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Retraction

Retracted: Correlation Analysis between Sports and Antiaging Based on Medical Big Data

Journal of Sensors

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

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[1] Y. Yang, "Correlation Analysis between Sports and Antiaging Based on Medical Big Data," *Journal of Sensors*, vol. 2022, Article ID 3810676, 9 pages, 2022.

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Research Article

Correlation Analysis between Sports and Antiaging Based on Medical Big Data

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With the aging of the population in China and even in the world becoming more and more serious, China has become the country with the largest proportion of the elderly population, and a series of social problems such as health and medical care brought about by aging are being actively responded by policies. Aging has also become a natural law that human beings cannot break free from. Although exercise cannot reverse the aging process, it can weaken the adverse effects caused by aging. Having good physical quality, keeping a happy mood, comfortable living environment, and friendly social relations are the secret recipe for prolonging life and resisting cell aging. On the contrary, if physical and mental exhaustion, various chronic diseases, negative life events, bad living environment, and social relations will seriously affect human life and quality of life. Sports promote the metabolism of the whole body. Exercise can stabilize blood sugar, avoid cardiovascular diseases, and even get a good mood. At the cellular level, exercise facilitates the transmission and absorption of nutrients, thus making tissues healthier to cope with the stress of daily life. According to the statistics of loving sports and not loving sports through medical big data, the physical fitness and cell health of the elderly who love exercise every day are better than those who do not love sports. Sports are controlled by the central nervous system, and there is a correlation between changes in motor ability and cognitive impairment. Aging is accompanied by the deterioration of skeletal muscle quality and strength, which is mainly due to the rapid degradation and slow synthesis of protein in skeletal muscle. Therefore, exercise is one of the most effective ways to delay the aging of muscles and bones. According to the great potential value of medical big data, this paper analyzes and explains the correlation between sports and antiaging.

1. Introduction

At present, the sharing level of medical big data in China has not reached a higher level, which provides reference and basis for the correlation analysis between sports and antiaging, hoping to promote the transformation of medical care, medical insurance, medicine, medical research, and medical policy decision-making and help the development of related medical industries. Literature [1] tells the health problems of the elderly, and the community should set up corresponding fitness service facilities. Literature [2] tells us that sitting for a long time will accelerate the aging speed, and only exercise can maintain a healthy and youthful form. Literature [3] expounds the research and analysis of taking traditional Chinese medicine to delay aging. Literature [4] expounds the application scenarios of intelligent decision-making service of medical information in different fields. Literature [5] states that intelligent neurosurgery has gradually entered the stage of orbital, systematic, and large-scale development. Many R&D sections, such as big data mining, machine learning/deep learning/neural network, clinical decision support system/expert system, surgical navigation, and robot, have initially matured. Related applications have covered clinical diagnosis, treatment decision-making, surgical assistance, prognosis evaluation, simulated teaching, and other scenarios of various diseases in neurosurgery, but the whole is still in its infancy. Literature [6] studies the analysis and sharing of big data in precision medicine to provide a stable data base for medical development. Literature [7] analyzes that medical big data and artificial intelligence (AI) have great potential in improving the utilization rate of medical resources and service quality, but they also bring challenges in privacy protection and technical risks. Literature [8] studies and analyzes the accurate application of big data in cancer diagnosis and treatment, clinical medication guidance, chronic disease prevention and control, and other fields. Literature [9] shows the construction and development of medical science in the era of big data. Literature [10] expounds that artificial intelligence technology integrates big data and cloud computing in the medical industry to effectively promote the intelligent development of medical diagnosis and treatment. Literature [11] expounds the data management of hospital clinical by big data and the construction of medical engineering in literature [12]. Literature [13] expresses the application exploration of medical diagnosis under the background of big data. Literature [14] looks forward to the help of big data to the development of world medicine. Literature [15] says that intelligent medicine will eventually change the future of medicine. Literature [16] puts forward thoughts on the problems of artificial intelligence, literature [17] points out the application research of medical big data in tumors, literature [18–20] talks about the future development of artificial intelligence in the medical field, literature [21, 22] expounds the application value of medicine under the background of big data, and literature [23] applies big data to evaluate health.

