Hindawi
Wireless Communications and Mobile Computing
Volume 2022, Article ID 4408506, 10 pages
https://doi.org/10.1155/2022/4408506

Research Article

Modeling and Analysis of Influencing Factors of Competitive Performance of Wushu Athletes

Wenya Li

School of Physical Education and Health, Chongqing Three Gorges University, Chongqing 404100, China

Correspondence should be addressed to Wenya Li; 20130028@sanxiau.edu.cn

Received 5 May 2022; Revised 18 May 2022; Accepted 1 June 2022; Published 21 July 2022

Academic Editor: Zhiguo Qu

In view of the problems that there are many influencing factors in wushu athletes' competitive performance, which lead to low accuracy of index evaluation and large error of weight calculation, this paper puts forward the modeling and analysis of influencing factors of wushu athletes' competitive performance. Preprocess and segment wushu routine characteristic signals, extract wushu routine characteristics by using fast Fourier transform coefficients, construct the index system of the influence of competitive performance ability, and determine the ideal solution and negative ideal solution of the index weight after standardizing the indexes of influencing factors. The index weight of the influencing factors of wushu athletes' competitive performance is determined by calculating the pasting progress, and the evaluation model of the influencing factors is constructed with the help of the grey correlation degree method. The experimental results show that the proposed model can effectively determine the key degree of the influencing factors of wushu athletes' competitive performance and improve the competitive performance of wushu athletes.

1. Introduction

Wushu can improve the speed, strength, endurance, and other physical functions of the human body and has a good role in promoting the regulation of cardiovascular and respiratory systems and nerves. Different groups can choose suitable exercise contents and forms according to their own functions, so as to enhance their physique [1, 2]. In modern competitive sports, the exertion of athletes' strength depends not only on the preparation of athletes' precompetition techniques and tactics but also on athletes' psychological competitive ability. Individuals or groups with weakened psychology will only be defeated in a close competition. Wushu is a skill-oriented sport, and its competition results are mostly scored by referees according to the technical level of athletes on the spot. Wushu routines have the characteristics of rich content, complex action structure, asymmetry, and many route changes. Wushu exercises especially emphasize the embodiment of "essence, Qi, and spirit," which requires the accuracy and coordination of the motor center corresponding to the cerebral cortex [3]. The uncertainty of wushu competition results greatly enhances the psychological pressure of athletes [4–6].

In modern competitive competition, the strength of athletes is closer, and the gap between their training means, training level, and athletes' function is becoming smaller and smaller. Athletes need high-level sports training and tactical application if they want to reach a new height and maintain stability in sports performance. In competition, the level of athletes' precompetition emotion and on-the-spot coping style is of great significance to competition performance and competition results. Therefore, athletes' precompetition emotion and on-the-spot coping style are not only the focus of coaches and athletes' psychological preparation but also the most dynamic research field in the field of sports psychology [7]. Factors such as mood and routine are the key factors affecting the competitive performance of wushu athletes. In order to improve the competitive performance ability of wushu athletes, researchers in this field have made a lot of analysis on the key factors affecting their performance and put forward how to solve the precompetition anxiety of wushu athletes and improve wushu

sports routines. Some experts have designed the image analysis knowledge map of wushu athletes' sports routines according to the characteristics of wushu athletes. However, in the current research, the influencing factors of wushu athletes' competitive performance are classified and divided in detail.

Therefore, based on the existing research, this paper puts forward the modeling research on the influencing factors of wushu athletes' competitive performance. Through the analysis of the characteristics of wushu athletes' competitive expression, the main key influencing factors affecting athletes' competitive performance are determined, and the determined factors are preprocessed in detail. Finally, an evaluation model is constructed to evaluate the reliability of the determined key factors. It can provide some guidance for improving the competitive performance of wushu athletes.

2. Technical Route

The main technical route of this paper is as follows.

Step 1. By analyzing the competitive performance characteristics of wushu athletes, preprocess and segment the characteristic signals of wushu routines, and use the fast Fourier transform coefficient as the frequency domain feature extraction method to extract the characteristics of wushu routines.

Step 2. Determine the basic structure model of wushu athletes' competitive performance ability, and construct the index system affecting wushu athletes' competitive performance ability.

Step 3. Standardize the influencing factor indexes of wushu athletes' competitive performance with the help of the standardization matrix, determine the ideal solution and negative ideal solution of the index weight, determine the influencing factor index weight of wushu athletes' competitive performance by calculating the pasting progress, build the influencing factor evaluation model with the help of the gray correlation degree method, and complete the modeling research on the influencing factors of wushu athletes' competitive performance.

Step 4. Experimental analysis.

Step 5. Conclusion.

3. Analysis of Competitive Performance Characteristics of Wushu Athletes and Extraction of Wushu Routine Characteristics

There is no clear standard for the concept of competitive expression and artistic expression. "Expressiveness" refers to the expression form of people's internal emotions in external actions. It is the reflection of athletes' sports passion and self-confidence and the use of actions and expressions to communicate with referees and audiences. For the concept of art, art is a general term of talent and technology, and art is a social ideology that reflects reality with images but is more typical than reality. Based on the understanding of expressiveness and art, artistic expressiveness is the combination of internal emotion and external action by using more vivid ways and methods. The present force is to use a more vivid way and method to unify the internal emotion and external action [8]. The competitive expression of competitive wushu athletes is mainly concentrated in wushu routines. The three major technical characteristics of competitive wushu routines are attack, diversity, and artistry. The attack is mainly reflected in the expression of the attack and defense meaning of each action. The diversity of competitive wushu routines is mainly due to the vastness and richness of its content, which also makes the competition levels and types diverse. The development and inheritance of wushu need to be demonstrated with the help of artistry. The artistry of competitive wushu routine competition is mainly reflected in the "form, spirit, meaning, and beauty" of the action. Through the collocation and transformation between various movements of wushu, it presents a state of alternating motion and stillness and ups and downs, so that the whole routine exercise [9] gives the viewer a visual impact with the unique artistic charm of wushu. Therefore, in order to determine the influencing factors of wushu athletes' competitive ability, this paper needs to extract the performance routine characteristics of wushu athletes, which is the most critical link affecting wushu athletes' competitive ability.

