriate data sources, data cleaning, data preprocessing, and feature engineering (McKinney, 2022). These steps ensure the accuracy and completeness of the training data. In terms of model selection, it is crucial to choose an appropriate AI model according to the problem definition and data situation (Mathew et al., 2021). Model selection may involve different types of models such as supervised learning, unsupervised learning, and reinforcement learning (Hastie et al., 2009). Choosing an appropriate model is more conducive to achieving accurate prediction and analysis results. In terms of training optimization, the training process is the core of AI model construction. We use the training dataset to train the selected AI models. This may require the use of machine learning frameworks such as TensorFlow, PyTorch, etc. During the training process, techniques such as parameter tuning, regularization, and optimization

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algorithms are widely used to improve the performance and generalization ability of the model (Géron, 2022). Training optimization also includes evaluating and improving the performance of the model (Bottou, 2010). In terms of model deployment, once a model is trained, it is a critical step to deploy it to real applications (Sandler et al., 2018). Integrate the trained artificial intelligence model into the APP (Wu et al., 2021). This may require the use of A, PIs, SDKs, or custom development. Model deployment can involve integrating the model into a mobile app, website, or cloud platform for real-time prediction and analysis (Paleyes et al., 2022). After a model is deployed, continuous monitoring and maintenance are key to ensure model performance and stability (Verma et al., 2021). The performance of the model may degrade due to changes in data distribution, environmental changes, or other factors, so a monitoring mechanism and a corresponding update strategy need to be established (Caruana et al., 2015). With the continuous development of AI technology, the process of building AI software is also evolving (Angermueller et al., 2016). In the future, integrating more automation technologies, more advanced model selection algorithms, and smarter model deployment methods will become the development direction (Chau et al., 2023).

4. Compatibility of AI technology and physical exercise prescription program

The chess game program developed by Newell, Simon, and Shawn (1959) is the beginning of the combination of artificial intelligence and sports (Lu Laibing et al., 2021). As the AlphaGo program defeated Li Shishi through the artificial neural network algorithm, and AlphaGo Master defeated Ke Jie, the algorithmic capabilities of artificial intelligence have greatly exceeded people's imagination (Huang Wenhu, 2022). Sun Lin et al. (2022) made the data more clustering performance through K-nearest neighbors and density peak clustering algorithm with an optimized allocation strategy. It improves the prediction efficiency and accuracy and simplifies the prediction process of the deep learning method, which can provide a good reference. Khurram et al. (2016) used k-nearest neighbor (k-NN) and naive Bayesian classifiers for clinical data, which greatly improved the recognition accuracy. Chen Yuchuan (2012) used artificial intelligence expert system technology to build a network-based nutritional diagnosis expert system, which is faster and more accurate than human nutritionists. Su Bingtian's breakthrough in the men's 100-meter sprint is inseparable from China's investment in technological means, and the results obtained also let us see the power of technology. Although there is not much research on artificial intelligence in sports science, with the improvement of people's sports needs, the use of high-tech means to monitor sports effects has gradually attracted attention (Su, Li, Xu et al., 2022). With the development of technology, there are more and more application scenarios for artificial intelligence. From data calculation to human-computer interaction, the realization of hardware also provides us with greater possibilities to explore sports and human science.

We can uses statistical measurement tools to analyze the types and degrees of functional movement limitations and analyze and push them based on mathematical modeling and AI algorithms (Shaffer et al., 2021), combined with the expert system (Fan, Lang, Xiao et. al., 2022), to guide students how to carry out the exercise, to solve the problems of students' functional movement limitations and insufficient knowledge of teachers' physical assessment. Through the integration of FMS and AI analysis technology, a set of more targeted physical exercise prescription programs can be designed according to the assessment and diagnosis results of students' physical characteristics.

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The literature review discusses functional movement limitations and the Functional Movement Screening (FMS) tool, providing insights into their definitions, origins, and applications. It also explores the increasing use of electronic devices by college students and its impact on physical health. The review delves into the application of artificial intelligence (AI) in various domains, especially in sports and health, showcasing its potential to enhance the assessment and prescription of physical exercises. The compatibility of AI technology with physical exercise prescription is highlighted, emphasizing its role in addressing functional movement limitations through a systematic and data-driven approach. Through the content of theoretical research, we can construct a conceptual framework (**Figure 1**). In terms of input, the theoretical methods will be verified and the input will be consistent with the content of this study. The research process includes data collection, application construction, and verification according to the research purpose. The output results are the results after the experiment, which proves the effectiveness of the application.

Conceptual Framework

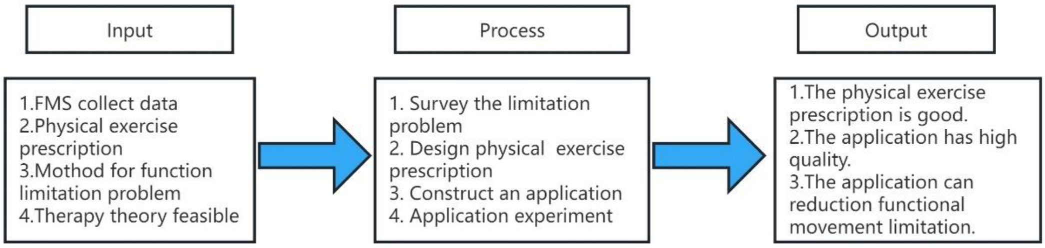

Figure 1 Conceptual Framework

Methodology

Population and Sample Size

In China, there are more than 30 million college students (Xu et al., 2023). The physical condition of college students is mainly understood through physical fitness tests. Due to functional limitations, it mainly affects the student's quality of movement and does not affect the student's daily life, but it can easily lead to sports injuries. Due to the lack of personnel and expertise, we have not conducted large-scale studies of functional limitations in college students.

We selected the 35 students by snowball sampling in the XX Universities in Guangzhou as samples to screen the functional movement limitation. Defined by Krihua and Xu (1984) to determine the sample size, and use 5-15 times the test items as the research sample (Chen et al., 2023). Since FMS has 7 action tests, theoretically our sample needs 35-105 samples. Finally, considering the convenience of sampling, we decided to use 35 as the minimum threshold sample size for this study. Compare the data changes before and after the experiment to determine the effectiveness of the application.

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Research Instrument

FMS test suite, The FMS test suite includes a 4-foot (1.2m) long pole, a stretch belt, two short rods, and a test board with a length and width of 152cm*13cm*5cm. Which is used to test the body's function situation with 7 movements.

Questionnaire for Expert IOC, We mainly conduct an expert IOC for the design of the body movement. Through flexible shoulders and active straight legs, we invite 5 experts for IOC to determine whether the training plan is feasible.