2. Sports Situation of the Elderly at Home and Abroad

2.1. Sports Situation of the Elderly Abroad. After big data [24], Australia is rich in fitness activities for the elderly, among which the middle-aged and elderly sports meeting is one of the large-scale sports activities active in the middle-aged and elderly people in Australia. The development of community sports activities in the United States is mainly funded by government sponsorship or collection of membership fees. Most of the residents of the United States carry out very rich sports and physical fitness activities, which cover a wide range of exercise projects, and the quality of their activities is quite high. Japan is already the country with the highest proportion of the elderly population in the world. The elderly in Japan have relatively more leisure time, pay more attention to their physical and mental health, and tend to be able to carry out various sports and health care activities independently. In the choice of sports, they hope that the sports rules are easy to understand, the technology has certain technical content, and it is easy to learn to experience the fun of sports.

2.2. Sports Situation of the Elderly in China. With the development of the times, there are various forms of sports, but according to statistics [25], the sports choices of the elderly in China are relatively single, among which walking is the most favored by the elderly. Secondly, running, square dancing, cycling, and other activities have a wide audience. These events do not need too many skills or special sports equipment. They are the cheapest and simplest events with relatively small difficulty coefficient. Some common sports equipment in the home, such as table tennis, badminton, swimming, skipping rope, kicking shuttlecock, and other activities, are also within the scope of activities of the elderly, and a small number of elderly people with strong physical fitness will participate in some professional activities, such as mountaineering, basketball, diabolo shaking, softball, folk dance, martial arts, and health qigong (See Table 1 for details).

3. Sports Statistical Algorithm Model

3.1. Logistic Regression Model

3.1.1. General Linear Regression Model. In statistical analysis with less fluctuation, the lever value of general linear model is defined as shown in the formula:

$$h_{ii} = X\left(X^T X\right)^{-1} X_i, \quad (1)$$

where h_{ii} is the i-th diagonal element of the matrix $H = X(X^T X)^{-1} X_i$.

The target value is estimated by the least squares of the general linear model, and the predicted value $\hat{y}_i$can be written as follows:

$$\hat{y}_i = \sum_{j=1}^{n} h_{ij} y_j = h_{ii} y_i + \sum_{j \neq i}^{n} h_{ij} y_j. \quad (2)$$

$\hat{y}$ takes the partial derivative of y_i , as follows:

$$\frac{\partial \hat{y}_i}{\partial y_i} = h_{ii}, i = 1, 2, \cdots, n. \quad (3)$$

The subsampling algorithm of general linear model is an important subsampling strategy based on normalized empirical statistical lever score of input matrix X. The calculation of sampling probability distribution is as follows:

$$\pi_I^{\text{leverage}} = \frac{h_{ii}}{\sum_{i=1}^{n} h_{ii}}, i = 1, 2, ..n. \quad (4)$$

3.1.2. Sensitivity to Misclassification. The formula for the logistic regression model is defined as follows:

$$P(y_i = 1 \mid x_i) = p_i(\beta) = \frac{\exp\left(x_i^T \beta\right)}{1 + \exp\left(x_i^T \beta\right)}. \quad (5)$$

When a certain i is selected, it is assumed that the tested event $y_i$is misclassified symmetrically with the probability q_i and that all other observations are correctly classified, that is, the probability of misclassification of these observations is q_i =0, $j \neq i$. If the sensitivity to error classification is calculated in the presence of error classification, the probability distribution of response variables is recorded as the following formula:

$$P(y_i = 1 | u_i = 0 = P(y_i = 0 \mid u_i = 1) = q_i. \quad (6)$$

Table 1: Statistical table of sports project names for the elderly in community.

Sports events	Number of people	Percentage (%)
Walk	540	29.7
Running	320	17.6
Square dance	334	18.4
Table tennis	210	11.5
Skipping rope	184	10.1
Martial arts	145	7.9
Mountaineering	82	4.5

The marginal probability of observed event $y_i = 1$ is obtained as follows:

$$P(y_i = 1) = P(y_i = 1 \mid u_i = 0) + P(y_i = 1 \mid u_i = 1) = \frac{\left(1 - q_j\right) \exp\left(x_j^T \beta\right) + q_j}{1 + \exp\left(x_j^T \beta\right)}. \quad (7)$$

When $q_i = 0$, there is a special case and there is no wrong classification. When $q_i = 1$, the opposite is true.