Due to the existence of the earth's gravity, the systematic measurement error, and the unconscious jitter of wushu athletes, the obtained acceleration data can not be extracted directly. Before extracting features, we must first complete the preprocessing operations, including signal segmentation and alignment, filtering, and noise removal [10]. In the competitive performance of wushu athletes, the sequence length and speed of each action are different. Before feature extraction, the collected data need to be aligned. Alignment can be performed before or after feature extraction. Align at the same time when extracting [11]. In this paper, alignment is carried out before feature extraction. The actual data length is aligned to a fixed length by copying the data of the last sampling point to a fixed length and copying all sampling points to a fixed length and linear interpolation [12]. The calculation method of linear interpolation is as follows.

The known data (x_0, y_0) and (x_1, y_1) value of a position $[x_0, x_1]$ in the y interval obtain:

$$y = \frac{x_1 - x}{x_1 - x_0} y_0 + \frac{x - x_0}{x_1 - x_0} y_1. \tag{1}$$

Because acceleration is discrete data with very high sampling rate, the estimated value obtained by simple linear interpolation will be very close to the real data in a very small time [13]. Therefore, the aligned martial arts actions will be segmented next. The segmented data is operated by sliding filter, and the data is operated by 10-order average sliding filter, and the following results are obtained:

$$Y(n) = \frac{1}{2n+1} \sum_{i=1}^{n} (x(n-k)) + \sum_{m=1}^{n} x(n+k) x_0, \tag{2}$$

where $x(n)$ represents the original data of the action sampling point of the current martial arts sports routine and $2n+1$ indicates the window length of the slide.

On the basis of preprocessing wushu athletes' routine actions, this paper uses the fast Fourier transform coefficient as the frequency domain feature extraction method [14]. The time-frequency characteristic is generally the method of Chiqian wavelet analysis. Wavelet analysis can not only reflect the frequency-domain characteristics of data but also reflect the time-domain characteristics of data. Wavelet packet decomposition (WPD) is used as the feature extraction method of acceleration signal. Time domain features generally refer to common mathematical statistical features, including mean, median, standard deviation, correlation coefficient, and covariance [15]. FFT, also known as fast Fourier transform, is a fast algorithm for calculating Fourier transform [16]. Its feature extraction formula is as follows:

$$\phi = \sum_{i=1}^{n} s(n) w_i (0 < i < n-1), \tag{3}$$

where $s(n)$ represents the acceleration data of length n and w_i represents the complex sequence of calculated length n.

When calculating the FFT coefficients of the segmented data, the fast Fourier transform is performed on the x-axis, y-axis, and z-axis, respectively. Here, taking the x-axis as an example, the transformed 2nd to 64th bit data are taken as the final FFT coefficients. The x-axis, y-axis, and z-axis data obtained by linear interpolation method are sorted into one-dimensional feature representation, and the competitive expression features of wushu athletes can be extracted [17]. The dimension segmentation diagram of feature extraction is shown in Figure 1.

In Figure 1, X is the competitive performance of the martial arts athlete, $x1, x2, \cdots, x11$ features are obtained after segmentation, and the feature of the competitive performance of the martial arts athlete after the segmentation is determined as $x1, x2, \cdots, xn$ and extracted to obtain the feature as $ax1, ax2, \cdots, axn$. In the analysis of wushu athletes' competitive performance characteristics and the research of wushu routine feature extraction, the analysis of wushu athletes' competitive performance characteristics is mainly reflected in the wushu routine demonstration. The wushu routine feature signal is preprocessed and segmented, and the fast Fourier transform coefficient is used as the frequency domain feature extraction method to extract the wushu routine features, so as to lay a foundation for the follow-up research.

4. Modeling and Design of Influencing Factors of Competitive Performance of Wushu Athletes

4.1. Determination of Influencing Factors of Competitive Performance of Wushu Athletes. Use big data mining technology to obtain the influence of wushu athletes' competitive performance. Make statistics on the competitive historical performance data of wushu athletes and mine the information data with high correlation with the competitive performance of wushu athletes. The specific process is shown in Figure 2.

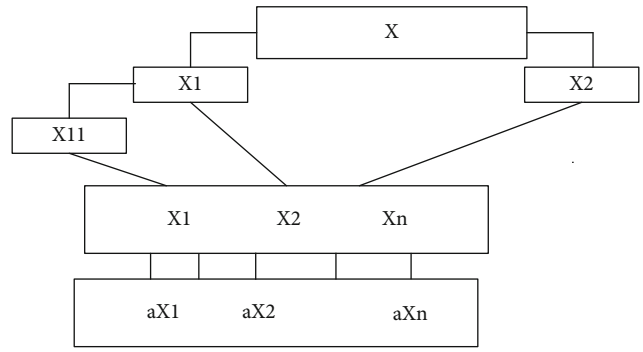

Figure 1: Schematic diagram of the dimension decomposition of competitive expressive characteristics of wushu athletes.

