

Retraction

Retracted: The Impact of the Development of Modern Biotechnology and Nanotechnology on the Swimming Sports Industry

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This article has been retracted by Hindawi, as publisher, following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of systematic manipulation of the publication and peer-review process. We cannot, therefore, vouch for the reliability or integrity of this article.

Please note that this notice is intended solely to alert readers that the peer-review process of this article has been compromised.

Wiley and Hindawi regret 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 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] S. Liu and B. Guo, "The Impact of the Development of Modern Biotechnology and Nanotechnology on the Swimming Sports Industry," *Advances in Materials Science and Engineering*, vol. 2022, Article ID 3303654, 14 pages, 2022.

Research Article

The Impact of the Development of Modern Biotechnology and Nanotechnology on the Swimming Sports Industry

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In today's world, science and technology are developing rapidly, which has had a broad and profound impact on human society. After entering the twenty-first century, every ordinary person can feel the profound changes brought by modern science and technology to people's daily life. In today's society, the global economy is developing faster and faster, and the demand for sports is also increasing, bringing more and more consumers, which makes the sports industry an emerging industry with unlimited potential and expanding scale in the industrial economy. As one of the important events of modern competitive sports, swimming provides many opportunities and platforms for the development of Chinese competitive sports. Today, swimming is not only an Olympic sport but also a popular sport. Modern biotechnology and nanotechnology have an impact on all of our lives, but like other advanced technologies, their development inevitably involves uncertainty. This article focuses on the integration of nanotechnology and biotechnology to produce nanobiotechnology, the use of nanotechnology to address swimmers' bodily functions, and the impact of its development on the field of swimming. The results found that compared with the normal group, the experimental group had an increase in the indexes of rest-fatigue-recovery stages, and the MPF value at rest increased significantly, from 90.1 to 111.3. As a popular sport among the people, swimming has also shown significant growth in the development of its social organization.

1. Introduction

In recent years, the popularity of national gymnastics has continued to increase, and various activities have emerged to meet people's needs for sports and passion for experience. Swimming, as an important element of sports and an important part of the swimming industry chain, has also been publicized to the public and has not been ignored. In just a few short years, the national swimming event has taken shape and has grown rapidly in scope and depth. As a traditional gold medal holder in the Olympic Games and National Games, the proportion of gold medals in the Olympic Games and National Games has exceeded 10%, and it has a core position in China's competitive sports. Combining the rapid development of modern science and

technology with the sports industry and making the sports industry more prosperous is a key issue that needs to be studied today.

Nanomaterials are solid systems composed of particles ranging in size from 1 to 100 nanometers. These systems typically include nanomaterial sensors, nanomolecules, imaging, drug delivery, and DNA transfer. Therefore, nanomaterials have a wide range of applications in biomedicine, biochemical analysis, engineering, and magnetism. With the deciphering of the human genome and the genomes of other model organisms and the advent of the post-genomic era, identifying all genes and their expression profiles, understanding the spatial structure, modification and processing of the proteins encoded by genes, and the interactions between proteins is becoming a new focus, and

there is more controversy in the use of sports athletes. In recent years, with the rapid development of modern biotechnology, especially the rapid development of gene technology, and its wide application, more and more people are testing genes to see whether they have strong sports abilities.

The transformation and development of sports under the new normal has triggered the continuous reform and development of swimming, and the continuous reform and development of swimming have also promoted the development of the sports industry under the new normal. The two complement, influence, and promote each other. This paper is based on the fact that modern biotechnology and nanotechnology are new comprehensive disciplines, which have been accompanied by many focal points of public opinion debate in the process of development. Actively discussing the combination of the development of the swimming sports industry and modern biotechnology and nanotechnology depends not only on the practicability of the technology but also on the perfection of related bioethical issues.

2. Related Work

The recently concluded 2019 World Aquatics Championships was another big swimming event that saw some huge strides made by human athletes across many disciplines. However, some world records set 10 years ago in the era of high-tech swimsuits still remain unbroken. With advances in technical skills and training methods over the past decade, the inability to break these world records strongly suggests that records with swimsuit rewards do not reflect the real progress human athletes have made in history. Many swimming professionals and enthusiasts are eager to know what the true world record would be if high-tech swimsuits were not allowed. Gao Zhenyu attempts to recover the real-world record for men's swimming without a high-tech swimsuit by integrating various advanced probabilistic modeling and optimization methods. By modeling and isolating swimsuit bias, natural improvement, and athlete intrinsic performance, the results provide the best estimates and 95% confidence intervals for real-world records. The method he proposed can also be applied to various multifactor similar studies [1]. Travel habits and motivations are constantly changing and reshaping. For this reason, their study is essential for the tourism industry, as the response to these changes is one of the determinants of competitiveness and product innovation. Tütüncü-Hriszto et al. studied the travel habits of young workers (mean age = 29.1 years, SD = 24.00) in terms of destination choice and sports tourism motivation ($N=1,182$). The survey found that the most popular destination was continental Europe, with 71.5% of respondents choosing EU countries and 7.5% choosing non-EU but European destinations, 9.3% of respondents chose only domestic (Hungary) holiday destinations in the past two years. The results showed that only 36.3% of respondents had taken a vacation without a sporting purpose, while the majority of respondents (63.7%) had taken a sports vacation with some frequency in the past two years. There were differences in gender, with significantly more males than females reporting

taking a sports vacation ($P = 0.001$). The most typical physical activities during these types of vacations are swimming and water sports, but the practicality is not strong [2]. The purpose of Sadovnikova's questionnaire is to uncover the recognition of fitness as a prerequisite for the form of mass physical education. He asked 100 respondents ranging in age from 20 to 60 and with work experience ranging from 1 to 40 years. More than 60% of respondents have 5 to 20 years of work experience, and population jobs in different specialties (aerobic, strength, athletics, oriental, aquatic sports). When the number of subjects exceeded 100 ($n=100$), the Kolmogorov-Smirnov method under normal distribution was used for selection. Based on demand, cardio and strength training took the top spot, at 30% and 40%, respectively. In the second place, there are swimming and water aerobics at 30% and 28%, respectively. In third place were sports and outdoor games, stretching, at 18% and 13%, respectively. Other forms of exercise earned less than 8%. The form he came up with was assessed in points, all of which were added up. Generally speaking, the demand is estimated to be 1.99 ± 1.31 points out of 12 points [3]. Pogodina discusses studies of the functional capacity of the major systems of the body in children, adolescents, and young men as they adapt to the physical load of sports swimming. He studied male swimmers aged 9–18. His research included 2 phases: studies of physical development, aerobic capacity, and non-specific resistance (9–18 years; $n = 603$) and a study of cardiovascular and respiratory adaptive responses (9–10 years, 11–13 years, and 14–16 years; $n = 75$). It physiologically demonstrated the potential ability of children, adolescents, and young men who engage in swimming to withstand physical loads of various intensities and durations. The results show that in swimmers in the performance-enhancing stage, the formation of aerobic potential is closely coordinated with the growth process. The development of aerobic capacity correlates strongly with anthropometric data at 9–13 years of age and with functional and homeostatic parameters at 14–18 years of age [4]. Swimming as a sport includes a variety of styles and distances (from 50 m to 500 m). Swimming as a sport encompasses a variety of styles and distances (from 50 m to 1,500 m). The correlation between athletic performance and general/specific muscle strength seems unquestionable. Wioletta et al. studied the ratio between maintaining muscle strength development (mainly dependent on land training) and water endurance training. General strength tests are performed at the beginning and end of winter and summer preparation periods. The following tests were performed: bench press, pull-up, and horizontal bar squat. At the end of the main study period, thrust tests were performed on land (on a swimming bench), as well as thrust tests in water. Results showed that all participants improved in performance between summer and winter [5]. de Barros Sousa et al.'s study aimed to propose and validate the tethered swimming lactate minimum test (TSLacmin), which uses force as a measurement parameter to estimate aerobic and anaerobic capacity in a single test. The tethered swimming test uses an acquisition system capable of measuring maximum (F_{max}) and mean (F_{mean}) force and intensity changes. A tethered swim test lasting 30 seconds resulted in hyperlactatemia of 7.9 ± 2.0 mmol·l⁻¹. TSLacmin exhibits a 100% successful application rate, which corresponds to aerobic capacity in 75% of cases [6]. The

