Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China

Libing Chen

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degree of Doctor of Philosophy in Exercise and Sport Science
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ABSTRACT

The purpose of this study is to explore the factors that influence the evaluation index of Chinese female dragon boat athletes. Analyzing the relationship between the influencing factors, Development of physical fitness evaluation indicator of female dragon boat athletes in China ; Validate the physical fitness evaluation Indicator model。Quantitative and qualitative studies using mixed research methods (mixed methods study).Using the interviews as a research tool, The confidence value of the study tool was 0.929 ; 66 Chinese female dragon boat athletes were selected as the test subjects, and the reliability coefficient of the study data was 0.850, greater than 0.8, indicating that the reliability of the study data was of high quality, For the Corrected Item Total Correlation（CITC） value, the CITC value of all indicators is greater than 0.4, indicating that the correlation between indicators is high, and the test method adopted is feasible, and the data can be used for further analysis. Data from this study were analyzed and collected using SPSS21.0 and Excel Table.

The result of this study is to development of physical fitness evaluation indicators of female dragon boat athletes in China.

1. Factors influencing the development of the physical fitness evaluation indicators for Chinese female dragon boat athletes. Through previous research, theoretical combing and interviews, The results show that the construction of this model involves 3 dimensions, 12 factors and 95 sub-factors. The reliability and empirical data of all variables are reliable, consistent and empirical data, with a credit value>0.929.

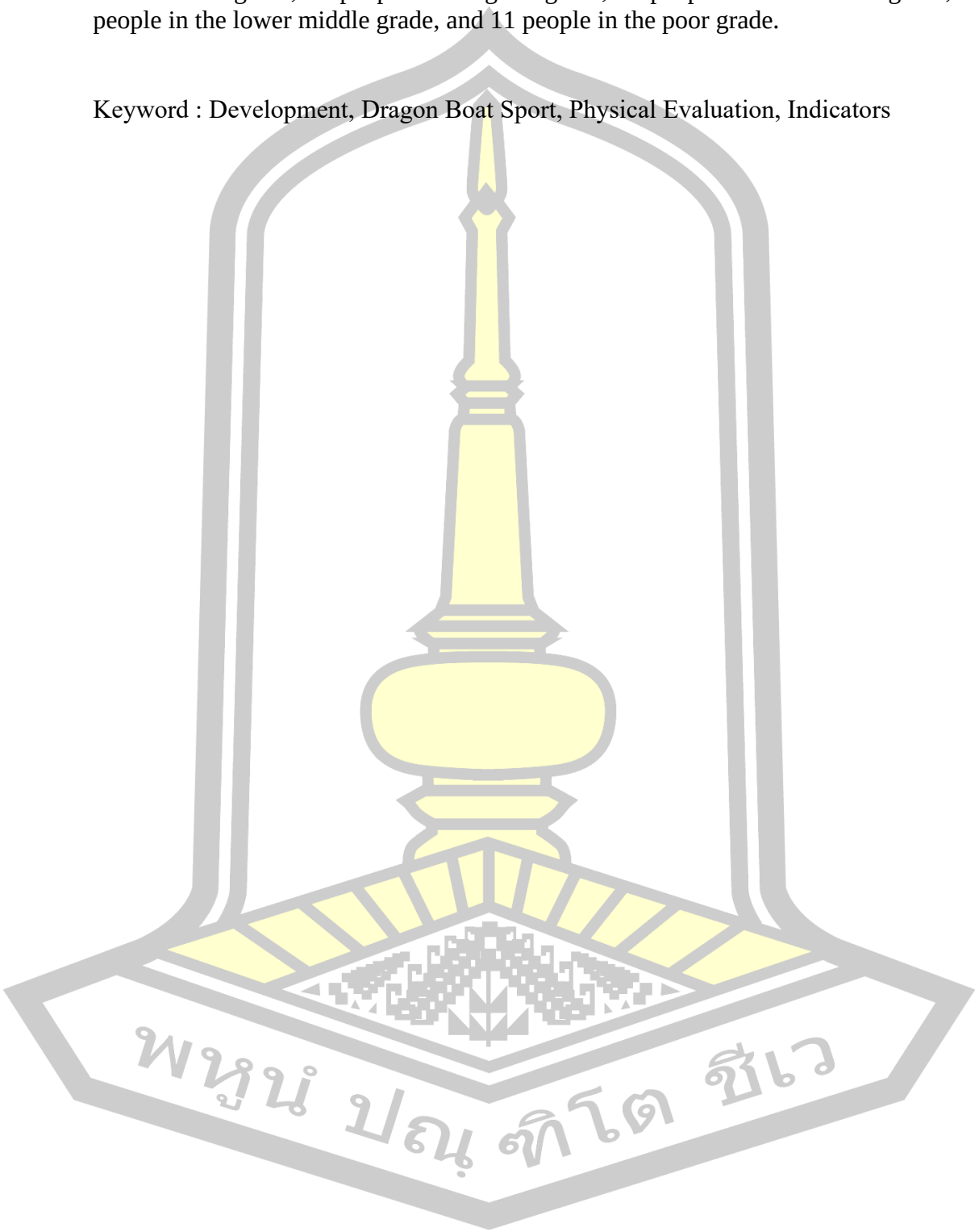
2. Explain the whole process of physical fitness evaluation indicators construction of Chinese female dragon boat athletes, Using Delphi method, 13 experts were invited to conduct three rounds of screening of first, second and third indicators using five-point Likert scale. The results showed that 3 first level indicators (body shape, physical function, sports quality), 11 second level indicators (length, width, Girth, Body principal component, Cardio-pulmonary function, Energy supply system, endurance, Strength, speed, flexibility, Sensitive) and 36 third level indicators (Upper extremity length (cm), Calf length (cm), Arm span (cm), ower limb

length (cm), Shoulder width (cm), Hip width (cm), Upper arm tension (cm), Calf circumference (cm), Waist circumference (cm), Thigh circumference (cm), Chest circumference (cm), Body fat percentage (%), The Ketole indicators (kgcm), Height (cm), Quiet heart rate (mintime), Heart Function indicators (Lmin㎡), Maximal oxygen uptake (mlcmkg), Maximum anaerobic power (W), Vertical jump touch height (cm), Core ventral bridge level 8 (level), 1RM pull-out (kg), Back muscle endurance (S), 1RM bench press (kg), Standing long jump (cm), 1RM Squat (kg), 1min pull-ups (time), 3000 m run (min), 800 m run (min), Seated forward bend (cm), Cross fork (cm), Shoulder mobility (cm), 400 m run (s), 30 m Sprint (s), 1 min jump rope (time), Cross-shaped change direction run (s), 30s burpees (time)) were selected. The average of 36 third level indicators is above 4, between 4.23 and 4.92; The coefficients of variation are all below 0.25 and range from 0.06 to 0.17. From the numerical point of view, experts on the third round of third Level indicators are very recognized, to determine the final indicators. The analytic hierarchy process is used to calculate the weight value of each indicators. The first level indicators (Body form 0.1179, Physical function0.2014, Sports quality 0.6806), the second level indicators (Length 0.0803, Width 0.0059, Girth 0.0124, Body principal component 0.0194, Cardio-pulmonary function 0.0671, Energy supply system 0.1343, Strength 0.2895. Endurance 0.1782, Flexibility 0.0317, Speed 0.1110, Sensitive 0.0702), and the weight value of 36 third-level indicators (Upper extremity length (cm) 0.0433, Calf length (cm) 0.0049, Arm span (cm) 0.0223, Lower limb length (cm) 0.0096, Shoulder width (cm) 0.0019, Hip width (cm) 0.0039, Upper arm tension (cm) 0.0050, Calf circumference (cm) 0.0011, Waist circumference (cm) 0.0036, Thigh circumference (cm) 0.0018, Chest circumference (cm) 0.0007, Height (cm) 0.0018, Body fat percentage (%) 0.0120, The Ketole index (kgcm) 0.0055, Quiet heart rate (mintime) 0.0067, Heart function index (Lmin㎡) 0.0604, Maximal oxygen uptake (mlcmkg) 0.1119, Maximum anaerobic power (W) 0.0223, Vertical jump touch height (cm) 0.0091, Core ventral bridge level 8 (level) 0.0696, 1RM Pull-out (kg) 0.0947, Back muscle endurance (S) 0.0252, 1RM bench press (kg) 0.0139, Standing long jump (cm) 0.0101, 1 RM Squat (kg) 0.0493, 1 min pull-ups (time) 0.0173, 3000 m run (min) 0.1188, 800 m run (min) 0.0594, Seated forward bend (cm) 0.0197, 30 Cross fork (cm) 0.0043, Shoulder mobility (cm) 0.0076, 400 m Run (s) 0.0185, 30 m Sprint (s) 0.0925, 1 min Jump rope (time) 0.0120, Cross-shaped change direction run (s) 0.0054, 30s Burpees (time) 0.0526).

3. Verify the physical fitness evaluation indicators model of Chinese female dragon boat athletes. Through the test, the physical fitness data of Chinese female dragon boat athletes, By using the standard percentage method to assign each indicators and formulate the scoring standard of each individual indicators ,Using the fifth class evaluation method for grade classification, development the physical fitness grade evaluation standard of Chinese female dragon boat athletes, The grading range is determined as 5 grades: excellent, good, medium, lower medium and poor. Combined with weight, establish the grade standard of comprehensive evaluation of physical fitness. the results show that: Comprehensive score ≧11.7033 as excellent, 10.9560-11.7033 as good, 10.2585-10.9560 as medium, 9.4612-10.2085 as lower medium, ≦9.4612 as poor. The scores of body shape, physical function, sports quality and comprehensive scores of 66 Chinese female dragon boat athletes were compared

with the comprehensive rating standard table. Result display : There are 13 people in the excellent grade, 15 people in the good grade, 12 people in the medium grade, 15 people in the lower middle grade, and 11 people in the poor grade.

Keyword : Development, Dragon Boat Sport, Physical Evaluation, Indicators



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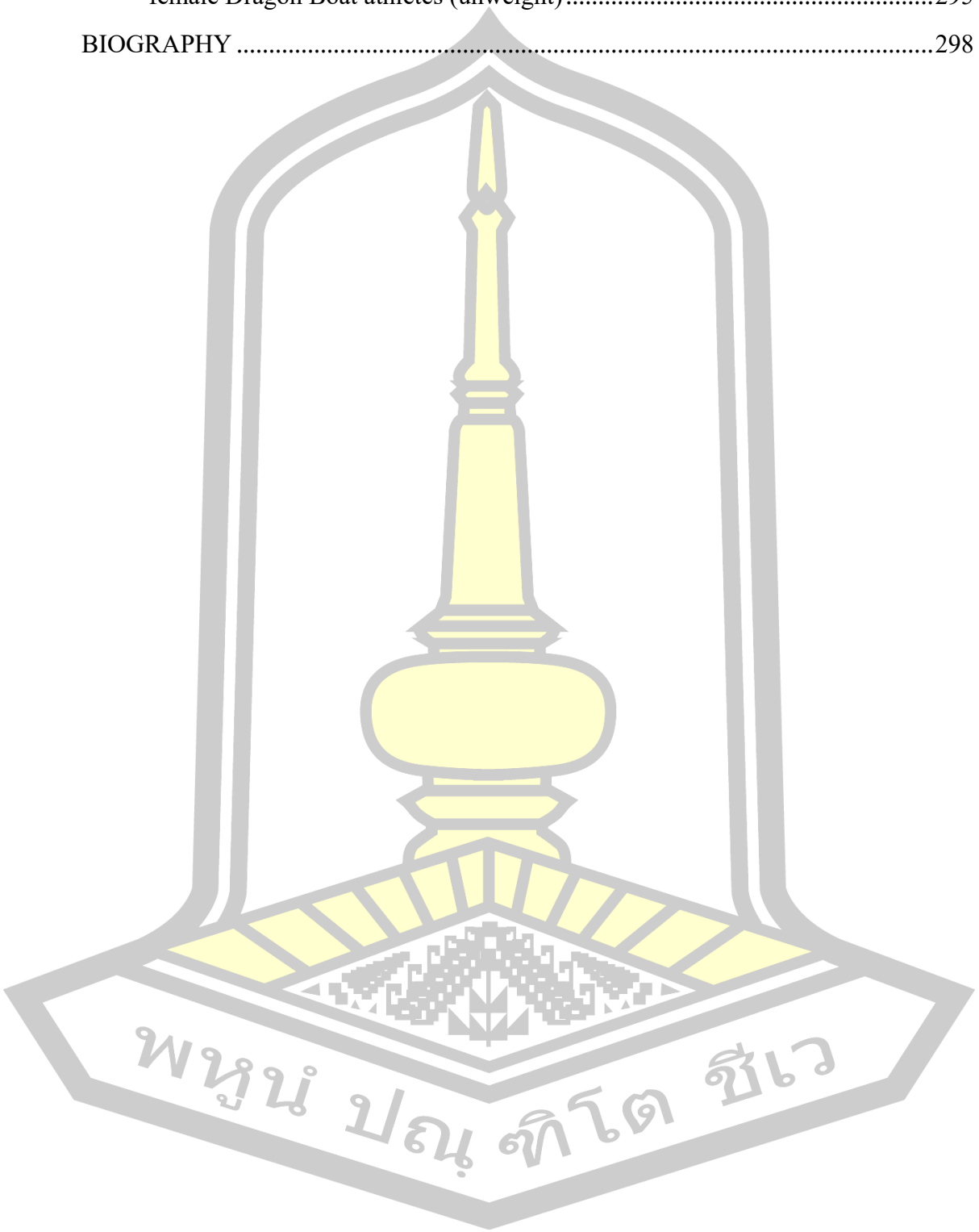

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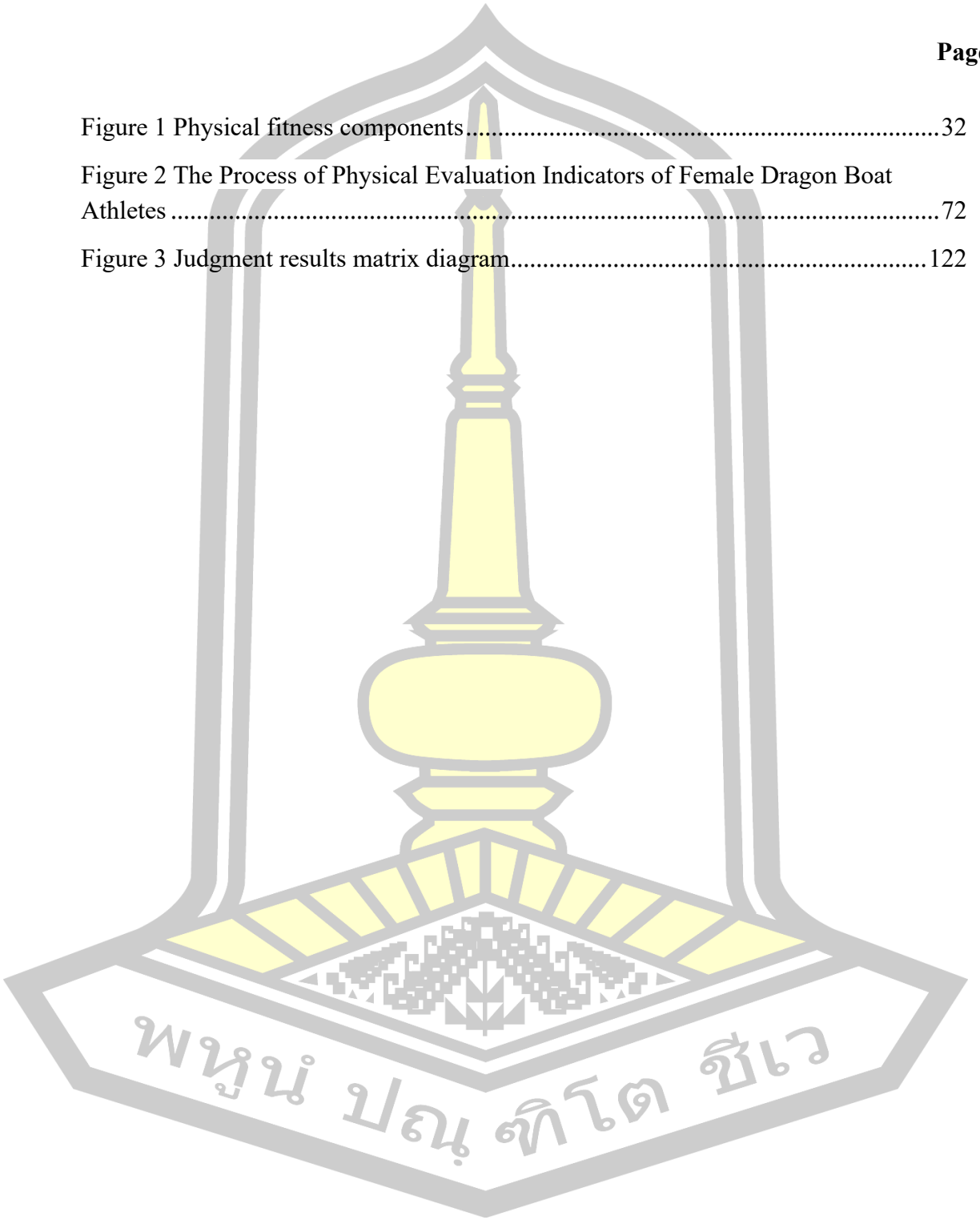

CHAPTER I
INTRODUCTION

Background

Dragon boat movement has a long history and culture in China, and is a traditional sports project deeply loved by the people and has profound ethnic characteristics (Yang Jianshe, 2007). On May 16,1984, the former State Sports Commission made the decision to list the dragon boat as an official competition event. Since then, the Dragon Boat Festival was officially combined with the sports competition, and competed according to the modern competitive sports competition method, which has played a positive role in promoting the popularization and development of dragon boat sports in China (Huang Zijian, 2019). In June 1985, the Chinese dragon boat association, the international dragon boat federation was established in 1991, the Asian dragon boat federation was established in 1992, the international dragon boat championship and the Asian dragon boat championships and the world dragon boat club championship, yellow cup world Chinese dragon boat series, the Yangtze river three gorges international dragon boat rally and a series of international dragon boat events, in addition, the 2007 world special Olympics (Shanghai) increased the dragon boat race, entered the Asian games in 2010 year, marked the dragon boat movement into the international comprehensive games. (liu, Wang Jiechun & Lv Guangming, 2022).