As shown in Figure 2, the relevant historical data affecting the competitive performance of wushu athletes are derived and preprocessed. Then, cluster the historical data of wushu athletes' competitive performance into different data sets. According to the similarity measurement standard, select the K-means clustering algorithm, set the initial data as the first division and serve as the center of data aggregation, and then compare the remaining information data with four centers one by one, classify them into the closest data aggregation, and calculate the mean value of all data in the new data aggregation. As the center of the data aggregation, according to the above steps, the competitive performance data of wushu athletes are added iteratively to realize the data mining of the influencing factors of wushu athletes' competitive performance. Finally, judge the mining data and select the data that can process a large amount of data, different data structures, multidimensional data, and multilevel data as the influencing factors of wushu athletes' competitive performance. The specific process is as follows.

Based on the above extracted wushu routine characteristics, this paper further analyzes the influencing factors of wushu athletes' competitive performance. Wushu is a kind of expressive competitive event which is different from other sports. Competitive ability refers to the ability of athletes to compete [18]. It is composed of physical ability, technical ability, tactical ability, psychological ability, and sports intelligence with different forms and functions and is comprehensively expressed in the center of the process of special competition. Among them, physical fitness can be subdivided into body shape, physical function, and sports quality: skills are reflected in the stability of athletes' movements and the quality of technical movements; tactical ability is reflected in three aspects: ensuring the exertion of due physical skills, using effective and reasonable methods to interfere with the exertion of opponents' competitive ability, and fair and just competition punishment. Psychological ability is intensively expressed through the will quality and competition emotion of athletes: the level of sports intelligence is reflected in the mastery and application of athletes' professional knowledge [19]. Each subcomponent of competitive ability plays a role in the competitive competition of athletes

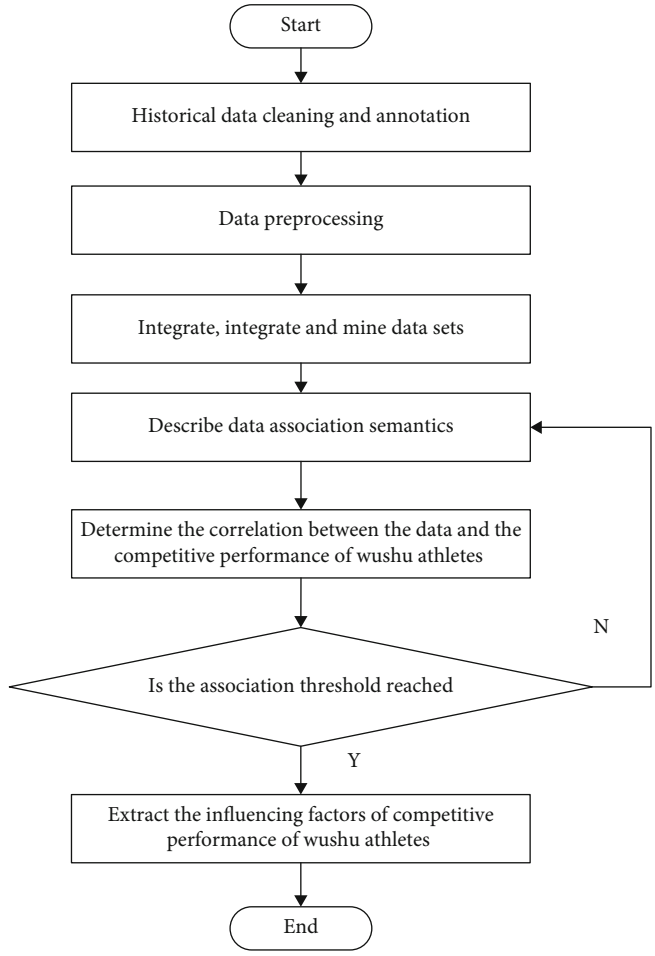

Figure 2: Big data mining process of influencing factors.

as a whole. The basic structure model of wushu athletes' competitive performance ability is shown in Figure 3.

It can be seen from Figure 3 that the structural model of wushu athletes' competitive performance ability includes competitive ability and exertion ability. Among them, competitive ability is affected by physical function and technical ability, and exertion ability is affected by sports quality and psychological ability.

Based on the basic structure model of wushu athletes' competitive performance ability, this paper constructs the index system of wushu athletes' competitive performance ability that is to determine its key influencing factors.

Step 1. Determine the primary indicators. The logical base point of factor decomposition is the primary index of the evaluation system. The next decomposition can be carried out only after the quantity and name of the primary index are determined according to the requirements and purpose of evaluation. The determination of primary indicators should be based on the main aspects of the requirements of wushu sports on athletes' competitive ability, as well as the principle of constructing the evaluation index system [20], as well as the organization of the evaluation. In the determination of primary indicators, this paper mainly determines two key primary indicators: competitive ability and play ability, see Table 1 for details.

Step 2. Determine the secondary indicators. On the basis of the established primary indicators, the indicators that can be set up at each level are listed step by step, and the above determined primary indicators are decomposed in turn. The competitive strength of wushu athletes is composed of physical fitness (body shape, physical function, sports quality), skills, and tactical ability [21]. The exertion ability consists of psychological adjustment ability and sports intelligence, and a total of five secondary indicators have been established. The main contents are shown in Table 2.