Questionnaire for Modified Delphi, Through two rounds of Modified Delphi, we have determined that the collection indicators needed to be increased for functional limited issues. Realize personalized analysis of individuals with different issues and a more in-depth understanding of different reasons for each person to lead to limited functions. According to the Modify Delphi criteria, if the following conditions are met, the factor will be saved. First: Mdn. ≥3.5, second: I.R.≤1.5, third: CV＜0.25.

Chi-Square Test, The Chi-Square test is mainly a verification of the application system. Including the training plan and system evaluation process issued by the system to verify whether the analysis and output results of the application can reach the level of the expert.

Data collection

Investigate the functional limitations of 100 college students through FMS. Using the Modified Delphi method, the questionnaires were distributed to 21 experts, and the core indicators for evaluating test content. Interview for 5 experts about IOC. Data comparison between the two testers. And Data collection of functional movement limitation for 35 subjects through Application.

Data Analysis

This study mainly used SPSS 21.0 software to analyze the data; The statistics used are mean and standard deviation, percentage, Mdn, IR, and CV. Chi-Square. And The compare mean within the group with t-test dependent.

Research Process

Step 1 Conceptual representation

1 Investigation on the causes and effects of functional movement limitation of 100 college students.

2 Using FMS to screen college students for functional movement limitation.

3 Construct the data collection index of functional movement limitation of college students by Modified Delphi (N=21).

4 Develop training programs for different functional limitations with expert IOC(N=5).

Step 2 Create Draft Application

1 Use classification algorithms, including decision tree classification, native Bayesian classification algorithm, SVM-based classifier, neural network method, k nearest neighbor (kNN), fuzzy classification, etc. After the sample data is imported, the classification diagnosis function limits the type

2 Rule-Based Algorithmic Classifier. Rule-based classifiers are just another type of classifier that makes the class decision depending on the use of various "if..else" rules. We will code the feature-restricted evaluation process.

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3 Judge the improvement of the subject's exercise. If there is an improvement, keep the program in the training set; if there is no improvement, modify the practice content and conduct experiments until the subjects improve;

4 Expert system algorithm. Incorporate the effective training plan into the training set to form the training set of the expert system. In artificial intelligence, an expert system is a computer system emulating the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning through bodies of knowledge, represented mainly as if–then rules rather than through conventional procedural code.

5 Try out the application for 5 subjects.

Step 3 Confirm Application quality

1 Compare the similarity of the physical exercise prescription between the two testers(5experts with application).

2 Compare the evaluation process of the same subjects between the two testers(5experts with application).

Step 4 Application operation

1 Use 35 samples as the experimental group, using the application for the data collection and analysis, the experiment is carried out 8 weeks/3 times a week.

2 Compare the results before and after the experiment.

Results

1.Survey the limitations of functional movements among college students

We investigated 100 students and FMS tests. We found that college students' upper limbs and core forces were poor, and the scores were less than 2 points. But their lower limb joint stability is better. The two flexible test movements, the shoulder mobility, and active straight legs raise are slightly higher, but they are still at a low level. Flexibility is the main problem of functional training. It is a priority problem that should be resolved in time.

Based on the above survey, we have added test indicators of shoulder flexibility and active straight legs by revising Delphi. With more in-depth assessment, the issue of joint flexibility is limited. The Final Active Straight Leg Raise Increased by 12 Observation Factors, and Shoulder Flexibility Increased by 4 Observation Factors.

2. Design physical exercise prescription for reduction of functional movement limitation

According to different functional limitations, we design appropriate physical exercise prescriptions. For the designed physical exercise prescription, we invited 5 experts familiar with the content of this study to conduct an IOC survey. According to Pongpaew’s (2009) research, the IOC value must not be less than 0.8 to be included in the criteria. We obtained an IOC value of 1 for physical exercise prescriptions for different shoulder mobility and active straight leg raising problems. This means that physical exercise prescriptions for functional limitations are endorsed by 5 experts (Table 1). This physical exercise prescription will be used in subsequent practical research for application construction and projects.

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Table 1 Experts information of IOC for physical exercise prescription (N=5)

Name	Title	Service organization	Field of research
Li Piyan	Sports Rehabilitation Therapist	Shaoguan University	Sports Rehabilitation
Cai Yishui	CEO	Hesheng Shisanyi Sports Rehabilitation and Physical Training Center	Physical Training and Sports Rehabilitation
Lin Shaojie	National Coach	China Golf Admin. Center	Physical Training
Liu Xiaosheng	National Coach	Guangdong Province Athletics Admin. Center	Track and Field
Du Shaohui	Pro.	Guangdong Industry Polytechnic	Physical Education

3. Application Construction

Through actual operations, data collection and analysis of the subject's physical condition can be carried out. It can help us gain a deeper understanding of the functional limitations of college students. Using apps we can achieve personalized guidance for students. This is difficult to achieve in ordinary physical education courses. The application-building framework is shown in Figure 2.

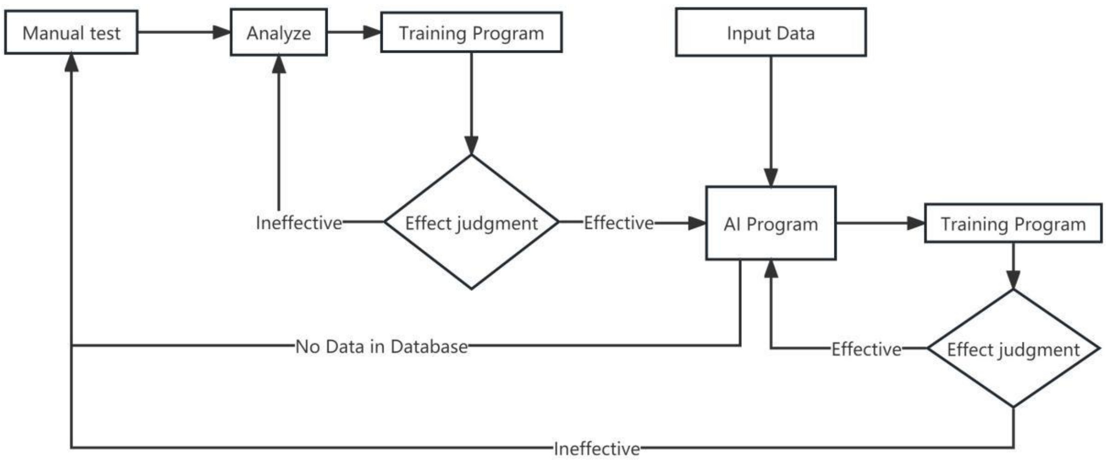

Figure 2 Application Construction Flow Chart

With the data from this study, we can build an application that uses artificial intelligence technology to personalize the training of people with limited functions (see Figure 2). We build the system based on the implemented data scheme.

