



Comparative Analysis of Swimming Techniques in Gymsnasiums and Open Water Swimming Techniques in Swimming

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Abstract

With the rapid development of our country's economy and the continuous prevalence of national fitness, more and more swimming enthusiasts and professional swimmers participate in open water swimming and enjoy this challenging project. The swimming events in our country's venues are basically ranked in the leading position in the world, and there are also many outstanding athletes such as Wang Shun, Sun Yang, Zhang Yufei and so on. However, there is still a certain gap between the level of open water swimming in China and the level of swimming in venues. Swimming in open water is carried out in open water. Due to external uncontrollable environmental factors, such as Climate, water quality, water temperature, water flow direction, etc., the environmental changes during the swimming process are unpredictable, and the risk factor is relatively large. Therefore, the technical requirements for athletes are also quite different from those of swimming in ordinary venues. This paper compares and analyzes open water swimming techniques and swimming techniques in venues by using literature, comparative analysis, and video observation methods. The research results show that: 1) in the case of the 1500-meter freestyle at the same distance, swimming in ordinary venues will have the action of rolling and kicking the wall, which reduces the distance for athletes in the process of swimming. However, open water swimming does not have any auxiliary actions after starting, and coupled with the influence of uncontrollable external environment and other factors, open water freestyle swimming takes longer than ordinary swimming pool freestyle swimming. 2) Open water swimming and swimming in ordinary venues are divided into three stages: departure, en route and sprint. However, judging from the comparison of the final results of the two, the speed of open water swimming fluctuates greatly during the swimming process, which is also related to the uncontrollable external environment. The swimming speed

in the venue is relatively uniform. The tactics are arranged in advance to carry out the competition, so the tactical allocation of open water swimming and swimming in the venue is different. 3) Swimming in ordinary venues is carried out under relatively stable conditions, so athletes will not be affected by external influences and change their movement skills during swimming. The actual effect is relatively stable and the fluctuation is small. 4) Since the open waters have not been treated and the visibility is low, athletes should use “head-up swimming” to observe the floats and so on to control the direction of their swimming when swimming in the open waters. Ordinary swimming pools have undergone water treatment and have high visibility. When swimming in ordinary swimming pools, athletes do not need to deliberately observe the direction of swimming. Therefore, swimming in open water consumes more energy than swimming in ordinary venues.

Subject Areas

Sports Science

Keywords

Open Water Swimming, Swimming in Ordinary Venues, Freestyle Technique, 1500-Meter Swimming, Triathlon

1. Introduction

There is an essential difference between indoor swimming and open water swimming. Open water swimming brings people closer to nature, but there are many uncertain factors, so the challenge is relatively difficult, and it is a challenging sport. It has very high requirements for athletes' endurance, adaptability, and adaptability, and it also has very high requirements for athletes' swimming skills. Therefore, there are still certain differences between ordinary swimming techniques and open water swimming techniques. With the rapid development of China's economy and society, the level of competitive swimming in my country has also made a qualitative leap, but at present, the development of swimming events in ordinary venues is relatively higher than that of open water swimming events. Open water swimming includes open water swimming in triathlons. Relatively speaking, it is still relatively unpopular. Due to the special environment of open water and the lack of a professional open water swimming team in my country so far, there are relatively few research materials related to open water swimming techniques and triathlon techniques, and generally refer to swimming techniques in ordinary venues. Due to the unpopularity of the project, there is still some distance between my country and other countries in terms of practice and theoretical research of open water swimming technology, but also because of this, the development space of my country's open water swimming project is relatively large. Therefore, the difference between “open water swimming technique and swimming technique in

venues” in swimming is studied. In order to strengthen the level of my country’s open water swimming events, reduce the gap with other countries, promote the improvement of my country’s open water swimming technology, and organize training competitions more scientifically and effectively. This article uses the method of literature, video analysis, comparative analysis, interview and other methods to analyze and study the swimming skills in open water and ordinary venues, find out the existing problems, and put forward suggestions for changes to draw up different training plans.