Step 3. Select the influencing factors and indicators of wushu athletes' competitive performance ability. Among the massive primary indicators, some are the response to the essence of the evaluation object, while others are not. Some are primary factors, and some are secondary factors. It is also inevitable that there will be duplication, intersection, inclusion, causality, and contradiction among indicators at all levels [22]. Therefore, in order to simplify the selection process, on the premise of ensuring objectivity and comprehensiveness, only the first round of screening of preliminary

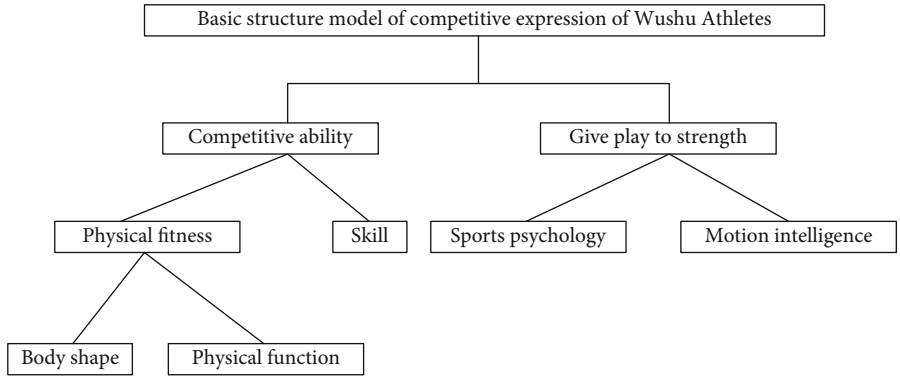

Figure 3: Structural model of the competitive performance ability of wushu athletes.

Table 1: Indicators of primary influencing factors of wushu athletes' competitive performance ability.

Level 1 indicators	Degree	Content
Competitive ability	Critical factor	Special and special ability, directly affect competitive ability
Play to the ability	The catalyst of competitive ability	The regulation of the psychological state indirectly affects the competitive ability

Table 2: Indicators of secondary influencing factors of wushu athletes' competitive performance ability.

Secondary indicators	Degree	Content
Somatic function	The basis of competitive ability affects the mastery of difficult martial arts movements and training load	Blood pressure, vital capacity, heart rate, oxygen intake, cardiac supply index, etc.
Sports quality index	Control the center of the body	Strength, speed, sensitivity, endurance, flexibility, etc.
Technical capability indicators	One of the important factors	Movement, movement standard degree, basic action completion degree, action stability degree, etc.
Psychological ability indicators	One of the important factors	Motivation, motor will, emotion, perception, etc.

indicators can be sorted and classified in order to simplify. This procedure can not only simplify indicator items but also improve indicator quality and not only ensure the effectiveness of evaluation but also facilitate evaluation.

4.2. Implementation of Modeling Factors Influencing Competitive Performance in Wushu Athletes. Based on the index system of influencing factors of wushu athletes' competitive performance constructed above, in order to determine whether the index affecting privacy is the key index affecting wushu athletes' competitive performance, it is necessary to determine the weight value of the set index before constructing the evaluation model [23].

First, the influencing factors of the competitive performance of martial arts athletes were standardized. Set the standardization matrix B [24] of the influencing factors of competitive performance, and the standardized decision matrix is obtained:

$$B = \frac{a_{ij}}{\sqrt{\sum_{i=1}^{n}(a_{ij})^2}} (1 < i < n, 1 < j < n). \tag{4}$$

Among them, a_{ij} represents the initial data of the competitive performance, and n represents the number of data.

Then, based on the standardization of index data, the index data is weighted standardized, and further processing [25] obtains

$$G = \sum_{i=1}^{n} a_{ij} \times e_i, \tag{5}$$

where G represents the initial weight value of the influence factor indicator.

On this basis, the ideal solution and the negative ideal solution of the influencing factor index are calculated to obtain the weight value of the preliminary index data [26], namely,

$$H^* = \{h_1^*, h_2^*, \cdots, h_n^*\}, \tag{6}$$

$$H^- = \{h_1^-, h_2^-, \cdots, h_n^-\}, \tag{7}$$

where H^* represents the ideal solution, H^- represents the negative ideal solution, and max represents the maximum of the ideal solution.

With the calculation of the ideal solution and the relative distance of the negative ideal solution, we obtain

$$S_i^* = \sqrt{\sum_{i=1}^{n} \left(H_i^j - H^-\right)^2} (1 < i < n). \tag{8}$$

Finally, the relative sticking schedule of the influencing factor index is determined to obtain

$$T_i = \frac{E_i^-}{E_i^* + E_i^-} (0 < i < m), \tag{9}$$

where the closer the value is to 1, the higher the weight accuracy of the value is.

In the calculation of the index weight of the influencing factors of wushu athletes' competitive performance, the index of the influencing factors of wushu athletes' competitive performance is standardized with the help of the standardization matrix, the ideal solution and negative ideal solution of the index weight are determined, and the index weight of the influencing factors of wushu mobilization competitive performance is determined by calculating the paste progress, so as to provide data support for the subsequent modeling.