First, data collection and classification

According to the content of data collection in this study, the data is imported into the program through data digitization. Through the comparison and classification algorithm, we can classify each data situation into different problems. This content can be done algorithmically. Decision tree algorithm

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is one of the classification algorithms in artificial intelligence. Decision trees are intuitive and easy to interpret, making them suitable for this task.

Second, Physical Exercise Prescription Construction

We conducted expert IOC on the physical exercise prescription for the problem of active straight leg raise and shoulder mobility. The IOC values were all 1, and the designed content of physical exercise prescriptions has been approved by experts. This physical exercise prescription will be used in subsequent practical research for application construction and projects.

Third, matching and correction of training content

According to the learned data cases in the program, the new data is matched, and the training plan is output according to the matched content. If there is no such type of data in the database, it will enter the manual test link, and the new data scheme will be imported into the program after the new data is tested and valid according to the process of this project research. We can take a rule-based approach. We will define rules that map each question type to the appropriate training content. Additionally, we will check for any ineffective training content that may not be appropriate for an individual's specific question type.

Fourth, the expert system construction

Through the construction of a training set for effective training, the system can learn more solutions to different problems. We use a form of machine learning to refine the data on the fly through supervised learning. Under a certain amount of data, the system can intelligently recommend training programs based on the input data, and realize personalized guidance for problems.

Fifth, To confirm the difference between the 2 testers

We invited 5 experts (Table 2) to conduct expert panel comparisons with applied exercise prescriptions for shoulder range of motion and active straight leg raising problems (
Table 3 and Table 4). We found that the chi-square value of each exercise prescription content between the expert group and the application ranged from 1 to 3. The chi-square value was small, indicating that the difference between the two parties was not significant. Through the difference test, we found that $P>0.05$, proving that the difference between the exercise prescriptions provided by the application and those provided by experts is small. Therefore, we judge that the exercise prescription of this application can meet the content requirements designed by experts.

Table 2 Experts' information for Chi-Square (N=5)

Name	Title	Service organization	Field of research
Huang Weihao	Pro.	South China University of Technology	Track and Field
Yu Guangcheng	Sports Rehabilitation Therapist	Guangdong Province Tennis Admin. Center	Sports Rehabilitation
Zheng Zetong	National coach	Guangdong Province Modern Pentathlon Admin. Center	Modern Pentathlon
Wu Meiling	Couch	Guangzhou Polytechnic of Sports	Physical Training

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Name	Title	Service organization	Field of research
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Table 3 Chi-Square Test of Physical Exercise Prescription for Shoulder Problems

Physical Exercise Prescription for different shoulder problems		**Application**	**Expert**					**X^2**	**P**
Problem	Physical Exercise Prescription		1	2	3	4	5		
Warm Up for Upper Body	Foam rolling lats 30s	1	1	1	1	1	0	1.091	0.296
	Foam Rolling Spine Stretch 30s	1	0	1	1	1	1		
	Foam Rolling Pectoral Rolling 30s / side	1	1	1	0	1	1		
	Positive Shoulder Press 30s	1	1	0	1	1	1		
	Side Press Shoulder 30s / side	1	1	1	1	0	1		
	Side Stretch 30s / side	1	1	1	1	1	1		
Shoulder Flexion Limitation	Triceps Stretch 30s	1	1	1	1	1	1	1.111	0.292
	Dumbbell Supine Shoulder Flexion 3X15 reps reps	1	0	1	1	1	1		
	Cat Stretch 10 reps X 3 groups	1	1	0	1	1	1		
	Lateral Thoracic Rotation 3X15 reps/side	1	1	1	0	1	1		
	Prone with Sticks in Hands and Shoulders Bent 3X15 reps reps	1	1	1	1	0	0		
Shoulder extension limitation	Biceps Stretch 30s	1	1	1	0	1	1	2.500	0.114
	Cat Stretch 3X10 reps	1	1	0	1	1	0		
	Shaking Back and Forth while Sitting on Hands 3X15 reps reps	1	0	1	1	0	1		
	Lateral Thoracic Rotation 3X15 reps/side	1	0	1	0	0	1		
	Sticks in Hands and Shoulders stretching 3X15 reps reps	1	1	0	1	1	0		

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Physical Exercise Prescription for different shoulder problems		Application	Expert					X^2	P
Problem	Physical Exercise Prescription		1	2	3	4	5		
Shoulder Internal Rotation Limitation	Front Shoulder Stretch 15s	1	1	1	1	1	1	1.111	0.292
	Cat Stretch 3X10 reps	1	1	1	1	1	1		
	Lateral Thoracic Rotation 3X15 reps/side	1	0	1	1	1	0		
	Lateral Elbow Internal Rotation Resistance 3X30 reps	1	1	1	0	0	1		
	Supine Dumbbell Inward Rotation 3X15 reps reps	1	1	0	1	1	1		
Shoulder External Rotation Limitation	Front Shoulder Stretch 15s	1	1	1	1	1	1	1.111	0.292
	Lateral Thoracic Rotation 3X15 reps/side	1	1	1	1	1	1		
	Supine Against Stick External Rotation 3X30s	1	1	1	1	1	0		
	Supine Shoulder External Rotation with Dumbbell 3X10 reps	1	0	1	1	0	1		
	Prone Shoulder Rotation 3X15 reps reps	1	1	0	0	1	1		
Spine and Scapular Stabilizatio n	Downward Dog Shoulder Press 10 reps	1	1	1	1	1	1	1.111	0.292
	Supine Flexion over Foam Roll with Stick 3X15 reps	1	1	1	1	1	0		
	Supine Flexion over Foam Roll with Hands up and down 3X15 reps	1	1	1	0	0	1		
	Supine Flexion over Foam Roll with Alternate Hand Flexion and Extension 3X15 reps	1	0	1	1	1	1		
	Alternating Shoulder Touch Exercise 30 reps	1	1	0	1	1	1		
Core Strength	Anti-Extension Dead Bug	1	1	1	1	1	1	1.077	0.299
	Dead Bug with Knee Press	1	1	1	1	1	1		
	Quadruped	1	1	1	1	1	1		

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Physical Exercise Prescription for different shoulder problems		**Application**	**Expert**					X^2	P
Problem	Physical Exercise Prescription		1	2	3	4	5		
	Abdominal Crunch	1	1	1	0	0	1		
	Russian twist	1	0	1	1	1	1		
	Supine Active Leg Lowering	1	1	0	1	1	1		
	overhead farmers walk	1	1	1	1	1	0		

Note: *P<.05, 0 means it does not match the training content, 1 means it matches the training content.