Dragon boat sport is a team sport, by many rowers rely on a single blade of paddle as a way of propulsion, the use of muscle strength to push the boat behind the water, the boat forward movement. It is driven by the paddling of the paddler, through the concerted efforts of the drummer, the paddler and the helmsman, in the shortest possible time, to complete the prescribed race distance, and the first to reach the end is the winner. According to the rules of dragon boat competition, the standard dragon boat has 22 people, 1 helmsman, 1 drummer, and 20 paddlers. The main events of the competition are straight race, round race, rally race, straight race including 200m, 500m, 800m, 1000m;200m belong to short track racing, 500m belong to short and medium track racing, 800m and 1000m belong to long track racing, and 200m and 500m are the most used events in international dragon boat races (Song, 2012). The

size of the standard dragon boat is as follows: (1) the length of the boat is 15500mm, excluding the dragon head and tail. (2) The total length of the hull including the dragon head and tail is 18400±30mm. (3) The widest part of the boat is 1100mm. (4) The height in the middle of the boat is 450mm. (Dragon Boat Competition Rules, 2014, 2019, 2020)

In 2010 Guangzhou Asian Games, dragon boat event became the official event of the Asian Games for the first time. There were standard dragon boat races for men and women, and 6 straight track races for 200m, 500m and 1000m. In men's event, the Chinese men's team won two bronze MEDALS, and in women's event, the Chinese women's team won three gold MEDALS (Zhang Xinbao, 2021). In the 2012 Asian Beach Games, there were six men's 200 m, 500 m and 3000 m. Chinese women's team won two gold MEDALS in the 200 m straight race, 500 m straight race against Indonesia and Thailand (Xiong Yu, 2018). In the men's event, Chinese men's team won the bronze medal in the 200 m straight race; The 2013 Tianjin East Asian Games included men's and women's standard dragon boats. In the 200 m and 500 m straight race, the Chinese women's team won two gold ME, and the Chinese men's team won the 200 m standard dragon boat gold medal (Liu Xiao, Wang Jiechun, Lu Guangming, 2022); In 2014, the first International Dragon Boat Federation World Cup, only the top 16 of the World Championship can participate in the World Cup, a total of 16 teams, including the United States, Russia, Britain, Germany, Canada, Australia, the Philippines, Guam and other teams and the host team, the Chinese women's team won the 200 m championship; In 2016, the second International Dragon Boat Federation World Cup, the Chinese team topped the top with 5 gold MEDALS, 3 silver MEDALS and 2 bronze MEDALS, holding the highest honor of the world's dragon boat World Cup; Dragon boat project again into the Asian games in 2018, the Asian games dragon boat race set men's standard dragon boat 200 meters, 500 meters and 1000 meters straight racing, women's standard dragon boat 200 meters and 500 meters straight racing five projects, Chinese men and women team won 200 meters straight race champion, 500 meters straight racing project Chinese men lost to Chinese Taipei, women lost to Korea united runner-up (Wang Long, 2014); In 2018, the third International Dragon Boat Federation World Cup, China won the 200 m and 500 m straight race champion (Li li,2016).In the 13th World Dragon Boat

Championship, Team Canada showed strong physical strength and endurance advantage and became the biggest winner; the 16th World Dragon Boat Championship, Team Canada continued to win the 200 m straight and 500 m straight silver.

As a standard sports event, dragon boat sport is gradually out of China, out of Asia, to the world, with the Chinese Dragon Boat Race, World Championship, World Cup and other domestic and foreign competitions held, marking the dragon boat sport into the ranks of international sports competitions. The level of dragon boat sport in China has experienced a brief glory, although it is in a leading position in Asia, with the extensive development of dragon boat sport in the world in recent years, the level of the world's dragon boat has improved rapidly, the level of dragon boat competition in European and American countries has reached the world's advanced level, and the competition is very fierce in international competitions. There is a big gap between Chinese dragon-boat players and European and American athletes in physical fitness. Looking at the world dragon-boat sports powers, all countries attach great importance to the physical training of athletes in order to improve the performance of the competition. The scientific research investment in the project has gradually increased, and the technical level of the project has been continuously improved (Journal of Beijing Sport University, 2008). If the Chinese dragon boat team wants to win new advantages, it should identify the gap in front of the performance, find problems at the level of competition, continue to study the rules of the project, strengthen the short board combined with the competition, and improve the competitive level of China's dragon boat sport (Wang Zequn, Wang Lin, Gong Man, Hou Wenli, 2021).

Song Qiang analyzed the training characteristics of 500m in the straight track race of Dragon boat race, and believed that to improve the performance of 500m in the straight track race of Dragon boat race, the anaerobic energy supply system which plays a major role in sports events should be developed, athletes should show good cardiopulmonary function, and strengthen the physical fitness training of athletes. Including strength, endurance, speed, flexibility, agility training (Song Qiang, 2012); In the discussion and analysis of the results of men's and women's 500m and 1000-meter straight race at the 16th Asian Games, Zhang Yaoyao measured the height, weight, sitting height, arm length, shoulder width, waist circumference, chest

circumference and upper arm circumference of the national dragon Boat Training team by measuring the morphological indexes of the 24 men's and 24 women's members. For the future selection, training to provide help. Sports quality indicators include 3000m running, 2 minutes of lying down, 2 minutes of sit-ups, maximum lying down, maximum bench press, human body upward and other quality indicators. Research shows that these quality indicators are highly correlated with the individual ability of dragon boat competition, and they should be improved in training (Zhang Yaoyao, 2012). Liu Xiaoin explored the impact of functional training on the physical characteristics of dragon boat athletes, selected 24 male dragon boat team athletes from Anhui Normal University to compete in 200m, 500m and 1000m straight track races as experimental objects, and divided the physical characteristics of dragon boat athletes into three parts: body form, body function and sports quality (Li Bing, 2010). It is concluded that body weight, body fat, upper arm tension circumference, Laurel index and Wilwick index are important reference bases to reflect the physical shape of athletes. The power factor and the flexibility factor are the basic indexes to evaluate the sports quality of dragon boat athletes, and the load contribution rate of 8 indexes such as seated forward bend, bench press maximum weight, pull-up and burpees for 10 seconds is greater. Test tools: seat forward bending test board, horizontal bar, barbell piece, barbell bar, bench press rack, squat rack (Liu Xiao, 2020). In the study on the influence of core strength training on the special physical fitness of college dragon boat athletes, Crown selected 40 male athletes from the Dragon boat team of China Three Gorges University as experimental subjects, and selected the maximum weight of bench press through expert investigation, one minute sitting row, one minute sit up, one minute back up, 1000m. The seven items of 30-second burpees can be tested on behalf of the special physical fitness indicators of dragon boats (Crown, 2019).

Dragon boat sport is an endurance racing event dominated by physical fitness. The athletes' competitive ability is composed of physical fitness, skills, tactical ability, sports intelligence and psychological ability with different forms and functions. As one of the important components of athletes' competitive ability, physical fitness is the key factor to determine the victory of dragon boat race (Yu Zhengcheng, 2022). According to previous research findings, there are few researches

on the three dimensions of body shape, physical function and sports quality of dragon boat athletes at present. Most of them tend to study the indicators of a certain dimension of male dragon boat athletes, and the researches mainly focus on the 500m and 1000m straight race. There is no research on the physical fitness evaluation index of Chinese female dragon boat athletes. 200m and 500m are the most used events in international dragon boat races (Song qiang, 2012). Chinese female dragon boat team has always been at an advantage in 200m. The research on the 200m straight race of female dragon-boat athletes is blank, which has become a big lack of scientific research of dragon-boat project. Therefore, the purpose of this study is to fill the gap in the physical evaluation index of Chinese female dragon boat athletes, and to reveal the key elements of physical training with the goal of 200m straight race, so as to provide a reference for the physical training effect of female dragon boat athletes, so as to improve and optimize physical training.

Research Problem

1. The performance of Chinese women's dragon boat sport in the 200-meter race has always been advantageous. In recent years, with the extensive development of the dragon boat sport in the world, the level of the world's dragon boat race has improved rapidly. The level of dragon boat competition in European and American countries has reached the world's advanced level, and the competition is very fierce. There is a big gap between Chinese dragon boat players and European and American athletes in physical fitness. Physical fitness, as one of the important components of athletes' competitive ability, is the key factor to determine the victory of dragon boat race. In order to improve the performance of the competition, all countries attach great importance to the athletes' physical training. It is found that the research on the 200-meter straight race of Chinese female dragon boat athletes is still blank, which has become a big lack of scientific research of dragon boat project.

2. The female dragon boat athletes of physical training efficiency is low, It is mainly of female dragon boat athletes of the physical fitness characteristics the lack of accurate understanding, the lack of athletes physical characteristics evaluating for standard, Lead to the inability to implement targeted training, Affect the effect of physical training.

3. At present, there is a lack of research on the body shape, physical function and sports quality evaluation indicators of Chinese female dragon boat athletes.

Research Question

1. What are the factors that influence the evaluation indexes of the body shape, body function and sports quality of Chinese female dragon boat athletes?

2. How about the relationship between the influencing factors of the physical fitness evaluation indicator of female dragon boat athletes in China, and how to construct the physical fitness evaluation indicator of female dragon boat athletes in China?

3. How to verify the of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China?

Objective of the study

1. To explore the factors influencing the development the of physical fitness evaluation Indicator of female dragon boat athletes in china.

2. Analyze the relationship between the influencing factors of physical fitness evaluation Indicator of female dragon boat athletes in china. development the of physical fitness evaluation Indicator of female dragon boat athletes in china.

3. Verification the of physical fitness evaluation Indicator of female dragon boat athletes in china.

Significant of study

1. This study has enriched the research of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China, It fills the gap of the physical fitness evaluation Indicator of Chinese female dragon boat athletes.

2. Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China, To evaluate the physical level of female dragon boat athletes, Understand the physical Fitness and weaknesses of athletes, Provide scientific basis for physical training; To evaluate the physical training effect of the dragon boat team, To improve and optimize physical training;

3. Provide the basis for scientific material selection.

Definitions of Terms

Dragon Boat

Dragon boat sport, also known as dragon boat race, dragon boat race, it is an important activity of the Dragon Boat Festival, very popular in the south of China, it is the earliest ancient Yue people worship water god or dragon God of a sacrificial activities, its origin can be traced back to the end of primitive society, according to legend originated in the ancient Chu people because of reluctant to give up the worthy minister Qu Yuan into the river died, many people rowing to save. They scrambled to reach Dongting Lake without a trace. After the fifth day of May each year to commemorate the dragon boat, by rowing the dragon boat to disperse the fish in the river, so as not to eat Qu Yuan's body. The practice of competing for ferry was prevalent in the states of Wu, Yue and Chu. Dragon boat sport has a history of more than 3,000 years in China and has been included in the national intangible cultural heritage list. In 2010 Guangzhou Asian Games became an official competition, dragon boat sports applied to the Chinese Dragon Boat Competition, China Dragon Boat Open, Asian Games, International Dragon Boat Invitational competition, National Dragon Boat Championship and other series of competitions. Dragon boat sport, as an endurance racing event dominated by physical fitness, is a sport in which many rowers rely on the paddling of a single blade as a means of propulsion, and use muscle power to paddle behind the boat to push the boat forward.

According to the rules of dragon boat competition, the standard dragon boat has 22 people, 1 helmsman, 1 drummer, and 20 paddlers. The main events of the competition are straight race, round race, rally race, straight race including 200m, 500m, 800m, 1000m; 200m belong to short track racing, 500 m belong to short and medium track racing, 800m and 1000m belong to long track racing, and 200m and 500m are the most used events in international dragon boat races (Song Qiang, 2012). The size of the standard dragon boat is as follows: (1) the length of the boat is 15500 mm, excluding the dragon head and tail. (2) The total length of the hull including the dragon head and tail is 18400±30mm. (3) The widest part of the hull is 1100 mm. (4) The height in the middle of the hull is 450 mm (Dragon Boat Competition Rules, 2014, 2019, 2020).

Physical Fitness

Physical fitness refers to the ability of the function to adapt to the environment and bear the load in various sports through innate heredity and acquired training. Body shape, Physical Function, and Sport Quality are the three components of the physical structure". Sport quality is the most important determinant of physical fitness, and body shape and physical function are the basis for forming good sport quality (Tian Maijiu, 1988).

Body Shape

Body shape refers to the shape characteristics of the outside and the inside of the human body. The indicators reflecting the external morphology are: Height (stature sitting height), Length (leg length, arm length, hand length), girth (chest, arm, leg, waist and hip), Width (shoulder width, hip width) and enrichment (body weight, cortical thickness). The index that reflects internal form has: heart vertical and horizontal diameter, the shape of muscle and cross section.

Physical Function

Physical function refers to the ability of the internal organs of the human body (such as cardiovascular organs, respiratory organs, central nervous system) to work. The functional state of athletes is closely related to competitive ability. Different sports have different requirements on the functional level of human organs and systems. Long-term high-intensity training in a certain sport will produce the functions of the athlete's motor system (muscle strength), cardiovascular system (blood pressure, heart rate, cardiac output, stroke output), respiratory system (vital capacity, oxygen uptake, maximal oxygen uptake), energy metabolism system (respiratory quotient, anaerobic threshold) and other biochemistry (blood lactic acid, hemoglobin) Adaptive change.

Sport Quality

Sport quality is the basic athletic ability of the athlete in the process of exercise, the organism under the control of the central nervous system, through muscle activities. It is mainly manifested in the size of the muscle contraction force, the frequency of completing the movement, the time consumption of the moving distance of the body position, the length of the continuous working time of the muscles, the coordination of the activities between the exercise muscles and the size

of the range of activities of each joint. The sports quality includes strength, speed, endurance, sensitivity, flexibility, coordination and other aspects. The dragon boat athletes want to succeed, In addition to the comprehensive development of various sports qualities, excellent endurance quality and strength quality are essential for excellent dragon boat athletes.