After calculating the index weight of the influencing factors of wushu athletes' competitive performance, an evaluation model is constructed to determine whether the influencing factors of wushu athletes' competitive performance are key indicators. Suppose the initial judgment matrix is set as

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ r_{m1} & r_{m2} & \cdots & r_{mn} \end{bmatrix}. \tag{10}$$

Determine the grey correlation degree between the initial samples of the influencing factors and indicators of wushu athletes' competitive performance, and obtain

$$P_{ij} = \frac{a_{ij}}{\sqrt{\sum_{i=1}^{m} \left(a_{ij}\right)^2}} (1 < i < m). \tag{11}$$

Then, the grey reference sequence of the influencing factors of wushu athletes' competitive expression is generated, namely,

$$X_0 = (X_0(1), X_0(2), \cdots X_0(N)). \tag{12}$$

Among them, $X_0(N)$ represents the maximum gray association value for the factors affecting competitive performance in martial arts athletes.

Calculate the difference value between the sequence of influencing factors of competitive expressiveness of wushu athletes and the reference sequence, and get

$$\Delta\beta(i) = \left|X_0(i) - a_{ij}\right|. \tag{13}$$

Finally, the evaluation model of the influence index of competitive performance is constructed:

$$Q(x) = \frac{\min \Delta\beta(i) + \delta \max \Delta\beta(i)}{\Delta\beta(i) + \delta \max \Delta\beta(i)}. \tag{14}$$

Input the influencing factor index of wushu athletes' competitive expression into formula (14), output the key degree of the influencing factor index of wushu athletes' competitive expression, and get

$$\eta_i = \frac{1}{n} \sum_{i=1}^{n} \Delta \frac{\beta(i)}{Q(x)}. \tag{15}$$

Among them, η_i represents the critical degree of the index data, and the value range is [0,1]; the closer to 1, the higher the critical degree of this influencing factor.

The main process of modeling the influencing factors of the competitive performance of martial arts athletes is shown in Figure 4.

5. Experimental Analysis

5.1. Design of Experimental Scheme. In order to verify the effectiveness of this modeling, experimental analysis is carried out. Taking the students of a sports college in a place and the athletes of a sports wushu school in a city as the experimental objects, 8 national wushu British level wushu routine athletes of the school were selected, 4 men and 4 women, respectively. A total of 20 national first-class wushu routine athletes, 10 men and 10 women, were selected from the city's sports school and sports college. A total of 20 national level II wushu routine athletes from Capital Institute of Physical Education were selected, 10 men and 10 women, respectively. All the subjects are in good health. Before the test, explain the experimental contents to them. Tables 3 and 4 show the basic information of the subjects.

This paper mainly uses stopwatch, digital display electronic advance meter wep-i, electronic one-foot standing tester fys-i, multiple reaction time tester, and dual arm flexibility tester in vocational ability selection and evaluation system to test and study the speed, time, and movement coordination of subjects. Divide the above subjects into men's group and women's group, perform wushu routines at the same level, respectively, select 10 professional scoring coaches, score the competitive performance of wushu athletes for each subject, determine the top 10 athletes, model and analyze the influencing factors of competitive performance of 10 athletes, and determine the accuracy of influencing factors of modeling and evaluation by different methods. The weight of the influencing factors of the competitive expressiveness of these 10 wushu athletes is

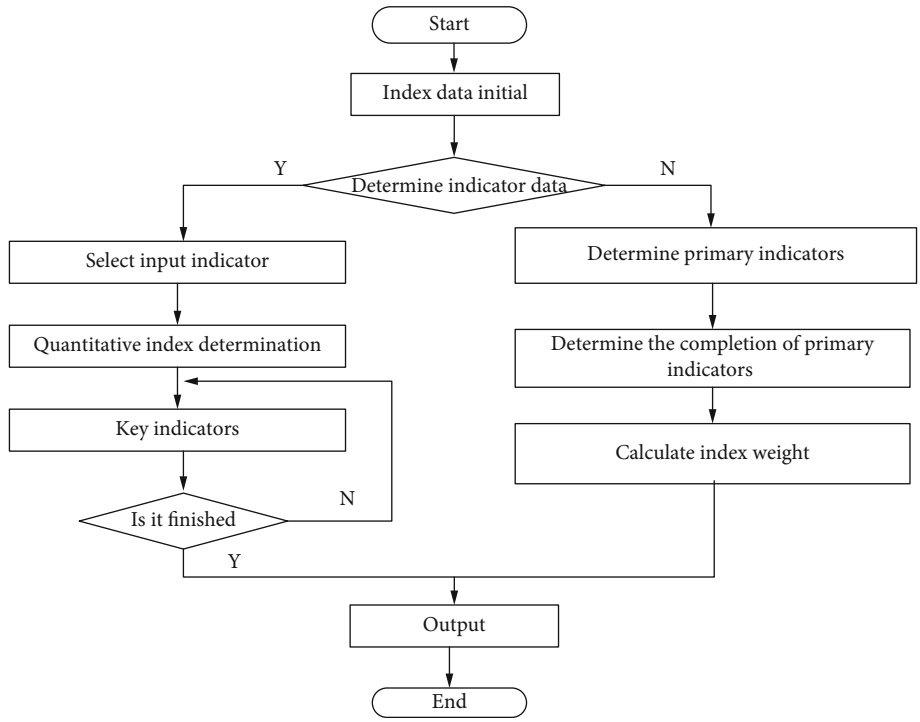

Figure 4: Modeling of the influencing factors of the competitive performance of martial arts athletes.

Table 3: Basic information of the male subjects.