Since y_i is a misclassified observation, the probability of y_i being symmetrically correctly classified is as follows:

$$P(y_i = 0 \mid u_i = 0) = P(y_i = 1 \mid u_i = 1) = 1 - q_i. \quad (8)$$

The likelihood function of logistic regression is as follows:

$$L(\beta) = \Pi_{j=1}^n \Pr\left(y_j \mid x_j\right) = \Pi_{j=1}^n \left[p\left(x_j, \beta, q_j\right)^{y_j}\right]\left[1 - p\left(x_j, \beta, q_j\right)^{1-y_j}\right] = \Pi_{j=1}^n \left[\frac{\left(1 - q_j\right) \exp\left(x_j^T \beta\right) + q_j}{1 + \exp\left(x_j^T \beta\right)}\right]^{y_j} \left[\frac{\left(1 - q_j\right) + q_j \exp\left(x_j^T \beta\right)}{1 + \exp\left(x_j^T \beta\right)}\right]^{1-y_j}. \quad (9)$$

Take the logarithm and the formula is as follows:

$$l(\beta) = \sum_{j=1}^n \left[y_j \text{In} \frac{\left(1 - q_j\right) \exp\left(x_j^T \beta\right) + q_j}{1 + \exp\left(x_j^T \beta + q_j\right)} + \left(1 - y_j\right) \text{In} \frac{\left(1 - q_j\right) \exp\left(x_j^T \beta\right)}{1 + \exp\left(x_j^T \beta + q_j\right)}\right]. \quad (10)$$

Formula (10) derives β and makes the derivative equal to zero, resulting in the scoring equation as follows:

$$\sum_{j=1}^n \left[\frac{y_j\left(1 - q_j\right) \exp\left(x_j^T \beta\right)}{\left(1 - q_j\right) \exp\left(x_j^T \beta\right) + q_j} + \frac{\left(1 - y_j\right) q_j \exp\left(x_j^T \beta\right)}{q_j \exp\left(x_j^T \beta\right) + \left(1 - q_j\right)} - \frac{\exp\left(x_j^T \beta\right)}{1 + \exp\left(x_j^T \beta\right)}\right] x_j = 0. \quad (11)$$

The value of the differential of β to q_j at $q_j = 0$ is as follows:

$$\left.\frac{\partial \widehat{\beta}_i}{\partial q_i}\right|_{q_i} = (1 - 2y_i) \exp\left[(1 - 2y_i) x_i^T \widehat{\beta}\right] H^{-1} x_i. \quad (12)$$

In the above formula, the expression for H is

$$H = \sum_{j=1}^n \frac{\exp\left(x_j^T \beta\right)}{\left[1 + \exp\left(x_j^T \beta\right)\right]^2} x_j x_j^T. \quad (13)$$

3.1.3. Prediction Probability Sensitivity. Logistic regression model mainly predicts whether it is misclassified by the size of $p_i(\beta)$. Therefore, after estimating the coefficient, the prediction ability of the model can be verified according to the prediction probability $p_i(\beta)$, and the formula is as follows:

$$\widehat{p} = \frac{\exp\left(x_j^T \beta\right)}{1 + \exp\left(x_j^T \beta\right)}. \quad (14)$$

The sensitivity of wrong classification is analyzed, and the derivative of prediction probability p with respect to classification probability $\widehat{p}$ at $q_i = 0$ is taken as prediction probability, and the formula is as follows:

$$\left.\frac{\partial \widehat{p}_i}{\partial q_i}\right|_{q_{i=0}} = \left(\left.\frac{\partial \widehat{p}_i}{\partial \widehat{\beta}}\right|_{q_{i=0}}\right)' \left(\left.\frac{\partial \widehat{\beta}_i}{\partial q_i}\right|_{q_{i=0}}\right) = (1 - 2y_i) \frac{\exp\left[2\left(1 - y_j\left(x_j^T \beta\right)\right)\right]}{\left[1 + \exp\left(x_j^T \beta\right)\right]^2}. \quad (15)$$

3.2. Subsampling Algorithm. Based on the gradient expression of loss function estimated by least squares, a self-adaptive gradient subsampling algorithm is proposed. The main steps of the algorithm are as follows.