Evaluating indicator

Indicator is the absolute number, relative number and average of a certain aspect of social phenomenon, which is a term in social and economic statistics. The evaluation field borrows this term, takes the goal as the center, breaks down the goal layer by layer, breaks down the goal into some specific and operational factors, and reflects the overall characteristics of the goal by evaluating these factors. Therefore, the evaluation index is decomposed by the designer of the evaluation index according to the evaluation goal, which can reflect the main factors of concretization and behavior of certain essential characteristics of the evaluation object, and it is the basis for the value judgment of the evaluation object.

Indicator weight

In the evaluation table, different evaluation indicators play different roles in judging the degree to which the evaluation object achieves the predetermined goal. In order to make each indicator play its due role, it is necessary to assign different weights to different evaluation indicators. The so-called index weight is to indicate the importance of each evaluation indicator in the index system, and give the corresponding value, this value is called the weight of the corresponding indicator, or weight. The process of determining the weight is called weighting. Weighting is a commonly used mathematical means in the measurement system of evaluation work, which is of great significance in the evaluation work, and it must be paid full attention to. It can objectively reflect the role of each indicator in achieving the goal, so the evaluation results are more objective. According to the historical and environmental conditions of the evaluation object, the weight of some indicators can be adjusted appropriately, which can guide people to pay attention to some weak links in the work. It is convenient for people to grasp the key points and grasp the key points in the work, distinguish the primary and secondary, the priority, concentrate on the main work, and arrange the comprehensive work.

Evaluation criterion

The evaluation standard is a measure of the evaluation object to meet the requirements of the evaluation index, which is composed of three elements: intensity and frequency, label and scale. Strength refers to the degree to which the index meets the requirements of the project or the degree of the pros and cons of various normative behaviors, also known as qualitative standards. For example, in the rating, what requirements are rated as good, good, average or poor, there must be certain provisions. Frequency refers to the number of items that meet the requirements of the index or the relative number of various standardized behaviors, also known as quantitative standards. A label is a marking symbol of different intensity and frequency, usually represented by a letter (such as A, B, C), text (such as A, B, C), or a number (such as 1, 2, 3). It has no independent meaning and represents only a classification. Scale is the grade of evaluation. It can be qualitative (e.g., excellent, good, medium, poor) or quantitative (each grade is represented by a number). However, qualitative values must be assigned to convert qualitative scales into quantitative scales in order to do statistical processing. Evaluation criteria of three elements - second. It can be qualitative (excellent, good, medium, poor) or quantitative (each grade is represented by a number). However, qualitative values must be assigned to convert qualitative scales into quantitative scales in order to do statistical processing. The three elements of evaluation criteria are interdependent and cooperate with each other to form a unified whole. Among them, intensity and frequency are the specific content and main components, label is the auxiliary part, scale is the basic part.

Summary

The first chapter mainly introduces the research background of dragon boat sports, the basis for selecting the topic, the constituent elements of physical fitness characteristics and various factors and variables, puts forward the research purpose and significance of constructing physical fitness evaluation indicators for Chinese female dragon boat athletes, sorts out the research problems, defines the relevant concepts, and lays a certain theoretical foundation for the subsequent paper writing.

CHAPTER II

LITERATURE REVIEW

Using the theory of sports training, morphology, sports measurement and evaluation to explore the evaluation index of female dragon boat athletes' physical fitness. The second chapter mainly uses Wuzhou University Library, Mahasarakan Library and China National Knowledge Network and other Internet resources. Search related books, academic journals, papers, Internet resources, and other sources of information related to the field of study. The second chapter systematically combs relevant research literature, in order to better grasp the theoretical needs and practical direction of the construction of female dragon boat athletes physical evaluation indicators, and provides ideas and references for further theoretical research and development practice of female dragon boat athletes physical evaluation indicators.

1. The historical origin of dragon boat sport
2. Muscle force principle
3. Principles of the kinetic mechanism
4. Principles of kinematics
5. Interpretation and structural elements of physical fitness
   5.1 Research views of foreign scholars
   5.2 Research views of domestic scholars
6. Study on the physical fitness characteristics of dragon-boat athletes
   6.1 Study on the body shape characteristics of dragon boat athletes
   6.2 Study on the physical function characteristics of dragon boat athletes
      6.2.1 Aerobic metabolic capacity
         Maximum oxygen uptake (VO2max)
         Anaerobic threshold (AT)
      6.2.2 Anaerobic metabolic capacity
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   6.3 Study on the sports quality characteristics of dragon boat athletes
      6.3.1 Strength quality

6.3.2 Endurance quality

6.3.3 Speed quality

6.3.4 Flexibility

6.3.5 Sensitivity and coordinated quality

7. Study on the physical fitness evaluation of dragon-boat athletes

8. The application of sports evaluation theory in physical fitness indicators

The historical origin of dragon boat sport

To commemorate the great man

There are many legends about the origin of dragon boats. First, in order to commemorate China's great patriotic poet Qu Yuan can not face the demise of the country, the Dragon Boat Festival to the local people in order to commemorate him, then the annual May Festival dragon boat race. Second, in order to commemorate the Spring and Autumn period Wu State of the great hero minister Wu Zixu. "Wu Yue Spring and Autumn" said Wu Zixu Tuanzhong by slander, after the death of the body to abandon the immortal into the water god, people will race to miss him. Third, in the ancient book "The Legend of Yue Land", the origin of dragon boat race originated from King Gou Jian of Yue using dragon boat race to train the water army. There are different opinions on the origin of dragon boat. In the final analysis, the dragon boat commemorates different historical figures due to regional and ethnic differences, but it is all to commemorate loyal and patriotic people and reflect people's high respect for and remembrance of patriotic great men (Qin Wei, 2010).

Totemism

Since ancient times, Chinese people have come from the descendants of the dragon, the descendants of the Yellow Emperor, and have a lofty belief in the dragon God. In the context of ancient farming civilization, people prayed for food and warm clothes. As a totem belief of ancient people, dragon was the rain god in charge of precipitation, which could bring them good weather, good harvest, and a happy life. The original origin of dragon boat race has five cultural connotations. First, the most original connotation of dragon boat race is the feudal ceremony of ancient people offering the dragon God for good luck; Second, the ancestors believed that the dragon was in charge of rain, so the dragon totem gradually derived the god of rain; Third,

the purpose of the magic of praying for rain or stopping rain is to pray for a smooth grain harvest, so the boat race is an activity of the ancestors to pray for abundance; Fourth, the dragon boat race is a ceremony to eliminate diseases and disasters; Fifth, the dragon boat race is a ceremony to pray for children and grandchildren. Under the background of Chinese traditional feudal thought, dragon boat race was given a superstitious color. In the early period, people lived in a difficult and prone environment, and the dragon totem represented their spiritual sustenance (Yao Zhengshu, He Genhai, 2000).

Dragon boat culture

National culture is the soul of a nation. If a country wants to stand in the cultural trend of the world, it must be full of vitality of national culture and constantly improve the soft power of national culture. The inheritance of national culture needs a carrier. The carriers are both substantive, such as murals, ancient books, characters, etc., and non-substantive, such as folk dances and rituals. The dragon boat culture derived from the dragon boat race, as a cultural symbol, represents the Chinese sports spirit of unity and cooperation, patriotism, fearlessness and courage. As one of the quintessence of Chinese traditional sports, dragon boat race has endured great changes for thousands of years and still maintains great vitality for development. With the continuous improvement of China's comprehensive strength, dragon boat race has become an indispensable backbone force in the world. From sacrificial ceremonies and festival activities, dragon boat race has developed into an international competitive sport loved by people all over the world. Because it contains unique national cultural connotation and is in common with the national culture of other countries, it is accepted by people all over the world. It is an important part of China's traditional culture, and it is also the material wealth of the world family (Xiang Fengli, 2020).

Overview of the development of dragon boat sport in China

Dragon boat is a traditional water sport of the Chinese nation. It is based on rivers or lakes with wide surface, deep water and slow flow. On the whole, the development level of southern China is better, such as Guangxi, Zhejiang, Fujian and other provinces. Dragon boats spread from Hong Kong, China to all over the world, and the scale and level of competitions are becoming stronger and stronger, especially

in some European and American world powers, the United States, the United Kingdom, and Italy (Guo Liangcai, 2019).

The development of dragon boat movement in China is divided into four stages: (1) early development: The earliest written record is the Western Zhou Dynasty ancient book "Mu Tianzi Biography", the Warring States period, dragon boat race has been very popular. (2) Stagnation and recovery: During the Cultural Revolution, the dragon boat movement was judged as the Four Old, resulting in heavy damage to the national dragon boat movement. After the reform and opening up, the dragon boat sport has been developed again, and the events held are more enriched, including rich cultural performances and academic exchanges. (3) Improvement and development: at the end of the 20th century, the State General Administration of Sport listed dragon boat racing as an official national competition, and began to hold the "Qu Yuan Cup" national dragon boat Championship; In the middle of 1990s, the Dragon Boat Association was officially established in Yichang City, the hometown of Qu Yuan. In 1991, the International Dragon Federation and the Hong Kong Dragon Boat Association were established in the same year. In 2005, the Rowing and Dragon Boat Branch of China University Sports Federation was established, which has successively held influential events such as Tianjin International University Student Dragon Boat Invitational Competition and National University Student Dragon Boat Invitational Competition. (4) Innovation and development: In 2005, the Social Sports Guidance Center of the General Administration of Sport of China, the China Dragon Association and eight provincial and municipal governments launched dragon boat series events; In 2010, the dragon boat race was included in the Asian Games for the first time, marking the development of the dragon boat sport to a mature stage. In early 2011, the China Dragon Association held a meeting in Boao to formulate a five-year development plan for dragon boats. In April 2011, the China Dragon Association and CCTV signed an agreement to jointly hold the China Dragon Boat Race and the China Dragon Boat Open. At present, dragon boat sports are carried out in various provinces and cities in China: Hebei, Beijing, Tianjin, Guangdong, Guangxi, Jiangxi, Sichuan, Chongqing, Hunan, Hubei, Jilin, Heilongjiang, Liaoning, Shandong, Inner Mongolia, Jiangsu, Shanghai, Zhejiang, Fujian, Ningxia, Shanxi, Shaanxi, Gansu, Xinjiang, Yunnan, Guizhou, Qinghai, Henan, Hainan Island, Hong Kong, Macao,

Taiwan, etc. (Wang Xiaoyu, 2016); In 2018, the first World Ice Dragon Boat Championship was held in Duolun County, Inner Mongolia Autonomous Region. Traditional water dragon boats entered Inner Mongolia in the form of ice dragon boats. Dragon boat sports have been carried out in major provinces and cities in China. Due to factors such as climate, traditional dragon boat races are held more frequently in southern provinces than in northern provinces (Zhou Cibao, 2017).

Overview of dragon boat races in China

China's national dragon boat races include China Dragon Boat Race, China Dragon Boat Open, China Ice Dragon Boat Open and other special dragon boat race brands. The Chinese Dragon Boat Race and the China Dragon Boat Open are the most influential in China's dragon boat relations. The ice dragon boat is a great innovation on the basis of traditional water sports, retaining the technical and competitive nature of the traditional dragon boat sport, and breaking the climate restriction that the dragon boat sport cannot be carried out in the northern ice period. He Yi, deputy director of the Social Sports Center of the General Administration of Sport of the State and secretary-general of the Chinese Dragon Association, mentioned: "The ice dragon boat sport was selected as the 'Fourteen Winter', highlighting the following advantages: First, the ice dragon boat is a collective project, and the degree of mass participation will be greatly improved; Second, the mass base is broad, dragon boat sport has been carried out in most provinces and cities in the country; Third, the dragon boat represents the essence of traditional culture, and the dragon boat spirit of "fighting for the first in the same boat" is kept in mind; Fourth, the technology is easy to master, the cost of venue equipment is low, and it takes into account competition, entertainment and safety." The holding of ice dragon boat races is a new driving force for the development of dragon boat races and promotes the international development of dragon boat sports (Xiang Chai Rong, 2019).

China's main dragon boat races National Sports Conference, National Minority Games, national Youth Games, national farmers' Games and other national games set up dragon boat events, as well as local dragon boat invitational competitions in various provinces and cities, college students dragon boat invitational competitions. China transmits Chinese traditional culture and traditional sports of the

Chinese nation to all over the world through the dragon boat race, which is a competition platform, and also lays the foundation for dragon boat racing to become a global sport to the world (GUI Tangbo, 2019).

Energy Metabolism Principle

ATP principle

The movement of the human body is inseparable from the energy supply of the body. In dragon boat race, the intense physical consumption of athletes is mainly supplied by three energy supply systems, and the amount of energy material determines the energy supply. ATP is the only way to convert chemical energy into mechanical energy when muscles contract. When the body moves, muscle contraction is adenosine triphosphate (ATP), Muscle contains very little ATP, When powered by ATP alone, the maintenance time is less than 1 second. If CP (creatine phosphate) is added, the maximum power exercise is less than 10 seconds, The metabolic process of glycolysis to lactate must continue to provide ATP, During the extreme movement of more than a few seconds, with the consumption of ATP and CP, the content of creatine and other substances in muscle cells gradually increases, which can activate the decomposition of muscle glycan and accelerate the speed of glycolysis. The energy supply of ATP in the muscle is completed by a variety of energy substances and coordinated metabolic processes of continuous system (Melvin, 1998). From a biochemical point of view, when energy supplies the body, the first one is ATP, Under the catalysis of diphosphate gland first enzyme, it quickly decomposes into ADP and Pi, and the energy at the same time releases, make the transverse bridge swing repeatedly, affect the muscle filament slide, and shorten the muscle fibers to complete the muscle work. However, due to the ATP in the human body can be few reserves, can only last a few seconds, so to make the muscle fast big strength work, must make the body ATP decomposition and synthesis, however, the amount of ATP in the human body, decomposition and synthesis of energy time in 10 seconds, after this stage, muscle energy will rely on the storage of sugar for yeast to energy. Due to the different energy substances used by different metabolic sports projects, in the physical training for the purpose of developing energy metabolism and energy supply ability, the energy system that plays an important role in the special project must first be selected (Li Chaohong & Ou Jian, 2003).

Anaerobic metabolic systems are divided into two types, namely, the prophospho-energy supply system (ATP-CP) and the glycolytic energy supply system. The anaerobic energy supply system has the highest energy supply rate of ATP-CP, but only lasts for a short time. Through the analysis of the exercise duration and energy consumption of 9 subjects at 100 meters, 200 meters and 500 meters, there is a relatively large difference in energy consumption per unit time per unit weight at different distances. Subjects row at 100 meters (27s), energy consumption is 41000 (cal), and 200 meters (53s), energy consumption is 331000 (cal). 200 meters (50s), energy consumption of 248,000 (cal), 500 meters row (140s), energy consumption of 2468,000 (cal), through the study confirmed that the energy supply system can only maintain 6~8 seconds, while the glycolysis energy supply system can last 69~90 seconds. The larger the value, the stronger the explosive power. The maximum anaerobic power can be used to reflect the performance of the phosphocreatine system. The higher the value, the faster the decomposition rate of ATP and the synthesis rate of CP will be. Studies have shown that the energy consumption per unit time of dragon boat movement at different distances has extremely significant differences. It indicates that the testing and analysis of energy consumption per unit time at different distances has relevant research significance and value for the scientific training of dragon boat athletes and the selection of new members (Zhang Xinbao, 2021).

