Hindawi
International Transactions on Electrical Energy Systems
Volume 2023, Article ID 9768718, 1 page
https://doi.org/10.1155/2023/9768718

Retraction

Retracted: Effects of Artificial Intelligence and Virtual Reality in Martial Arts Sports on Students' Physical and Mental Health

International Transactions on Electrical Energy Systems

Received 15 August 2023; Accepted 15 August 2023; Published 16 August 2023

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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) Peer-review manipulation

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.

References

[1] J. Li, X. Wang, L. Wang, and H. Kang, "Effects of Artificial Intelligence and Virtual Reality in Martial Arts Sports on Students' Physical and Mental Health," *International Transactions on Electrical Energy Systems*, vol. 2022, Article ID 1359243, 12 pages, 2022.

Hindawi
International Transactions on Electrical Energy Systems
Volume 2022, Article ID 1359243, 12 pages
https://doi.org/10.1155/2022/1359243

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Research Article

Effects of Artificial Intelligence and Virtual Reality in Martial Arts Sports on Students' Physical and Mental Health

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Received 21 July 2022; Revised 1 September 2022; Accepted 6 September 2022; Published 30 September 2022

Academic Editor: Raghavan Dhanasekaran

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As a treasure left over from Chinese traditional culture, martial arts have a long history and lasts for a long time. With the country's promotion and support of martial arts culture, martial arts have also attracted more and more people's attention. In order to carry forward the martial arts culture, the combination of martial arts and sports has formed a set of martial arts sports suitable for today's students, such as martial arts aerobics. It is used as a class exercise for students, and basically, every student in the school has learned it and practiced it often. However, with the development of the times, it is difficult for today's students to arouse students' enthusiasm for martial arts sports for traditional martial arts sports. Artificial intelligence technology and virtual reality, as products of today's digital age, attract the attention and use of students with their unique features. This also means that the reform of martial arts sports based on artificial intelligence and virtual reality technology is imperative in order to make more students regain their enthusiasm for martial arts sports. However, the specific impact of artificial intelligence and virtual reality on the physical and mental development of students in martial arts sports is a problem to be confirmed by research. Through in-depth research on artificial intelligence and virtual reality technology, this paper shows that artificial intelligence and virtual reality martial arts sports can increase the lung capacity of boys by about 14% and girls by 16%; the effect on physical fitness can increase the lower body strength of boys by 3% and the flexibility of girls by 30%; as for the impact on mental health, it can be concluded that the emotional and cognitive dimensions of boys and girls have increased by about 19% compared with the previous values.

1. Introduction

Martial arts sports are the product of the combination of traditional culture and sports, and it is also very important in students' physical education. As part of the development of traditional culture, martial arts sports must closely follow the pulse of the times and keep pace with the development of the times, otherwise, it will face elimination. This also means that in the current era of artificial intelligence and virtual reality technology, martial arts sports must also be combined with artificial intelligence and virtual reality in order to usher in new development, and will not be abandoned by the times. Traditional martial arts sports have been difficult to arouse students' interest because of its dullness. Even the martial arts aerobics that is performed between classes is for most students to escape or escape, otherwise, they will directly deal with it. It has gradually lost the original intention of martial arts sports to promote the physical and mental development of students. However, the combination of martial arts sports with artificial intelligence and virtual reality technology is a new research direction and hotspot, and more experiments are needed to verify its impact on the physical and mental development of students. As for the research on artificial intelligence and virtual reality technology, many scholars have done research on it. Research shows that artificial intelligence and virtual reality can

promote the healthy development of student's physical and mental health in martial arts sports.

In recent years, artificial intelligence and virtual reality have become the focus of current research due to their great achievements. Hassabis et al. research aimed to explore the historical interaction of artificial intelligence and neuroscience and highlight recent developments in artificial intelligence [1]. Thrall et al., mainly, studied the opportunities, challenges of artificial intelligence and machine learning in radiology and showed that medical applications of artificial intelligence would play a leading role in radiology [2]. Kihonge et al., mainly, explored the design of spatial mechanisms in network virtual reality and showed that virtual reality could intuitively view and interact with digital models [3]. Berg and Vance, mainly, studied the industrial application of virtual reality in product design and manufacturing and showed that virtual reality was used to make decisions in the design, evaluation, and training process of multiple disciplines [4]. These studies showed that both artificial intelligence and virtual reality could be widely used in various fields, especially in the medical and industrial fields. However, it is rarely involved in the field of sports, which requires further in-depth research. For this reason, attention can be turned to scholars' research on the impact of martial arts sports on students' physical and mental health. Wang M, mainly, studied the effects of exercise intervention on the physical and mental health of contemporary college students. It was shown that physical exercise could improve the flexibility and coordination of the collective, have a positive impact on physical quality and greatly reduce the anxiety symptoms of college students, so that their mental health could tend to a higher level [5]. Moore A primarily investigated the impact of martial arts training on mental health outcomes. The question of whether martial arts training might be an effective exercise-based mental health intervention showed that the relationship between mental health and martial arts training was generally positive [6]. Schneider, mainly, explored the conceptual considerations of physical, psychological, and social effects of exercise, and it showed that physical activity could enhance physical, psychological, and social resources, but there was also personal stress [7]. Chu, mainly, studied the impact of sports on health science and its influencing factors, and it showed that college students' cognition and understanding of healthy sports will affect their own sports status [8]. Although these scholars study the physical and mental effects of sports, they focus on the effects of sports on mental and psychological health. Little attention has been paid to the combined effects of both the body and the mind. This also reflects the fact that there will be few scholars conducting research on the impact of artificial intelligence and virtual reality on the physical and mental health of students in martial arts sports. This requires more effort and more time to study to confirm.

This paper is an in-depth study of artificial intelligence and virtual reality technology. Studies have shown that the wide applicability of artificial intelligence and virtual reality makes it better to combine them with martial arts sports to promote the healthy development of students' physical and mental health. In order to promote the promotion of artificial intelligence and virtual reality martial arts sports, enable students to achieve healthy physical and mental health, and let more students accept artificial intelligence and virtual reality martial arts sports, studies can be started from the following aspects.