2. Literature Review

In recent years, many university researchers and sports workers such as Zhang Wenqing, Wang Yi, Liu Xiao, etc. A lot of research has been done on freestyle techniques and tactics of triathlon in natural waters and still water pool freestyle techniques and tactics, and how to enable athletes to reasonably master swimming techniques in the new era, and a lot of information has been accumulated, and swimming techniques have been investigated in detail.

1) Zhang Wenqing (2019) [1] pointed out that the time for open water swimming in China is relatively short, and there are fewer provinces, cities and registered athletes participating in it, which affects the level of open water swimming in China. At the same time, open water swimming higher requirements are placed on the comprehensive ability of athletes. Since the location of each competition is different, the environment, climate, temperature, water area, water flow, route, wind and waves, etc., of the competition are different. However, Chinese coaches and athletes lack corresponding training concepts and methods, means and professional system training. Generally speaking, the environment of open water swimming in my country needs to be improved. Insufficient level of athletes, unreasonable training methods, and lack of training venues are all factors that restrict the development of open water swimming.

2) Wang Yi (2018) [2] emphasized that swimming events are generally carried out in open waters such as lakes or seas, athletes need to follow completing the 1500-meter swimming event according to the prescribed competition line. The longest ordinary swimming event stipulated in the Olympic Games is 1500 meters, so in terms of swimming events, the distance of 1500 meters is very long. When triathletes complete swimming events, they not only have to fight against the wind and waves formed by nature, but also compete with other athletes to gain an advantage in swimming events. So this is a lot more difficult than ordinary swimming competitions.

3) Liu Xiao [3] wrote in “How to Make Athletes Reasonably Master Swimming Techniques in the New Era” that swimming learning and training are quite difficult, so many athletes often cannot master reasonable swimming techniques during daily learning and training, but swimming It is also a rigorous sport, so in the new era, when coaches guide athletes to learn and train swimming, they must adopt reasonable training methods so that athletes can master reasonable sports skills during training.

4) Veiga James *et al.* [4] pointed out that in “Race Strategies of Open Water Swimmers in the 5-km, 10-km, and 25-km Races of the 2017 FINA World Swimming Championships” that despite literature on the pacing strategies of endurance sports, there is an existing lack of knowledge about the swimmers’ tactical decisions in the open water races.

3. Research Objects and Research Methods

3.1. Research Object

This paper takes the technical movements and open water techniques of the eight national team swimmers Wang Yifan, Sha Tianqi, Cheng Guangyu, Wang Shuchuan, Tian Muran, Xin Xin, Zhu Chuan and Yan Yuxiang in ordinary swimming pools as the research object.

3.2. Research Methods

3.2.1. Documentation Method

By logging into HowNet, using open water swimming, swimming in ordinary venues, freestyle techniques, 1500 m freestyle, open water, etc., as keywords, and referring to domestic and foreign swimming technical materials, swimming books, swimming quarterly magazines, competition videos, etc., analysis open water freestyle technique and freestyle technique in ordinary venues.

3.2.2. Video Analysis Method

Watch the video of the open water swimming competition and the video of the swimming competition in ordinary venues to understand the technical differences between the 1500-meter freestyle in open water and the 1500-meter freestyle in ordinary venues, and make a comparative analysis of the two.

3.2.3. Comparative Analysis

Comparing and analyzing the technique of 1500-meter freestyle swimmers in open water and the technical movements of ordinary 1500-meter freestyle swimmers to find out the differences.

4. Discussion

4.1. Analysis of the Characteristics of Swimming Sports in Different Places

4.1.1. Characteristics of Open Water Swimming Sports

Open water swimming is a swimming competition in natural waters, that is, rivers, lakes, oceans and other waters. At present, according to the division of competition and record setting, it can be divided into short-distance (less than 1.5 km) swimming, long-distance (1.5 - 10 km) swimming and marathon (10 - 25 km or more) swimming. Swimming is different from other sports. Because it is carried out in a special environment, it is a sport with a higher risk factor than other sports. However, open water athletes have to compete in an external uncontrollable environment, which itself is harmful to the natural environment.