Muscle force principle

Skeletal muscle has the ability to contract, and the contractile force is displayed from small to large. The fibers of skeletal muscle are organized into motor units. Each motor unit includes a motor neurogen and all the muscle fibers innervated by that neurogen. Different muscle groups differ greatly in the number of muscle fibers contained in the single body. The motor nerve fibers start from the central nervous system and enter the skeletal muscle to the muscle fibers they innervate. The ends of the nerve fibers divide into many branches, and each branch is connected to one muscle fiber. When the neurogen conducts the nerve impulse, the impulse spreads through the branches of the primary nerve fibers and reaches all the muscle fibers of the motor unit, and causes all the muscle fibers of the motor unit to contract together. The muscle fibers of the motor unit do not assemble together, but are scattered

throughout the muscle. Therefore, when a single motor unit contracts, the whole muscle group can contract slightly. If more motor units contract, their muscles produce greater tension. The motor unit is the basic action unit of skeletal muscle, and when the motor neurogen of a motor unit is stimulated, all the muscle fibers in this unit contract. If there are many muscle fibers in this unit, then its contractile force is strong; conversely. If only contains a few muscle fibers, then its contraction force is weak. Thus, the contractility of the muscle can vary by the number of motor units participating in the contraction or by the size of the motor unit. Exercise units can be functionally divided into fast muscle fibers and slow muscle fibers (Pan Yi. 2016). We also differ in their function according to the different types of muscle fibers in the muscle. From the following four aspects of the dragon boat athletes：

Energy metabolism of the muscle

The anaerobic metabolic capacity of fast shrinking units is much larger than slow shrinking units. For example, fast and slow units contain enzymes that make the ATP-CP metabolic system, but the enzyme force in the former is about 3 times that of the latter; Similarly, sugar ytic enzymes are contained in both motor units. But the cheese in the fast muscle fibers is more than twice that of the muscle fibers. There fore, the fast shrinkage unit in the most suitable for fast sprint, jumping and other activities. conversely. The aerobic metabolic capacity of the slow unit is much greater than the fast unit. Therefore, it is the most suitable for the endurance project activities in biochemistry (Xu Xiaoyang & Ji Zhongqiu, 2000).

Speed of muscle contraction

It is generally believed that the time required for the fast muscle fibers to produce the maximum tension is about 1/3 of that of the slow muscle fibers. There are two main reasons for this difference: the large anaerobic metabolic capacity of the motor neurogen has a larger diameter. The conduction velocity of nerve impulses is faster. It is the high speed of fast contraction, so the higher the proportion of fast muscle fibers in the human muscle, the faster the contraction speed of the muscles is, and the more obvious its movement ability in terms of speed.

Contraction strength of the muscle

The fast muscle contraction unit has a much more contraction force than the promoting muscle contraction unit. There are two reasons for this difference

between the two: that is, the fast muscle fiber is thicker than the diameter of the fast fiber is larger than that of the slow muscle contraction unit. Therefore, the higher the proportion of fast muscle fiber in the human muscle, the greater the contraction force, the more obvious the movement ability of the human body in terms of strength.

Fatigue of the muscles

Fast muscle fibers are more prone to fatigue than slow muscle fibers. The reason is that the aerobic metabolism capacity of fast muscle fiber is poor, and the requirement of glucose metabolism is high. Therefore, when the movement time reaches a certain limit, it needs to rely on the sugar explanation under the anaerobic state. Fast muscle fibers are more likely to fatigue than slow muscle fibers. The reason is that the aerobic metabolism capacity of fast muscle fiber is poor, and the requirement of glucose metabolism is high. Therefore, when the action time reaches a certain limit, it needs to rely on the anaerobic sugar interpretation for its work, but in this way, a lot of lactic acid, and gradually accumulate in the body to limit the work of fast muscle fibers, and before the slow muscle fibers, causing fatigue. The occurrence of slow muscle fatigue mostly occurs after long endurance training or exercise, which is not caused by the accumulation of lactic acid, but for a variety of reasons: the extreme reduction of blood sugar; the depletion of liver sugar; Large loss of water in the body; loss of body electrolyte; increase of body temperature; psychological boredom, etc. Therefore, it has a better mechanism of muscle fatigue. In the daily physical training process of dragon boat sports, more attention should be paid to the fatigue and recovery of muscles, and different fatigue recovery means should be carried out for different types of muscle fibers to ensure that muscles can adapt to the needs of competition and training.

Principles of the kinetic mechanism

Dynamics mechanism It refers to the mechanical principle of providing human movement during the movement. In the process of physical training of dragon boat athletes, referring to the mechanical characteristics of their sports, the strength training of their main muscle group, and the scientific and reasonable selection of training methods and means can make the goal of physical training more clear and the effect more significant. The dragon boat movement is to rely on the human paddle to

make the boat forward in the water, so the power of the boat forward is the force on the oar to overcome the resistance of the water to obtain, the size of its strength depends on the size of the force of the human on the oar. Therefore, in order to increase the speed of the boat, the most important thing is to improve the muscle contraction speed and strength, in order to increase the paddle force so as to get a large reaction force, so that the state of the dragon boat changes. According to Newton's law of mechanics, to change the state of static or uniform linear motion, the external force must be applied to the object. When the external force is not equal to zero, the object will produce acceleration. So the external force is the only driving force to change the motion state of the object. Dragon boat in the process of row on the water, by the external force of the dragon boat itself vertical downward gravity, vertical water upward buoyancy and paddle in the water forward friction force and parallel water (behind the two force is the dragon boat change movement force), obviously, gravity and buoyancy due to the equal size, opposite direction, force is zero, can not make the dragon boat acceleration, change the original state of the dragon boat. Therefore, the power of the dragon boat forward movement can only be the reaction force of the oar on the water and the friction of the water on the dragon boat. Athletes in rowing many technical characteristics, such as paddle arm and support arm forward amplitude and speed, paddle distance, shoulder joint Angle, water force and paddle Angle will indirectly through the parts of the muscles of the surface of the dragon boat force, thus affect the dragon boat before oar Angle will indirectly affect the surface of the muscles of the dragon boat force, thus affect the speed of the dragon boat forward. But in the final analysis, these factors all indirectly affect the power of the athletes to paddle. The force they produce is the internal force of the human body, which itself can not make the dragon boat displacement relative to the water surface. Therefore, they can not be used as the motivation of the dragon boat forward. They can only affect the force of the paddle on the water through the transmission of the relevant muscles, thus affecting the reaction force of the water on the dragon boat (according to Newton's Third Law), which is the real power of the dragon boat movement.

Principles of kinematics

Kinematics is a branch of mechanics, which specifically describes the movement of an object, that is, the change of the position of an object in space with the evolution of time, without considering the influencing factors such as force or mass. Kinematic characteristics are an important form of human body movement, which is the measure of the human body's position and movement in space and time (including spatial halo degree, temporal measurement and spatial measurement). Kinematic characteristics can describe the characteristics of the body shape and sports forms of different athletes, and can guide them to understand the most suitable movement characteristics to improve their sports skills. When dragon boat athletes paddle, the way and amplitude of the upper limbs are significantly too much than those of the trunk and lower limbs, mainly the muscles of the upper arm of the shoulder belt. When the athletes pull the paddle, the main motor muscles are the back of the deltoid, triceps, subaspinatus, latissimus dorsi and so on. In the back paddle movement, the protomus are the pectoralis major, deltoid anterior and biceps brachii. The trunk and postural muscles are also important, and the ventral oblique muscles and the erector spinal muscles play a main role. The role of the lower limbs is relatively small, mainly to assist the upper limbs and trunk to complete the movement, the reaction force of water conduction to the dragon boat, tibialis anterior muscle, biceps, quadriceps muscle play a role. From the technical analysis of the completion of dragon boat sports, the working mode of athletes' upper limb muscles is mainly distal fixed centripetal contraction. According to the characteristics of muscle movement, the usual training method should use distal fixed training method, which has important guiding significance for physical training.

Summary

1. Dragon boat project belongs to the mixed energy supply system of phosphate acid and sugar anaerobic glycolysis, At the beginning of the exercise, the phosphoric supply immediately provides the dragon boat athletes with a lot of energy, so that the dragon boat is quickly started from rest, However, due to the short energy supply time of phosphates and the limited energy supply, the whole dragon boat race cannot be completed, so glycolysis and aerobic oxidation are needed for further supplement to continue the energy supply until the completion of the race .

2. In the dragon boat project, most of the energy supply is adenyl triphosphate (ATP) and sugar element. To understand its main characteristics of energy supply, in the training method, we should choose to vigorously develop the training method of its energy supply system, and increase its energy reserves. For example, if we want to develop the ATP system for dragon boat athletes, we can use the maximum exercise time and the maximum force exhaustion time to control the exercise intensity of the athletes' training, so as to promote the synthesis and decomposition rate of ATP.

3. In the process of the dragon boat, the sailing technology requires athletes to have strong speed explosive force, which requires fast muscle fiber to contract quickly and provide great energy for fast muscle work. Therefore, in terms of daily physical training, more physical training of the key development of fast muscle fiber should be done according to the actual needs of the competition.

4. In the dragon boat race, in the rowing stage, the faster the rowing speed, the more the work to overcome the resistance of water, the faster the boat speed, which requires the athletes to have a strong rowing ability. Therefore, in the daily physical training, should be according to the technical requirements of the dragon boat characteristics, do some special physical training.

5. To improve the competitive ability of dragon boat athletes, improving their physical training is the key. In the training, effective methods can improve the explosive force of each muscle group, increase the forward range and speed of the paddle arm and support arm, strengthen the water pulling force, promote the water to increase the reverse force of the dragon boat, and accelerate the speed of the dragon boat forward. This is the foundation of the physical science training of dragon boat athletes. Dragon boat is a typical physical competition speed project, which must rely on the rapid contraction of muscles to produce strong muscle strength to meet the needs of exercise.

Interpretation and structural elements of physical fitness

Since the mid to late 1980s, the term "physical fitness" has been appearing in various academic works, newspapers and magazine literature. In the English literature, words such as physical fitness, physical conditioning, physical capacity,

physical efficiency, and physical power are often translated into physical fitness as needed. In China's Hong Kong, Macao and Taiwan regions, the concept of physical fitness is often used. The attention and attention to physical fitness and physical training does not make people's unified and clear understanding of the concept of physical fitness, but shows a diversified understanding of the concept of physical fitness. The main reason is the different perspectives of experts and scholars in different research fields. For example, in the study of exercise physiology, more physical ability refers to the physical function, physiological function and exercise ability, and both aerobic and anaerobic ability belong to the scope of physical ability. From the perspective of biochemistry, physical fitness is based on the three major energy metabolism activities of the human body. It is the exercise ability shown by the neuromuscular system. The physical fitness level of athletes mainly depends on the integration ability of the supply, transfer and utilization of energy in the process of exercise. In the study of physical fitness, physical fitness is regarded as the basis of physical fitness, and physical fitness refers more to physical fitness and physical adaptability, In the research field of competitive sports, many experts and scholars in China have written articles, summarized and defined the concept of physical fitness. Overall, there are roughly five basic ideas: First, the special endurance theory proposed by Zhao Zhiying, et al.; second, the sports dictionary proposed by Li Zhiwen, 12 and Wang Baocheng 13 published in 1984, the theory of Xiong Douyin and Wang Xing, etc., the theory of physical fitness, namely, Xu Benli, Yang Shiyong, 19 and Yuan Yunping 20; fifth, Liu Qingshan 1 and Jin Zongqiang. In addition, Yan Zilong 23, Wang Baocheng and others also believe that physical ability should include psychological ability. To sum up, due to the differences between disciplines and the direction of the research field, many experts and scholars define the concept of physical fitness from different focuses according to their own knowledge, experience and research needs.

Research views of foreign scholars

The word "physical fitness" first appeared in the United States, as early as in 1978 the United States established a non-profit physical training institutions, then, the agency spread to 62 countries around the world, in 1985 the United States was named "physical training" professional institutions, and gradually to basketball,

football, volleyball, football projects introduced and gradually set up basketball, football and football physical fitness training association. Finally, in 1994, under the cooperation of various project fitness associations, published the world's first physical training monograph, namely Essentials of Strength Training and Conditioning, in which a comprehensive study of physical fitness, First of all, it believes that: physical fitness refers to the human body to participate in sports and training of the ability, including human sports quality, physical function, sports skills and psychological ability and other factors of the comprehensive signs; A group of German physical fitness experts led by Stephen defined physical ability from the movement structure: physical ability belongs to the category of motor ability, which is the basic motor ability of the human body, that is, including the basic movements, forms and functions of human activities, as well as the special qualities reflecting special characteristics (Stephen, 2016). Former Soviet union scholar matviev, torov and some western scholars, in the physical interpretation gave the basic point of view, think physical fitness is a kind of human movement ability, which is an important part of sports training content, and people maintain the ability should have in daily life (Matveyev, 2005, Prato, 2013). On this basis, Greke and other scholars define the definition of physical fitness as the athletic ability required by athletes in training and competition, including body shape, physical function, sport quality, psychology and other aspects (Greke, 2007). Matveyev (Matveyev) in the book "Theory of Competitive Sports" on the physical fitness of competitive athletes, that physical fitness includes body shape, physical function and sports quality, physical function is divided into nervous system function, muscle system function and energy metabolism system function, Sports quality is divided into strength, speed, endurance, flexibility and sensitivity (Matvieev, 1997). Foreign scholars Platonov and others believe that the quality of sports is physical fitness, usually including strength, speed, endurance and flexibility of the quality (by Platonov. Lu Shaozhong, Zhang Renmin, Huang Xiaoying, 1986). The results of his study show, " Physical ability is the physical and physical adaptability of human beings, adapting to modern life, it can include four points: health, physical function, exuberant complexion and spiritual maintenance. The American physical association (NSCA) the American society of physical fitness as fitness (the human body) an important part, that the ability is individual operation,

including physical fitness, emotional fitness, social fitness, spirit and cultural fitness five parts (Powers & Dodd, 2001).The American Society of Health, Sports and Leisure Dance Larsen proposed the 10 general components of athletes, namely, defense ability, muscle strength, muscle strength, flexibility, speed, agility, coordination, balance, skill and cardiopulmonary endurance (Las, Larsen & Liu Yiqian, 1993).The American Association of Sports Medicine (ACSM) The American Physical Fitness Association (NSCA) sees physical fitness as a "strength training and conditioning". From the perspective of strength training and other physical quality training, the training principles, training methods and training evaluation are proposed respectively (American College of Sports Medicine defines, 1954).