2. Martial Arts Sports and Effects on Physical and Mental Health

In order to better understand the impact of martial arts sports on the physical and mental development of students, it is first, necessary to understand the relevant concepts. This section mainly introduces the general situation of martial arts sports and analyzes its influence on students' physical and mental aspects.

2.1. General Situation about Martial Arts Sports. Sports are one of the most basic forms of physical exercise. It relies on orderly organization to carry out social activities, which can ultimately improve physical fitness, enrich social life and spiritual world, and promote the spiritual civilization. Its content is rich and diverse, mainly including martial arts, track and field, ball games, swimming, dance, aerobics, mountaineering, skating, running, and other items [9]. Martial arts is a unique sport in China with the movements of defense and attack as the main body and the unique sets and fighting methods of martial arts as the main form of sport, emphasizing the combination of internal and external [10]. With the needs of the national fitness policy, martial arts sports have gradually entered the campus. The most direct form of expression is martial arts aerobics. It is aimed at different stages of students have different martial arts exercises, in the form of broadcasting exercises to enrich students' activities during the break promote students' physical and mental health, promote the spread of traditional culture, cultivate the national spirit of a sport and entertainment sports form [11].

Chinese Wushu can be divided into two categories according to its sports form: routine sports and fighting sports. Routine movement: it is a complete set of practice forms based on the changing laws of contradictory movements, such as offensive and defensive movements, moving and static movements, rigid and soft movements, and so on. Routine sports can be divided into three types according to the form of practice: individual exercise, pair exercise, and group exercise. Solo training includes unarmed boxing and equipment. The training includes the training of bare hands, the training of equipment, and the training of bare hands and equipment. Group exercise: it is divided into unarmed boxing, equipment, or unarmed and equipment.

Fighting sports: it is a form of confrontation practice in which two people compete with each other under certain conditions and according to certain rules. At present, Sanda, pusher, and short soldier are gradually carried out in Wushu competitions.

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The school's physical education class is the most common way for students to exercise, and it is also one of the few times when students do sports other than radio exercises. This also means that physical education classes are very important for students' sports. It is also a very important link for the development of martial arts, and it can even be used as an important link to carry forward the traditional martial arts culture. As a result of the combination of traditional culture and sports, martial arts sports can not only help students to strengthen their bodies but also cultivate their bodies, so as to improve their physical strength and internal emotional control and release ability to make students feel more peaceful and improved, and ultimately promote the all-round development of body and mind. The popularization of martial arts sports in schools can not only strengthen the body but also promote the development of the overall sports career, and it is also one of the important ways to achieve the goal of strengthening the country through sports. In any case, the school, a good platform for developing martial arts sports, must be paid attention to, and used well to ensure that students can exercise and develop physically and mentally.

2.2. Health of Students. "Health" is a physical condition in which individuals are in good physical, mental, and social conditions [12]. On the one hand, it means that the body is in good shape and there is no other disease that the body's functions are good and normal activities and labor can be carried out; on the other hand, it means that it has high resistance to disease and can quickly adapt to different environments. Today's health includes not only physical health but also mental health, including mental health, spiritual health, and moral health.

For the study of student health, scholars at home and abroad have conducted in-depth research on this issue and have achieved considerable results. In general, the first is the analysis and research on the health status of students. Compared with the health status standard, it is difficult for most students to reach the health standard they should have at their stage. The overall physical quality and physical function of the students also showed an underscored state. Second, the research on the influence of students' physical factors has shown that there is a relationship between a student's physical health and her athletic ability, and the two promote each other and achieve each other. And as you age, mental health factors will also affect physical health whether you like it or not. Obesity is more likely to affect the development of physical health and mental health. Intervention studies on physical health also show that appropriate and reasonable physical exercise can promote physical and mental health. And interclass exercise is very important to promote the all-round development of students, so it is very vital to improve the intensity and content of the physical exercise in the large recess to promote the effectiveness of the physical exercise between the large classes. These scholars' research on students' health can be used as a basis for studying the impact of martial arts sports on students' physical and mental health and help better research.

2.3. Influence of Martial Arts Sports on Students' Mind and Body. The influence of martial arts sports on students is reflected in various aspects. From the perspective of helping students keep fit, the basic movements of martial arts can only be completed by a good use of a person whole body. It has relatively high requirements for its own speed and strength, but it also means that martial arts can enable students to get a full range of practice. For students who want to get more systematic martial arts training, their both external and internal spirits can be improved. It is of great benefit to the improvement of students' physical function and physical fitness. In terms of internal training will, martial arts emphasizes "three nines in winter and three fu in summer," which is a huge challenge for students' will. Students should overcome the boring training, calm down, and exercise seriously. From the moral level, learning martial arts sports must first learn martial arts, which is the first lesson of learning martial arts sports, and is also the central idea of martial arts culture. The improvement of martial arts moral cultivation can promote the development of students' moral education and enable students to develop in all directions. Martial arts sports can enable students to practice both inside and outside, externalizing in the heart and internalizing in the action. Through martial arts sports, students' mental outlook can be improved to a certain extent, both internal cultivation and external ability can be improved, and students can be psychologically satisfied. As a result, students are more confident, full of energy, reduce fatigue, concentrate better, make students' bad emotions easier to clear, and improve the quality of learning and life. In addition, martial arts can promote the development of students' intelligence to a certain extent, and its practice of a superficial phenomenon of complex movements can promote students to learn the three-dimensional system more clearly. Martial arts sports can also help to rule out mental illnesses, and it has a relieving effect on the anxiety that evolves from the pressure of study and life, that is, depression. From these aspects, it can be shown that martial arts sports are indeed very beneficial to the physical and mental development of students, but at the same time, it is difficult to avoid exposing problems. The boring taste of martial arts sports makes it difficult for students to be interested in it. At the same time, it requires students to sink their hearts and be able to endure hardships, "practice three-nine in winter and three-fu in summer," which is difficult for students in today's fast-paced environment. Artificial intelligence and virtual reality can solve these problems and meet the needs of today's students for martial arts sports.