Table 4 Chi-Square Test of Training Programs for Active Straight Leg Raise Problems

Physical Exercise Prescription for different lower body problem		**Application**	**Expert**					X^2	P
Problem	Physical Exercise Prescription		1	2	3	4	5		
Warm Up for Lower Body	Foam rolling on the front of the Thigh 30s	1	1	1	1	1	1	2.222	0.136
	Foam Rolling Outer Thighs 30s	1	1	1	1	1	1		
	Inner Thigh Foam Rolling 30s	1	1	1	1	1	1		
	Back Thigh Foam Rolling 30s	1	1	1	1	1	1		
	Hip Stretch 15s / side	1	1	1	1	1	1		
	Hamstring Stretch 15s / side	1	1	0	1	1	0		
	Quadriceps Stretch 15s / side	1	1	1	1	0	1		
	Adductor Stretch 15s / side	1	0	1	0	1	0		
	Outer Thigh Stretch 15s / side	1	1	0	1	0	1		
	Calf Stretch 15s / side	1	0	1	0	1	1		
Biceps Femoris Tension	Biceps Femoris Fascia Ball Release 1min	1	1	1	1	1	1	1.077	0.299
	Standing Straight Leg Internal Rotation Stretch 30s	1	1	1	1	1	1		
	Supine Inner Leg Swing 15 reps	1	1	1	1	1	1		

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Physical Exercise Prescription for different lower body problem		Application	Expert					X^2	P
Problem	Physical Exercise Prescription		1	2	3	4	5		
	Supine Hand Grabbing the Opposite Foot Flexion and Extension 3X10 reps	1	0	1	1	1	1		
	Side Plank Inner Support 3X30s	1	1	0	1	1	1		
	Supine Straight Leg Elastic Band Resistance Internal Rotation 3X15 reps	1	1	1	1	0	0		
	Internal Band Resistance Lunge 3X15 reps	1	1	1	0	1	1		
Semitendinosus Tension	Semitendinosus Fascia Ball Release 1min	1	1	1	1	1	1	2.333	0.127
	Standing Straight Leg Internal Rotation Stretch 30s	1	1	1	1	0	1		
	Supine Lateral Leg Swing 15 reps	1	1	1	0	1	1		
	Supine Hand Grabbing the Same Foot Flexion and Extension 3X10 reps	1	1	0	1	0	0		
	Side Plank 3X30s	1	0	1	0	1	1		
	Supine Straight Leg Elastic Band Resistance External Rotation 3X15 reps	1	1	1	1	1	0		
	Outer Band Assisted Lunges 3X15 reps	1	0	0	1	1	1		
Calf Tension	Foam Rolling Calf Rolling 1min	1	1	1	1	1	1	1.053	0.305
	Lunge Calf Stretch 30s	1	1	1	1	1	1		
	Kneeling Dynamic Dorsiflexion 30s	1	1	1	1	1	1		
	Open Kneeling Dorsiflexion 30s	1	1	1	1	1	1		

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Physical Exercise Prescription for different lower body problem		Application	Expert					X^2	P
Problem	Physical Exercise Prescription		1	2	3	4	5		
	Foot Stool PNF Foot Press 30s	1	1	1	1	1	1		
	Centrifugal Push-down with Heel Suspension 3X15 reps	1	1	1	1	0	0		
	Elastic Hook Feet 3X15 reps	1	0	1	1	1	1		
	Elastic Band Inversion 3X15 reps	1	1	1	0	1	1		
	Elastic Band Eversion 3X15 reps	1	1	0	1	1	1		
	Stick to Body Single Leg Hinge 3X15 reps	1	1	1	1	1	1		
Hip Flexion Training	Standing Leg Swing 15 reps	1	1	1	1	1	1	1.091	0.296
	Anti-Extension Dead Bug 3X30s	1	1	1	1	1	1		
	Supine Leg Swing 3X15 reps	1	1	1	1	1	1		
	Elastic Ring Knee Lift 3X15 reps	1	1	0	1	1	0		
	Sitting Straight Leg Raise 3X15 reps	1	1	1	0	0	1		
	Half-kneeling while Leaning on the Wall to Step over Yoga Blocks 3X15 reps	1	0	1	1	1	1		
Hip External Rotation Tension	Foam Rolling Glute Release 1min	1	1	1	1	1	1	1.091	0.296
	Sit Straddle Hip Stretch 30s	1	1	1	1	1	1		
	Banded Clamshell with Loop Booty Band centrifugal 3X15 reps	1	1	1	1	0	0		
	Side Plank Inner Support 3X30s	1	1	1	1	1	1		

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Physical Exercise Prescription for different lower body problem		Application	Expert					X^2	P
Problem	Physical Exercise Prescription		1	2	3	4	5		
	Side Lying Knee Internal Rotation 3X15 reps	1	1	0	0	1	1		
	Double Knee Ball Squat 3X15 reps	1	0	1	1	1	1		
Hip internal rotator tension/ hip weakness	Foam Rolling Tensor Fascia Lata Release with Stretch 1min	1	1	1	1	1	1	1.059	0.303
	Foam Rolling Glute Release 1min	1	1	1	1	1	1		
	Seated Knee Fixed Opposite Side Twist Stretch 30s	1	1	1	1	1	1		
	Alternating Side Leg Press 10 reps	1	1	1	1	1	1		
	Frog Stretching 30s	1	1	0	1	1	1		
	Side Lying Straight Leg Glute Activation 3X30s	1	1	1	0	1	1		
	Clam Exercise 3X15 reps	1	1	1	1	0	0		
	Standing Hip Flexion 3X15 reps	1	0	1	1	1	1		
	Squat Sideways Walk 3X20 meter	1	1	1	1	1	1		
Hamstring Weakness/Quadriceps Tightness	Foam Rolling Rectus Femoris with Stretch 1min	1	1	1	1	1	1	1.059	0.303
	Foam Roller Vastus Medialis with Stretch 1min	1	1	1	1	1	1		
	Foam Rolling Vastus Lateralis with stretch 1min	1	1	1	1	1	1		
	Hip Extension Stretch 30s	1	1	1	1	1	1		
	Quad Stretch 30s	1	1	0	1	1	1		