Research views of domestic scholars

The correspondence textbook "Sports Training" (1999) believes that " physical competitive ability is physical ability, which is one of the most important structures in the overall structure of athletes' competitive ability. It refers to the synthesis of various physical sports ability necessary for athletes to improve the level of sports skills and tactics and create excellent sports performance. These abilities include the physical form, physical function, physical health and sports quality of athletes, among which sports quality is the most important physical sports ability, and physical form, physical function and physical health are the basic ability to form good sports quality (adult education textbook compilation group. Sports Training Science, 1999). China's current textbook "Sports Training" Nakada and other experts regard physical fitness as the innate genetic quality of athletes and the ability of continuous exercise shown by trained athletes in special sports. And it is defined as: the athlete physical ability refers to the basic athletic ability of the athlete body, is an important part of the athletes' competitive ability. In the broad sense, physical fitness includes body shape, physical function and sport quality; and in the narrow sense, the physical fitness level of athletes usually refers to the quality level of athletes. (General teaching materials of physical education college. Sports Training, 2000). The Sports Dictionary published in the late 1920s defines "physical ability" as " the basic athletic ability of the athlete's body and an important component of the athlete's competitive ability. According to the characteristics of the body organs, system, physical fitness including body shape (reflect the human growth and development of each link height,

circumference, length and width and other external form characteristics, and the heart, the cross section of muscle internal form characteristics), body function (human cardiovascular system and the organs of work ability), sports quality (athletes in the process of exercise, the body organs, the system in the central nervous system of various basic movement ability) and health level (including athletes' injuries) four aspects (Liu, 1992). There is now an international concept of physical fitness (physical fitness), Divided into motor fitness (sport related physical fitness) and healthy fitness (health related physical fitness), Sports fitness mainly refers to: strength, speed, coordination, endurance, flexibility and sensitivity, This is to meet the athletes in the competitive competition to get excellent results of the physical fitness; Healthy physical fitness mainly refers to:, muscle strength and endurance, cardiovascular endurance, body fat composition and flexibility, This is the physical fitness needs of ordinary people to maintain a normal life, improve the efficiency of work and study, and help to promote health and prevent disease. The interpretation of "physical ability" in modern Chinese Dictionary is that physical ability refers to the ability of various organ systems of the human body in physical activities (Li Ke, 2008). According to the research on physical fitness, "physical fitness" should refer to the ability of athletes to fight fatigue when maximizing the mobilization of organism function under special training and competition load. To some extent, this ability is special endurance, or can be called the ability to continue special work (Zhao Zhiying, 1999). According to Wang Xing et al., "physical strength is a general term of physical strength and special sports ability" (Wang Xing, CAI Li & Si Huke, 1999). According to Professor Liu Boli et al., "physical fitness refers to the combination of various physical abilities necessary for athletes to improve their sports skills and tactics and create excellent sports performance" (Bao Han, 2016).Chinese sports training experts Tian Maijiu and other experts regard physical fitness as the innate genetic quality of athletes and the ability of continuous shown by the athletes formed by training in special sports (Tian Maijiu, 1988). There is also a view that " physical competitive ability is physical ability, which is one of the most important structures in the overall structure of athletes' competitive ability. It refers to the synthesis of various physical sports abilities necessary for athletes to improve the level of sports skills and tactics and create excellent sports performance. These abilities include the physical form,

physical function, physical health and physical quality of athletes, among which physical quality is the most important physical exercise ability, while physical form, physical function and physical health are the basic ability to form good physical quality " (Compilation Group of Adult Education Textbooks in Sports Colleges, 1999). In 1995, Hartmann, a famous German training expert, believed that physical fitness is based on the energy metabolism activities of the three energy supply systems of the human body, and the energy ability shown through the skeletal muscle system. From the biochemical point of view, the physical ability of athletes mainly depends on the integration ability of energy supply, transfer and utilization in the process of exercise (Shen Lin & Chen Chunmei, 2022). Physical ability is defined in the textbook "Training of Sports" in China as: the basic sports ability of the athletes 'body, which is an important part of the athletes' competitive ability. In broad sense, physical fitness includes three aspects: form, function and quality; in narrow sense, the physical fitness level of athletes usually refers to the quality level of athletes (Cui Xiaochun, 2022). Xiong Douyin believes that physical ability is an uncertain concept, there are general ability and small physical ability, generally refers to xiong Douyin believes that physical ability is an uncertain concept, there are general ability and small physical ability, generally refers to the physical ability, including physical exercise ability, physical adaptability, physical function and various physical quality; Small physical fitness refers to the physical fitness training and physical fitness items in sports training. It studies a wide range of physical fitness, which is generally close to the concept of physical fitness in sports training, but only ignores the role of body form in physical fitness (Xiong Douyin, 2000). Li Zhiwen believes that physical fitness is the ability of the function of the body organ system in muscle activities, which includes the adaptive changes of body shape and basic qualities such as strength, speed, agility, endurance and flexibility (Li Zhiwen, 2001). Tian Yupu believes that physical ability as the body, in the subjective and objective aspects. From the subjective perspective of the human body, its tissues, organs and systems, after training, have reached a certain level, forming a relatively stable characteristics, forming the internal reserve of physical strength; The performance in the objective reality is the most important and basic standard to measure the physical fitness. In social practice, it is mainly manifested in walking, running, jumping, throwing,

climbing, climbing, climbing, balance, hanging, bearing and other forms of life activities (Tian Yu, 2001). Some scholars in Taiwan believe that physical fitness can be divided into healthy physical fitness, general sports physical fitness and special technical physical fitness, and physical fitness evaluation can be realized through healthy physical fitness and sports physical fitness (Jin Zongqiang, 2004). The comparison of the concepts of physical fitness, physical fitness, fitness and physical fitness show that physical fitness belongs to the true relationship, not the full relationship; physical fitness and health overlap, therefore not all the same relationship, but the cross relationship (Zhang Jianping, 2002). Yang Shiyong and others believe that physical ability is the athletic ability of athletes' bodies, an important part of competitive ability, and a comprehensive combination of various physical sports abilities necessary for athletes to improve their technical and tactical level and create excellent results. These abilities include body form, body function and sports quality, among which physical quality is the most important determinant of physical ability, and body form and body function are the basis for forming good sports quality (Yang Shiyong, Qian Guangjian & Zhang Jie, 2012). According to Wang Baocheng, the physical fitness in competitive sports refers to the ability of athletes to mobilize the various organ systems of the organism to overcome fatigue and complete the special physical fitness and competition with high quality under the special training and competition load. According to Yan Zilong and others, " physical ability is the physical ability that people show to better complete their work in specific practical work. Physical ability includes both physiological adaptation and psychological adaptation. Physiological ability includes physical exercise quality and physical adaptability, while psychological factors mainly emphasize willpower, that is, emphasize subjective initiative " (Wang Baocheng, Kuang Lubin & Tan Zhenbin, 2002). Yuan Yunping said: " Physical fitness is the result of athletes acquired by heredity and acquired training, The potential ability in function and regulation, in the storage and transfer of material energy, and the comprehensive movement ability expressed in combination with the external environment, Its size is determined by the morphological structure of the body, the function level of the system organs, the energy and material storage, namely the basic metabolic level conditions, Sports quality is Yuan Yunping believes: " physical fitness is acquired by innate heredity and

acquired training in terms of morphological structure, The potential ability in function and regulation, in the storage and transfer of material energy, and the comprehensive movement ability expressed in combination with the external environment, Its size is determined by the morphological structure of the body, the function level of the system organs, the energy and material storage, namely the basic metabolic level conditions, Sports quality is the main external expression form of physical ability, Strength, speed, endurance, flexibility and sensitivity " (Yuan Yunping, 2004). Liu Qingshan defines physical fitness as "the ability of the human body morphological structure and functions of various organ systems to actively adapt to sports training, competition and daily life needs" (Liu Qingshan, 2004). Chen Youyuan believes that " physical ability is in the broad sense of all the activity ability shown in human activities, and the physical ability of athletes in the narrow sense is the sports ability. Motor ability refers to the level of movement that the human body can feel and be observed. Sports ability has project characteristics (Chen Youyuan, 2005). According to Gao Peng, physical fitness is mainly composed of five elements, namely, basic quality, the ability to develop physical quality, motor organ function, motor technology and psychological elements (Gao Peng, 2019). According to Huang Xin et al., physical fitness refers to the physical fitness that all parts of the body can adapt to a certain exercise physically and psychologically, mainly including cardiopulmonary function (cardiovascular system and respiratory system, etc.), muscle strength and muscle endurance, speed, sensitivity, and nerve conduction velocity (Huang Xin et al., 2021). According to the American Association of Sports Medicine (ACSM), physical fitness means physical fitness, including heart and lung fitness, muscle fitness, softness, and body composition. Zhao Zhiying and others believe that physical ability is the special endurance ability of athletes, which refers to the ability of athletes to fight fatigue when maximizing the function ability of organisms under special training and competition load (Zhao Zhiying, 1999). Wang Xing et al. believe that physical fitness is a general term for physical strength and special exercise ability. It includes physical fitness in the broad sense and physical fitness in the narrow sense. In the broad sense, physical ability refers to the basic living ability that must be possessed in daily life. In the narrow sense, physical ability refers to the corresponding competitive ability of running, climbing, climbing and kicking in various sports (Wang Xing, Cai

Li, Si Huke, Zhang Qingwen, Wu Xueping, 2003). Xiong Douyin divides physical ability into general ability and small physical ability. Generally refers to physical ability, including physical exercise ability, physical adaptability, physical function and various physical qualities; small physical ability refers to physical training in sports training (Xiong Douyin, 2000). Wang Baocheng believes that in a broad sense, physical ability consists of three parts: body structure, physical function and intellectual will, including human physical ability and intangible ability. Tangible ability refers to physical ability, and intangible ability refers to mental ability. In the narrow sense, physical fitness refers to the ability of athletes to mobilize all organ systems of the organism to the maximum extent to overcome fatigue and complete the special training and competition under the special training and competition load (Wang Baocheng, 2002). Dong Guozhen believes that the physical level of athletes is determined by the development of body form, physical function and sports quality. Among them, sports quality is the external expression form of physical fitness, Therefore, the sports quality training naturally becomes the basic content of physical fitness training (Dong Guozhen, 1986). Xu Benli, Liu Baili and others believe that physical fitness is a combination of various physical fitness ability necessary to improve the level of sports skills and tactics and to create excellent results, including body form, physical function, sports quality and health level (Xu Benli, 1991).In Sports Training, Tian Maijiu and Liu Daqing defined physical ability as the basic athletic ability of the athlete's body, which is an important part of the athletes' competitive ability. It is believed that in the broad sense, physical fitness includes form, function and quality, and in the narrow sense usually refers to the quality level of athletes (Tian Maijiu and Liu Daqing, 2000-2012). According to Yang Shiyong et al., physical ability refers to the sports ability of athletes' bodies, which is an important part of competitive ability, and is a combination of various physical sports abilities necessary for athletes to improve their technical and tactical level and create excellent sports performance (Yang Shiyong, 1992). According to Yuan Yunping, physical fitness refers to the synthesis of morphological structure, physical function and sports quality obtained by the human body on the basis of innate genetic and acquired nature (Yuan Yunping, 2014). Chen Yueyue believes that physical ability is a kind of comprehensive ability, the result of adaptation to specific items, with certain

direction, stability and variability. In addition, military physical fitness experts combine physical fitness with military characteristics (Chen Yueyue & Zhao Yuhua, 2009). American sports physiology expert Colliton said: " physical fitness includes physique, organ function, exercise adaptability three."Mr.Xiong Douyin, a veteran of Chinese sports field, has deeply studied the definition of physical fitness. He believed that there are general ability and small physical ability, which generally refers to the comprehensive physical ability, including physical exercise ability, physical adaptability, physical function ability and various physical qualities; small physical fitness refers to the physical training and physical fitness items in sports training (Xiong Douyin, 2000). Wang Baocheng and others believe that: physical ability in a broad sense includes people's tangible ability and invisible ability. Tangible ability refers to physical ability, while intangible ability means intelligence. In a narrow sense, physical ability refers to the ability shown by the body in various activities ③. The above studies covers a wide range of areas, believing that physical ability is not only exercise ability, but also mental ability and the comprehensive ability of the human body in different environments (Tan Zhenbin, Wang Baocheng, Yu Zhenfeng, 2004). Professor Li Zhiwen believes that physical fitness is the ability of the functions of various organ systems obtained through physical training in muscle activities, which includes the adaptive changes of body shape and basic qualities such as strength, speed, agility, endurance and flexibility (Li Zhiwen, 2001). According to the research of Zhao Zhiying et al., "physical fitness" refers to the ability of the body to fight fatigue in training and competition, that is, special endurance (Zhao Zhiying, 1999). Dr. Sun Xuechuan defined the concept of modern military physical fitness, and believed that physical fitness refers to the comprehensive biological ability that soldiers must have in order to complete specific military tasks in different environments (Sun Xuechuan, 2001). Many researchers have different views on the composition of physical fitness. Most of them agree that physical fitness is composed of three elements: body shape, physical function and sports quality. Some researchers also believe that the composition of physical fitness also includes technical and psychological factors. Some researchers say it also includes fitness levels.

Summary

At present, experts at home and abroad regard physical fitness as the innate genetic quality of athletes and the continuous movement ability shown by athletes formed by training in special sports. It is the potential ability of the morphological structure, function and regulation obtained through the innate genetic and acquired training and the storage and transfer of material and energy, as well as the comprehensive movement ability combined with the external environment. Its size is determined by the body morphology and structure, the function level of the system organs, the energy and material reserve and the basic metabolism level, and the external environment. Through previous research will define physical fitness as: function through innate genetic and acquired training to adapt to the environment and can bear the load in the sports, body shape, physical function and sports quality is the three parts of physical characteristics ", sports quality is the most important determinant of physical fitness, body shape, physical function is the basis of the formation of good sports quality ability. The physical shape reflects the height, circumference, length and width of the human body.

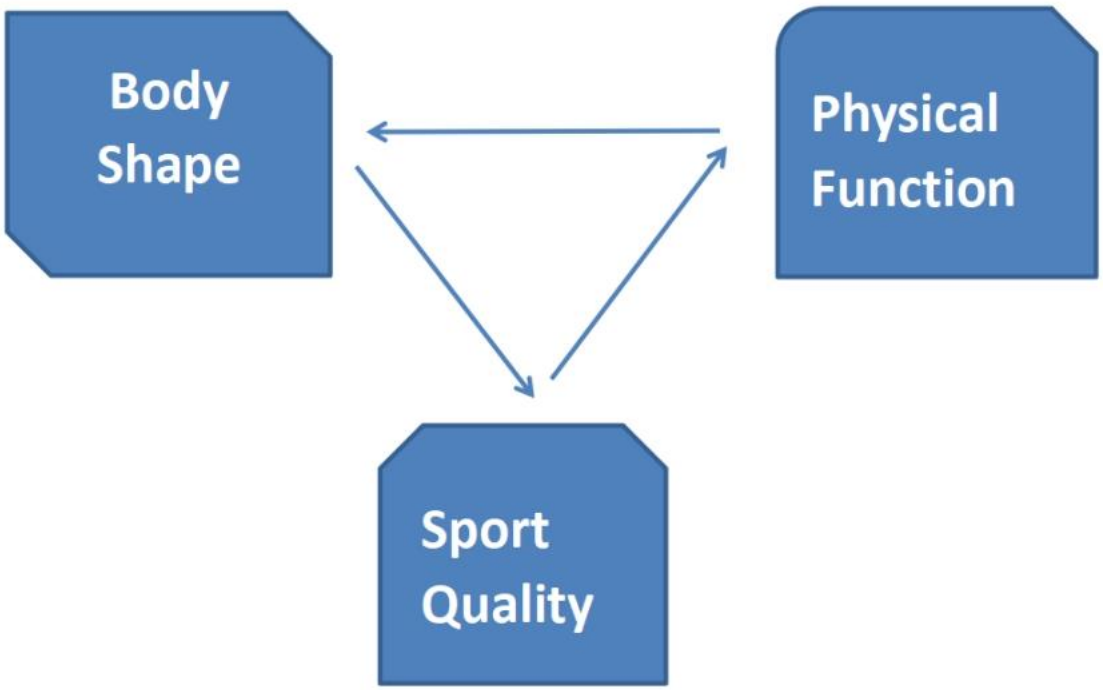

Figure 1 Physical fitness components

Study on the physical fitness characteristics of dragon-boat athletes

With the rapid development of dragon boat sport, its competitiveness is getting higher and higher, in order to meet the needs of competition, the physical requirements of dragon boat athletes are also getting higher and higher, and it is urgent to provide systematic physical evaluation indicators to guide the physical training of dragon boat athletes and improve their sports level (Li Bing, 2010). Physical training, whether in the theoretical research or in the practice of sports training, has attracted more and more attention. Compared with general physical fitness, physical fitness is a direct factor that determines sports performance. Physical fitness is composed of three parts: body form, body function and sports quality, so related body form, body function and sports quality are the focus of this paper. At present, the research on the physical fitness of dragon boat athletes mainly focuses on the following three aspects: first, the research on the characteristics of the body shape of dragon boat athletes; second, the research on the characteristics of the body function of dragon boat athletes; Thirdly, the research on the characteristics of dragon boat athletes' sports quality and their training;

Study on the body shape characteristics of dragon boat athletes

Body shape refers to the external or internal shape characteristics of a person, which is the material basis for determining whether an athlete is suitable to engage in a certain competitive sport. Feng Xiaoyu et al. believe in "Scientific Selection of Athletes" that ideal excellent athletes should have "high body shape, arm length, wide shoulders and weight" (Feng Xiaoyu, 2021). Yu Zhi analyzed the morphological indicators of competitive dragon boat athletes as follows: their distance index, height, arm length, shoulder width, chest circumference and upper arm tension circumference are significantly higher than that of general adults, which is related to the special training of athletes. Therefore, the morphological characteristics of competitive dragon boat athletes can be preliminarily summarized as tall, long and strong upper limbs, wide shoulders, broad chest and thick waist, full body, inverted triangular trunk, strong forearms, and developed back and back muscles. The body shape of height and arm length increases the distance; the shoulder width and chest can provide sufficient power for rowing, give full play to the strength of large muscle group and guarantee the rapid operation of the boat body (Integrity, Liu Shuai & Tan

Jiang, 2019). Xiao Qin et al. proposed that when selecting the body shape of dragon boat athletes, they selected relatively long players who are tall, symmetrical body, arm length, shoulder width, long lower limbs and tight upper arm circumference (Xiao Qin, Liu Meng, 2010). Li bing, such as the establishment of excellent man dragon boat athletes body form evaluation through the 2009 national dragon boat championship, the Chinese dragon boat competition finals, the 2010 Asian games dragon boat trials in the top six 30 men dragon boat team research, shows that outstanding dragon boat athletes body shape characteristics are: long limbs and arm span and shoulder wider, refers to the distance index, symmetry, have good height and weight, ville vik index (Li Bing, 2013). Tian Zhenhua, Wu Xiaofeng, Li Yunyong, etc. The Chinese university dragon boat athletes physical characteristics and the evaluation of the study through the first Chinese college students dragon boat championship " 62 teams part of the athletes (man), the study shows that outstanding athletes upper arm circumference, thigh circumference, chest circumference, shoulder width, arm length, refers to distance index, ville index, Laurel index, height and weight, BMI these indicators and general athletes have significant difference, these indicators fully shows the characteristics of the outstanding dragon boat athletes form. The indicators of upper arm tension, thigh circumference and shoulder width reflect the distinctive external morphological characteristics of dragon boat athletes (Tian Zhenhua, Wu Xiaofeng, Li Yunyong, 2008). In the Functional Assessment Manual of Excellent Athletes, the body shape requirements of athletes can be attributed to: high sitting, tall but not thick, long upper and lower limbs; long forearm, large upper arm circumference, less body fat, large body weight and body density (Pu Junzong, 1989). Liu Xiao proposed that the vervik index, arm length, finger distance index, shoulder width, upper arm tension circumference, thigh circumference, quiet chest circumference, Laurel index, height and weight and other indicators can be used as typical morphological indicators of rowing events (Liu Xiao, 2020). Wang Zequn pointed out that from the appearance of the dragon boat athletes, the male athletes are tall and strong, wide hip, index index, muscular and symmetrical, and these appearance characteristics are very beneficial to increasing the frequency and length (Wang Zequn, 2021). Sun Jian proposed that typical dragon boat athletes are tall, with low body fat and a high proportion of slow muscle fibers (Sun Jian et al., 2020).