Find the loss function of the logistic regression model of the set $\{(x_i, y_i)\}_{i=1}^n$, and the formula is as follows:

$$\vartheta(\beta, x_i) = \frac{1}{n} \sum_{i=1}^n \left[y_i \log_{p_\beta}(x_i) + \log\left\{1 - p_\beta(x_i)\right\}\right]. \quad (16)$$

The loss function is derived from β:

$$\frac{\partial \vartheta(\beta, x_i)}{\partial \beta} = \frac{1}{n} \sum_{i=1}^n \left[y_i - p_\beta(xi)\right] x_i. \quad (17)$$

The gradient formula of loss function of the i test sample is as follows:

$$\delta_i = \left[y_i - p_\beta(xi)\right] x_i. \quad (18)$$

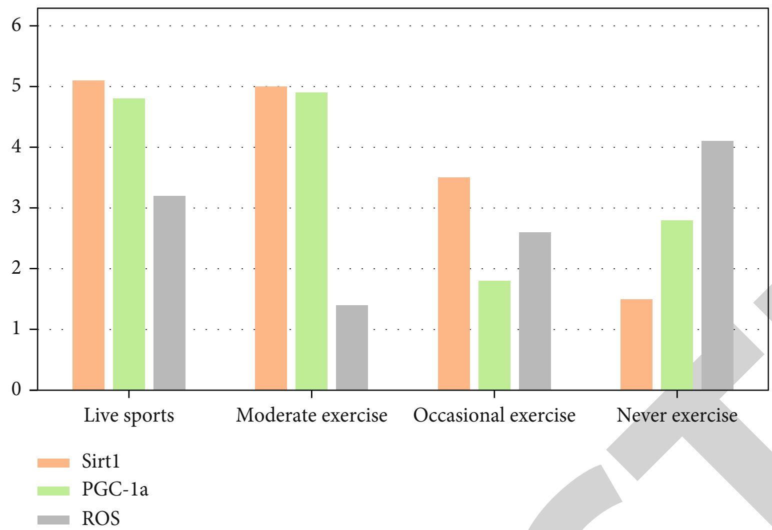

Figure 1: Protein activity bar chart.

The definition of subsampling probability of the i test sample for loss function gradient is as follows:

$$\pi_i^{\delta} = \frac{|\delta i|}{\sum_{i=1}^{n} |\delta i|}. \tag{19}$$

3.2.1. Optimized Subsampling Algorithm. The asymptotic properties of weighted gradient subsampling maximum likelihood estimators for logistic regression models are studied. Given the total sample $\{(x_i, y_i)\}_{i=1}^{n}$, when the response variable satisfies certain conditions, r is the subsample size, and when $n \longrightarrow \infty$, $r \longrightarrow \infty$, the formula is as follows:

$$V^{-1/2}\left(\tilde{\beta} - \hat{\beta}_{MLB}\right) \longrightarrow N(0, 1). \tag{20}$$

In the above formula, the expressions for V and V_c are as follows:

$$V = M_X^{-1} V_c M_X^{-1},$$
$$V_c = \frac{1}{rn^2} \sum_{i=1}^{n} \frac{\left\{y_i - \hat{\beta}_{MLB}\right\}^2 x_i x_i^T}{\pi_i}. \tag{21}$$

The asymptotic mean square error of $\tilde{\beta}$ is equivalent to the trace of matrix V, that is,

$$\mathrm{AMSE}\left(\tilde{\beta}\right) = tr(V). \tag{22}$$

Optimize according to the thinking mode of "A-optimality":

$$\min\ \mathrm{AMSE}\left(\tilde{\beta}\right) = \min\ tr(V) \tag{23}$$

$\mathrm{tr}(V)$ takes the minimum value, and the sampling probability is as follows:

$$\pi_i^{mMSE} = \frac{\left|y_i - \hat{\beta}_{MLB}\right| \left|M_X^{-1} x_i\right|}{\sum_{i=1}^{n} \left|y_i - \hat{\beta}_{MLB}\right| \left|M_X^{-1} x_i\right|}. \tag{24}$$