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Physical Exercise Prescription for different lower body problem		**Application**	**Expert**					**X^2**	**P**
Problem	Physical Exercise Prescription		1	2	3	4	5		
	Seated Elastic Band Straight Leg Passive Knee Bend 3X15 reps	1	1	1	1	1	1		
	High Static Glute Bridge 3X30s	1	1	1	0	1	1		
	Elastic Band Hamstring Curl 3X15 reps	1	0	1	1	1	1		
	Nordic Curl 3X10 reps	1	1	1	1	0	0		
Tense Adduction/ Weak Abduction	Foam Rolling Inner Thigh with Stretch 1min	1	1	1	1	1	1	1.077	0.299
	Alternating Side Leg Press 10 reps	1	1	1	1	1	1		
	Dynamic Medial Lateral Support 3X15 reps	1	1	1	1	1	1		
	Side Lying Static Leg Raise 3X30s	1	0	1	1	1	0		
	Side Lying Dynamic Leg Raise 3X15 reps	1	1	1	0	0	1		
	Standing Elastic Band Straight Leg Lateral Raise 3X15 reps	1	1	1	1	1	1		
	Squat Sideways Walk 3X20 meter	1	1	0	1	1	1		
Abduction Tightness/ Adduction Weakness	Foam Rolling Glute Release 1min	1	1	1	1	1	1	1.059	0.303
	Foam Rolling Tensor Fascia Lata Release with Stretch 1min	1	1	1	1	1	1		
	Sit Straddle Hip Stretch 30s	1	1	1	1	1	1		
	Seated Knee Fixed Opposite Side Twist Stretch 30s	1	1	1	1	1	1		
	Side Plank Inner Support 3X30s	1	1	1	1	1	0		

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Physical Exercise Prescription for different lower body problem		**Application**	**Expert**					**X^2**	**P**
Problem	Physical Exercise Prescription		1	2	3	4	5		
	Side Lying Leg Raise 3X15 reps	1	1	1	0	0	1		
	Supine Crossed Legs 3X15 reps	1	0	1	1	1	1		
	Clip Yoga Brick Hip Bridge 3X15 reps	1	1	0	1	1	1		
	Squat with Ball 3X15 reps	1	1	1	1	1	1		

Note: *P<.05,0 means it does not match the training content, and 1 means it matches the training content.

In addition, we verify the evaluation process of functionally limited content within the application. For the collected data of subject 1, we invited the 5 experts to evaluate the subject's functional limitations. Compare the consistency of application processes with expert assessments. We found that the chi-square value of the Application group and the expert group was 0.087 (>0.05), indicating there was no statistically significant difference in the evaluation results between the expert group and the Application group. The consistency of the judgment results is as high as 76.8%, which demonstrates that the consistency between the Application and experts is high.

4. Experience the application to compare the reduction of functional movement limitation with pre-test and post-test.

The sample selection for this study was carried out in a snowball manner, and college students with functional limitations were tested according to the research topic. Since the flexibility problems in the FMS are mainly reflected in the two departments of straight leg raising and shoulder mobility, the test samples can only be selected for this research sample if they meet the criteria of the restricted problems in these two movements. Through the FMS content we set, we collect data on the sample, as shown in Table 5.

Table 5 Sample Basic Information Collection Form (N=35)

Item	**M±SD**
Age(y)	20±0.94
Height(cm)	164±7.88
Weight(kg)	54±10.79
Gender	M=34.3%(12)，F=65.7%(23)

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In Table 5, we can see that the participants in the test are all college students and their average age is 20±0.94, of which 34.3% are men and 65.7% are females. The average height is 164±7.88 cm, and the average weight is 54±10.79 kg.

Aiming at the problem of functional limitation in this study, we analyzed the scores of the two tests of shoulder mobility and active straight leg raising. The analysis results are shown in
Table 6 and
Table 7.

Table 6 Mean and standard deviation of Shoulder Mobility, Left Shoulder Mobility Right, Active Straight Leg Raise Left, and Active Straight Leg Raise Right that separated by pre-test and post-test.

Variable	**Pre-test**	**Post-test**
	M±SD	**M±SD**
Shoulder Mobility Left (N=29)	1.83±0.71	2.86±0.35
Shoulder Mobility Right (N=29)	1.55±0.51	2.83±0.38
Active Straight Leg Raise Left (N=31)	1.94±0.63	2.94±0.25
Active Straight Leg Raise Right (N=31)	1.48±0.51	2.84±0.37

Table 7 The compare Mean and standard deviation of Shoulder Mobility, Left Shoulder Mobility Right, Active Straight Leg Raise Left, and Active Straight Leg Raise Right separated between pre-test with post-test by t-test dependent.

NO.	**Paired Samples Test**	**M**	**df**	**t**	**P**
Pair 1	Shoulder Mobility Left	1.03	28	7.62	0.00 *
Pair 2	Shoulder Mobility Right	1.28	28	13.02	0.00 *
Pair 3	Active Straight Leg Raise Left	1.00	30	8.80	0.00 *
Pair 4	Active Straight Leg Raise Right	1.36	30	13.70	0.00 *

*P<0.05

Table 6 and
Table 7 show that statistics were performed on the first and second functional limitations of the test sample. We found that the number of people with limited shoulder mobility was 28. The number of people with limited active straight leg raising was 30 people. Among them, 25 people were limited in both functional test movements. Through paired samples t-test, we found that the first test score of the shoulder mobility test was 1.45±0.51, and the second test score was 2.83±0.38, with a T value of 11.945, P=0.00. The first test score on the left side was 1.83±0.71, the second test score was 2.86±0.35, and the T value was 7.62, P=0.00. The first test score on the right side was 1.55±0.51, the second test score was 2.83±0.38, and the T value was 13.023, P=0.00. The left mean increased by 1.03. The right mean increased by 1.28. Through the eight weeks of applied intervention training, the problem of limited shoulder mobility among college students has been well solved.

In addition, the first test score of active straight leg raising was 1.45±0.51, and the second test score was 2.81±0.4, the T value was 12.403, P=0.00. The first test score on the left side was 1.94±0.63,

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the second test score was 2.94±0.25, and the T value was 8.803, P=0.00. The first test score on the right side was 1.48±0.51, the second test score was 2.84±0.37, and the T value was 13.699, P=0.00. The left mean increased by 1.00. The right mean increased by 1.36. Through eight weeks of applied intervention training, the problem of limited active straight leg raising among college students has been well solved. Generally speaking, weak core strength, limited spine extension, poor shoulder stability, weak gluteal muscles, tight hamstring muscles, and poor upper body strength are common problems among college students today. This is closely related to the fact that contemporary college students are under great study pressure, spend a lot of time using electronic products, and are sedentary, and do not like sports. The problem of functional limitation is no longer caused by muscle tension. Many factors such as core strength, spine stability, and spine extension ability affect people's joint function, assessment, and physical exercise prescription.

By building an application. We can provide more targeted interventions for the functional limitations of college students. Use artificial intelligence technology to intelligently process test content and exercise prescriptions. It can meet the interdisciplinary knowledge shortage of sports practitioners.