3. Artificial Intelligence and Virtual Reality Technology

3.1. Overview of Virtual Reality. Virtual reality technology is a relatively good high-tech developed recently due to the good momentum of computer development and has received more attention [13]. It creates a virtual environment based on computer technology, so that the user's visual and auditory perception are very close to the real world. Research on virtual reality technology is also linked to various other

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emerging technologies, and it is a very challenging research project. The specific virtual reality technology modeling process is shown in Figure 1:

Since virtual reality is a newly emerging technology, it has not been around for a long time, but it has been widely sought after and widely used since its appearance. It promotes a change in the mode of interaction between humans and machines and presents perception and immersion. Several features, such as interaction and conception [14]. Its perceptivity is reflected in the fact that traditional computers only have visual perception, while virtual reality is more perceptive. It not only has visual perception but also touches and smells perception. A truly perfect virtual reality technology should allow people to experience all kinds of senses in the real world. Virtual technology is in development. And some of the most common and widely used methods are to get 3D sound quality from the headset and to use the virtual reality head-mounted display to watch 3D animations while watching movies. Immersion is also best understood as the most visible feature of virtual reality. It can make the experiencer immersive; it is difficult to distinguish the real from the fake, and they become immersed in the world of virtual reality. And a well-developed virtual reality technology immersed in the five senses will experience the real world the same way. Interactivity means that when the experiencer interacts with the virtual objects, they see in the virtual world created by virtual reality technology, they can learn about similar objects from the real world, that is, conditioned reflex occurs. To put it simply, the objects encountered by the experiencer in the virtual world can be perceived by touch and can obtain basic information about the object, such as shape and other characteristics. As for the conception, it means that the space presented by virtual reality can be imagined unconditionally. It can reconstruct the real world, and it can also create a self-imagined environment based on human imagination. In general, virtual reality is built on extremely high-performance computer systems, relying on head-mounted displays for vision, and relying on speech recognition, voice synthesis, and voice localization for hearing. It uses data gloves, clothing, and direction trackers to obtain the position and shape of the experiencer to obtain a motion system, as well as a feedback system for the other five senses, such as touch and smell.

3.2. Artificial Intelligence. Artificial intelligence can also be regarded as machine intelligence. It is the ability to correctly interpret external data, learn from it, and use this knowledge to improve the ability to achieve specific goals and tasks [15]. Its ultimate goal is to surpass human intelligence. Artificial intelligence and computers are closely linked, and the first thing that comes to mind when seeing artificial intelligence is a computer. Artificial intelligence can use the capabilities of multidisciplinary technology to model human audio-visual thinking so that machines can acquire human capabilities. The good use of artificial intelligence can greatly improve work efficiency and enhance human problem-solving ability. It can better change the computer's information processing capabilities, control system resources more accurately, and respond to resource changes faster, thereby improving information processing and protection capabilities. Its advantages in resource integration are also obvious, and its learning and reasoning abilities can be better used in it. Its most representatives are the artificial neural networks and the error back propagation networks.

3.3. Artificial Neural Network Classification

3.3.1. Artificial Neural Network. An artificial neural network is a computer system that uses many connected simple artificial neurons to simulate the function of a biological neural network [16]. An artificial neuron is a simple bionic neuron that performs simple calculations on the data of the external environment and other artificial neurons, and then outputs it to the external environment or other artificial neurons. Artificial neurons are composed of many artificial neurons. Artificial nerve cells are also called "neuron-like," "artificial neuron," or "processing unit." The specific structural model is shown in Figure 2:

This model can be described using the following formula:

$$\begin{aligned} \lambda_n &= \sum_j \mu_{nj} a_j + b_n - \delta_n, \\ c_n &= m(\lambda_n), \\ w_n &= f(c_n) = p(\lambda_n) = p\left(\sum_j \mu_{nj} + a_j - \delta_n\right), \\ p &= f \times m. \end{aligned} \tag{1}$$

Among them, $a_1, a_2, a_3, \ldots, a_i$ input signal; c_n-the internal state of the neuron; δ_n-imitating neuron thresholds; μ_{nj}- the ganglion strength of the model of the model biological neuron, i. e. the weight of the connection from c_n to c_j; b_n-external input signal; $p(a)$-the transformation function simulates the pattern of biological neurons and is a mathematical formula. It is used to convert the weighted product of the input values from other processing devices into the output values of the processing device, also known as the excitation function.

w_n-simulating the output of biological neurons, that is, the value of the output.

If the time is considered, the formula can be formed under the simplest conditions:

$$\begin{aligned} d\frac{g_\xi}{g_t} + \lambda_n &= \sum_j \mu_{nj} a_j(r) - \delta_n, \\ w_n(r) &= p(\lambda_n(r)). \end{aligned} \tag{2}$$

Artificial neural networks contain many neurons that exhibit certain properties of the brain. Nonlinear mapping, also called a nonlinear operator, is an operator that does not satisfy the linear conditions. It can make it possible to approximate a nonlinear function. An artificial neural network system has the ability of self-adaptation and self-learning, and can self-organize itself according to different information processing requirements, thus, forming a scale-

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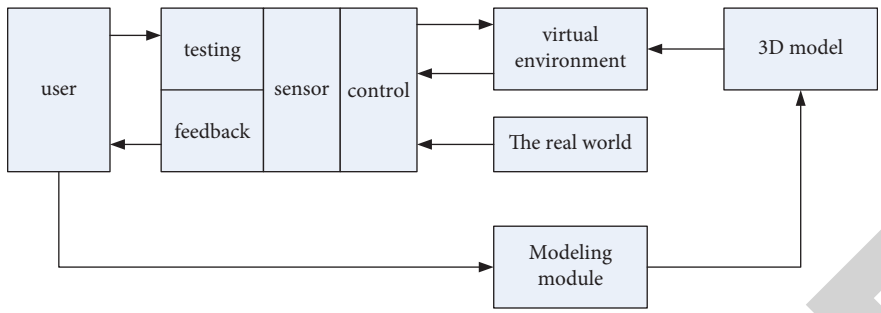

Figure 1: Virtual reality technology modeling process.