Zhang Yaoyao identified the most important special morphological indicators for China's male dragon boat athletes, including arm length, shoulder width, weight, upper arm tension circumference, thigh circumference, quiet chest circumference, vervik index, height and sitting height (Zhang Yaoyao, 2012).

The above studies are mainly based on qualitative and commonly used morphological quantitative indicators, while the application of derived index can further reflect the proportional relationship, physical shape characteristics and relative level of each indicator, which is exactly the relatively weak aspect in the current research.

Table 1 Body Shape Characteristics of Dragon Boat Athletes

	Body Shape indicators													
	Length			**Width**			**Girth**		**Body principal component**				**Height**	
Author Time	arm length	Sitting arm length	lower extremity length	shoulder breadth	Hip breadth	Upper arm tension girth	Thigh girth	Quiet chest circumference	Wervik index	Laurel index	weight	BMI	stature	sitting height
Feng Xiaoyu, 2021	√				√						√		√	
Wang Zequn, 2021		√							√		√		√	
Liu Xiao, 2020	√	√		√		√	√	√	√	√	√		√	
Jian Sun, et al., 2020											√	√		
Yu Cheng Cheng et al., 2019	√	√		√		√		√					√	
Tian Zhenhua, et al., 2008	√	√		√		√	√	√	√	√	√	√	√	
Li Bing, 2013	√	√	√	√	√	√			√		√		√	
Yaoyao Zhang, 2012	√			√		√	√	√	√		√		√	√
Xiao Qin, Liu Meng, 2010	√					√						√	√	
Pu Junzong, 1989	√		√	√		√					√		√	√
Total	**8**	**5**	**2**	**6**	**2**	**7**	**3**	**4**	**5**	**2**	**8**	**3**	**9**	**2**

Summary

According to previous studies, the body shape reflects the height, circumference, length and width of body growth and development, as well as the heart diameter and cross section of muscles. Many scholars believe that the ideal dragon boat athletes should have the body shape of " tall, arm length, shoulder width, weight, etc. Integrity, Xiao Qin, Liu Meng summarized the competitive dragon boat athletes as tall and strong, long and powerful upper limbs, broad shoulders, broad waist, thick body, full trunk, inverted triangle, strong arms, waist and back muscles. Tian Zhenhua, Wu Xiaofeng, Li Yunyong agreed that the body shape characteristics of height and arm length increase the distance; the shoulder width, chest width, can provide sufficient power for the power of large muscle groups and guarantee the rapid operation of the boat. However, Sun Jian and Zhang Yaoyao proposed the typical special morphological indicators of dragon boat athletes, including arm length, shoulder width, weight, upper arm tension, thigh circumference, quiet chest circumference, vervik index, height and sitting height, which fully showed the special characteristics of excellent dragon boat athletes in China.

Study on the physical function characteristics of dragon boat athletes

Aerobic metabolic capacity

Aerobic metabolic ability refers to the energy provided by the body relying on the energy aerobic oxidation to maintain physical energy and complete the exercise load. It is the main energy support system for human body to engage in daily life, labor, work and study, and also the main sign and basis for evaluating human health level. The evaluation of the aerobic metabolism ability of dragon boat athletes is mainly about the oxygen intake capacity and oxygen utilization capacity of the body. Many studies have shown that the maximum oxygen uptake (VO2max) and the anaerobic threshold (AT) are important indicators to evaluate the aerobic capacity of dragon boat athletes, and training with the anaerobic threshold intensity is an important means for dragon boat athletes to improve their aerobic capacity (Feng Lianshi, Feng Meiyun & Feng Weiquan, 2003).

1. Maximum oxygen uptake (VO2max)

The VO2max is a method to measure a person's aerobic capacity or cardiopulmonary endurance. When the body is in extreme exercise, the function of

each organ and system reaches the best, the body can absorb all the oxygen (Cao Xiaopei. 2022).

As a dragon boat project dominated by aerobic metabolic energy supply, its sports performance is closely related to the maximum oxygen uptake. After the correlation analysis between 2000-meter dynamometer performance and multiple physiological indicators of dragon boat athletes, Sun Jian found that the correlation coefficient between performance and VVO2m and lean weight was r=0.85. After applying the stepwise regression analysis, it was found that VVO2ma was the best single index to predict the performance (Sun Jian et al, 2020). Liu Xiang published the research results on the VVO2m of dragon boat athletes. It is believed that the VO2max of outstanding male dragon boat rower should be at 6.01 L/min (Liu Xiang, 2022). Domestic scholars have conducted research on the basic situation of VO in Chinese male dragon boat athletes. Yu Cheng Cheng proposed that the VO2max value of male athletes in Chinese universities is 4.38 L/min (Yu Cheng, 2019). Zhang Puqiang et al. tested the V2max of 99 men and 192 female dragon boat athletes in China and found that the average value of men in the 20s was 4.84±0.74L/min, and that of women in the 20s group reached 4.03±0.35L/min. Can be seen from the comparison of research data at home and abroad, the VO level of Chinese men dragon boat athletes and foreign 2max men dragon boat athletes VO2max level compared with larger gap, and foreign women's dragon boat athletes VO2max VO2max level, even more than the foreign excellent women dragon boat athletes, the standard with the dragon boat athletes in the world competition sports performance is more consistent (Zhang Puqiang, etc., 2010). Although VO2max size mainly depends mainly on genetics, systematically trained athletes can still increase by 15% to 20% 4344 (Liu Deqiong Liu, 2001). Li Bing In addition, the author found that the non-season VO2max increased significantly, the absolute value increased from 5.09 L/min to 6.01L / min, the relative value increased from 56.5ml/kg/min to 69.1ml/kg/min, and the maximum power increased by 14%45 (Li Bing, 2013).Studies by Tian Zhenhua et al. found that after 18 weeks of Asian altitude training, the Vmax levels of 18 male dragon boat team members increased significantly (Tian Zhenhua et al., 2008). Dragon boat sport is an endurance racing project based on aerobic energy supply. In the 500m race, aerobic energy supply accounts for more than 80% of the total energy

supply in the 500 m race. Lv Yanli, Hu Hongquan and others pointed out that in the dragon boat endurance quality training, aerobic endurance training should be dominated by (Zhang Yaoyao, 2012).

2. anaerobic threshold (AT)

The anaerobic threshold is one of the important indicators to assess the aerobic metabolic capacity of athletes. Since Wasserman came up with the concept of anaerobic threshold, Numerous studies have been conducted (Wasserman, et al. 1993). At present, there is no consensus on the production mechanism of anaerobic threshold in the academia, but most scholars believe that the aerobic capacity may be more accurate by anaerobic threshold than the maximum oxygen uptake (Wang Fengyang, 2002). Many scholars have confirmed that sports performance and AT level are closely related, and the correlation coefficient r can reach 0.89, which is higher than the correlation between VC2max and sports performance (r=0.64) (Hagberg J M. 1983). Studies show that the anaerobic threshold was increased by more than 45% through systematic training (K Wasserman, BJ Whipp, SN Koyal, etc. 1973). The anaerobic threshold is often expressed by the corresponding exercise intensity or power, heart rate and%VO2max when the lactic acid content reaches 4 mmol/L, which is called the lactic acid anaerobic threshold or lactic acid threshold (Feng Lianshi, Feng Meiyun & Feng Weiquan,. 2003). Many studies on sports training of dragon boat events have pointed out that anaerobic threshold is an important indicator in sports training, and anaerobic threshold training is one of the training methods widely used by high-level athletes. Steinacker It points out that the training characteristics of successful dragon boat athletes are large-of non-intense endurance training. Even during the season, the total amount of strong endurance training above AT will not exceed 10 percent of the total training volume. For athletes, 86%~94% of training volume in winter and 70%~77% of training volume in summer are non-intense training, so the training with blood lactate level lower than 4 mmol/L accounts for 93%~99% (Steinacker. 1993): s3-s10.). Wang Zequn pointed out that high-level dragon boat athletes only have a little or almost no blood lactic acid accumulation during 80% to 90% of the maximum load exercise (Wang Zequn, 2021). Feng Xiaoyu's research points out that the oxygen threshold training intensity of outstanding dragon boat athletes usually reaches 85% to 89% of the maximum oxygen

consumption, and she believes that dragon boat athletes should constantly train without oxygen threshold intensity (Feng Xiaoyu, 2021).Many scholars have also conducted a lot of research on the effect of training on the lactic acid threshold in dragon boat athletes. Du Zhonglin's research shows that in order to significantly increase the lactate threshold power, more than four months of aerobic training is obvious, and the effect of two months of aerobic training is not obvious. With the further extension of the training time, the increase rate of lactate threshold power gradually decreased, and the change rate of lactate threshold was larger in those with shorter training time. The lactic acid threshold is usually the lowest before winter training in a year, rises to the highest point after winter training and maintains or drops slightly until before the national championship in October, and drops significantly after the competition (Du Zhonglin, Gu Jun, Li Ronghua, etc. 1998). After Liu Deqiong studied the changes in the lactate threshold during a training cycle of the National Youth Team, he found that the lactate threshold of athletes usually decreased during the upper training stage, but usually increased during the reduced recovery period, and the athletic performance also improved (Liu Deqiong, 2001). In their study, Feng et al. found that the lactate threshold power did not decrease in the upper stage, but increased slowly. Therefore, they believed that the lactate threshold power did not decrease due to the upper amount, but the change of lactate threshold power caused by different training volume and training intensity of each cycle (Feng et al., 2003). In conclusion, lactate anaerobic threshold has been widely used in dragon boat sports practice, and it can be used to assess the aerobic metabolic capacity of dragon boat athletes and as an indicator of developing aerobic endurance adaptation intensity.

Anaerobic metabolic capacity

Anaerobic metabolism refers to the ultimate ability of the anaerobic metabolism energy supply system of human muscles to provide ATP during exercise, which indicates the ability of muscles to do work under the conditions of phosphatogen and glycolysis (Zeng Fanxing, Ding Yijian & Peng Xiji. 2005). Although dragon boat sport is a sport based on aerobic metabolism and energy supply, anaerobic energy supply capacity is still very important, especially glycolytic energy supply capacity plays a very important role in the sailing and sprint stage, so blood

lactic acid is commonly used to evaluate the anaerobic glycolytic capacity of dragon boat athletes (Liu Xiang, 2022).The movement of the human body cannot be separated from the energy supply of energy in the body. In the dragon boat race, the intense physical consumption of the athletes is mainly supplied through the three major physical energy supply systems. The amount of physical energy material determines the energy supply (Melvin WHuman Kineties, 1998). AT is the only way to convert chemical energy into mechanical energy during muscle contraction. When the human body is moving, The direct energy material for muscle contraction is adenosine triphosphate (ATP), The minimal amount of ATP in the muscle, During the extreme exercise powered by ATP alone, Maintenance time is less than 1 second, If CP (creatine) is added, Maintain the maximum power exercise for less than 10 seconds, The metabolic process continuing by glycolysis to produce lactate must provide ATP, At extreme amounts of motion over a few seconds, With the depletion of ATP and CP, Creatine and other substances in muscle cells gradually increased, Ability to activate muscle glycanide breakdown, To accelerate the speed of glycolysis, The energy supply of intramuscular ATP is made up of a variety of energy materials and continuous systems, The coordinated metabolic processes are completed (Wang Zequn, 2021). The maximum blood lactic acid value after exercise indicates both the maximum tolerance to lactic acid and the maximum energy supply capacity of anaerobic glycolysis. Studies show that blood lactate levels in elite European athletes can reach 15.24±3.30mmol/L after the 2000 m simulated race (Secher, 1993). After a 2,000-meter simulation race on the dynamometer, the blood lactate level of the excellent European athletes can reach 16.11±1.77mmol/L, and some players can even exceed 18 mmol/L63. On the other hand, the blood lactate value of the national champion is 10.27±2.41mmol/L, and the blood lactate value after 6min maximum work test is 11.99 ± 3.304.Feng Feihu et al. found that the blood lactate concentration after 2000 meters was only 12.1±1.0mmol/L (Hagerman FC, Connors MC, Gault JA.1978).Niels Point out in the study, in the dragon boat simulation race, 90% of the lactic acid is produced in the first minute, the second minute reached the highest value and remain in a high stable value until the end of the game, so athletes must tolerate high lactate work in the body, like the dragon boat in complete equivalent to the maximum oxygen consumption level for a few minutes of exercise, athletes on the

way to maintain the aerobic intensity of the higher, the higher the finish the blood lactate concentration, the sports performance is better (Niels H).The results suggest that the Chinese dragon boat athletes should strengthen the training of glycolysis ability, especially in the competition training should strengthen the training of maximum lactic acid level and the training of lactic acid resistance ability, in order to improve the speed endurance, using the traditional Wingate anaerobic test can also evaluate the anaerobic metabolic ability of rowers, test index of the dragon boat athletes is reflect the maximum power of explosive athletes (PP) and reflect the average speed of endurance (AP),Some studies have also reported that extending the exercise time of Wingate anaerobic test to 60 seconds can better reflect the anaerobic capacity of dragon boat athletes, especially the anaerobic capacity of lactic acid (Pu Junzong, 1989). Dragon boat project belongs to the phosphoric energy and sugar yeast mixed energy supply system, at the beginning of the movement, phosphate energy for the dragon boat athletes to provide a lot of energy, make the dragon boat by static quickly start, however, because of the phosphate energy time is very short, energy supply is limited, cannot complete the dragon boat race, so also need to glycolysis and aerobic oxidation to further supplement, make the energy supply, until the game (tian zhenhua, etc., 2008).