Challenge the risks and difficulties that exist in the competition, and at the same time overcome the maliciously arranged tactics and collisions from competitors, so the challenges for athletes have been increased [5]. However, compared with ordinary swimming in the venue, open water swimming can plunge into the embrace of nature and enjoy the unique charm of nature. However, before enjoying the beauty that nature brings us, athletes must understand that there may be Risks, and formulate reasonable emergency plans before training or competitions, have dealt with various emergencies that may occur during swimming, and minimized the danger caused by insufficient preparation.

In the freestyle 1500-meter sport, through the analysis of the results of triathlon open water and ordinary indoor swimming pool, it is concluded that swimming in open water has higher requirements for athletes' endurance quality, ability to cope with external factors, and body speed.

4.1.2. Characteristics of Swimming Sports in the Venue

Formal competitive swimming pools are divided into short pools and long pools. The short pool is 25 meters long and the long pool is 50 meters long. The water depth is generally greater than 1.8 meters. Temperature, there are eight swimming lanes, there will be lanes between each lane, a dark center line is set at the bottom of the pool, and the starting platform is set at the center of the swimming lanes at both ends of the pool. In order to ensure the safety of athletes, each swimming pool will be equipped with corresponding lifeguards and lifesaving equipment, with a high safety factor. Due to the standard venue and fixed swimming lanes, the athletes compete together without interfering with each other. During the swimming process, the movement technique will not be affected by the external environment, and there is no need to swim with the head up to observe the direction. The marking line is enough. Compared with swimming in open water, the clear visibility of the swimming pool saves a lot of energy for athletes, so athletes will pay more attention to movement skills when training in the venue.

Swimming venues are the most basic guarantee for swimming. The good conditions and facilities of swimming venues can enable swimmers to enjoy the swimming experience better. Compared with swimming in open water, swimming venues with better conditions can bring athletes a better training atmosphere., to meet the athletes' mastery of technology in the process of training and competition, so that athletes can better improve their deficiencies in movement skills in a good training environment [6].

1) At present, ordinary swimming pools use water circulation to filter water, which ensures water sanitation while saving water resources, so the water quality in the venues is clear and clean, with high visibility. Swimming in open water is in natural waters, the water has not been artificially treated, there may be some pollution, and the visibility is not high. During the swimming process, athletes should use head-up swimming to determine the direction.

2) Swimming in ordinary venues is carried out in fixed waters, and there is no

complex water regime and no impact on people from seaweed and animals, so the safety factor is high. The venues will be equipped with various life-saving equipment and life-saving personnel. External instability poses dangers. Swimming in open water is carried out in natural waters, and it is necessary to face various emergencies, such as weather, aquatic organisms, waves, etc., which have certain dangers.

3) Swimming competitions are divided into two types: in-venue competitive swimming competitions and open water competitive swimming competitions. The organization of the two competitions is similar, but there are certain differences in the requirements of the competition rules.

4.2. Technical Analysis of Swimming in Open Waters and Swimming Pools in Stadiums

4.2.1. Differences between the Two Departures, Midway Tours, and Sprint Tours

The process of swimming in open water is divided into starting, mid-way swimming, and starting water; while ordinary swimming pool swimming is divided into starting, mid-way swimming, and sprint swimming. The following table compares and analyzes the sub-section results of the four athletes in the 1500-meter freestyle in the venue and the 1500-meter freestyle in the open water.

Table 1 shows the athletes' 500-meter segmented results in the venue; **Table 2** shows the athletes' 1500-meter segmented results in open water.

Through the comparative analysis of the swimming performance of athletes in the venue and in the open water, the overall performance of mobilized swimming in the venue is higher than that in the open water.