	Age/year	Training years/y	Stature/cm	Weight/kg	BMI (kg/m^2)
Class of warrior head	22.34 ± 1.80	15.23 ± 1.52	172.32 ± 4.32	61.76 ± 5.76	21.01 ± 2.98
Country level	22.44 ± 1.75	12.23 ± 1.58	170.32 ± 5.32	60.51 ± 6.03	21.24 ± 2.45
National level II	21.76 ± 1.26	9.21 ± 1.23	172.76 ± 4.40	63.76 ± 4.97	22.12 ± 2.33

Table 4: Basic information of the female subjects.

	Age/year	Training years/y	Stature/cm	Weight/kg	BMI (kg/m^2)
Class of warrior head	21.14 ± 2.03	14.75 ± 1.97	160.32 ± 3.97	59.76 ± 3.76	22.01 ± 1.82
Country level	21.21 ± 1.53	12.23 ± 1.58	161.62 ± 3.32	58.51 ± 3.03	22.24 ± 1.87
National level II	20.83 ± 1.66	9.21 ± 1.23	165.76 ± 5.63	59.76 ± 5.97	22.12 ± 1.93

calculated to determine the calculation error, and two traditional evaluation methods are selected: traditional method 1 (entropy weight method) and traditional method 2 (Bayesian evaluation method).

5.2. Analysis of Experimental Results. In the experiment, firstly, the movement speed of the top 10 athletes in wushu competitive expression was determined and evaluated with the help of this model. The results are shown in Figure 5.

It can be seen from the analysis of Figure 5 that in the evaluation of the moving speed of the competitive expressiveness of the top 10 wushu athletes by using the proposed model, the average moving speed of the athletes in the three groups is between 50 and 60, and the change is relatively stable, in which the standard difference is between 7 and 8, which is also within the reasonable range. Therefore, it can be seen that the designed model can effectively evaluate the competitive expressiveness of wushu athletes, and the results are relatively stable.

In order to highlight the feasibility of the designed model, the indexes of balance ability, overall coordination and psychological stress resistance in the competitive expression of wushu athletes are selected as the research object in the experiment. Compared with this model, traditional method 1, and traditional method 2, these three models are used to evaluate the impact of these three indexes on the competitive expression of wushu and determine the accuracy of different methods. The results are shown in Figure 6.

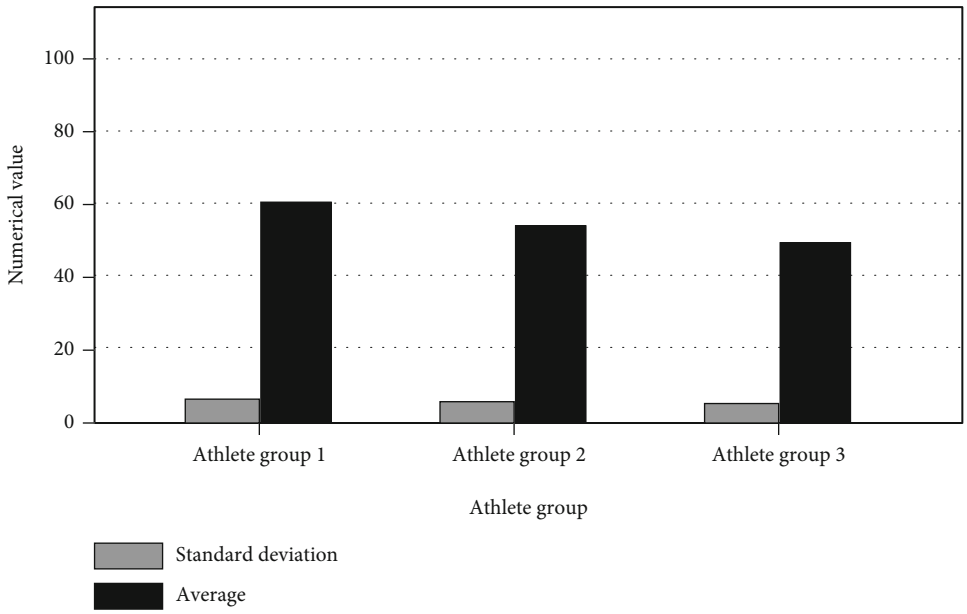

Figure 5: Evaluation results of the index movement speed in wushu competitive performance.

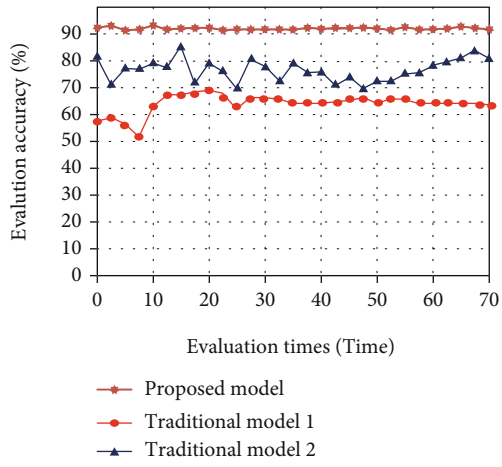

Figure 6: Different models evaluate the evaluation accuracy of the three martial arts competitive performance indicators.

By analyzing the experimental results in Figure 6, it can be seen that the accuracy of the three models in evaluating the balance ability, overall coordination, and psychological pressure resistance of wushu athletes is different. Among them, the evaluation accuracy of the proposed model is always maintained at about 90%, while the evaluation accuracy of the other two models is lower than that of the proposed model. The evaluation accuracy of traditional method 1 is between 50% and 70% and that of traditional method 2 is between 69% and 86%. Although it is maintained within a reasonable range, there are still some differences. It can be seen that the proposed model has good accuracy and certain feasibility.