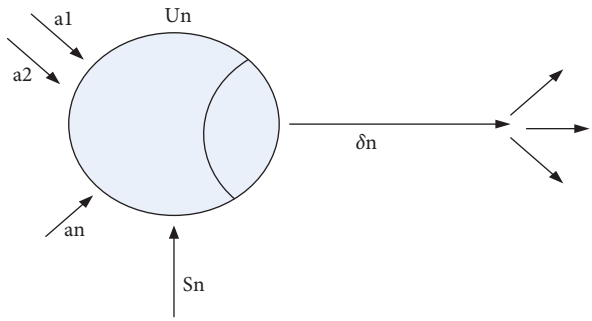

Figure 2: Structure diagram of artificial neuron model.

parallel distribution structure. In the network, based on the content, information processing is carried out in a parallel manner. The neuron network is composed of many neurons; it is not a simple set but has general, complex, and nonlinear dynamics. The system can deal with some problems with very complex environmental information, ambiguous knowledge background, and ambiguous logical reasoning so that it can perform data fusion of qualitative and quantitative signals. There are three classification methods for artificial neural networks. According to the learning strategy, it can be divided into three types: supervised learning, unsupervised learning, and linked learning; and according to the organizational form of the network, it can be divided into two types: feedforward and feedback. According to the characteristics of the network, it can be divided into continuous, discrete, deterministic, and random [17].

3.3.2. Error Backpropagation Network. The error backpropagation network is a multilayer feedforward neural network that can realize arbitrary nonlinear mapping from input to output, also known as BP network [18]. The BP network is one of the most widely used feedbacks, decentralized, supervised learning networks. A BPN consists of many layers, each of which has several processing units. The input layer processing part is used to input information to the external environment, and the output layer processing part is used to output information to the external environment. The basic principle of the BP network is to use the concept of the steepest slope-descent method (it is also known as gradient descent, which is a first-order optimization algorithm) to minimize the error function [19]. One of the most commonly used nonlinear transformation functions in BP networks is the quadratic curve.

$$f(a) = \frac{1}{1} + e^{-a}. \tag{3}$$

When the independent variable tends to positive and negative infinity, the function value tends to be constant, and its function value range is between $(0, 1)$.

The calculation principle is to assume that there is a neural network with a layer, and add a sample X to the input layer. Assuming that the sum of the inputs of all b neurons in the nth layer is represented as U_b^n, the output is X_b^n. The weight coefficient from the hth neuron in the n-1th layer to the bth neuron in the nth layer is W_{bh}, and the excitation function of each neuron is f. Then the relationship between its variables is

$$\begin{aligned} X_b^n &= f(U_b^n), \\ U_b^n &= \sum_h W_{bh} X_h^{n-1}. \end{aligned} \tag{4}$$

The backpropagation algorithm consists of two steps, namely forward propagation and backpropagation. Forward propagation means that the input samples are processed layer by layer from the hidden units of the input layer, and then, sent to the output layer: In hierarchical processing, the condition of each neuron will change the condition of the next level. The current output is compared with the expected output, and if the current output and the expected output are not the same, the reverse transfer is performed. The essence of the BP algorithm is to solve the error function of the optimal solution. In this method, the steepest slope-descent method is introduced into the nonlinear programming, so that the weight coefficient is corrected according to the negative gradient direction. Then, in order to express the BP algorithm, an error function p is given. Taking the sum of squares between the expected output and the actual output as a function of the error, it can be obtained:

$$p = \frac{1}{2} \sum_b \left(X_b^m - W_n\right)^2. \tag{5}$$

Among them, W_n-the expected value of the output unit, which is also used as a supervisory signal; X_b^m-actual output; m-output layer.

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Because the BP algorithm modifies the weight coefficient according to the negative gradient direction of the error function P, the modification amount ΔW_{bh} and p of the weight coefficient W_{bh}:

$$\Delta W_{bh}\theta = \frac{\rho p}{\rho W_{bh}}. \tag{6}$$

It can also be expressed as follows:

$$\Delta W_{bh}\theta = \vartheta \frac{\rho p}{\rho W_{bh}}. \tag{7}$$

ϑ-learning rate, i. e. step size. According to the principle of BP algorithm, it can be known that obtaining $\rho p/\rho W_{bh}$ is the key point. If seeking $\rho p/\rho W_{bh}$, there is

$$\frac{\rho p}{\rho W_{bh}} = \frac{\rho p_n}{\rho U_b^n} * \frac{\rho U_b^n}{\rho W_{bh}}. \tag{8}$$

Because

$$\frac{\rho U_b^n}{\rho W_{bh}} = \frac{\rho\left(\sum W_{bl} X_l^{n-1}\right)}{\rho W_{bh}} = X_h^{n-1}\mid_{l=h}. \tag{9}$$

Therefore,

$$\begin{aligned} \frac{\rho p}{\rho W_{bh}} &= \frac{\rho p}{\rho U_b^n} * X_h^{n-1}, \\ \Delta W_{bh} &= -\vartheta \frac{\rho p}{\rho W_{bh}} = -\vartheta \frac{\rho p}{\rho U_b^n} * X_h^{n-1}. \end{aligned} \tag{10}$$

Let

$$d_b^n = \frac{\rho p}{\rho U_b^n}. \tag{11}$$

Then, there is the learning formula:

$$\Delta W_{bh} = -\vartheta * d_b^n * X_h^{n-1}. \tag{12}$$

As a representative branch of artificial intelligence, artificial neural network and error backpropagation network are the most direct manifestations of artificial intelligence being widely used. This part mainly introduces artificial intelligence and its algorithms.