In swimming competitions, the starting technique can form a psychological advantage, and the victory or defeat is determined by one hundredth of a second, so the starting technique is very important. In the competitions in the venues, athletes started by standing at the edge of the pool at first. The modern starting technique has been continuously improved and developed. Now, the starting technique is divided into "grasping platform" and "flat style", "arm swing", "hole entry into the water", "squatting", etc. Most modern athletes use "squatting". In the swimming competition in the venue, the athletes do not interfere with each other. When they hear the gun being fired during the competition, they only need to concentrate on thinking about their starting movement skills and swimming skills. An agile and neat starting diving can enable Make swimmers slide about 15 meters quickly.

Open water swimming has different starting methods, and different venues have different starting methods. Due to the particularity of open water, there is relatively large space between the starting point and the ending point of the competition. There is no independent starting platform, and all participating players stand behind the common starting line. Starting, the starting action technique is particularly critical in open water swimming competitions. Whether

Table 1. The results of swimmers' starting, midway swimming and sprint swimming in the venue.

swimmer	Set off 100 m (s)	On the way	sprint 100 m (s)	final grade
Wang Yifan	56.63	13.23.26	57.8	15: 29.48
Sha Tianqi	57.2	14:03.45	59.6	16: 00.42
Cheng Guangyu	58.3	14:12.32	59.8	16: 17.37
Wang Shuchuan	55.32	13:43.6	57.1	15:60.00_

Table 2. Swimmers' results in open water departure, mid-swim, and sprint swim.

open water athlete	Set off 100 m (s)	On the way	sprint 100 m (s)	final grade
Wang Yifan	1:07.34	15: 34.57	1 :12.46	17:91
Sha Tianqi	1:10.35	16:23.1	1:15.57	18:82_ _
Cheng Guangyu	1:10.34	16:06.23	1:15.43	18:53_ _
Wang Shuchuan	1:07.56	1 5:28.4	1:12:23	17:80_ _

the starting is good or bad will greatly affect the results of the competition. In the open water area, because all the athletes stand on the common fixed platform or behind the starting line, the athletes often huddle together, unlike in the swimming competition in the venue, one person works together without disturbing each other. If they want to quickly follow the first group after entering the water, the athletes We must first occupy a favorable position and sprint with all our strength when we start, so open water swimmers should not have too much time to think about their starting techniques when starting, and choose different starting actions because of the different venues each time. Falling behind at the beginning, and then chasing after, neither mental nor physical advantage [7].

From the above table, it can be seen that the reaction of starting in open water is obviously slower than that in the stadium. There are clear rules for starting in the stadium, but the open water is not as standardized as in the swimming pool. In the competition in the venue, after the start of swimming, it enters the stage of mid-swimming. Swimmers complete the competition according to their own competition rhythm. Open water athletes have no distance between swimming lanes. There may be unnecessary collisions between each other, and there will also be some external influences, such as the impact of strong wind and waves, tides, and aquatic biological attacks on athletes.

4.2.2. The Difference in the Actual Paddling Effect of the Two Swimmers

After a long period of high-intensity exercise, the muscle acid resistance of athletes has declined. At this time, whether athletes are swimming in natural waters or in stadiums, their swimming skills will be deformed to a certain extent. And pushing water fatigue and other reasons.

Because swimming in the swimming pool is in still water, the athlete's move-

ment skills will not be affected by external waves. They only need to compete according to their own rhythm and technique. Swimming is one of the most important technical movements in swimming, and the main thrust of the body forward. It is produced by the stroke of the arm, and in order to obtain the best stroke effect, athletes will speed up the stroke as much as possible and extend the range of stroke. Swimming competitions in the venue will not have a greater impact on the stroke technique due to the external environment such as the swimming pool. Generally, changes in the stroke technique during the swimming process are based on the athlete's state on the day.

Because the visibility in the open water is poor, the biggest challenge for open water swimmers is that there is no black T-line at the bottom of the pool as a guide, so that they can swim straight. For open water swimmers, the visual field is the decisive factor. The important factor is that athletes who want to quickly and effectively observe the target in the swimming process must use the "crocodile eye" method to swim in. During the swimming process, they must look up every few strokes and turn their eyes observing the target out of the water will change the stroke route for open water athletes and increase the burden on strokes. Therefore, athletes need to speed up the stroke frequency and use their arms and waist to push up their upper body to improve their swimming distance speed.