The average value of the scores of 10 experts is compared with the evaluation results of this model to verify the accuracy of the evaluation of wushu competitive expressiveness index of this model. The expert scoring results are shown in Table 5. The test results of wushu competitive expressiveness index evaluation of this model are shown in Table 6.

Table 5: Scoring results of experts.

Primary index	Secondary index	Expert scoring
Competitive ability	Physical function	3.5
	Technical capability	2.5
Develop ability	Sports quality	1.5
	Psychological ability	1.5

According to Tables 5 and 6, this model can effectively calculate the influence value of wushu competitive expressiveness index. According to the comparison between the evaluation value of wushu competitive expressiveness obtained by this model and the score of experts, the gap between the comprehensive value of expressiveness of this model and the score of experts is very small, less than 0.2. Experiments show that this model has high accuracy in the evaluation of wushu competitive expression index and can effectively provide corresponding opinions on wushu competitive expression.

The determination of influencing factors and indexes of wushu athletes' competitive expression is the key to building the model. Therefore, by comparing the proposed model, traditional method 1, and traditional method 2, this paper analyzes the error in the calculation of the index weight of the influencing factors of wushu athletes' competitive expressiveness. The lower the result, the greater the impact of the determined key index. The error result is shown in Figure 7.

By analyzing the experimental results in Figure 7, it can be seen that the proposed model, traditional method 1, and traditional method 2 have different results according to the

Table 6: Test results of this model.

Secondary index	Expressive influence value	Score	Comprehensive value of expressiveness
Physical function	2.4943	3.49	0.9977
Technical capability	2.4376	2.5	1.2188
Sports quality	3.6124	1.5	1.8062
Psychological ability	2.4184	1.3	0.7255

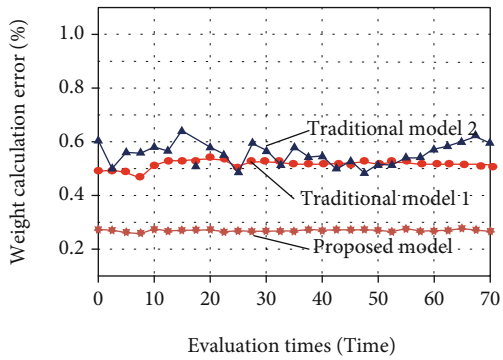

Figure 7: Weight error analysis of the factors influencing wushu athletes calculated by different models.

error of calculating the index weight of the influencing factors of wushu athletes' competitive expressiveness. Compared with traditional method 1 and traditional method 2, the weight error of the proposed method is less than 0.3%; the weight error of traditional method 1 and traditional method 2 is less than 0.55% and 0.65%, respectively, but both are higher than 0.42%, and the weight error of the influencing factors of wushu athletes' competitive expressiveness in the two traditional models is not different, but there is a certain fluctuation. Compared with the two traditional models, the error value of the proposed model is lower, which verifies the effectiveness of the proposed model.

Based on the above analysis, it can be seen that the average and standard deviation of the moving speed evaluation of the model in this paper are within a reasonable range, the evaluation accuracy is 90%, the gap between the comprehensive value of expressiveness and the scoring results of experts is less than 0.2, and the error of index weight is less than 0.3%. Therefore, this model has high practical significance in evaluating the competitive performance of wushu athletes.

6. Conclusion

Aiming at the problems existing in the evaluation of influencing factors of wushu athletes' competitive performance, this paper designs a new evaluation model of critical degree. The model analyzes the competitive performance characteristics of wushu athletes and extracts the characteristics of wushu routines. On the basis of constructing the index system of the influence of wushu athletes' competitive performance ability, standardize the index and determine the index weight. With the help of grey correlation degree method, this paper constructs the evaluation model of influencing factors to realize the analysis of influencing factors of competitive performance of wushu athletes. The feasibility of the proposed method is verified by experiments.

Data Availability

The raw data supporting the conclusions of this article will be made available by the author, without undue reservation.

Conflicts of Interest

The author declared that there are no conflicts of interest regarding this work.

References

[1] Z. Long and D. Jiang, "Analysis of factors affecting the expressiveness of wushu routine athletes and countermeasures," *Sports Fashion*, vol. 15, no. 5, pp. 2–7, 2020.

[2] S. Li, C. Liu, and G. Yuan, "Martial arts training prediction model based on big data and MEMS sensors," *Scientific Programming*, vol. 2021, Article ID 9993916, 8 pages, 2021.

[3] K. E. O. Carmo, D. I. V. Pérez, C. N. Valido et al., "Caffeine improves biochemical and specific performance after judo training: a double-blind crossover study in a real judo training situation," *Nutrition & Metabolism*, vol. 18, no. 1, pp. 97–109, 2021.

[4] R. Predoiu, R. Makarowski, K. Görner et al., "Key personality traits of martial arts and world's top coaches – impact on future martial arts specialists," *Archives of Budo*, vol. 16, no. 1, pp. 129–142, 2020.

[5] C. Zilidis, D. Stuckler, and M. Mckee, "Use of amenable mortality indicators to evaluate the impact of financial crisis on health system performance in Greece," *European Journal of Public Health*, vol. 30, no. 5, pp. 861–866, 2020.