Conclusion

1. Summary of Physical Exercise Prescription

We used the test content determined by the Delphi survey to design the body movement prescription. In the test of shoulder mobility, we add 4 tests, including shoulder flexion, shoulder external rotation, shoulder internal rotation, and shoulder extension. In the test of active straight leg raise test, we add 12 tests, including core strength, raising with external rotation 45°, passive straight leg raise, active hip and knee flexion angle test, passive hip and knee flexion test, passive external rotation angle test, passive internal rotation angle test, hip abduction angle test, hip adduction angle test, active hip extension angle test, passive hip extension angle test, toe flexion straight leg raise test. In response to the limited problem of each test content, we have designed targeted physical exercise prescriptions. We are also recognized by experts for each exercise prescription by expert IOC survey (IOC = 1). Therefore, the physical exercise prescriptions of the targeted body issued by the application are reliable.

2. The quality of the application

The evaluation process of application can play the role of experts. Through the IOC and Chi-Square Test for the application of the application, we found that the consistency of the application and the experts are high. After comparing the evaluation process of experts and application, the Chi-Square value of application and expert groups was 0.087. As a result, P> 0.05 showed that there was no statistically significant difference between the evaluation results of the expert group and the application. The consistency of the verdict is as high as 76.8 %, which proves that the consistency between application and experts is high. We have verified the application of the application of individual experts with functional movement restrictions. Through systematic evaluation logic, the emergence of the application helps solve the knowledge of sports practitioners' knowledge of sports anatomy and functional assessment. It can encourage physical education teachers and coaches to solve the basic physical function of students in grass-roots sports work in the most basic level of sports pyramids in a more targeted way. Avoid the helplessness that students are injured immediately after increasing exercise intensity due to physical defects.

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3. Effectiveness of Physical exercise prescription for reduction of Functional movement limitation in college students

Through experimental intervention, the restrictions on the functional movement of college students have been improved. After experimental research, through comparison of two test data, we found that the training content of the design has been established, and the students' shoulder mobility and active straight leg raise have improved significantly (P <0.05). Greatly reduced the low score rate. Both the average of the two flexible tests and the post-testing average test have been greatly improved, with an average increase of a lot and reaching at least 1 point. Through intersection with multi-disciplinary knowledge, more practitioners with sports backgrounds can achieve the process of evaluating and testing different individuals. By following the application of the application, we can find the problem of the limited functions of each person and solve them in a goal way. As the amount of data increases, the application can quickly diagnose different people, different data, and different problems after training a lot of data. In big data, we can better discover the various effects of different functional restrictions on people's daily movements. Through induction and summary, we can recommend exercise plans for different people in people's daily lives so that people can participate in physical exercise healthily.

Discussion

1. The physical exercise prescription is reliable

The study emphasizes the reliability of physical exercise prescriptions determined through a structured methodology involving the Delphi survey. The incorporation of various shoulder mobility and active straight leg raise tests, along with a total of 16 tests, underscores a comprehensive approach to designing exercise prescriptions (Reilly et al., 2009). By incorporating expert feedback and utilizing the Delphi survey, the study confirms the reliability of the exercise prescriptions issued by the application.

The involvement of experts in validating the exercise prescriptions through an IOC survey reaffirms their reliability and effectiveness. The unanimous recognition of the exercise prescriptions by experts strengthens the credibility of the application's recommendations, further supporting its potential to aid individuals in improving their functional movement through targeted exercises (Izquierdo et al., 2021).

2. The application has a good quality

In the construction of Applications, we use the decision tree algorithm for data collection and classification. According to the previous research experience, this study will classify and classify the collected data through the decision tree algorithm to identify the functionally limited types of samples. Finally, a secondary decision tree model is used to classify the new data as core strength issues, muscle tension issues, or muscle weakness issues for docking training programs.

The training schemes for each problem are corrected and verified. Through the collection of effective training schemes, we build a case-based expert system (Zhang et al., 2010). The system applies human knowledge stored in computers to solve problems that would normally require experts. It mimics the reasoning process of human experts when solving specific problems, so it can be used by non-experts to enhance problem-solving ability, and experts can also use it as an assistant with specialized

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knowledge. Since expert resources are quite scarce in human society, with the expert system, this precious expert knowledge can be widely applied (Flasiński, 2016).

3. Functional limitations have been greatly improved

Through the research of this project, we found that college students are affected by the changes in modern lifestyles. Sedentary and long-term use of electronic products, poor posture, and lack of exercise have led to increasingly serious restrictions on the functional movement of the body. Through the intervention of various sports, various studies have promoted the development of college students' physiques. However, not everyone's physical condition is suitable for various sports. In this regard, we use the research of this project to understand the functional limitations of the subjects by adding joint function tests to the FMS. Through the intervention of functional training, performing special sports after recovering the range of motion of the joints can reduce the sports injuries of students. This is also the suggestion that He Mei et al. (2019) call for targeted training for college students' unhealthy lifestyles.

Recommendation

1. The construction of the application is subject to funding investment, so we only design the content based on the research objectives. In the future, with the investment of funds, the application can be further improved and more intelligent fields can be realized.

2. This study is based on the FMS test method to study the functional movement limitations of college students. to solve more movement problems. In the concept of the sports pyramid model, the most basic factor we deal with is flexibility. The next step is to shape the human body's basic movement capabilities from the perspective of stability and movement force patterns.

3. Through the construction of applications, we systematize screening methods and training programs. This study only collected a small amount of sample data. We all know that the larger the amount of data, the more accurate the AI system will be. To improve the application, testing with a large sample size will be needed in the future.

Reference

Alves, V., & Silvestrini, A. P. (2020). Achieving the Right to Work in the Face of Technological Advances: Reflections on the Occasion of the ILO's Centenary. *U. Bologna L. Rev*., 5, 226.

Angermueller, C., Pärnamaa, T., Parts, L., & Stegle, O. (2016). Deep learning for computational biology. *Molecular systems biology,* 12(7), 878.

Baker, R., Coenen, P., Howie, E., Williamson, A., & Straker, L. (2018). The short-term musculoskeletal and cognitive effects of prolonged sitting during office computer work. *International journal of environmental research and public health,* 15(8), 1678.

Bottou, L. (2010). Large-scale machine learning with stochastic gradient descent. In Proceedings of COMPSTAT'2010. *19th International Conference on Computational Statistics Paris France, August 22-27, 2010 Keynote, Invited and Contributed Papers* (pp. 177 - 186). Physica-Verlag HD.

Caruana, R., Lou, Y., Gehrke, J., Koch, P., Sturm, M., & Elhadad, N. (2015, August). Intelligible models for healthcare: Predicting pneumonia risk and hospital 30-day readmission. *In*

Citation Lin, P., Tongdecharoen, W., Tasnaina, N. (2023). Development of Physical Exercise Prescription Application for Reduction of Functional Movement Limitation in College Students. International Journal of Sociologies and Anthropologies Science Reviews (IJSASR), 3 (5), 421-424; DOI: https://doi.org/10.60027/ijsasr.2023.3729

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DOI: https://doi.org/10.60027/ijsasr.2023.3729

Proceedings of the 21st ACM SIGKDD international conference on knowledge discovery and data mining (pp. 1721-1730).