Optimize the problem and get

$$\pi_i^{MVE} = \frac{\left|y_i - \hat{\beta}_{MLB}\right| \left|M_X^{-1} x_i\right|}{\sum_{i=1}^{n} \left|y_i - \hat{\beta}_{MLB}\right| \left|M_X^{-1} x_i\right|}. \tag{25}$$

4. Experiment

4.1. Sample Population Selection. In the logistic regression model, samples are the most important step in the experimental study. Samples are selected from three groups: excessive sports, moderate sports, occasional sports, and never sports. The differences in sample selection also affect the final analysis results. The sample used in this study is the middle-aged and elderly people of similar age in the community. According to their sports situation, the correlation between sports and aging is analyzed.

4.2. Experimental Testing. We know that exercise can improve the activity of protein mitochondria and exercise can improve the activity expression of Sirt1 and the ability of antioxidant system. Below, we use logistic regression model to test and count the aging of the sample population by sports, as shown in Figure 1.

From Figure 1, we can know that the longevity factor Sirt1 has the highest activity in moderate exercise and can achieve antiaging effect more than other degrees of exercise. Based on logistic regression model, we count

Table 2: Manifestations of various parts of central nervous system.

Sample population	Cerebellum	Cerebellum	Brainstem	Spinal cord
Live sports	Excellent	Good	General	General
Moderate exercise	Excellent	Excellent	Excellent	Excellent
Occasional exercise	Excellent	Good	Good	Good
Never exercise	Excellent	General	General	General

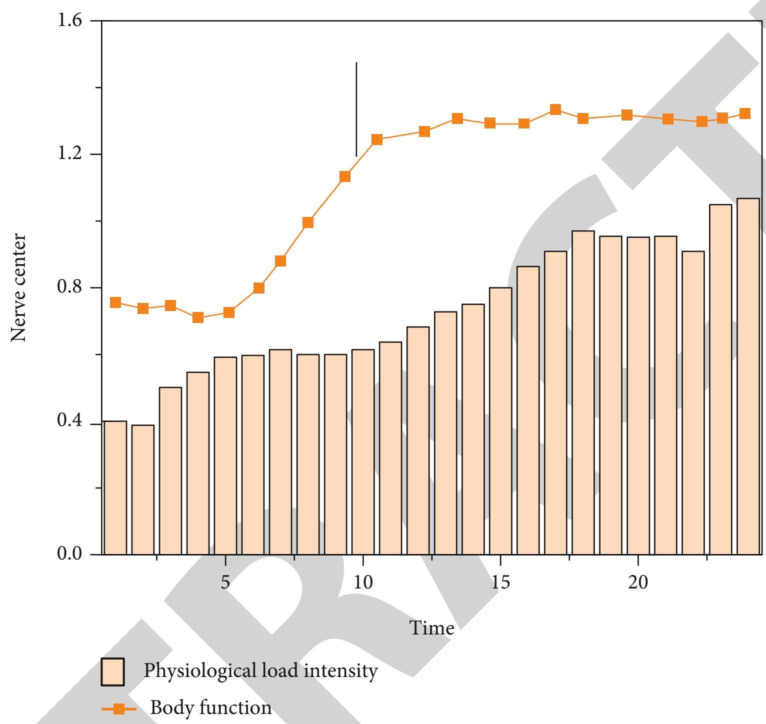

Figure 2: Central nervous system.

Table 3: Cardiopulmonary function.

Sample population	Cardiopulmonary index			
	Load peak/w	VO_2/ml/min	HRR/times/points	Pulse accounts for the predicted value
Live sports	130.2 ± 38.1	1360.21 ± 340.02	37.1 ± 17.23	92.1 ± 20.01
Moderate exercise	117.3 ± 36.1	1190.21 ± 335.02	27.3±15.21	82.1 ± 11.01
Occasional exercise	122.2 ± 37.2	1290.41 ± 338.09	32.1 ± 17.11	87.1 ± 20.61
Never exercise	131.2 ± 41.1	1490.21 ± 345.01	38.1 ± 19.21	92.3 ± 23.01

the central nervous system, cardiopulmonary system, and digestive system of the sample population based on medical big data as follows:

The performance of each part of the central nervous system of the sample population is shown in Table 2.