In addition, many domestic scholars have shown that the maximum power test of the dynammeter and the distance between the paddle are commonly used indicators to reflect the anaerobic metabolic ability of dragon boat athletes (Feng Xiaoyu, 2021, Sun Jian, et al., 2020, Yu Zhengzheng, etc., 2019, Li Chengzhi, 1993)

Cardiopulmonary function

Zhang Puqiang, liu etc "Jiujiang college of dragon boat athletes physical characteristics research" through the first in 2010 Tianjin world college championship dragon boat team (20), the dragon boat training makes the myocardial strength and vascular elasticity, heart rate, so that the transport capacity of oxygen and nutrients, ensure the large load training and competition (Zhang Puqiang, liu, 2010). The evaluation of the heart function of the dragon boat athletes is an aspect that should be paid attention to in the future material selection work. In the future training, attention should also be paid to the strengthening of heart function exercises (Liu Xiang, 2022); Dragon boat training has a greater impact on men's lung capacity than women, and

women's vital capacity is also increased, but the difference is not significant, which indicates that long-term systematic dragon boat training can improve the strength of respiratory muscles, thus improving the vital capacity. Since vital capacity is greatly influenced by genetic factors, attention should be paid to selecting athletes with large lung capacity for training in material selection (Yu Cheng et al., 2019). The study points out that the exercise intensity and load of dragon boat sports are relatively large, which can play a good role in regulating the cardiopulmonary function of athletes (Wang Zequn, 2021, Feng Xiaoyu, 2021). The author points out that the dragon boat sports training needs on the basis of scientific training system, using scientific and reasonable training methods and means, improve the training effect of the dragon boat movement, and promote the development of the dragon boat movement, this needs to pay attention to the dragon boat athletes lung capacity, heart rate, heart function index characteristics (Ho Sarah R, Smith Richard M, Chapman Philip G... & Funato Kazuo, 2013, sun Ji'an, etc., 2020).

Table 2 Physical Function Characteristics of Dragon-boat Athletes

Physical Function Indicators									
	Cardio-pulmonary function						Energy supply system		
Author Time	vital capacity	heart rate\time (min	cardiac function index	blood pressure	step index	VO2max	anaerobic threshold	Dynamometer five pulp maximum power	20s Full paddle distance
Liu Xiang, 2022	√	√		√	√	√		√	√
Wang Zequn, 2021		√					√	√	
Feng Xiaoyu, 2021	√		√				√		√
Jian Sun, et al., 2020	√				√	√			√
Yu Cheng Cheng et al., 2019	√		√			√		√	√
Li Bing，2013	√	√		√		√			
Zhang Puqiang, et al., 2010	√	√	√			√		√	√
Liu de qiong,2001		√		√		√	√	√	
Tian Zhenhua et al., 2008	√	√			√	√		√	
Feng Lian-Shi,et al., 2003	√	√		√		√	√	√	√
Total	**8**	**7**	**3**	**4**	**3**	**8**	**4**	**7**	**6**

Summary

Physical function refers to the working ability of various internal organs of the human body (such as cardiovascular organs, respiratory organs, central nervous system, etc.). The functional state of athletes is closely related to their competitive ability. Different sports have different requirements on the functional level of human organs and systems. According to previous studies on the physical function characteristics of dragon-boat athletes, Many experts believe that the athlete's heart rate, blood pressure, cardiac function index, Pulmonary capacity reflect the cardiopulmonary characteristics of athletes' basic physical function, In the selection of dragon boat athletes, Pay special attention to athletes with large vital capacity, In the future training sessions, Attention should also be paid to strengthen the heart function exercises; Oxygen-free valve, Relative maximum power reflects the anaerobic capacity characteristics of dragon boat athletes, Show that dragon boat athletes have higher requirements for anaerobic capacity, The anaerobic capacity of the dragon boat athletes should generally reach a certain level; The maximum oxygen uptake is an important indicator of the aerobic capacity of dragon boat athletes.

Study on the sports quality characteristics of dragon boat athletes

Sports quality is the athletes in the process of movement, the organism under the control of the central nervous system, through the muscle activity of various basic movement ability, mainly for the size of the muscle contraction force, the frequency of movement, the distance of the length, keep muscle working time, movement between muscle coordination and the size of the joint range, etc (sports dictionary editorial committee, 1984). In short, sports quality includes strength, speed, endurance, agility, flexibility, coordination and other aspects. For dragon boat athletes to achieve success, in addition to developing the quality of various sports in an all-round way, excellent endurance quality and strength quality is more excellent dragon boat athletes must have.

Strength quality

Although the champion of the dragon boat race is not always the most powerful player, great power is at least the beginning of excellent results. After the test of 5 oar and 10 paddle, the maximum peak power of 5 prizes and 10 prizes was 1350 cattle and 3230 watts respectively, and the maximum peak power of 5 oar and

10 prizes is 1020 cattle and 1860 watts respectively. Strength endurance is a comprehensive and multidimensional ability of strength and endurance. In the 2,000 m race, athletes need to paddle 210 to 240 meters with an average force of 686 to 882 cattle. The study found that athletes need about 40% of their maximum rowing strength to maintain this muscular endurance level 3. In the actual training, the pull-up (individual) in 1min, 1 bench push, 1 RM squat, and abdominal jump are commonly used to evaluate the maximum strength of the athletes, and the number of times with 40%~50% of the maximum strength is recorded to evaluate the strength and endurance level of the athletes (Cao Yingying et al., 2022). Researchers studied the characteristics of the main joint muscle strength, found that the male athletes knee extensor strength and 2000 meters meter highly effective (r= 0.40), and the athletes measured VO2max and 2000 meters (r= 0.43) the same, using bench press, 1 RM squat, abdomen jump means commonly used to evaluate the maximum strength of athletes (Tan Yuqing, 2022, Wang Xue, 2020). Feng Xiaoyu on the outstanding male dragon boat athletes trunk muscle strength characteristics were studied, found that the male dragon boat athletes torso flexor group relative peak torque and the relative work decreases with the increase of test speed, the relative power increases with the increase of test speed, and flexor at 240 / s to the maximum, and extensor in around 180 / s has reached the maximum. Specific to the power use, dragon boat athletes should make full use of the human body big muscle strength, legs, back, waist, abdomen, shoulder, arm and other coordination coherent paddle rhythm, human body muscle organically to produce the best work effect, training with 1min pull-up (a), bench press to improve the strength of the arm (Feng Xiaoyu, 2021). In view of the power characteristics of the dragon boat movement, many experts and scholars have put forward various training methods and means of strength and quality. On the basis of analyzing the characteristics of rowing sports, Wang Zequn et al. gave the training methods of maximum strength, speed strength and endurance strength of rowing athletes. They believed that 1min pull-up (one), bench press, 1 RM squat and belly jump can enhance the strength and quality (Wang Zequn, 2021, Zhang Yaoyao, 2012). Research scholar Liu Xiao proposed that in strength training, 1min pull-up (individual), bench press and vertical jump touch methods are often used to evaluate the maximum strength of athletes (Liu Xiao, 2020); Sun Jian and others used 1min

pull-up (individual) and abdominal muscle endurance to study the upper body strength and abdominal strength of female dragon boat athletes, and achieved good results (Sun Jian et al., 2020). Wang Gang et al. designed a set of strength and quality exercises for dragon boat athletes: 1min pull-up, 1 RM bench press maximum weight, 1 RM squat, and vertical jump height, which solved the problems of insufficient strength and height of the rear half of the paddle (Wang Gang et al., 2017). Li Li et al. designed a system that can be used for dragon boat sports strength training, believing that 1min pull-up, maximum weight of 1 RM bench press, 1 RM squat and belly jump can complete the scientific training of special strength, and also train special technology (Li Li, 2016). Tian Zhenhua and others proposed that the dragon boat athletes should have good strength, endurance and speed endurance. For example, in the sailing stage, excellent athletes can increase the paddle frequency from static to 150 paddle in a few seconds. It is difficult to do without good explosive force, the core of which is speed force. The physical fitness training of athletes includes the training of overall physical fitness and special physical fitness (strength, explosive power, endurance, sensitivity, and flexibility). 1min pull-up, the maximum weight of 1 RM bench press, and abdominal muscles are commonly used to evaluate the maximum strength of athletes by endurance (Tian Zhenhua, Wu Xiaofeng, 2008).

Endurance quality

In the 2000-meter race, aerobic metabolic energy supply accounts for a large proportion, 70%~85%, anaerobic glycolysis accounts for 20%~25%, and phosphoric acid energy supply accounts for about 5%. To evaluate the endurance quality of dragon boat athletes by the dynamometer 1000 meter (s), dynamometer 2000 meter (s), lying ra, etc. (Cao Yingying et al., 2022, Wang Gang et al., 2017, Wang Xue, 2020). The energy supply characteristics of dragon boat sports determine that the aerobic endurance quality ranks first among the various sports quality of dragon boat sports. 1000 m running (s), 2000 m (s), lie pull and other means are commonly used to evaluate the endurance strength of athletes (Feng Xiaoyu, 2021). The endurance quality characteristics of dragon boat athletes have been discussed in the above aerobic metabolism ability and anaerobic metabolism ability, which mainly describes the endurance training characteristics of dragon boat sports summary. The water endurance training time of dragon boat athletes is close to 70%~80%（Jensen

& Nielsen, 1993). Liu Xiao pointed out that to develop the endurance level of dragon boat athletes must first develop aerobic capacity, the use of 1000 meters (s), horizontal pull can improve the aerobic capacity of the athletes, rowing time is generally about 10 points, no more than 15 points, the intensity of rowing with the change of rowing time (Liu Xiao, 2020). in a word, The endurance required for dragon-boat sports is achieved through several training stages, In the full-year training program, Endurance training can be divided into three stages: (1) the general endurance phase, Usually arranged in the first phase of the preparation period, Mainly in developing aerobic capacity; (2) Special endurance foundation stage, Usually arranged in the second phase of the preparation period, To develop the aerobic capacity and aerobic and anaerobic mixing energy supply capacity; (3) Special endurance stage, This stage should be consistent with the competition stage, With intensive training, Bring the body's oxygen utilization, oxygen transport, no oxygen threshold capacity and the ability to continue working under anoxic conditions to the physiological limit level, And is well combined with dragon boat techniques, tactics and race characteristics, Form the ability to play. Most of the training uses 2000 meters (s) and pultools to evaluate the endurance strength of athletes (Zhang Yaoyao, 2012, Tian Zhenhua et al., 2008). Sun Jian believes that the endurance quality of dragon boat sports can be practiced from the 1000 meters (s), which can improve the coordination of strength and technology (Sun Jian et al., 2020).

Speed quality

Speed quality is the essence of dragon boat sports, it is the basic quality for athletes to achieve excellent results (Zhang Xiaobin & Zhang Jun, 2003). The dragon boat race requires the athletes to set sail quickly, paddle the race with all their strength on the way, and sprint at the final stage, so the speed of the dragon boat race is divided into the starting speed, the speed of the movement on the way and the sprint speed. The speed of the dragon boat movement is that the movement of each oar is mainly in a fast and powerful form. Due to the influence of wind and waves on the channel in the process of rowing, and the interference of opponents in the process of the competition, the athletes are required to be able to accurately and quickly complete each stroke technique. Studies have shown that the speed improvement is influenced by innate genetic and scientific training, and that it depends on the

anaerobic threshold and movement speed improvement. The method and means of speed training can be the meter 500 meters (s) and meter 100 meters (s) to improve the speed (Cao Yingying et al., 2022, Tian Zhenhua et al., 2008);Use 50 m running (s), develop movement speed and frequency (Wang Xue, 2020, Sun Jian et al., 2020); use 500 m (s), such as resistance stroke before normal stroke, improve muscle sensation and speed perception and neural process (Tan Yuqing, 2022, Liu Xiao, 2020, Wang Zequn, 2021); use 100 m, 50 meter running speed of movement speed, movement frequency and strength, improve and improve high frequency technology (Wang Gang et al., 2017).

Flexibility

Flexibility refers to the amplitude of the movement of the joints and the extension and elasticity of the muscles and ligaments across the joints. Dragon boat sports require athletes to have good flexibility in their shoulders, hips and ankles. Good flexibility is an indispensable condition for ensuring a large rowing technique and muscle relaxation ability (Wang Xue, 2020). Although the flexibility of the athlete does not directly create motivation, it is indeed essential to complete the movement. A large number of sports practices and studies in China show that the flexibility of shoulder rotation plays an important role in improving the performance of dragon boat athletes, and is the key for dragon boat athletes to give full play to their physical fitness and skills (Wang Gang et al., 2017, Zhang Yaoyao, 2012). Many scholars believe that the development of flexibility of athletes can not only make technical movements more coordinated, reduce muscle tension, but also improve muscle strength and increase joint range of movement. At the same time, the improvement of flexibility also plays a very positive role in preventing sports injuries and promoting physical recovery. It is often used to evaluate the flexibility of athletes (Cao Yingying et al., 2022; Tan Yuqing, 2022; Feng X.Y., 2021; Wang Zequn, 2021; Liu Xiao, 2020; Sun Jian et al., 2020; Tian Zhenhua et al., 2008).

Sensitivity and coordinated quality

Coordination ability refers to the ability of different systems, different parts and different organs of the athlete to cooperate with each other to complete the practice movements or technical and tactical activities. Dragon boat athletes want to achieve excellent results, they should pay special attention to the development of

sensitive coordination ability. Research shows that the test indicators and methods: 30s vertical lying, etc., using sports measurement method (Cao Yingying et al., 2022; Wang Xue, 2020; Feng Xiaoyu, 2021);Tan Yuqing et al. showed that the test indicators and methods: word run (s), tested by sports measurement method (Wang Zequn, 2021; Liu Xiao, 2020; Wang Gang et al., 2017; Li Li, 2016). Zhang Yaoyao's study showed that the test indicators and methods: word run (s), 30s standing sleeper were tested by sports measurement (Zhang Yaoyao, 2012).

The coordination ability of dragon boat athletes is mainly manifested in three aspects: (1) forced coordination. That is, when completing the stroke of the paddle action, the active muscle, active muscle, synergistic muscle coordination force, under the command of the nervous system, in order to mobilize more movement units to participate in the work, improve the degree of muscle fiber synchronization, to ensure that the maximum potential. (2) Movement coordination and the athletes with good movement coordination ability can truly reflect the effectiveness and economy of sports technology when completing the rowing technology.(3) Spatial coordination. In the dragon boat race, due to the influence of wind and waves, the fulcrum of each stroke and the boat and water is different, requiring athletes to have the ability to change the position to maintain the balance of the hull.

Table 3 Sports Quality Characteristics of Dragon Boat Athletes

Sport Quality indicators

Author Time	Strength						Endurance				Speed			Flexibility		Delicacy	
	1minpull-up	1RM Benchpress maximum weighttime	1RMdeep squat	Vertical jump touch height	Belly jump	Abdominal muscle endurance	Dynamometer 1000m (s)	1000m run	Dynamometer 2000m (s)	prone arms rowing (kg) times	Dynamometer 500m (s)	50(m) run (s)	Dynamometer 100m (s)	Sitand Reac (cm)	Shoulder Gyration	Zigzag run (s)	30s Burpees (times)
Cao Yingying et al, 2022	√	√	√		√		√		√	√	√		√	√			√
Tan Yuqing, 2022		√	√		√						√			√		√	
Feng Xiaoyu, 2021	√	√						√	√	√				√			√
Wang Zequn, 2021	√	√	√		√						√			√		√	
Xue Wang, 2020		√	√		√		√			√		√			√		√
Liu Xiao, 2020	√	√		√			√	√			√			√		√	
Jian Sun, et al., 2020	√					√	√					√		√			
Wang Gang et al., 2017	√	√	√	√			√		√	√		√	√		√		
Li Li, 2016	√	√	√		√		√									√	
Yaoyao Zhang, 2012	√	√							√	√					√	√	√
Tian Zhenhua, et al., 2008	√	√				√				√	√		√	√			
Total	9	10	6	2	5	2	6	2	4	6	5	3	3	7	3	5	4

Summary

According to previous studies on the characteristics of sports quality of dragon boat athletes, most experts agree that sports quality includes strength, speed, endurance, agility, flexibility, coordination and other aspects. To better reflect the differences in the athletic quality of the dragon-boat athletes, Find out the specific reasons for affecting the dragon boat movement, Li Bing, diadema, Zhang Yaoyao and most other scholars selected the standing long jump in the analysis of the sports quality of the dragon boat athletes, Maximum weight of the bench press, pull-up, The maximum weight as a test indicator, Reses the strength characteristics of the athlete athletic qualities of the athlete, Especially for upper limb strength, These indicators have some important correlations on the selection of materials and training of dragon boat athletes; Endurance features were selected for one-minute sit-ups, One-minute bench press, One-minute recumbent in action, Sitting body forward flexion, etc., It shows that the dragon boat athletes have high requirements for special endurance, Generally to reach a certain level of state; The prone back body, Spin the shoulder, Sitting body forward flexion, It reflects the important index of the flexibility of sports quality; 500m, 100m, It reflects the important index of speed in sports quality; The 30-s standing bunches, The word running reflects the index of sensitivity and coordination in sports quality. In the dragon boat race, the dragon boat athletes want to achieve success, in addition to the comprehensive development of the quality of various sports, excellent endurance quality and strength quality is the excellent dragon boat athletes must have.