3.3.3. Application of Artificial Intelligence in Sports. Big data is an extremely important part of today's development. It covers various levels of data knowledge and different values, and can harvest extremely high economic value for intelligent analysis and extraction. The most important thing is to analyze the data, to discover the laws and hidden information contained in the data. With the development of today's technology, the application of this technology has also undergone different changes. It has changed the traditional statistical method; the accuracy and speed of information search have been improved; and the decision-making process has become more efficient. Artificial intelligence and big data are two kinds of data that integrate and interact with each other. Artificial intelligence can make its technology and programs have the minds of people. It is built on the basis of big data, and through a large number of data-driven, the problem to be solved becomes the data for computer analysis and processing. In this age, artificial intelligence is widely used in smart homes, smart manufacturing, and other fields, but it is rarely used in martial arts sports.

Artificial intelligence is helpful for Wushu athletes to arrange the load scientifically in training. Since the load is inversely proportional to the strength, the load is large and the strength is small. Vice versa, at the same time, it can scientifically grasp the exercise time, so that the local load will not be too large [20]. When there is acid numbness, pain and swelling in the body, it can also immediately sense and remind the athletes to adjust immediately. During the training of Wushu athletes, it is a stage from body load to fatigue. After fatigue, artificial intelligence can timely relax after exercise and conduct restorative training to better eliminate fatigue, so as to reduce sports injury. Therefore, Wushu athletes can achieve a state of excessive recovery and ultimately reduce the injury rate by implementing scientific fatigue recovery after sports.

In the field of sports, artificial intelligence is mostly used in sports competitions and sports training. It can be used in sports competitions to ensure the fairness of the competition, and because the technology in this area is relatively more mature, it is more convenient to use. For physical education, artificial intelligence plays more of an auxiliary role, and physical education teachers and coaches are the absolute dominant ones. Specifically, it can be seen in Figure 3:

3.4. Development Trend of Artificial Intelligence and Virtual Reality in Sports. Artificial intelligence and virtual reality have a good development in today's society and have achieved good results, but there is indeed a lot of space in the field of martial arts sports. First of all, artificial intelligence and virtual reality technology must be further upgraded. The current development of artificial intelligence is in the stage of perceptual intelligence. Machines cannot think independently or act independently. Errors are prone to occur in the stages of data collection, processing, and information analysis, and the related intelligent algorithms also need to be further improved. And the application in sports lacks corresponding support and guarantee. Artificial intelligence can become the key to the development of martial arts sports in the future, but for now, it cannot be the whole of sports development. But as long as one part has begun to develop, such as martial arts sports, it can also promote the development of the whole part. For virtual reality technology, sports simulation will be an important direction for the development of sports in the future [21]. Sports simulation can simulate and reproduce teachers' teaching experience, physical training, and students' training processes by using computer simulation, and can promote the development of sports evaluation science. At present, the simulation of motion is usually displayed through the methods of interactive simulation and simulation. In motion simulation, the methods of interactive simulation and simulation are very

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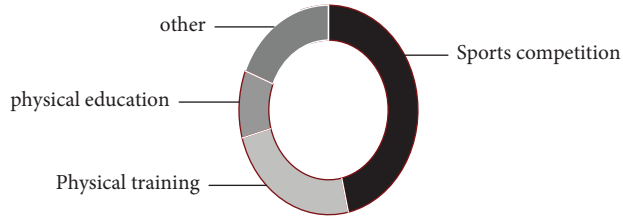

Figure 3: Application proportion of artificial intelligence in sports field.

Table 1: Five health status indicators.

Dimension	High health	Good health	General health	Sub healthy	Disease
Cognition	21~25	17~20	11~16	8~10	5~7
Thinking	22~25	19~21	13~18	9~12	5~8
Personality	22~25	18~21	12~17	8~11	5~7
Emotion	14~15	11~13	7~10	5~6	3~4
Will	27~30	22~26	14~21	10~13	6~9

different, so the interactive feeling and perception of motion simulation can be improved. Due to the continuous development of virtual technology, motion simulation will have better development in the future.

With the popularization of artificial intelligence and virtual reality technology, sports are not only for national fitness, but also to respond to the call of a sports power. The new sports method based on sports application software and portable equipment has become a popular sports method in today's society. With the continuous development of artificial intelligence and virtual reality technology, sports activities that rely on intelligence and virtual reality are more in line with the needs of people's current life and play a more important role in people's daily life. For example, many portable intelligent devices nowadays can monitor daily data at any time when they are carried on the body and obtain the corresponding calories, which can be synchronized to the Internet, and obtain a reasonable fitness policy and health status report. It is simply an essential tool for people losing weight.

4. Experiment Design of Artificial Intelligence and Virtual Reality

In order to verify the impact of artificial intelligence and virtual reality in martial arts sports on students' physical and mental health, this paper conducts an empirical study. This paper mainly conducts empirical research through the questionnaire survey method. The research object is 300 freshmen students in the city. Experimental group A has 150 students who take the latest martial arts sports aerobics optimized by artificial intelligence and virtual reality. In the control group, 150 students from B students take traditional Wushu aerobics as an elective. The ratio of males to females in each group is 1 : 1, with 75 participants.

4.1. Formulation of the Questionnaire. The psychological questionnaire of the experimental subjects is based on the data of the Mental Health Scale. The table is compiled according to the principles of psychometrics on the basis of juvenile health assessment at home and abroad, and has high reliability and validity. As shown in Table 1: it is the norm of the health status of each dimension of the mental health scale.