For the elderly with Alzheimer's disease, the statistical central nervous system situation after one month of appropriate exercise is shown in Figure 2.

After a month of proper exercise, the central nervous system has obviously improved, and the physical function has gradually improved.

Based on the cardiopulmonary function of the sample population with medical big data, the statistical data are shown in Table 3.

For the elderly with poor cardiopulmonary function, the statistical changes of cardiopulmonary indexes after one month's appropriate exercise are shown in Figure 3.

Figure 3 shows that proper exercise is also of great help to the elderly with poor cardiopulmonary function, and various indicators are also developing in this good direction.

Statistics of digestive system indicators of sample population based on medical big data is shown in Table 4.

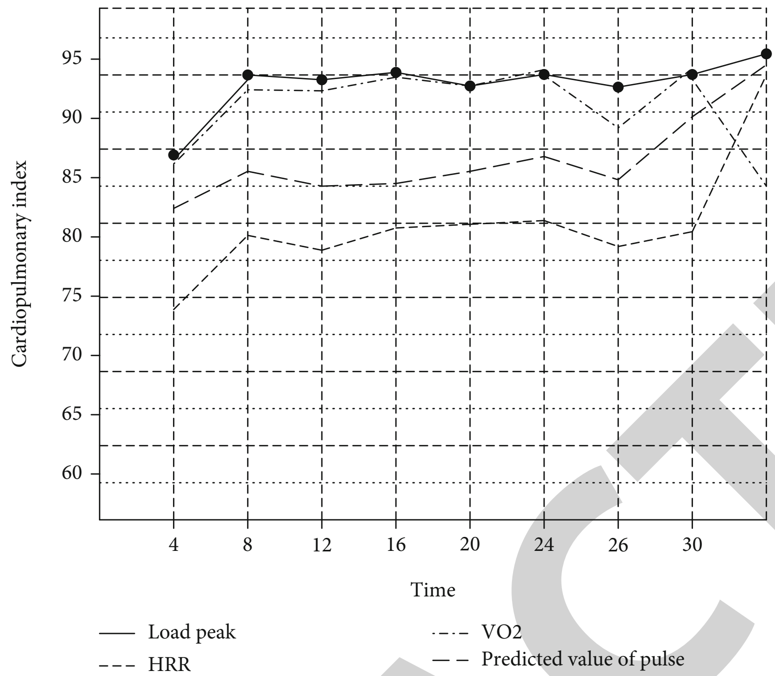

Figure 3: Cardiopulmonary function diagram.

Table 4: Digestive system.

Sample population	Digestive system index			
	Carcinoembryonic antigen	Alpha-fetoprotein	Carbohydrate antigen	Carbohydrate antigen242
Live sports	5.1	10.1	27.1	17
Moderate exercise	4.4	8.2	25.2	15.1
Occasional exercise	5.0	9.8	27.3	17.1
Never exercise	5.5	12	28.2	17.5

Based on medical big data, the sports situation of the elderly suffering from digestive diseases in the community is counted, as shown in Figure 4.

4.3. Model Comparison. We compare and analyze the logistic regression model with the subsampling model algorithm and the large sample model algorithm and analyze the correlation analysis of sports against aging through the algorithm as shown in Figure 5.

4.4. Experimental Analysis. Based on the specific research and analysis of sports and antiaging, in order to highlight the great role of sports in human aging, we selected some aging monkeys as samples, and we compared four schemes:

Scheme 1: The aging monkeys were overtrained every day, and the experimental training lasted for 3 months

Scheme 2: Training aging monkeys occasionally for 3 months

Scheme 3: The aging monkeys should exercise properly every day for 3 months

Scheme 4: The aging monkeys only watch TV every day without any training. After 3 months, we will count the heart and lung conditions of aging monkeys as shown in Figure 6

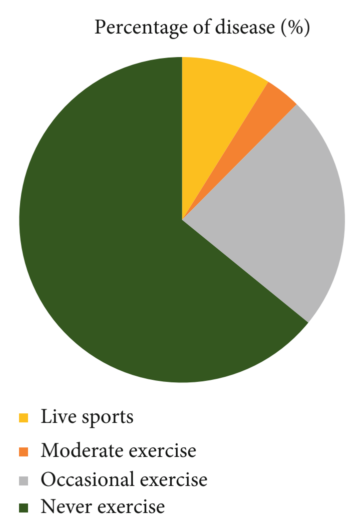

Figure 4: Pie chart of digestive tract diseases.