healthcare sector is likely to benefit the most from the application of nanotechnology. Nanotechnology in the form of nanomedicine, nanoimplants, nanobiosensors, and the internet of nano things (IoNTs) has the potential to revolutionize the fields of medicine and healthcare services. Pramanik et al. explore the clinical and medical possibilities of these different nanotechnological implementations. They provide a comprehensive overview of nanotechnology, biosensors, nanobiosensors, and IoNTs. In addition, they present a multilevel taxonomy of nanotechnology, nanoparticles, biosensors, nanobiosensors, and nanozymes. They discuss the potential medical and clinical applications of these techniques in detail with several examples. They also rigorously discuss the challenges of successfully implementing IoT and, in particular, discuss the internet of bio nano things (IoBNT) and its potential to make IoT more compatible with the human body [7]. These studies provide a detailed analysis of swimming sports and nanotechnology. It is undeniable that these studies have greatly contributed to the development of the corresponding fields. We can learn a lot from the methodology and data analysis. However, the combined studies of the two fields are relatively few and not thorough enough, and there is a need to fully apply these techniques to the research in the field.

3. Development of Modern Biotechnology and Nanotechnology and Swimming Sports Industry

Swimming is a sport in which the body moves in water in various positions, and it is one of the most intimate sports in contact with nature. It is a combination of swimming in the water, sunbathing, and swimming in the air and has a large impact on physical and mental health [8]. It can improve cardiorespiratory capacity and cardiovascular and muscle strength and is also effective in preventing obesity, asthma, varicose veins, and neurasthenia. There are two main types of swimming today: competitive and recreational, as shown in Figure 1.

The development of sports is inseparable from the support of sports talents. The experience of world sports powers tells us that the development level of a country's sports undertakings depends to a large extent on the quantity and quality of sports talents [9]. The development of sports is inseparable from the support for sports talents. With the continuous development of society, competitive sports are more closely related to people's material and spiritual life. On the basis of some important characteristics, some new trends have emerged. Of course, these trends also have a strong moral character.

3.1. Emphasizing Social Value. As one of the development trends of sports, modern competitive sports is a sport with social significance, which is based on meeting people's individual needs for physical competition [10]. Competition drives sport to continually improve athlete's overall athletic performance, which means that an athlete's training methods must be constantly revised and reviewed. The

objective result of this process is that the whole society is required to conduct long-term research on the selection and training methods of athletes, standardize the technical equipment and movements that are the basis of competition, improve the rules of competition, build suitable stadium facilities, and train the personnel specifically responsible for organizing competitions and athlete procedures. Individual athletic activities lead to the improvement of overall sports performance, and various complex social and economic relations have been formed and developed around sports performance, forming a unique sports phenomenon in society. The social value of competitive sports has been enhanced [11].

The development of China's competitive sports talent training system is formed by the interweaving and combination of factors such as talent subject, training approach, funding source, and development goals. Figure 2 shows the main path of talent training in competitive sports at this stage.

At present, China's sports academies have greater advantages than professional teams and universities in terms of hardware, teachers, and scientific research. This allows student-athletes to gain theoretical knowledge in training and better apply that knowledge in practice. At the same time, it also provides a larger platform for learning and communication, which is conducive to broadening horizons and future development. There are various ways of training swimmers, including the independent training mode of sports schools, the cooperation mode between schools and provincial training groups in various regions, and the mode of training world-class and high-level athletes [12].

3.2. Strengthening the High-Tech Content. The modern world is an era of rapid scientific development, and competitive sports are the reasons for the rapid development of modern times. Therefore, competitive sports and technological progress are inextricably linked [13]. In the composition system of sports performance, there are competitive factors such as human body, psychology, and technology; life factors such as nutrition, diet, rest, and rehabilitation; and instrumental factors such as tools and device, sportswear, and equipment. Therefore, it is only possible to comprehensively improve the composition of the sports performance system by pushing all the factors that make up the sports performance system to science [14].

The swimming industry refers to the people who produce swimming products and provide swimming services. The swimming industry has its specific swimming products and its specific sports services. Moreover, as mentioned in the analysis of the industrial nature of swimming, the swimming industry is not a productive industry, what the swimming industry provides is that it mainly produces and provides non-productive services and products [15]. According to the nature of the industry, the classification of the swimming industry is shown in Figure 3.

Swimming competition is an important form of swimming, an important link in the swimming chain, and an effective tool for developing swimming. For competitors, the

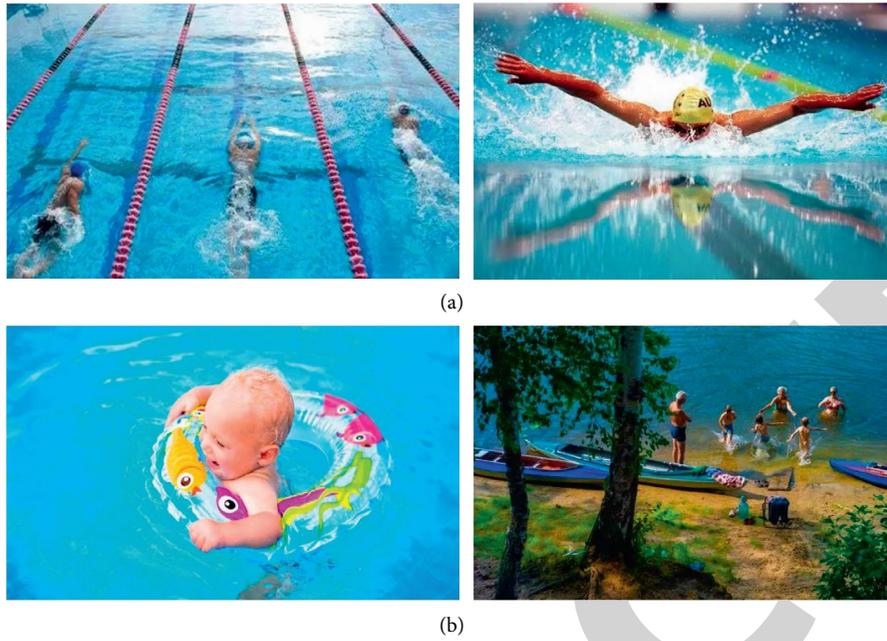


FIGURE 1: Types of swimming exercises: (a) competitive swimming and (b) recreational swimming.