Castro, O., Vergeer, I., Bennie, J., Cagas, J., & Biddle, S.J. (2021). Using the behavior change wheel to understand university students' prolonged sitting time and identify potential intervention strategies. *International Journal of Behavioral Medicine*, 28, 360-371.

Chau, R.C.W., Thu, K.M., Hsung, R.T.C., & Lam, W.Y.H. (2023). Teeth reconstruction using artificial intelligence: trends, perspectives, and prospects. *Journal of the California Dental Association*, 51(1), 2199910.

Chen, Y., Cai, X., Li, J., Lin, P., Song, H., Liu, G., & Ma, X. (2023). The values and barriers of BIM implementation combination evaluation based on stakeholder theory: a study in China. *Engineering, Construction and Architectural Management*, 30(7), 2814-2836.

Chen, Y., Hsu, C.Y., Liu, L., & Yang, S. (2012). Constructing a nutrition diagnosis expert system, Expert Systems with Applications, 39(2), 2132-2156.

Chimera, N.J., Knoeller, S., Cooper, R., Kothe, N., Smith, C., & Warren, M. (2017). PREDICTION OF FUNCTIONAL MOVEMENT SCREEN™ PERFORMANCE FROM LOWER EXTREMITY RANGE OF MOTION AND CORE TESTS. *International journal of sports physical therapy*, 12(2), 173–181.

Cook, G., Burton, L., & Hoogenboom, B. (2006). Pre-participation screening: the use of fundamental movements as an assessment of function - part 1. *North American journal of sports physical therapy: NAJSPT,* 1(2), 62–72.

Cook, G., Burton, L., & Hoogenboom, B. (2006). Pre-participation screening: the use of fundamental movements as an assessment of function - part 2. North American journal of sports physical therapy: NAJSPT, 1(3), 132–139.

Dong, S., Zeng, L., Che, X., Du, X., Xu, H., Ji, C., & Li, Z. (2023). Application of Artificial Intelligence in Logging Identification of Fractures in Tight Reservoirs. *Earth Science,* 48(7), 2443-2461.

Fan, L., Lang, L. A. N. G., Xiao, J., Zhang, S., Chong, Y., & Lyu, S. (2022). Intelligent fault diagnosis expert system for a multi-parameter monitor based on fault tree. *Journal of Biomedical Engineering*, 39(3), 586-595.

Flasiński, M. (2016). *Rule-Based Systems. In: Introduction to Artificial Intelligence*. Springer, Cham.

Géron, A. (2022). *Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow*. O'Reilly Media, Inc.

Hastie, T., Tibshirani, R., Friedman, J. H., & Friedman, J. H. (2009). *The elements of statistical learning: data mining, inference, and prediction (Vol. 2, pp. 1-758).* New York: Springer.

He, M., Liu, J., & Meng, L. (2019). Research on the Current Situation and Countermeasures of College Students' Physical Activity and Sedentary Behavior--Taking Wuhan Business School as an Example. *Fujian Sports Science and Technology*, 38(1), 43-46.

Huang Wenhu.(2022). The Crisis and Value Reconstruction of Go Culture in the Age of Artificial Intelligence. *Journal of Huaqiao University (Philosophy and Social Sciences Edition),* (2), 24-34.

Citation Lin, P., Tongdecharoen, W., Tasnaina, N. (2023). Development of Physical Exercise Prescription Application for Reduction of Functional Movement Limitation in College Students. International Journal of Sociologies and Anthropologies Science Reviews (IJSASR), 3 (5), 421-424; DOI: https://doi.org/10.60027/ijsasr.2023.3729

Izquierdo, M., Merchant, R.A., Morley, J.E., Anker, S.D., Aprahamian, I., Arai, H., ... & Singh, M.F. (2021). International exercise recommendations in older adults (ICFSR): expert consensus guidelines. *The journal of nutrition, health & aging*, 25(7), 824-853.

Kastelic, K., Kozinc, Ž., & Šarabon, N. (2018). Sitting and low back disorders: an overview of the most commonly suggested harmful mechanisms. *Collegium antropologicum*, 42(1), 73-79.

Khurram, I. Qazi, H.K., Lam, B.X., Gaoxiang, O., Xunhe, Y. (2016). Classification of epilepsy using computational intelligence techniques. *CAAI Transactions on Intelligence Technology,* 1(02), 137-149

Krihua, P.R., & Xu, L. (1984). Determination of the Number of Sample Units in a Simple Random Sampling Survey. *Jiangxi Forestry Science and Technology,* (3), 52-53.

LeCun, Y., et al. (2015). Deep Learning. *Nature,* 521, 436-444. https://doi.org/10.1038/nature14539

Lee, Y., & Park, K.H. (2006). Health Practices That Predict Recovery from Functional Limitations in Older Adults. *American Journal of Preventive Medicine,* 31(1), 25-31.

Lepp, A., Barkley, J. E., & Karpinski, A. C. (2014). The relationship between cell phone use, academic performance, anxiety, and satisfaction with life in college students. *Computers in human behavior*, 31, 343-350.

Li, L., Chen, Y., Jia, F., Hu, W., Yang, H., Zhang, Y., & Li, M. (2019). The current situation of poor posture of college students in three universities in Shijiazhuang. *Chinese School Health*, 40(7), 1099-1101.

Li, T., Wang, X., Fang, F., Gu, W., & Li, B. (2018). Observation on the effect of functional training of core muscle groups in preventing recruits from lower back pain and improving core muscle function. *Journal of the Second Military Medical University,* (5), 538-542.

Liao, T., Li, L., Wang, Y.T. (2019). Effects of Functional Strength Training Program on Movement Quality and Fitness Performance Among Girls Aged 12–13 Years. *Journal of Strength and Conditioning Research*, 33(6), 1534-1541.

Lu, L., Wang, Y., Ma, Y., & Xu, J. (2021). Research and Analysis of Sports Artificial Intelligence Based on Knowledge Graph. *Journal of Capital Institute of Physical Education*, 33(1), 14.

Lynn, S.K., & Noffal, G.J. (2010). Hip And Knee Moment Differences Between High and Low Rated Functional Movement Screen (FMS) Squats. *Medicine & Science in Sports & Exercise,* 42(5), 402.

Mao, Z., Ye, L., Ding, T., & Qiu, L. (2022). Research on Intervention Strategies for Large-scale Improvement of Students' Physical Fitness in School Physical Education in the New Era from the Perspective of "Three Precisions". *Journal of Tianjin Institute of Physical Education,* 37(02), 125-130

Mathew, A., Amudha, P., & Sivakumari, S. (2021). Deep learning techniques: an overview. *Advanced Machine Learning Technologies and Applications: Proceedings of AMLTA 2020*, 599-608.