4.2. Distribution and Recovery of Questionnaires. In order to verify the impact of artificial intelligence and virtual reality on the physical and mental health of students in martial arts sports, the mental health of the experimental subjects is detected by the mental health scale, and questionnaires are distributed to 300 college students. The recovery rate of the questionnaire is 97%, and the effective rate is 94%, as shown in Table 2:

4.3. Experimental Data Collection, Investigation, and Arrangement. Of 10 classes in the School of Biomedical Sciences, 5 classes in experimental groups A and B were selected, and students in 10 classes were tested to obtain relevant information. A test was conducted in ten freshman classes, and 300 subjects who met the experimental conditions were finally identified. There were 150 people in both experimental group A and control group B, including 75 male and female students. The experimental period was 3 months. In the first month, 150 students in 5 classes in group A were taught martial arts aerobics with artificial intelligence and virtual reality. In order to promote teaching, students who choose artificial intelligence and virtual reality martial arts gymnastics must practice at least 5 times a week with equipment, two rounds; while group B chooses the training of traditional Wushu aerobics. The students of traditional aerobics training need to adhere to two rounds of training in the stadium every day, five times a week. After 3 months of persistence, the obtained data were collected, sorted, and analyzed.

In order to verify the impact of two forms of sports on students, students were tested according to the health test

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Table 2: Distribution statistics of mental health scale.

Issued amount	Number of recoveries	Rate of recovery (%)	Effective number	Efficiency (%)
300	291	97	282	94

indicators given by the students' physical health test standards. The content of the test mainly includes three aspects: body shape, physical function, and the physical quality of students. In terms of student body shape, the test indicators selected in this study include student height and weight. As for the physical function of students, the measurement indicators are lung capacity and heart rate. In terms of the physical fitness of the students, there are sitting body forward bends; 50-meter sprint for boys; 1,000 meters for boys; 800-meter long-distance running for girls; standing long jump; pull-ups for boys; and sit-ups for girls. The specific physical fitness test table is shown in Table 3:

In this experiment, the experimental results were obtained by measuring various physical data of the experimental subjects every month from the experimental day. After the measurement, the changes in height and weight of boys and girls before and after the measurement were obtained, as shown in Figure 4:

It can be seen from Figure 4 that the students in group A recorded their height and weight from the initial day of the experiment. Overall, the height did not change significantly, and the weight increased. The data of control group B are shown in Figure 5:

It can be seen from Figure 5 that the height and weight of the students in the control group have not changed much from the start of the experiment to three months later. Therefore, it can be known that, excluding the interference items of the basic stereotype of college students' height, there is no particularly obvious change in the body shape of college students. The overall comparison table before and after the specific experiment is shown in Table 4:

It can be seen from the table that, in terms of height, after three months of experimental training, the difference in height is not obvious, and the change is very small. This shows that the two groups of martial arts sports modes A and B have little effect on the adult college students; in terms of weight, after three months of training, the weight changes of boys and girls in group A were more obvious than those in group B. Group A men and women significantly increased their weight by about 1 kg, while group B gained less than 1 kg. It shows that the influence of the way of Wushu Sports Aerobics Training on students is more obvious than that of traditional Wushu aerobics. This also means that martial arts aerobics based on artificial intelligence and virtual reality can strengthen students' physiques, and the effect is more obvious.

The subjects' physical abilities were, then, measured. Figure 6 is the measurement of the lung capacity of male and female students, which is also measured once a month from the initial date of the experiment, as shown in Figure 6:

It can be seen from Figure 6 that the vital capacity of students in group A has improved significantly. Although the vital capacity of students in group B has also increased, compared with group A, the increase is not so obvious. It can be seen that the training method of group A has a relatively high effect on improving the vital capacity of students. Whether the change in heart rate is also like the lung capacity, as shown in Figure 7:

It can be seen from Figure 7 that the heart rate of girls in group A is lower than that of boys, and the heart rate of girls in group B is also lower than that of boys. This shows that martial arts sports are helpful for reducing the heart rate of girls. On the whole, the overall heart rate did not drop significantly, but the heart rate of group A decreased more than that of group B. This suggests that, to a certain extent, the training method of group A will be more effective than that of group B.

Comparing the measurement data of vital capacity and heart rate, it can be concluded that the training methods of group A have significant differences in the improvement of vital capacity and have a great effect on improving vital capacity; similarly, the training method of group A also had a certain effect on the reduction of heart rate. Therefore, it can be determined that the training method of group A is more effective for improving physical function. As for the various effects on physical fitness, the two groups of data before and after the test are mainly tested, and the two groups of data are summarized. The specific data comparison table is shown in Table 5:

According to Table 5, it can be seen that the experimental data of group A have significant differences. Whether it was in the 50-meter race, the 1,000-meter and pull-up for boys, or the 800-meter and sit-up for girls, or the sit-forward bend or the standing long jump, the data of group A was significantly different, and the overall test performance was better than that of group B. This means that after 3 months of training, students in group A have better endurance, flexibility, and explosiveness than students in group B, and students in group A have better physical fitness than students in group B after training.

Experimental results show that: after three months of martial arts aerobics practice based on artificial intelligence and virtual reality, the flexibility of the boys in the experimental group has been significantly improved, the strength of the lower body has been improved, and the balance ability has also been significantly improved; the flexibility of girls has been significantly improved, the strength of the lower body has been significantly improved, and the balance ability has been significantly improved. This shows that martial arts gymnastics based on artificial intelligence and virtual reality can significantly improve the physical function of students. But for the impact of psychological changes, it can be known from Table 6:

As can be seen from Table 6, compared with group B, the training data of group A showed more significant differences in the thinking dimension, cognitive dimension, will

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Table 3: Measurement indicators and equipment.