Compared with the swimming skills in the venues, even if they are about to reach the finish line in the open water competition, the athletes will still be entangled together, and because the athletes still need to overcome various difficulties during the swimming process, even if the final sprint technique There will be no significant change in the timeliness of already paddling.

4.2.3. The Tactics and Speed Ratio of the Two Swimmers

Table 3 and **Table 4** analyze and study the results of domestic excellent 1500-meter freestyle swimmers and 1.5-kilometer swimming among domestic excellent open water athletes.

Speed distribution is the key to the team's success in long-distance swimming, and the classification of speed distribution tactics is a competition technique.

Before the competition, the athletes will formulate relevant tactics and strategies with the coaches in advance. Because the athletes in the swimming competition in the venue are all one-to-one and under the condition of non-interference with each other, the coaches generally do not interfere with each other in the competition. Tactics will be arranged according to the level and characteristics of the athletes themselves. Generally, tactics are used such as forward rush and rear top, front fast and then slow, front slow and then fast, etc. The tactics generally chosen by the athletes in the venue during the upstream stage of the competition are "fast forward and backward, steady in the middle". At the beginning when the physical strength is relatively abundant, most of them choose to swim aggressively and quickly, and then switch to swimming at a constant speed in order to save physical strength, and there will be an obvious sprint process in the final stage.

Table 3. Swimmers' results in each segment.

	Wang Yifan	Sha Tianqi	Cheng Guangyu	Wang Shuchuan	average score
100 meters	61.5	61.9	60.9	62.2	61.6
200 meters	61.9	62.4	61.2	62.8	62
300 meters	62.5	63.0	61.9	62.3	62.4
400 meters	63.2	63.4	61.7	62.1	62.6
500 meters	64.1	63.7	62.0	62.9	63.1
600 meters	63.9	64.5	62.3	63.2	63.4
700 meters	64.3	64.9	62.4	62.7	63.5
800 meters	64.3	65.3	62.6	62.1	63.5
900 meters	64.6	65.0	62.3	62.4	63.5
1000 meters	64.5	64.2	62.6	62.1	63.3
1100 meters	64.9	63.9	61.3	62.4	63.1
1200 meters	65.1	65.6	60.3	61.7	63.1
1300 meters	64.6	64.6	59.7	61.3	62.5
1400 meters	63.7	63.9	58.2	60.2	61.5
1500 meters	61.5	62.3	57.8	59.3	60.2

Table 4. Results of each segment of open water athletes.

	Tian Muran	Xin Xin	savings	Yan Yuxiang	average score
100 meters	67	66	68.2	66.6	66.9
200 meters	67.9	64.5	66.7	65	66
300 meters	68.8	63.8	66	64.8	65.8
400 meters	69.4	64	65.5	64	65.7
500 meters	70.3	64.5	66	63.9	66.1
600 meters	71.8	65.1	65.9	63.8	66.6
700 meters	72.3	66	65.3	64	66.9
800 meters	72.9	67.1	65.6	64.8	67.6
900 meters	74	67.6	66.5	64.5	68.1
1000 meters	75.6	68	66.2	64.7	68.6
1100 meters	76.6	67.8	65.6	64.4	68.6
1200 meters	75.5	66.6	67	63.9	68.3
1300 meters	74	66.9	67.5	63.8	68
1400 meters	73.9	66	66.7	63.4	67.5
1500 meters	72.5	65.6	66.3	63	67.5