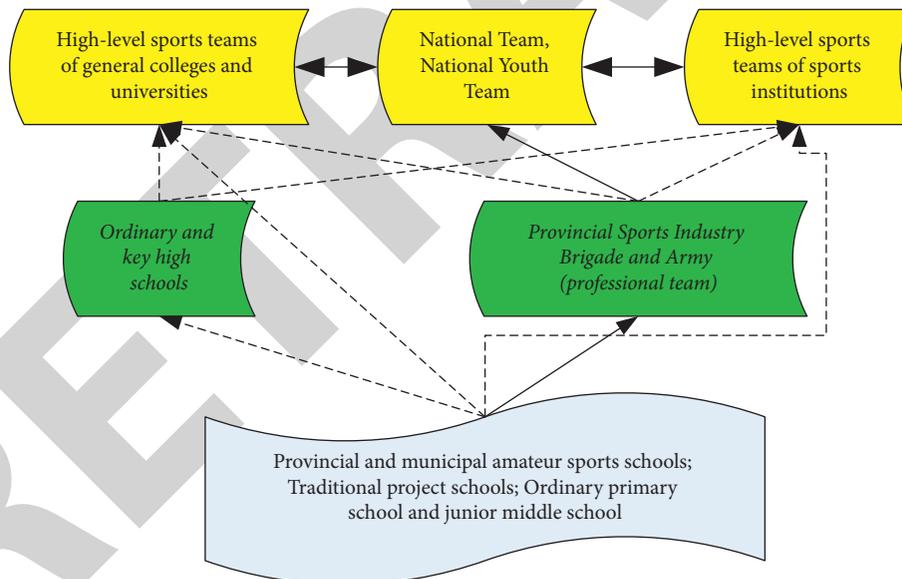


FIGURE 2: China's competitive sports talent training pathway map.

traditional function of swimming competitions is to help them improve their level of competition through mutual comparison, to exchange and develop swimming techniques, tactics, and training methods through mutual learning. For organizers, swimming competitions are an important manifestation of swimming, an important link in the swimming industry chain, and an effective means to promote the development of swimming. It is mainly to cultivate reserve talents, publicize and popularize, and let as many people as possible participate in swimming events

[16]. The main categories of sporting events are shown in Figure 4.

Applying the development of modern biotechnology to sports, it is possible to enrich and improve the scientific system of sports bioscience and to fully and accurately unravel the relationship between sports and the human body [17]. It has played an active role in revealing the changes in various aspects of the human body and the laws of exercise training and is an important knowledge system. However, the development of sports bioscience has been greatly

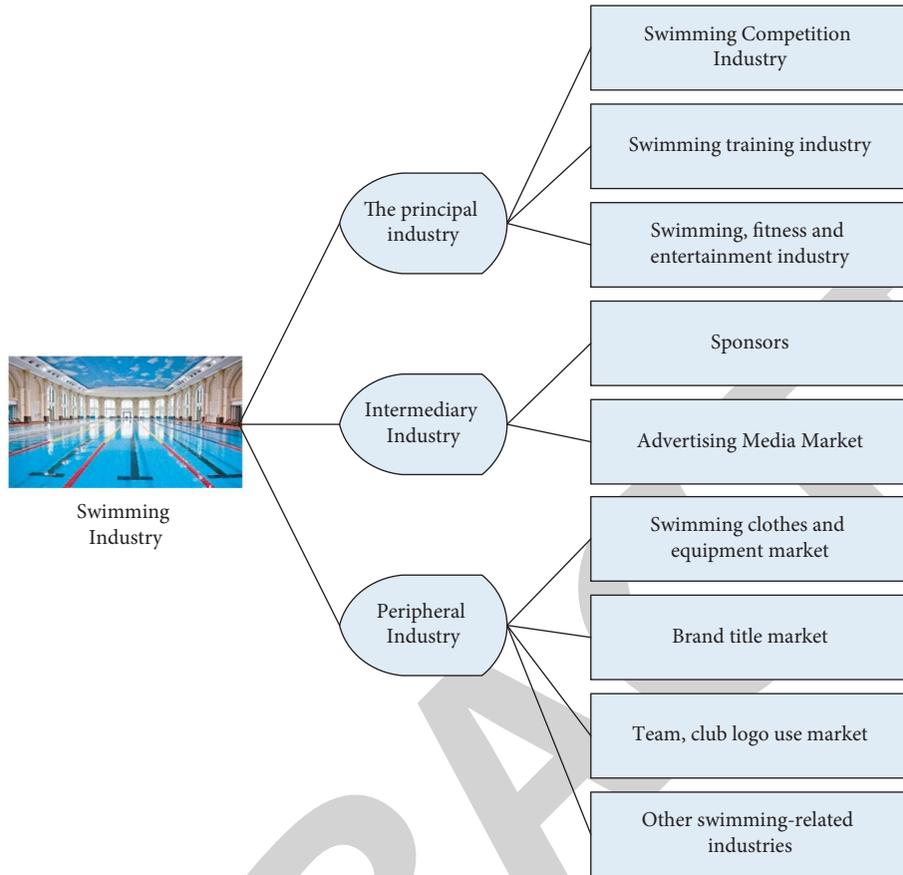


FIGURE 3: Classification of the swimming industry.

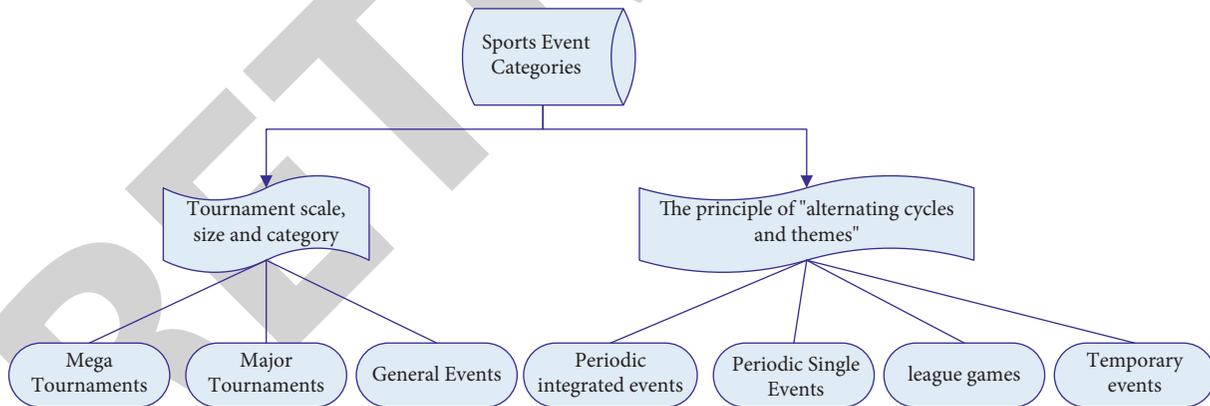


FIGURE 4: Classification of sporting events.

hindered by the complexity of human movement and the limitations of in vivo measurement methods [18]. With the advancement of modern biological science and technology, the theories and methods that have been formed will undoubtedly help to fully and accurately clarify the connection between sports and human functional activities, so as to better guide the practice of sports training. For example, the mechanism of exercise fatigue is an important factor in the development of rehabilitation methods for sports training, and the application of neuromolecular biology makes it possible to unravel the “black box” of central fatigue [19].

The characteristics of R&D innovation in the field of biotechnology are mainly reflected in the following three aspects: first, the R&D innovation of related technologies in the field of biotechnology relies heavily on platform technology. At present, DNA chips and recombination have become key platform technologies in this field and play an important role in the R&D and innovation of related technologies [20]. The field of biotechnology has the characteristics of interdisciplinary development with chemistry, engineering, nanometer, and other disciplines. For example, the development of new drugs may also involve

combinatorial chemistry technology and computer-aided design. Biophotovoltaic technology, bioinformatics, bio-energy, and biosensors produced by the integration with other high-tech technologies are widely used in industrial production, which have a great impact on modern life and become a new high-tech field [21].

Training fatigue and recovery are normal phenomena in the training process, and if the relationship between them is not properly handled, it will affect the athletic performance of the athlete. With the advent of genetic engineering and nanotechnology, nanobiotechnology can be directly used to study the metabolic processes of skeletal muscle, cardiac muscle, liver, and nerve during exercise and to study the biological mechanisms of central and peripheral fatigue and recovery after exercise [22].