Test level	Test indicators	Test equipment
Body shape	Height Weight	Height scale
Bodily function	Vital capacity	Electronic spirometer
Physical quality	Sitting body flexion Sprint 50 meters Men's 1000 m Women's 800 m Standing long jump Boys pull up Girl sit ups	Sitting body flexion measuring instrument Stopwatch Tape Horizontal bar Stopwatch

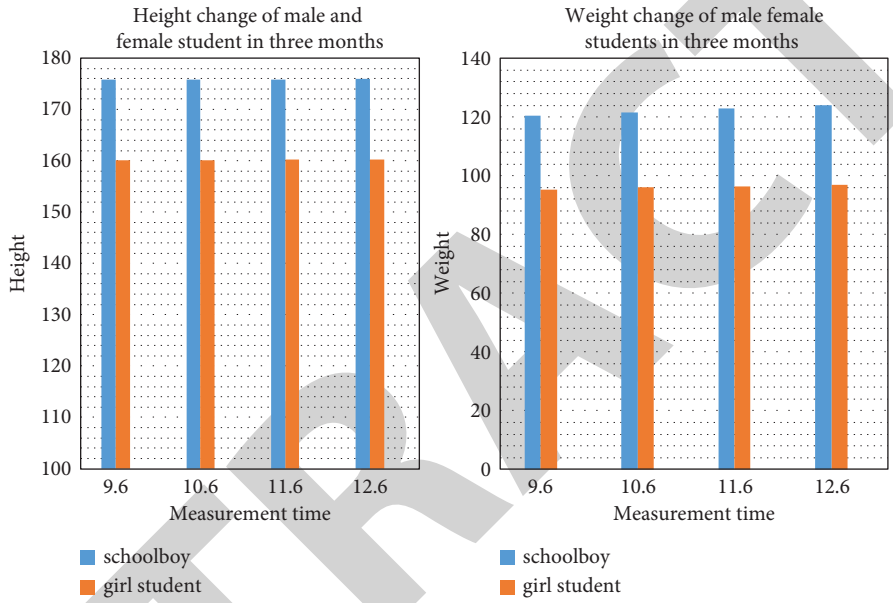

Figure 4: Height and weight of male and female students in group A.

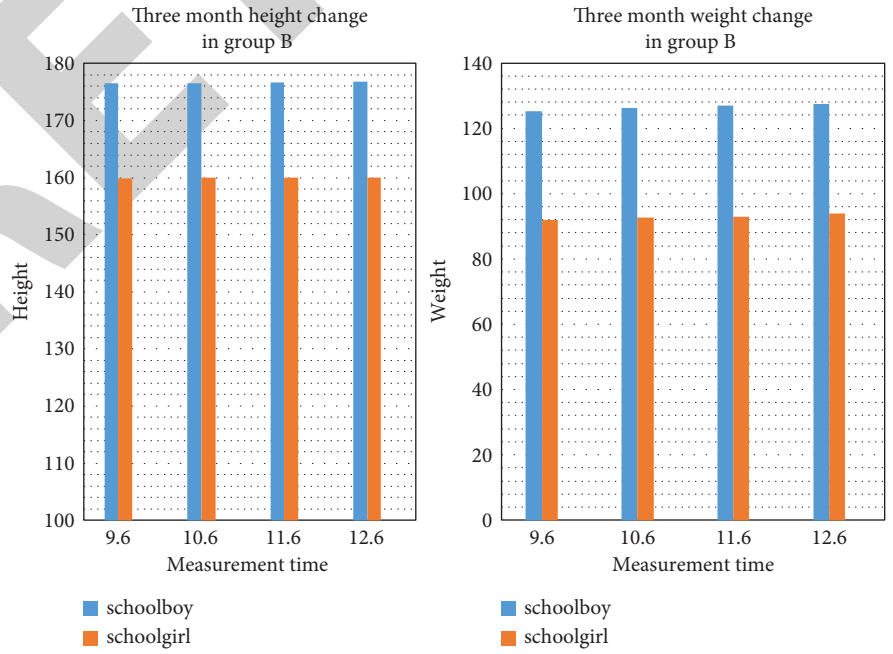

Figure 5: Height and weight of male and female students in group B.

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Table 4: Comparison of body shape between boys and girls before and after the experiment.

Index	Group	Before experiment		After experiment	
		Schoolboy	Schoolgirl	Schoolboy	Schoolgirl
Height (cm)	A	175.78 ± 5.15	160.05 ± 5.75	175.95 ± 6.03	160.03 ± 6.97
	B	176.53 ± 5.88	159.85 ± 5.55	176.88 ± 6.06	160.03 ± 5.85
Weight (kg)	A	60.17 ± 7.02	47.65∓6.01	62.16 ± 8.12	48.70 ± 7.12
	B	62.66 ± 7.99	46.05 ± 6.01	63.78 ± 7.96	46.52 ± 7.84

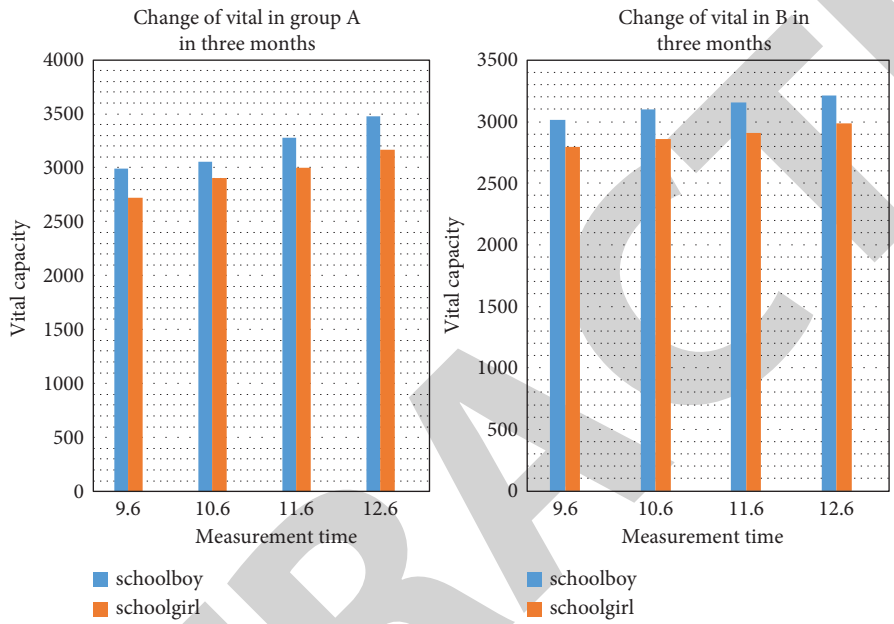

Figure 6: Comparison of students' vital capacity before and after the experiment.