[6] C. Zhao, H. Yang, X. Li, R. Li, and S. Zheng, "Analysis and application of martial arts video image based on fuzzy clustering algorithm," *Journal of Intelligent and Fuzzy Systems*, vol. 16, no. 4, pp. 1–9, 2020.

[7] K. Tang, "Statistical evaluation of model factors in reliability calibration of high-displacement helical piles under axial loading," *Canadian Geotechnical Journal*, vol. 57, no. 2, pp. 246–262, 2020.

[8] B. N. Morrison, I. Zwaiman, S. Isserow et al., "Masters athlete screening study (MASS): insights into the psychological impact of cardiovascular preparticipation screening," *Clinical Journal of Sport Medicine*, vol. 11, no. 9, pp. 156–166, 2020.

[9] T. Timpka, A. Spreco, O. Dahlstrom et al., "Suicidal thoughts (ideation) among elite athletics (track and field) athletes: associations with sports participation, psychological resourcefulness and having been a victim of sexual and/or physical

abuse," *British Journal of Sports Medicine*, vol. 55, no. 4, pp. 198–205, 2020.

[10] A. Gledhill and R. Craig, "165 psychosocial factors are associated with lower re-injury risk in competitive athletes," *British Journal of Sports Medicine*, vol. 54, no. 1, pp. 70–75, 2020.

[11] J. B. Caccese, B. A. Bodt, G. L. Iverson et al., "Estimated age of first exposure to contact sports and neurocognitive, psychological, and physical outcomes in healthy NCAA collegiate athletes: a cohort study," *Sports Medicine*, vol. 50, no. 7, pp. 1377–1392, 2020.

[12] I. Jurov, N. Keay, D. Spudić, and S. Rauter, "Inducing low energy availability in trained endurance male athletes results in poorer explosive power," *European Journal of Applied Physiology*, vol. 122, no. 2, pp. 503–513, 2022.

[13] C. A. Rambarat, F. Reifsteck, J. R. Clugston et al., "Preparticipation cardiac evaluation findings in a cohort of collegiate female athletes," *The American Journal of Cardiology*, vol. 140, no. 18, pp. 145–152, 2020.

[14] R. Purcell, S. Rice, M. Butterworth, and M. Clements, "Rates and correlates of mental health symptoms in currently competing elite athletes from the Australian national high-performance sports system," *Sports Medicine*, vol. 50, no. 9, pp. 1683–1694, 2020.

[15] M. L. Weber Rawlins, A. Wilson, R. C. Bay, and T. C. V. McLeod, "An examination of perceived pressure from stakeholders on concussion reporting intentions and behavior in ice hockey athletes," *Journal of Head Trauma Rehabilitation*, vol. 37, no. 2, pp. 79–88, 2022.

[16] G. Zhang, W. Luo, S. I. Hajee, and H. Gong, "Atomic force microscope observation of athletes' hemoglobin imaging," *Cellular and Molecular Biology*, vol. 66, no. 7, pp. 84–92, 2020.

[17] M. Anderson, K. M. Petit, J. Wallace, T. Covassin, and E. Beidler, "Factors associated with concussion nondisclosure in collegiate student-athletes," *Journal of Athletic Training*, vol. 56, no. 2, pp. 157–163, 2021.

[18] H. Pentikäinen, K. Toivo, S. Kokko et al., "Resting electrocardiogram and blood pressure in young endurance and non-endurance athletes and non-athletes," *Journal of Athletic Training*, vol. 56, no. 5, pp. 201–211, 2020.

[19] P. Bauer, L. Kraushaar, O. Dörr et al., "Association of 25-hydroxy vitamin D level with the blood pressure response to a maximum exercise test among professional indoor athletes," *European Journal of Applied Physiology*, vol. 120, no. 8, pp. 1931–1941, 2020.

[20] P. Bauer, L. Kraushaar, O. Dörr, H. Nef, C. W. Hamm, and A. Most, "Sex differences in workload-indexed blood pressure response and vascular function among professional athletes and their utility for clinical exercise testing," *European Journal of Applied Physiology*, vol. 121, no. 7, pp. 1859–1869, 2021.

[21] S. J. Ren, C. P. Wang, Y. Xiao et al., "Thermal properties of coal during low temperature oxidation using a grey correlation method," *Fuel*, vol. 26, no. 8, article 116287, 2020.

[22] M. Firat, "Experimental investigation on the thermal characteristics and grey correlation analysis of frost penetration depths for different subgrade soils," *Environmental Earth Sciences*, vol. 80, no. 11, pp. 1–12, 2021.

[23] D. J. Sodums and V. D. Bohbot, "Negative correlation between grey matter in the hippocampus and caudate nucleus in healthy aging," *Hippocampus*, vol. 30, no. 10, pp. 76–85, 2020.

[24] S. L. Liu and S. P. Pang, "Effect of degree correlation on edge controllability of real networksProject supported by the National Natural Science Foundation of China (Grant no. 61903208)," *Chinese Physics B*, vol. 29, no. 10, pp. 1002–1110, 2020.

[25] M. Hamka and Harjono, "Application of fuzzy preference relations method in AHP to improve judgment matrix consistency," *IOP Conference Series: Materials Science and Engineering*, vol. 821, no. 1, pp. 120–130, 2020.

[26] B. A. O. Han and F. A. N. Xiao-an, "Simulation of dynamic classification for unbalanced big data in cloud computing environment," *Computer Simulation*, vol. 37, no. 8, pp. 311–314, 2020.