With the increasing complexity of technology and the unpredictability of knowledge flow in the Internet environment, a complex network of knowledge interaction among the world's major economies is gradually emerging spontaneously [23]. With the increasing immediacy and convenience of information flow, all countries in the world are keenly aware that while developing industrial technology, they should pay special attention to knowledge dissemination and innovation brought about by the international knowledge flow network, and focus on improving technological innovation capabilities [24, 25]. The strength of internal knowledge flow (CF-IN) is measured as follows:

$$(CF - IN)_{i-e,tf} = 100 \frac{NC_{i-e,tg}}{NP_{i,t} * NP_{e,tg}}. \quad (1)$$

It indicates the frequency of citations to published patents among all patents filed in year t , which come from citations in technical field f in country i . The patents cited are from patents issued before year t in the technical field e (e is not equal to f) of country i . $NC_{i-e,tg}$ stands for the number of authorized patents, which refers to all patent applications submitted in year t in the field of technology f in country i , and the reported patents are from the authorized patents in the field of technology e in country i before year t . $NC_{i,t}$ represents the total number of patents applied for in the field of technology f in year t ; $NC_{e,tg}$ represents the number of patents reported in the field of technology e before year t . The higher the CF value, the greater the intensity of internal knowledge flow between technical departments.

The external flow intensity of knowledge (CF-EX) is measured as follows:

$$(CF - EX)_{i-e,tf} = 100 \frac{NC_{i-e,tg}}{NP_{i,t} * NP_{e,tg}}. \quad (2)$$

It represents the frequency with which patents filed in year t are cited in technology sector f in country i , where the cited patents are from patents granted before year t in technology sector g in country i and cited (g is not equal to f). $NC_{i-e,tg}$ represents the number of cited patents issued by country i among all patents applied for in year t , where the cited patents are from patents in the country's technology sector g (g is not equal to f) and cited before year t . $NC_{i,t}$

represents the total number of patents in country i in year t ; $NC_{e,tg}$ represents the number of patents belonging to technology sector g in the cited country and up to year t . The higher the CF value, the greater the knowledge flow intensity among knowledge technology departments, and therefore, the higher the degree of knowledge utilization.

The technical capability of the industry is the main driving force for the industry to independently develop new technologies or obtain intellectual property rights, while the lack of technical capability is an important reason why the industry is difficult to redesign and modernize. This paper divides industrial technology capabilities into three-dimensional technology portfolios, which are, respectively, composed of patent growth rate, patent dominant advantage, and patent technology diversity, to measure industrial technology development capabilities, technological competitiveness, and technological expansion capabilities.

3.3. Technical Development Ability. Technological development capability refers to the speed of technological innovation and development. The technological development capabilities of different technological sectors of an industry can objectively reflect the development preferences and trends of a country's industries and accurately reflect the relative activities of sectors in the industry. Considering the cumulative nature of technological development and the delayed publication of patented technologies, this paper uses the patent growth rate (PGR) index; to measure the technological development capability of a specific field, the calculation method is as follows:

$$\eta_{PGR_j} = \frac{1}{n} \sum_t \frac{P_{j,t}}{\sum_{t-4}^t P_j}. \quad (3)$$

where $t = \{2000, \dots, t, \dots, 2021\}$, P_j represents the total number of patents of technical department j , and $P_{j,t}$ represents the total number of patents of technical department j in year t . A higher value of η indicates that the technological innovation and creation of the sector is more dynamic and has stronger growth potential.

3.4. Technical Competitiveness. Technological competitiveness refers to the relative advantage of technology in a specific field. It can reflect a country's development level in a certain technology sector to a certain extent and thus determine a country's competitive advantage or disadvantage in different technology sectors in a certain period of time in the future [26]. The revealed patent advantage (RPA) indicator is used to measure the technological competitiveness of each technology sector, and the formula is as follows:

$$\eta_{RPA_{ij}} = 100 * \tan g \left\{ \ln \left[\left(\frac{P_{ij}}{\sum_i P_{ij}} \right) \left(\frac{\sum_j P_{ij}}{\sum_{ij} P_{ij}} \right) \right] \right\}, \quad (4)$$

where P_{ij} indicates that country i has a relative competitive advantage over all benchmark countries in technology sector j . When η is positive, it means that country i has a relative competitive advantage in technology area j compared with all the comparison countries, and the larger

the value, the more obvious the competitive advantage; if η is negative, it means that the development level of technology area j in country i is lower than the average level of the comparison countries, and there is no competitive advantage.

3.5. Potential for Technology Expansion. Technological expansion potential refers to the extent to which technological expansion can be achieved through innovation generated by cooperation. In the five biotechnology subsectors, there is synergy and complementarity of technical knowledge between related (intrinsic) and unrelated (extrinsic) occupations within a single field, while the biotechnology industry is the result of interdisciplinary and cross-integration. Therefore, there is always some intrinsic and extrinsic extension of technology to related or unrelated occupations. This growth model is a necessary mechanism for developing knowledge-based industries. Using the entropy method, this diversification is divided into related technology diversification (RTD) and unrelated technology diversification (UTD). The former represents the internal extension of technology within a single field to related disciplines, while the latter refers to the external extension of technology between unrelated disciplines. TD is measured as follows:

$$W_{TD} = 100 \sum_{i=1}^p P_i \ln\left(\frac{1}{P_i}\right). \quad (5)$$

Likewise, the formula for unrelated technological diversity is

$$W_{UTD} = 100 \sum_{j=1}^q P_j \ln\left(\frac{1}{P_j}\right). \quad (6)$$

For a particular field with n distinct IPC subcategories (top four), P_j is the ratio of patents in IPC subcategory j to the total number of patents in that field.

The relative technical diversity is calculated as follows:

$$W_{RTD} = W_{TD} - W_{UTD}. \quad (7)$$

In the calculations, higher UTD values indicate higher external expansion of non-sectoral specializations, and higher RTD values indicate higher internal expansions of sector-related specializations.

The basic concepts of clustering and cluster-based data privacy anonymization methods are introduced here. The general clustering problem requires that in the clustering results, the objects in equivalent classes should be as similar as possible, and the objects between classes should be as dissimilar as possible. However, the data anonymity problem requires that the requirements of the anonymous model should be met first, and then, on this basis, the clustering structure should be considered to help reduce the information loss caused by generalization as much as possible. Genomic data is also a data type, and this type of method can also be applied. Data anonymization is one of the most important ways to solve the problem of privacy leakage

caused by login attacks [27]. The basic method is to modify or hide the quasi-identifiers in the database before the data is disclosed so that it cannot provide enough identity information, to ensure that the quasi-identifiers cannot be clearly linked to an individual's identity, and the individual's privacy is protected. As shown in Table 1, for the basic information data of user objects, masking the name space can achieve primary anonymity protection.

De-identification occurs when only attributes that uniquely identify individuals (also known as unique identifiers, such as names, ID cards, etc.) are removed from the original data, as shown in Table 2. There are often unrecognized combinations of attributes in data sets, called quasi-identifiers, that can be linked to information in external databases to identify the data set to which the person in the data set corresponds. Thus, if an attacker knows the value of a person's quasi-identifier attribute in a record, he can infer the value of that person's sensitive attribute and violate his privacy. A k -anonymous record has at least k quasi-identifiers with the same attribute value.

A link attack is a relatively common way of gaining someone's privacy. The basic idea is that attackers can extract sensitive attributes and violate privacy by associating attributes in published databases with externally extracted attributes. For example, linking medical data with voter registration forms can almost uniquely identify the exact object. This is illustrated in Figure 5.