McKinney, W. (2022). *Python for data analysis.* O'Reilly Media, Inc.

Nagi, S. Z. (1976). An Epidemiology of Disability among Adults in the United States. The Milbank Memorial Fund Quarterly. *Health and Society,* 54(4), 439-467.

Newell, A., Shaw, J.C., & Simon, H.A. (1959). *Report on a general problem-solving program.* In IFIP congress, 256, 64.

International Journal of Sociologies and Anthropologies Science Reviews (IJSASR), 3 (5), September-October 2023, pages 421-424. ISSN: 2774-0366
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index
DOI: https://doi.org/10.60027/ijsasr.2023.3729

Paleyes, A., Urma, R.G., & Lawrence, N.D. (2022). Challenges in deploying machine learning: a survey of case studies. *ACM Computing Surveys*, 55(6), 1-29.

Peebles, R., & Jonas, C. E. (2017). Sacroiliac joint dysfunction in the athlete: diagnosis and management. *Current sports medicine reports*, 16(5), 336-342.

Reilly, T., Morris, T., & Whyte, G. (2009). The specificity of training prescription and physiological assessment: A review. *Journal of Sports Sciences*, 27(6), 575-589.

Sandler, M., Howard, A., Zhu, M., Zhmoginov, A., & Chen, L.C. (2018). Mobilenetv2: Inverted residuals and linear bottlenecks. *In Proceedings of the IEEE conference on computer vision and pattern recognition*, 4510-4520.

Scannapieco, M. (2006). *Data Quality: Concepts, Methodologies and Techniques.* Data-Centric Systems and Applications. Springer.

Shaffer, C.M., Deo, A., Tudor, A., Shenoy, R., Danesh, C. D., Nathan, D., & Chen, Y. (2021). Self-Programming Synaptic Resistor Circuit for Intelligent Systems. *Advanced Intelligent Systems*, 3(8), 2100016.

Simon, H.A. (1988). The science of design: Creating the artificial. *Design Issues*, 67-82.

Smith, P.D., & Hanlon, M.P. (2017). Assessing the effectiveness of the functional movement screen in predicting noncontact injury rates in soccer players. *The Journal of Strength & Conditioning Research*, 31(12), 3327-3332.

Song, R., Yang, S., & Cheng, Q. (2021). Investigation and Research on the Status Quo of College Students in Medical Colleges - Taking Zhuhai Campus of Zunyi Medical University as an example. *Neijiang Science and Technology*, 42(04), 116-117.

Su, B., Li, J., Xu, H., Xu, Z., Meng, J., Chen, X., & Li, F. (2022). Scientific training aids: application of flexible wearable sensors for motion monitoring. *Chinese Science: Information Science*, 52(1), 54-74.

Sun, L., Qin, X., Xu, J., & Xue, Z. (2022). Density Peak Clustering Algorithm Based on K-Nearest Neighbors and Optimal Allocation Strategy. *Journal of Software*, 33(04), 1390-1411.

Tahran, Ö., & Yeşilyaprak, S.S. (2020). Effects of modified posterior shoulder stretching exercises on shoulder mobility, pain, and dysfunction in patients with subacromial impingement syndrome. *Sports Health*, 12(2), 139-148.

Tee, J.C., Klingbiel, J.F., Collins, R., Lambert, M.I., & Coopoo, Y. (2016). Preseason Functional Movement Screen Component Tests Predict Severe Contact Injuries in Professional Rugby Union Players. *Journal of strength and conditioning research*, 30(11), 3194–3203.

Verbrugge, L.M., & Jette, A.M. (1994). The disablement process. *Social science & medicine*, 38(1), 1–14.

Verma, A.A., Murray, J., Greiner, R., Cohen, J.P., Shojania, K.G., Ghassemi, M., & Mamdani, M. (2021). Implementing machine learning in medicine. *Cmaj*, 193(34), E1351-E1357.

Wang, Y. (2017). Re-understanding of the kinematic chain, chain reaction, and functional training from the perspective of system theory. *Journal of Shandong Institute of Physical Education*, (3), 92-99.

Citation
Lin, P., Tongdecharoen, W., Tasnaina, N. (2023). Development of Physical Exercise Prescription Application for Reduction of Functional Movement Limitation in College Students. International Journal of Sociologies and Anthropologies Science Reviews (IJSASR), 3 (5), 421-424; DOI: https://doi.org/10.60027/ijsasr.2023.3729

Wright, A., Stevens, J., Galloway, R., Donahue, P., Sha, Z., & McCoy, S. (2023). Aortic stiffness increases during prolonged sitting independent of intermittent standing or prior exercise. *European Journal of Applied Physiology*, 123(3), 533-546.

Wu, F., Fan, S., Zhang, L., Wang, Y., Wang, L., & Chang, Q. (2021). The effect of corrective movement training on the intervention effect of physical fitness training for recruits. *South China Journal of Defense Medicine*, (5), 364-367.

Xu, J., Li, L., Ma, X.Q., Zhang, M., Qiao, J., Redding, S.R., & Ouyang, Y.Q. (2023). Fertility Intentions, Parenting Attitudes, and Fear of Childbirth among College Students in China: A Cross-Sectional Study. *Journal of Pediatric and Adolescent Gynecology*, 36(1), 65-71.

Xu, R., Zuo, H., Ji, Y., Li, Q., Wang, Z., Liu, H., Wang, J., Wei, Z., Li, W., Cong, L., Li, H., Jin, H., & Wang, J. (2021). Effects of Short-Term Limitation of Movement of the First Metatarsophalangeal Joint on the Biomechanics of the Ipsilateral Hip, Knee, and Ankle Joints During Walking. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research*, 27, e930081.

Yan, Q., Li, S., & Fu, B. (2012). A case study of applying IHP dual training method to improve lower limb motor function of elite hockey players. Journal of Beijing Sport University, (12), 126-129.

Zhang, L., Li, Z., & Ma, Z. (2022). Research progress of rehabilitation physical training in non-specific low back pain. *Contemporary Sports Science and Technology*, 17, 146-149.

Zhang, X., Chen, F., & Zhao, Z. (2009). Prevention and rehabilitation measures of ankle joint injuries in gymnasts. *Chinese Journal of Sports Medicine*, 4, 452-453.

Zhang, Y., Wu, L., & Wang, S. (2010). Survey on development of the expert system. *Computer Engineering and Applications*, 46(19), 43-47.

Citation Lin, P., Tongdecharoen, W., Tasnaina, N. (2023). Development of Physical Exercise Prescription Application for Reduction of Functional Movement Limitation in College Students. International Journal of Sociologies and Anthropologies Science Reviews (IJSASR), 3 (5), 421-424; DOI: https://doi.org/10.60027/ijsasr.2023.3729