When swimming competitions in open waters, tactical arrangements need to be very flexible, due to special competition rules and special competition envi-

ronments. Due to the low visibility in the water, all athletes will use head-up swimming to observe the marker points and check the position to determine the direction of their own swimming, but there is no need to check the position in the swimming pool [8]. Tactical arrangements also need to be made according to the weather conditions. If the weather is cold and the water temperature is too low that day, athletes will choose to wear wet-proof swimsuits for the competition, but wearing cold-proof swimsuits will bring greater resistance to athletes and increase the burden on athletes. It also depends on whether the competition is held in a still water lake or in the ocean. If it is in the ocean, athletes should also face the difficulties of head waves, jellyfish and other sea creatures. In addition, everyone is competing in the same water area, which will often cause physical collisions or frictions. When ensuring the implementation of one's own tactics, it is also necessary to defend against the opponent's malicious tactical arrangements [9]. In open water competitions, the burden caused by the external environment is too great, so athletes will choose follow-up swimming tactics to save energy. Judging from the speed ratio of the athletes in **Table 4**, most of them choose to go fast before going slow, because the start is particularly important for open water athletes, so they will sprint from the start to the first 300 meters to seize a favorable position. Then there will be no obvious sprint after switching to average speed swimming in order to save energy.

5. Conclusions and Suggestions

5.1. Conclusions

1) Judging from the research on the characteristics, external environment, and competition rules of swimming in venues and swimming in open waters, there are still great differences in the movement techniques of swimming in venues and swimming in natural waters.

2) According to the physiological characteristics of the human body, the energy consumed in water is greater than that of land, which itself causes a certain load on the human body, and because of the changeable and unstable environment of natural waters, the time spent in open waters for the same distance is greater than that of physical strength. Swimming in the venue.

3) The water quality in open waters is quite different from that of swimming pools that have not been artificially treated. The swimming pools will be equipped with lifesaving observation decks, lifebuoy rings, lifesaving poles, lifesaving boards, oxygen bags, first aid medicines and various equipment and professional equipment. Lifeguards, the safety guarantee is higher than that of open water swimming.

4) Athletes pay more attention to the quality of stroke technique when performing 1500-meter freestyle in the venue, while open water athletes pay more attention to the frequency of stroke technique when performing 1500-meter freestyle.

5) In terms of tactics, athletes in ordinary venues will formulate correspond-

ing tactics according to their own ability level, while athletes in open waters have relatively flexible tactics and pay attention to adapting to changes. Therefore, open water swimmers have higher endurance quality, ability to cope with external factors, and higher body reaction speed.

5.2. Suggestions

1) Due to the unclear water quality in open waters, the direction cannot be seen in the water. Athletes need to use “crocodile eyes” to identify the direction. This swimming method will never appear in the competition in the venue. It is an ordinary swimming posture. The wrong movements in the swimming pool, because raising the head will cause the athlete’s technical movements to be deformed, and destroy the athlete’s speed rhythm during the swimming process. However, athletes in open waters must swim in this way if they want to see the direction clearly, so they should increase the swimming practice of “crocodile eyes”, so that the athletes’ movement skills will not change too much when they compete in open waters.

2) Swimming in open water is carried out in an uncontrollable external environment, which will increase some uncontrollable burdens on athletes, so more attention should be paid to athletes’ strength quality, speed quality, physical fitness, endurance quality, and acid resistance of muscles for practice, prepare for the corresponding warm-up activities before the training game, do a good job of supplementing water and nutrition during the training process of the game, and do a good job of relaxing and summarizing after training.

3) Athletes must understand the possible risks in open water swimming before participating in open water competitions, and formulate reasonable emergency plans before training or competitions, and have dealt with various emergencies that may occur during swimming, to minimize the danger caused by insufficient preparation.

4) The change of athletes’ skills will greatly improve their sports performance, so it is necessary to effectively use the skills of movements and manage the distribution of movement power. During the training process, pay more attention to the mastery of technical training. While maintaining the frequency of strokes, increase the timeliness of strokes, achieve coordinated strength of hands and legs, reduce the resistance of the body in the water, increase the driving force during swimming, and pay attention to the quality of movement skills while also paying attention to the effect of movements.

Conflicts of Interest

The author declares no conflicts of interest.

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