Clustering is a method of examining physical or logical relationships in data. A cluster generated by clustering is a collection of data objects that are similar to each other and dissimilar to objects in other clusters within the same cluster. The results of this analysis not only reveal the internal relationships and differences in the data but also provide a basis for further analysis and knowledge discovery. Cluster-based anonymization algorithms map the original data set to a specific metric space and then group points in that space to anonymize the data, similar to K -anonymization. The requirement of this approach is to find a clustering-based aggregation scheme (replacing the original discrete eigenvalues with the same abstract eigenvalues in multiple primitives), reducing the information loss associated with aggregation. The basic idea is to first cluster the primitives in the original data set so that the attribute values of the primitives in each class are as close as possible to the quasi-identifier. Primitives from the same class are then aggregated to have the same quasi-recognizer attribute aggregated value, forming an equivalence class, resulting in an L -dimensional model data set.

For data sets S_1 and S_2 that differ by at most one element, $R(K)$ represents the range of values for the random function K , $\Pr(A_C)$ represents the disclosure risk of event A_C , and for all $C \subseteq R(K)$, the random function K represents ϵ -differential privacy (ϵ is the privacy parameter).

$$\Pr[K(S_1) \in C] \leq \exp(\epsilon) \times \Pr[K(S_2) \in C]. \quad (8)$$

Differential privacy is a means in cryptography designed to provide a way to maximize the accuracy of data queries

TABLE 1: Original object information table.

	Name	Gender	Date of birth	Zip code
1	Xiao Li	Female	1999-11-12	532200
2	Li Lei	Male	2000-09-09	531400
3	Fang Yang	Male	2005-06-17	533400

TABLE 2: Results after anonymization.

	Gender	Date of birth	Zip code
1	Female	1999-11-12	532200
2	Male	2000-09-09	531400
3	Male	2005-06-17	533400

when queried from statistical databases while minimizing the chance of identifying their records. The random noise value that needs to be added to the computational output to achieve differential privacy is determined by the sensitivity of the computation because

$$f: S \rightarrow R^K. \quad (9)$$

Sensitive is defined as follows:

$$\Delta f = \max_{S_1 \sim S_2 \in S} |f(S_1) - f(S_2)|. \quad (10)$$

Differential privacy has a property that if N_1 and N_2 are ϵ -differential privacy, then $N_2 \circ N_1$ is 2ϵ -differential privacy.

The privacy protection mechanism of the query function f is denoted as k_f ; the $f(x)$ has to be calculated; and the noise that increases with the variance σ^2 of the scaled symmetric exponential distribution in each part can be expressed by the following density function:

$$\Pr[k_f(x) = b] \propto \exp\left(\frac{-f(x) - b}{\sigma}\right). \quad (11)$$

It should be noted that in order to achieve ϵ -differential privacy, it must be guaranteed that

$$\sigma \geq \frac{\epsilon}{\Delta f}. \quad (12)$$

In addition to the traditional applications of encrypting sensitive files and distributing keys to authorized users, modern encryption technology is particularly important in data sharing. Figure 6 shows how participants A and B use the additive secret sharing scheme to allocate two 32 bit integer values x and y , distribute the shared values to three servers, use the scheme's homomorphism to securely calculate the sum of x and y , and pass its sum to party C for safe storage of the result. The process of A is as follows:

- (1) Choose a random secret value x
- (2) Randomly generate R_1
- (3) Randomly generate R_2

In addition, the generation method of R_3 is as follows:

$$R_3 = x - R_1 - R_2 \bmod 2^{32}. \quad (13)$$

The process of B is

- (1) Choose the secret value y
- (2) Randomly generate P_1 .
- (3) Randomly generate P_2 .

In addition, the generation method of P_3 is as follows:

$$\begin{aligned} P_3 &= y - P_1 - P_2 \bmod 2^{32}, \\ T_1 &= R_1 + P_1 \bmod 2^{32}, \\ T_2 &= R_2 + P_2 \bmod 2^{32}, \\ T_3 &= R_3 + P_3 \bmod 2^{32}. \end{aligned} \quad (14)$$

The calculation done by C is

$$C = T_1 + T_2 + T_3. \quad (15)$$

So

$$\begin{aligned} C &= (R_1 + P_1) + (R_2 + P_2) + (R_3 + P_3) \bmod 2^{32} \\ &= x + y \bmod 2^{32}. \end{aligned} \quad (16)$$

As shown in Figure 6, according to this protocol, each center developed a secret sharing system for its genotype and phenotype collections, dividing the data into smaller pieces. The sharing of each part is managed by different participants, and the secret information is not accessed by a single participant. This means that the data each participant receives appears to be completely random, and only multiple cooperating participants receive secret information. Also, if the data is shared, the secret information will be received by only one participant. Also, if the data is shared with different participants, the secret information will not be received by just one participant. This means that each party will receive seemingly completely random data, and only multiple cooperating participants can receive secret information. And, most importantly, if the data is shared with different participants, all data sent to other centers can be stored on a dedicated server. Its interface allows external researchers to analyze the genotype or phenotype of interest at their own will. Connections between servers are established collaboratively; no reconstruction of the original genotype or phenotype is required; and significant SNPs are stored in plain text. However, one drawback of this method is that plain text format has been attacked by ADAD.

4. Experiment on the Impact of the Development of Modern Biotechnology and Nanotechnology on the Swimming Sports Industry

4.1. Influence of Ingestion of Nanomedicine on Physical Function of Athletes. Exercise fatigue and recovery are physiological phenomena of the human body during exercise. If the relationship between them cannot be properly handled, it will affect the athletic performance of athletes.

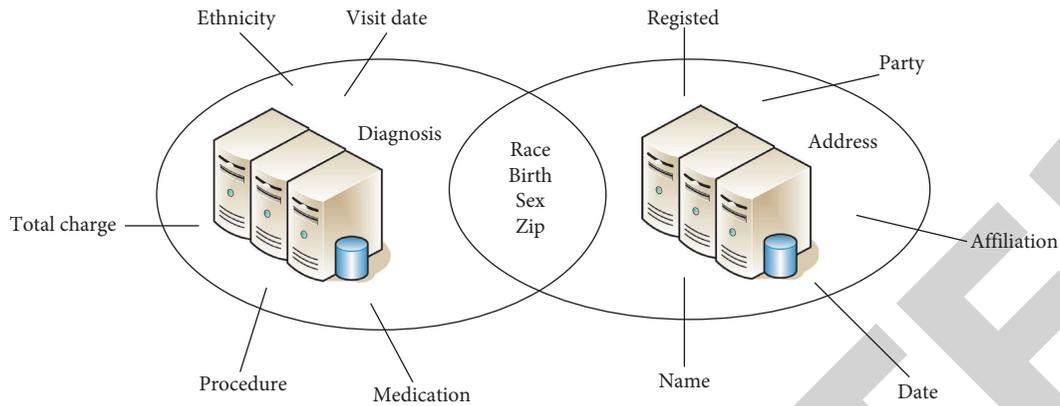


FIGURE 5: Link attack.