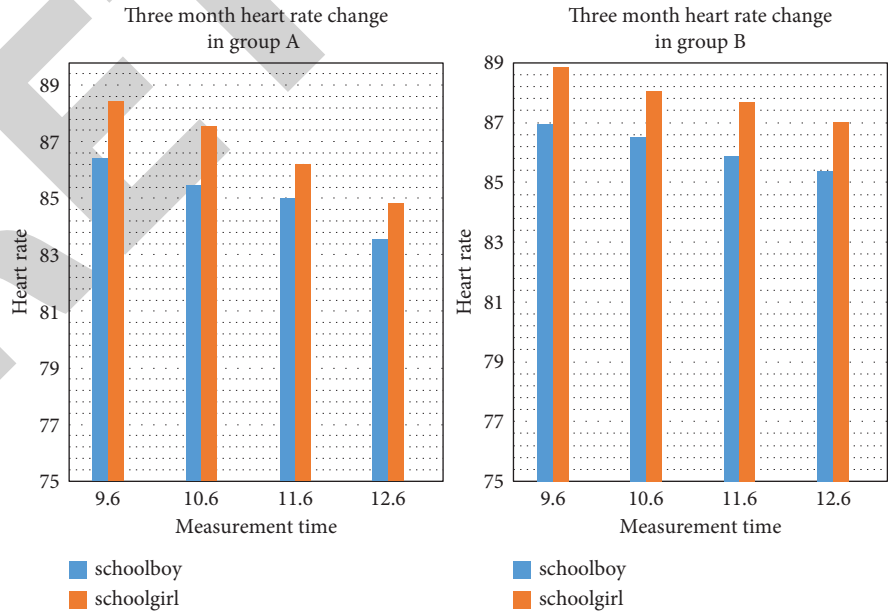

Figure 7: Comparison chart of students' heart rate changes.

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Table 5: Comparison of average data of various indicators of students' physical fitness.

Index	Group	Before experiment		After experiment	
		Schoolboy	Girl student	Schoolboy	Girl student
50 m	A	8.34	9.25	7.92	8.87
	B	8.48	9.35	8.05	9.08
Male 1000 m or female 800 m	A	286.25	224.38	240.65	200.68
	B	287.56	225.42	265.32	220.15
Sitting body flexion	A	12.15	13.82	15.32	17.25
	B	12.41	13.78	14.25	15.65
Male pull up or female sit ups	A	5	39	7	50
	B	5	39	6	45
Standing long jump	A	195.65	175.84	210.54	195.25
	B	194.54	178.63	200.58	189.45

Table 6: Psychological impact of Wushu and aerobics on students.

Index Gender	Group	Before experiment		After experiment	
		Schoolboy	Schoolgirl	Schoolboy	Schoolgirl
Thinking dimension	A	18.32	17.95	21.25	20.34
	B	18.45	17.58	19.62	18.96
Cognitive dimension	A	17.62	17.98	20.56	21.58
	B	18.09	18.02	19.24	19.52
Will dimension	A	18.56	18.43	19.52	19.22
	B	18.45	18.14	19.12	18.87
Emotional dimension	A	13.05	13.62	15.89	16.21
	B	12.72	13.70	14.09	14.24
Personality dimension	A	19.56	19.56	20.05	20.04
	B	19.02	19.45	19.69	19.81

dimension, emotion dimension, and personality dimension. In addition, the comparison between the data of group A and the initial data has been improved, and the training data of group B, which is a reference to it, has also been improved, but the result of the comparison with the data of group A is not obvious. Specifically, after three months of training, the boys in the experimental group have significantly improved their thinking, cognitive, and emotional dimensions; the thinking dimension of girls has been significantly improved, and the cognitive dimension and emotional dimension have been significantly improved. This also shows that artificial intelligence and virtual reality are helpful for the development of students' mental health in martial arts sports.

In general, through the verification of experiments, it can be known that artificial intelligence and virtual reality in martial arts sports are beneficial to the physical and mental development of students, and it can promote students' physical and mental development in a healthier and more stable direction. Through experimental data, it can be known that artificial intelligence and virtual reality martial arts sports can increase the lung capacity of boys by about 14% and girls by 16%. As for physical fitness, it can increase the strength of the lower limbs of boys by 3% and the flexibility of girls by 30%; as for the impact on mental health, it can be concluded that the emotional and cognitive dimensions of boys and girls have increased by 19%, compared with the previous values. This also means that physical exercise in this way can promote students' better venting of emotions and improve cognition.

5. Conclusions

With the development of the times, in today's rapid development of artificial intelligence and virtual reality technology, which is widely used, sports are also inseparable from artificial intelligence and virtual reality technology. As a traditional culture, martial arts are even more difficult to break away from the current development trend of the times. In order to make martial arts sports accepted and practiced by more people, it must be combined with artificial intelligence and virtual reality, so that it can escape from the boring and difficult learning of traditional martial arts, making it easier to use and more effective. Based on artificial intelligence and virtual reality technology, this paper deeply analyzed the influence of Wushu aerobics based on artificial intelligence and virtual reality on students' body shape, body function, and physical quality as well as psychological thinking, cognition, will, emotion, and personality. The experimental results also proved that this kind of exercise could promote students' physical and mental development in a healthier direction. This paper mainly tests the effects of artificial intelligence and virtual reality in martial arts sports on students' physical and mental health through questionnaires and experimental methods. The research focused on the external physical constitution, function, and internal

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psychological influence. During the experiment, it is difficult to exclude the influence of subjective factors on the experimental results, and the overall experimental analysis is currently in a relatively simple stage, and further research can be carried out in other directions in the future.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest in this study.

Authors' Contributions

JingGang Li and LiJun Wang are the co-first authors.

Acknowledgments

The project was supported by the "Research Center for Cultural Security in Ethnic Areas" of the Key Research Base of Humanities and Social Sciences of Guangxi Universities (no. 2022YJJD0037).

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