After the experimental comparison of the four schemes, only the third scheme has the smoothest and most stable cardiopulmonary indexes.

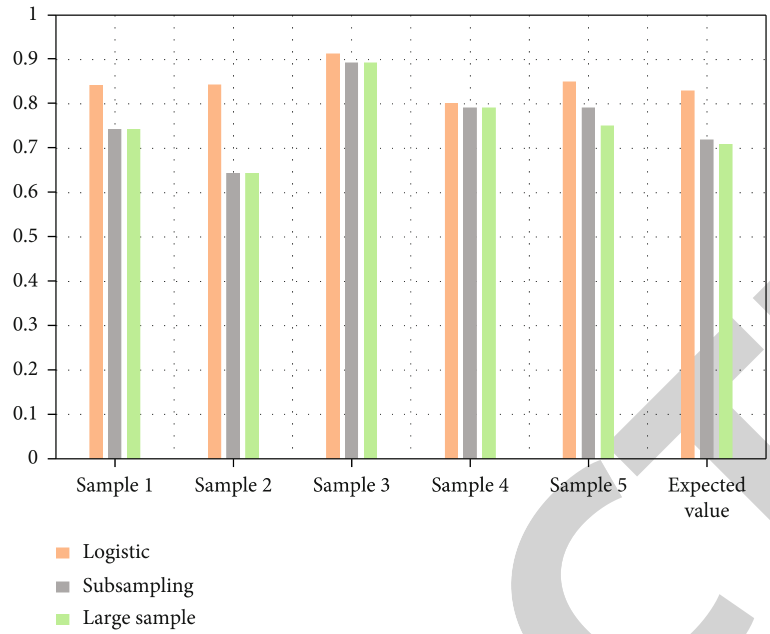

Figure 5: Model comparison diagram.

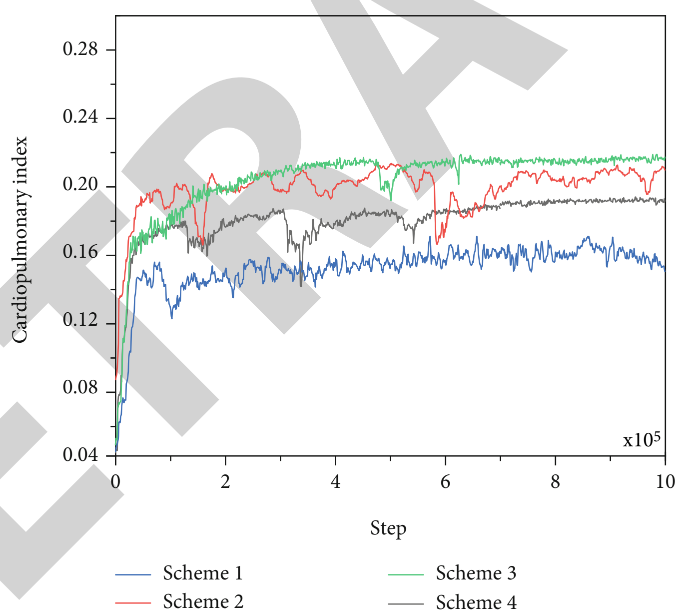

Figure 6: Schematic diagram of cardiopulmonary indexes.

The experimental data obtained after several months of training are shown in Figure 7.

According to the experimental comparison of five indexes of aging monkeys, the five indexes of monkeys with suitable training are indeed superior to those of monkeys with other exercise degrees, which fully confirms our experimental goals.

4.5. Contrast Test. According to the logistic regression model in the paper, we classify and compare the intensity of sports. The sports with the greatest intensity are set as rock climbing, followed by basketball, tai chi, and TV. The relationship between aging and aging is analyzed, as shown in Table 5.

Table 5 lists the analysis data of aging caused by liking four different intensity sports based on logistic regression model. It can be clearly seen that not loving strenuous exercise is the most effective in antiaging, but doing some suitable physical exercise can delay the aging of the body. Of course, watching TV every day without exercise will not delay the aging of the body.