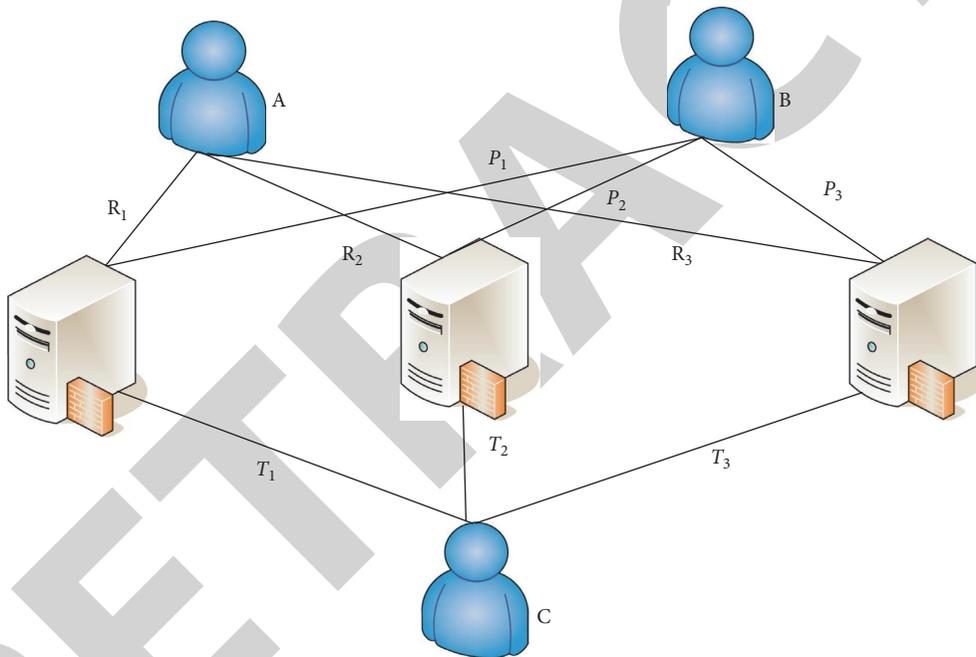


FIGURE 6: Additive secret sharing scheme.

The expression of genes that lead to exercise-induced fatigue can be inhibited, or the expression of genes that accelerate recovery can be induced by some means, such as nanomedicine. And it can be achieved by providing athletes with artificial red blood cells with oxygen transport function, which can solve the problem of hypoxia in sports and effectively improve sports performance. In order to study the positive effects of nanomedicines on swimmers, a comparative experiment will be conducted between the experimental group (taking an appropriate amount of nanomedicines) and the normal group. In the experiment, the screened 10 athletes were divided into men’s group (M group) and women’s group (F group) for self-control and gender comparison. The basic information such as age, height, weight, and years of exercise are shown in Table 3. All

TABLE 3: Basic information on experimental subjects.

Category	Males	Females
Number of persons	5	5
Age	21 ± 0.5	19.5 ± 0.8
Body weight	65 ± 5.54	55 ± 5.3
Height	1.75 ± 0.05	1.63 ± 0.06
Campaign years	3.2 ± 1.5	3.46 ± 1.6

subjects had no smoking history, no insomnia, alcohol abuse, heavy-duty training, competition, and so on within 48 hours before the experiment, and no clinical medical diseases or sports system injuries that were not suitable for high-intensity exercise. At the same time, they have been

familiar with exercise load and experimental procedures many times.

According to the characteristics of swimming sports, the upper limb muscles need to be used to maintain a stable balance during swimming, select biofeedback effect indicators: sEMG biofeedback amplitude index (IEMG, RMS) and frequency index (MPF, MF), compare the biofeedback technical index data obtained in the quietness-fatigue-recovery stages before and after, and analyze.

4.2. Current Situation of the Swimming Sports Industry. Swimming social sports instructors refer to professional staff who are engaged in teaching swimming skills and abilities in mass sports and fitness activities, guiding the masses in reasonable exercise, and organizing management. A sports instructor is a forge of swimming practitioners and a leader in training. According to the needs of the thesis, it is necessary to investigate the current situation of swimming social sports instructors and to understand the basic situation of swimming social sports instructors and the occupational conditions of swimming social sports instructors. This paper takes swimming social sports instructors in a city as the research object, distributes 300 designed questionnaires during the research, and conducts research and analysis on 200 male instructors and 100 female swimming instructors. The designed questionnaires will be distributed to investigate the current situation of swimming social sports instructors, mainly from the basic situation, influencing factors, and development strategies of swimming social sports instructors.

In the survey, 295 questionnaires were recovered, including 205 males and 90 females, with a recovery rate of 98%. There were only 280 valid questionnaires, including 200 males and 80 females, with an effective rate of 93%. The reliability of the questionnaire was tested by the "test-retest" method. Twenty swimming social sports instructors were selected to conduct two questionnaire surveys, and the time interval between the two surveys was 20 days. Using computer software to obtain the correlation coefficient of the two surveys, the teacher questionnaire system after the two surveys is $R = 0.86$, $p < 0.01$. Therefore, the reliability test of the questionnaire is in line with the requirements.

5. Impact Data on the Swimming Sports Industry

5.1. Numerical Change Characteristics of sEMG Indexes in Three Stages: Quietness, Fatigue, and Recovery of Athletes. The surface electromyography indexes of the athletes in the three stages (quietness-fatigue-recovery) were compared and analyzed, and the results are shown in Figure 7. Through the analysis results, when the normal group entered the fatigue state from rest, the index IEMG and RMS values showed a significant increase ($p < 0.05$), and they decreased to different degrees when they recovered. MPF and MF decrease and return to the values close to the quiet state when the state is restored. Compared with the normal group, the indexes of the three stages of resting-fatigue-recovery in

the experimental group all increased, and the MPF value increased significantly in the resting state, from 90.1 to 111.3.

5.2. Current Situation Data of the Swimming Sports Industry. A person's education level is reflected by the educational level, and it is a reflection of the instructor's work ability and personal knowledge ability. The knowledge structure can reflect the instructor's creative ability and learning ability. At the same time, age is also an important factor affecting swimming social sports instructors. Figure 8 is a schematic diagram of the educational level and age distribution of swimming social sports instructors.

As can be seen from Figure 8, in the age survey of swimming social sports instructors, male social sports instructors aged 20–30 account for 68%, and female social sports instructors account for 66%, which are the largest proportions of all age groups. It can be seen from the age that the physiological mechanism of each age group is different. With the growth of age, the experience of social sports guidance work will be richer, and more knowledge accumulated. Therefore, the age structure can reflect the work ability of social sports instructors. It can be seen that there is some imbalance in the age structure of swimming social sports instructors: most instructors are in their 20s, average instructors are in their 30s, and fewer instructors are in their 40s. In the long run, the number of instructors over the age of 30 should be increased, and the number of instructors over the age of 30 should be optimized because swimming events require the active participation of young and middle-aged instructors. The lack of instructors over the age of 30 is due to family reasons and work pressure factors, so there are relatively few practitioners in this age group.

Figure 9 shows the statistics of the number of sports organizations in China from 2014 to 2020. As can be seen from Figure 9, the number of sports social groups and sports private non-enterprise units continued to grow from 2014 to 2020. Swimming, as a sport that is deeply loved by the masses, has also shown substantial growth in the development of its social organizations.

Since 2014, the week of July 16 has been designated as the "National Swimming Fitness Week" by the Swimming Management Center of the General Administration of Sports of the People's Republic of China. During this week, various regions in China responded positively, setting up event sites in the form of open water and venue qualifying competitions, and held events for four consecutive years. The coverage of the event, the number of participants, and the enthusiasm for participating in the event have all received positive responses from the masses, and the number of participants has grown exponentially. Figure 10 shows the growth trend of "National Swimming and Fitness Week" activity sites and theme festivals from 2014 to 2020.

As can be seen from Figure 10, the number of the two committees joining the China Swimming Association is increasing, and the number of members of the China Venue Committee has increased from 237 in 2014 to 587 in 2020. The development and popularization of winter swimming

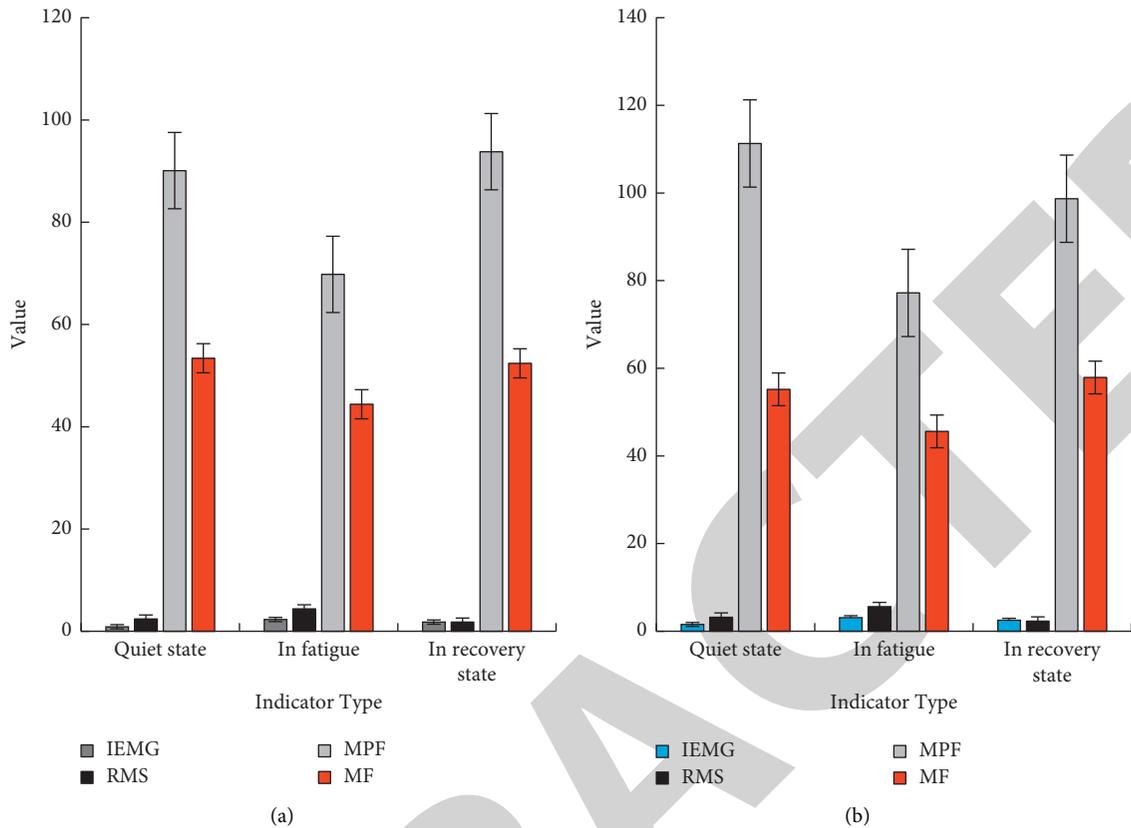


FIGURE 7: Mean change in sEMG data (μV) of subjects in quiet, fatigued, and recovering states: (a) normal group and (b) experimental group.

has made the group member units of the Winter Swimming Committee increase from 56 in 2014 to 201 in 2020, and the growth rate is very fast. In addition, the increase of swimming fitness sites and theme festivals shows that China's national swimming fitness movement has received a positive response from the people, and the "National Swimming Fitness Week" brand influence has promoted the masses to join the swimming movement. We can seize the opportunity of the event and vigorously promote the establishment of brand events, which not only can increase the number of sports consumers and activate sports cultural life but also can accelerate the industrialization of sports and the development of the sports industry.

Swimming social sports instructors play a vital role in the swimming sports industry. Its professional characteristics have a positive guiding role, that is, it has a certain guiding and motivating role in national fitness and has extensive complexity. The guidance objects are relatively wide (all grassroots, all age groups, and all educational levels), have different physical conditions and different fitness purposes, and adapt to the different needs of different groups of people. Combining physical strength and intelligence, in the process of guiding the fitness of the whole people, demonstration and explanation require a certain amount of athletic ability. In addition, the teaching and guidance experience needs to be summarized in the guidance process. Learning new

theories and new knowledge requires a certain amount of mental work.

With the development of nanotechnology and biotechnology, its application in sports science is becoming more and more important. Once the genetic regulatory mechanisms underlying exercise-induced adaptive changes are fully understood, genetic engineering and nanotechnology will enable genetic diagnosis of athletes' fatigue, fitness for exercise training, and immune function. The law is a powerful weapon for maintaining order, and a barrier to law enforcement is needed to ensure the rapid and beneficial development of modern biotechnology. Most importantly, with the continuous development of modern biotechnology, its industrial application will inevitably have an impact on human society. On the one hand, it will promote social progress, and on the other hand, it will also cause various ethical disputes. The ethical principles of the development of modern biotechnology include the principle of no harm, the principle of respect, and the principle of practicality. Like other technologies, genetic engineering is a "double-edged sword." For example, the use of genetic doping can cause great harm to the health of athletes. Too many red blood cells in the blood, for example, can lead to increased blood viscosity, slowed blood flow, and progressive narrowing of the lumen of blood vessels, predisposing to circulatory disturbances, ultimately leading to unacceptable diseases

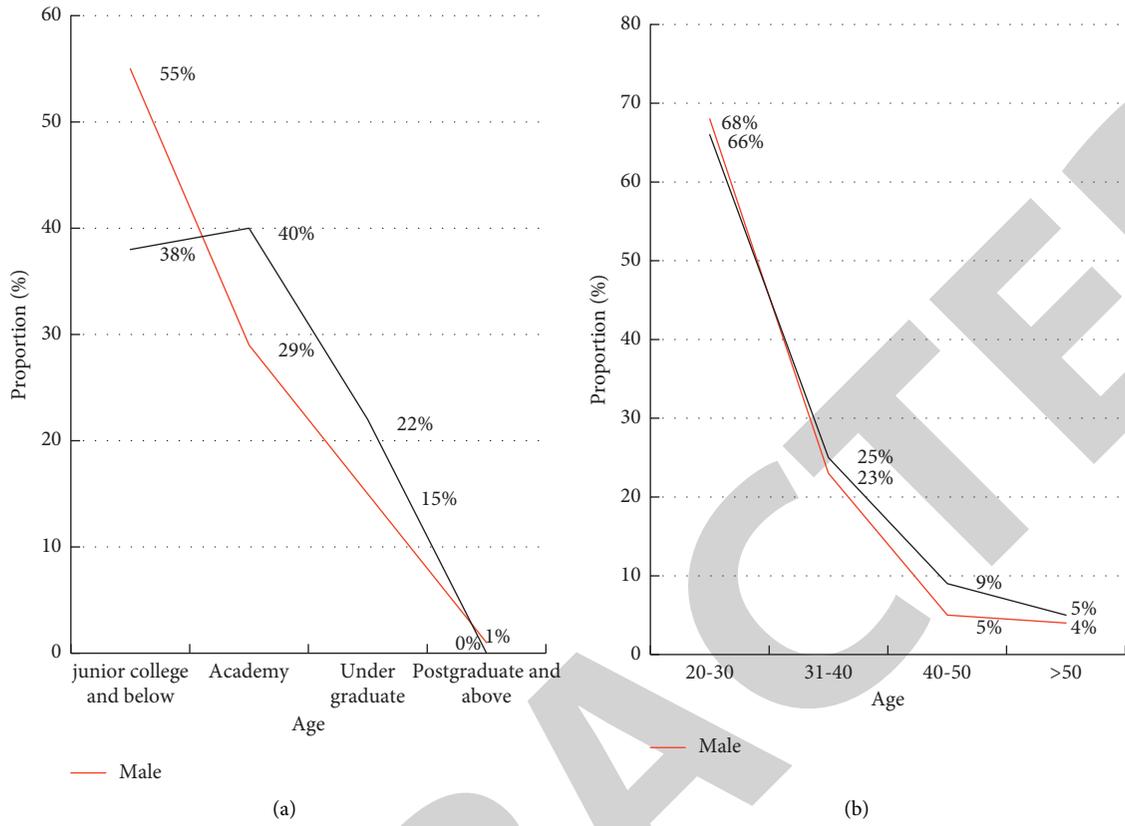


FIGURE 8: Schematic diagram of educational level and age distribution of swimming social sports instructors.