For the influence on cognitive function of the elderly with different exercise intensity, the experiment was carried out for 6 months (schematic Figure 8).

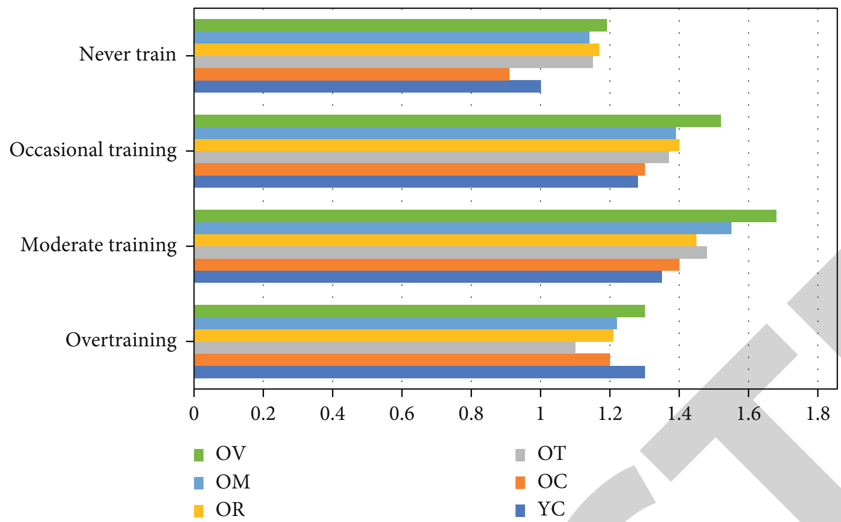

FIGURE 7: Comparison diagram of experimental rats.

TABLE 5: Comparative experiment.

Sample population	Number of illnesses	Logistic regression model		Sirt1 activity
		Health coefficient	Cell senescence	
Rock climbing	3	1.0	0.9	Stronger
Play basketball	1	0.8	0.7	Stronger
Play tai chi	0	0.6	0.8	Strong
Watch TV	3	1.2	1.5	Weak

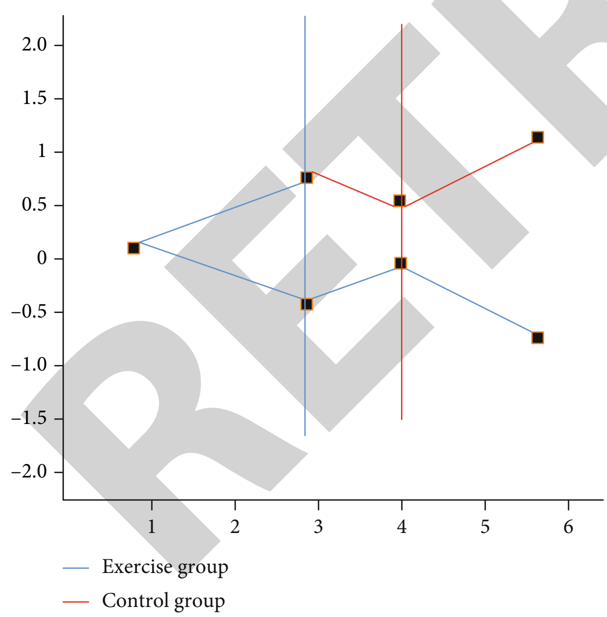

FIGURE 8: Influence of exercise on cognitive function of the elderly.

5. Conclusion

The increasing aging population leads to the gradual aggravation of the aging problem. Nowadays, our country has become a country of "getting old before getting rich," and aging has brought a series of social problems that need us to solve. For personal health, how to keep a healthy body and delay one's own aging is the most important thing. Through logistic regression model, this paper studies and analyzes sports and aging:

(1) We compare logistic regression model with subsample algorithm and large sample algorithm and obviously draw the conclusion that logistic regression model has more statistical significance

(2) Based on the use of medical big data, we can know that patients with poor cardiopulmonary function, digestive function, and nerve center function have improved through proper exercise

(3) For people who do not exercise, they suffer from digestive tract diseases as high as 70%, and proper exercise can improve the cognitive function of the elderly

Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

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

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