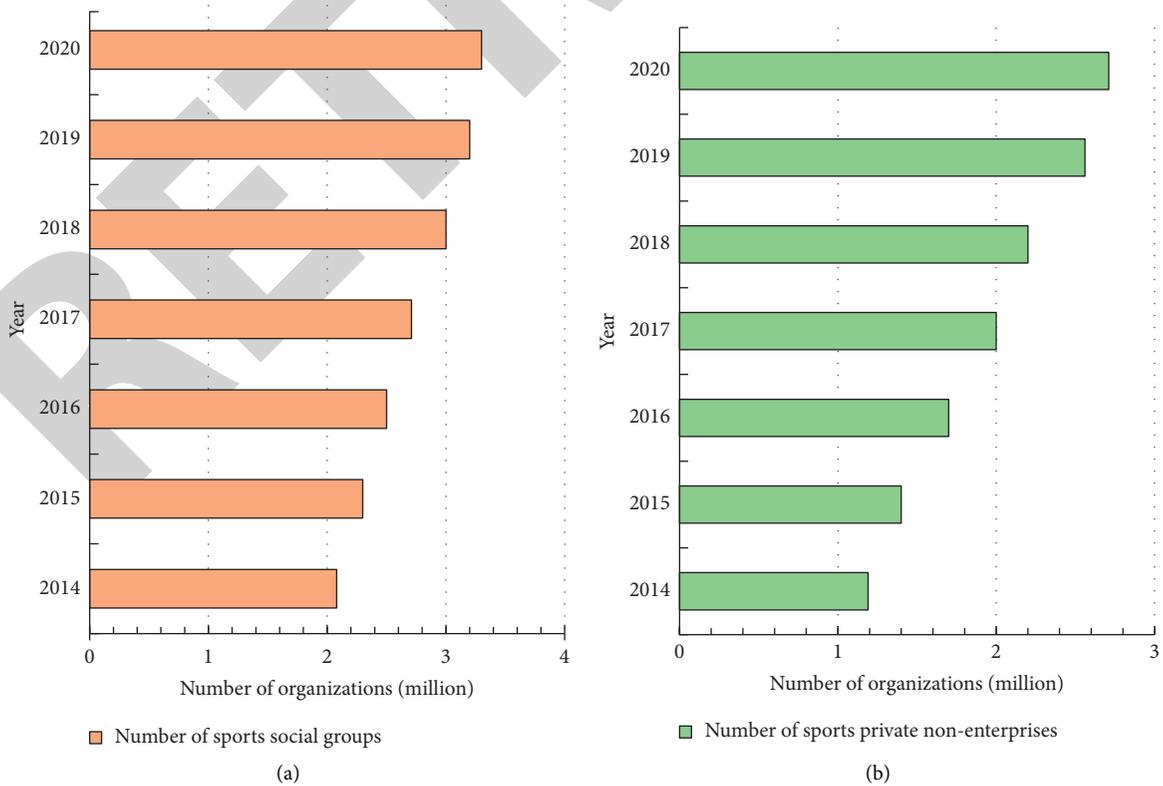


FIGURE 9: Statistics on the number of sports organizations in China from 2014 to 2020.

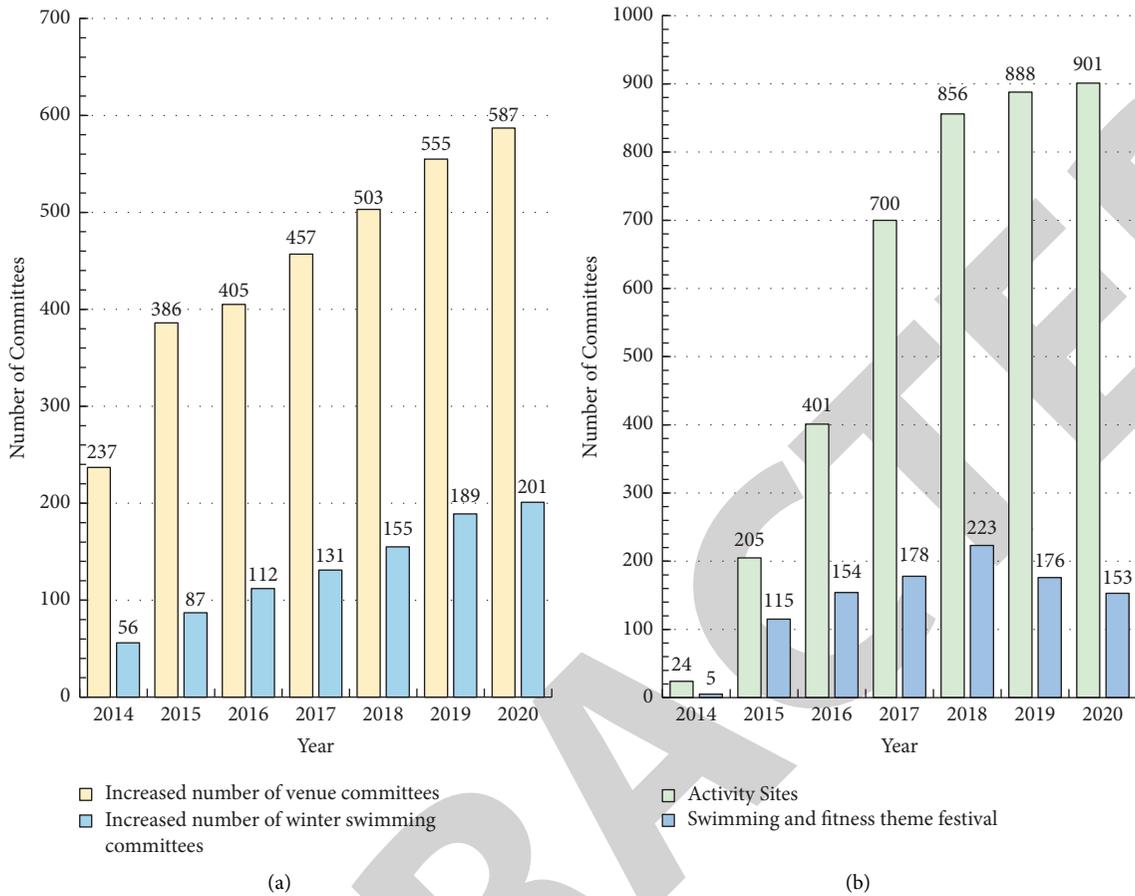


FIGURE 10: Growth trend of activity sites and theme festivals for "national swimming and fitness week" 2014–2020.

such as high blood pressure and stroke. The State Sports General Administration will always follow the three strict principles of the antidoping fight and will increase its efforts to promote fairness and justice.

6. Conclusion

Nowadays, with the rapid development of science and technology, people's material life has been greatly enriched, and people's life has gradually changed from the need for survival to the need to enjoy life. At the same time, people are paying more and more attention to their health and all-round development. As a popular sport, swimming has attracted much attention because of its fun, convenience, and technicality, especially in summer, more people swim for sports. The swimming industry not only satisfies people's intellectual and cultural structure but also brings huge economic benefits. Swimming is now one of the most popular sports in the world, and its industry is very important and has great potential for development. As an important form of swimming, the development of swimming competitions has also received more and more attention. The development of modern biotechnology and nanotechnology in China has its unique history and advantages, and its development scope is very wide. While actively promoting the widespread use of this technology, it

is important to use the technology with caution and be aware of its potential negative effects.

Data Availability

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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