Study on the physical fitness evaluation of dragon-boat athletes

The form, function and sports quality of dragon boat athletes are incorporated into a systematic comprehensive study of physical fitness level, one is in the field of material selection, the other is in the construction of physical fitness model.

Li Bing used the literature and data method, Questionnaire method, Mathematical statistics method, interviewing method, Main research methods, such as the test method, This paper studies the body shape, body function and sports quality of Chinese outstanding male dragon boat athletes, To explore the relationship of the

various indicators, Body shape indicators were obtained: shoulder width (cm), height (cm), quiet chest (cm), waist (cm), weight (kg), single arm length (cm), height sitting index, upper arm circumference (cm), arm length (cm), vervik index; Physical function indicators: cardiac function index, vital capacity (), no oxygen threshold, maximum oxygen uptake (ml/kg / min), hemoglobin (g / L), blood urea (mmol/L), urine protein (g / L), serum testosterone; Sports quality index: dynamometer 250 meters (s), dynamometer 2000 meters (s), one minute lie-pull (times), pull-up (times), standing sleeper 10 seconds (times), sitting body forward flexion (cm), running 1500 meters (s), maximum weight of bench press (kg). Specific index evaluation system and standards have been formulated, which provide a reference for the selection of body form, body function and sports quality of Chinese excellent male dragon boat athletes (Li Bing, 2013).Liu xiao research through the literature method, expert interview method, experiment and mathematical statistics method, the Anhui normal university sports college 24 male dragon boat team athletes, random average divided into 12 people and control 12 people as the object, on the basis of ensuring condition equilibrium, 12 weeks of systematic physical training respectively. The experimental group used the functional training method; the control group adopted the traditional physical training method. Functional motion screening (FMS) test, body shape (body weight, body fat, Pagrest index, Laurel index, Virvik index, upper arm tension circumference), exercise quality (sitting forward flexion, pull-up, bench press, squat, hard pull) and dynamometer (200 m, 500 m 1000 m) were used as the test indicators. The data before and after the experiment were collected for comparative analysis (Liu Xiao, 2020). The crown was studied with 40 men's dragon boat team athletes from the Three Gorges University. It is randomly divided into two groups: control group and experimental group, 20 people each. The control group conducts traditional strength training, and the experimental group conducts core strength training. For 60 minutes twice a week for 12 weeks. Before and after the experiment, the subjects need to test seven special physical fitness indicators: the maximum weight of bench press, one minute sitting rowing, one minute sit-up, one minute back, 1000 meters, sitting forward flexion, 30 seconds standing lying, SPSS22.0 data statistical processing. T-test for independent sample for comparisons between groups and paired sample T-test for within-group comparisons (Crown, 2019). Wang Zequn, Wang Lin et al. selected

18 second-class athletes from Beihua University as the experiment object, and divided 18 students into two groups (group 1 and group 2), each 9 people, group 1 mainly strength and endurance training; group 2 mainly strength and endurance training, and flexibility training for 2 months. The experiment included prone lift and pull, posterior solid ball throwing, 800m running, return run, and sitting body forward bending. Before the experiment, the two dragon boat athletes were statistically tested, and the results showed no significant difference to ensure the balanced grouping of subjects (Wang Zequn, Wang Lin, Gong Man, Hou Lihong, 2021). Zhang Xue used the literature data method, expert interview method and experimental method to select the research object: 28 young male dragon boat athletes from the dragon boat team of Liaocheng University, and the experimental objects were divided into equal experimental group and control group by the form of snake grouping method. Through interviewing and consulting expert opinions, 11 test methods were selected as the evaluation indicators of this study. Before the test of the measurement indicators, the p-value of the experimental group and the control group was greater than 0.05, and there was no significant difference, which can be used as the same level for experimental control. In this case of group, the group of core stability training was the experimental group, and the group of traditional lumbar and abdominal strength training was the control group of the experimental period. The same period was 10 weeks. The athletes of the two groups completed the core stability training and the traditional waist and abdomen training three times a week outside the unified training plan. After 10 weeks of experiment, two groups of subjects were post-tested and conducted intra-group and between-group analysis before and after the experiment (Zhang Xue, 2020). Tian Zhenhua and others studied the physical characteristics and evaluation models of outstanding male dragon boat athletes in Chinese universities. The research objects selected some athletes (men) from 62 participating teams in 2006 "Tianjin" Tanggu Cup "International College Student Dragon Boat Invitational and China's First College Student Dragon Boat Championship". The research method adopts the test method, the mathematical statistics method, and the comprehensive evaluation method. The relevant indicators were tested according to the standard method of body morphology. Through the SPSS13.0 statistical software package with GUTTMAN SPLIT-HALF, 11 indicators

were determined to form the physical fitness of the male excellent dragon boat athletes in Chinese universities. The method for developing single index scoring table is: take the average of each index as the base value; in the maximum and minimum range (kneeling arm length, 30s fast standing support, upper arm tension circumference, shoulder width, 1min bench press, lung capacity / weight) T=10 + 10 (x-x) / 3S, low optimal value (100m run, 400m, 1 500m100m dynamometer, 500m dynamometer T=10-10 (x-x) / 35. List the results in the table (Tian Zhenhua, Li Yunyong, Wu Xiaofeng, Xu Lanjun, 2008).

In summary, the dragon boat athletes body form, body function, sports quality evaluation index is relatively perfect, establish the evaluation and evaluation criteria is relatively scientific, but it is not hard to find that more emphasis on the study of male dragon boat athletes physical characteristics, lack of the study of female dragon boat athletes physical characteristics.

Summary

According to the findings of previous studies, At present, the body shape, body function, sports quality of the dragon boat athletes, When evaluating the 2 D single-term features, The evaluation index used is relatively perfect, The established evaluation and evaluation criteria are relatively scientific, But it's not hard to see that, Most of the studies focus on the characteristics of male dragon boat athletes, Few studies on the characteristics of body shape, body function and sports quality of female dragon boat athletes, The 200 meters is a short track race, The most used events in international dragon boat races (Song Qiang, 2012), With 200 m as the study object, The research on the comprehensive physical characteristics of female dragon boat athletes is in the blank.

The application of sports evaluation theory in physical fitness indicators

Evaluation is a method for people to measure all things in the world. Yuan Jizhou pointed out that "evaluation" refers to the process of analyzing things and judging the collected data, whether objective or subjective, and giving some kind of interpretation (Yuan Jizhou & Yellow Sea. 2011). In this process, Tang Xuli gave the answer to what content is used to judge. Evaluation is the value judgment of the object, and the judgment content can include no value and value, what value, great

value and small value (Tang Xuli. 2011). Since the content of the evaluation has been given, Yang Jun explained the evaluation combined with the content of the evaluation, believing that the evaluation is the most basic activity for people to understand the world and the way of understanding the essential characteristics of objective things from the surface to the inside (Yang Jun & Yan Jianhua, 2017). It can be seen that evaluation is the starting point for people to understand things, and it is a psychological process of value evaluation of objective or subjective things.

Nowadays, the research on sports evaluation is widely used in various fields, and is also widely used in different projects in the field of sports. The theory about sports evaluation has been consulted and provides a theoretical basis for the screening and establishment of the physical fitness evaluation indexes of women's dragon boat.

In Chen Chong's doctoral thesis, 113 secondary indicators and 13 tertiary indicators were constructed, forming a physical fitness evaluation system composed of three parts of form, function and quality, and making five evaluation grades using the percentile method (Chen Chong. 2016). It is believed that the physical core of football is flexibility and stability, and the physical foundation of football players is flexibility and core strength. Peng Xiao selected female rowers in Jiangxi Province as the survey object. For 35 female athletes, according to the final selected body shape: thigh circumference and upper arm tension circumference, kneeling arm length, finger distance index, chest circumference and shoulder width, etc.; physiological function: maximum oxygen uptake, blood testosterone, hemoglobin, etc.; sports quality: 1-minute pull-up, 30-minute dynamometer, sitting forward flexion and shoulder flexibility test, etc. According to the weight of the data obtained from the test, the comprehensive scoring standard, single scoring standard, comprehensive grade evaluation standard and single grade evaluation standard are established according to the weight. To provide reference for coaches and athletes (Peng Xiao, 2022). Zhang Jie uses the literature data method, questionnaire survey and interview method, mathematical statistics method, test method and logical analysis method, Based on the special physical fitness of China's excellent male weightlifters, Combined with the modern physical fitness training theory, On the special physical fitness evaluation index system of male weightlifters, Through index primary selection, expert screening and statistical optimization, Finally, 3 primary indicators (body shape, physical

function and motor quality), There are 14 secondary indicators (height height index, iliac width index, chest circumference, torole index, body fat percentage, blood testosterone, blood cortisol, high grasp, high turn, force push, squat front, squat back, wide hard pull, narrow hard pull) as the special physical fitness index system for male weightlifters (Zhang Jie, 2011). Through the literature, expert interview, Delphi investigation, test and mathematical statistics, Wang Panbo made a special analysis on the physical characteristics of male players and formulated the physical evaluation index system and evaluation standard of male players. In the operation process, the primary indexes are obtained by expert interview and literature method, then by the Delphi method; statistical optimization of the selected indexes; and finally, the complete physical fitness evaluation index system is obtained by assigning the indexes. The physical fitness index system was applied to the athletes. According to the test results, the physical fitness evaluation criteria for men's Dutch players were divided into five grades: A, B, C, D and E. Specific cases were substituinto the evaluation criteria, physical characteristics were analyzed and specific training suggestions were given. The formulation of the evaluation criteria is conducive to the coaches 'routine monitoring of the athletes' physical fitness development level in daily training, so that the test data is more intuitive and visual (Wang Panbo, 2022).Summer cold using literature method, expert interview method, delphi method, testing, mathematical statistics, the football players physical characteristics, after primary, expert two rounds of questionnaire, statistical optimization of three steps of screening, reflect the women's college students rugby athletes physical development level of the main indicators is: the arm tension circumference, height, maximum anaerobic power, maximum oxygen consumption, free lever bench press, squat, 30m run, 30s floor, wild run, cross to run. The physical fitness evaluation index system of outstanding female college student rugby players has been established, and the physical fitness evaluation standard has been established (Xia Han, 2020).Chen Yahao took the special physical fitness evaluation index system of outstanding athletes of Breaking project as the research object, Using the literature data method, expert interview method, expert investigation method, Organize and summarize the special physical characteristics of hip-hop dance Breaking project, From the perspective of system, physical fitness, Breaking physical fitness, sports evaluation theory and practice and other related

theoretical research to build a theoretical basis, From the evaluation and mathematical statistics theory, Build the index system and evaluation scale through index screening and weight confirmation; With nine athletes from Henan and Sichuan provinces preparing for the National Games, Test and analyze their special physical fitness, To further verify the effectiveness of the evaluation scale (Chen Yahao, 2022). Yan Jiarong's paper uses literature data method, expert survey, sports measurement and mathematical statistics, According to the physical fitness and its evaluation theory and physical development characteristics, After two rounds of expert investigations, According to the expert teaching, training experience and the accumulation of theoretical knowledge, After screening, make reference to the expert opinion, And according to the systematic, scientific, representative and feasible index selection principles, Form a first-level index containing three modules of body form, body function and sports quality, Length, fullness, speed, strength, endurance, flexibility, sensitivity, coordination, physiological and biochemical ten secondary indicators, Including height, upper limbs, lower limbs length, weight, BMI, heart rate, vital capacity, hemoglobin, blood testosterone, 30 m, standing long jump, plank support, 800 m, sitting body flexion, forward, cross fork, Illinois running, quadrant jump, rope ladder split leg, Cross-beat foot 19 elements of the three-level indicators. Then, according to the test results, the percentile method is used to formulate the individual scoring standard of each indicator of athletes, and the individual evaluation grade and comprehensive evaluation standard of each indicator are formulated with five-level evaluation (Yan Jiarong, 2019). Wang Hongliang to kunlun star ray gold club and Heilongjiang province 17 key level male ice hockey players as the research object, through the literature method, questionnaire survey, interview, survey, statistics method of male hockey players physical characteristics index research and screening, and through the form of expert questionnaire and interview, to check the index, eliminate unreasonable index, finally selected a number of reflect the ice hockey players special physical characteristics, including the level index 3, body form, body function, physical quality. There are 8 secondary indicators and 12 tertiary indicators. The tertiary indicators refer to distance, shoulder width, body fat rate, resting heart rate, lung capacity, maximum oxygen uptake, 30s30 squat test, horizontal barbell, weight half squat, one minute rope skipping, 30 m sprint, and return running. In

addition, according to the expert score, the weight of each index was calculated, and a relatively complete special physical fitness evaluation index system for Chinese men's ice hockey players was established (Wang Hongliang, 2019). Ren Yang used the literature method, Delphi method and mathematical statistics methods to study the special physical fitness and evaluation index system of 110 meters column. The evaluation index system of special physical fitness of excellent 110-meter hurdles athletes is constructed. Through research analysis the following conclusions: (1) according to the 110 meters column physical characteristics of special primary level index 3, secondary index 11, tertiary index 45, after three rounds of expert score screening and modification, finally determine the Chinese excellent 110 meters hurdles athletes special physical fitness evaluation index, including sports quality three, including height, lower limbs long, speed, strength quality of secondary index 10 and specific field test level 3 index 16.(2) The first-level index and three-level index weight system of 110 m column: 3 first-level index weight body form 0.32, physical function 0.25, sports quality 0.43, 16 tertiary indicators weight province 0.25, lower limbs 0.25, weight 0.22, torole index 0.28, resting heart rate 0.51, vital capacity 0.51,0.09,30 m time 0.12, half squat 0.11, standing long jump 0.08, run-up 0.10,0.11,150 m, end time 0.09,10 sitting forward 0.09, high turn 0.09,0.12.The evaluation score table of the special physical fitness index of the Chinese excellent 110-meter hurdles athletes is constructed, and then evaluated by the four-grade scoring method. The evaluation results are basically in line with the normal hurdles level of the athletes. According to the results of the special physical fitness test of China's outstanding 110-meter hurdles athletes, Chinese athletes need to further strengthen their flexibility and final sprint ability during training (Ren Yang, 2022). Guo Xiaoyu paper mainly adopts the literature method, expert survey and mathematical statistics method, including expert survey, according to the experts in the field of teaching and training experience and accumulation, through the questionnaire collected 10 experts on special physical indicators, through three rounds of selection, concentrated formed the Chinese excellent climbers special physical fitness indicators. The research conclusions are as follows: 1. The special physical fitness evaluation index of China's excellent rock climbers is established, It includes three first-level indicators: body shape indicators, Physical function indicators and

physical activity quality indicators, 10 secondary indicators, Enrichment index, circumference index, length index, cardiopulmonary function index, speed index, strength index, endurance index, sensitivity and coordination index, flexibility index, balance index; There are 14 three indicators: BMI, forearm relaxation, arm span, heart rate, 30s30 squats, 50 m running, grip strength, longitudinal jump, pull-up, arm hanging, 10s vertical lying, left and right splitting, shoulder rotation, dynamic balance (straight walking). 2. According to the expert questionnaire of climbers, the weight system of special physical fitness evaluation indicators of climbers is calculated. The weight of the three first-level indicators are: body form index 0.33, body function index 0.3, and sports quality index 0.37. Using the expert questionnaire, the weight was determined, and the comprehensive evaluation standard of physical fitness index was established by the percentile method according to the data of Chinese elite athletes to evaluate the athletes (Guo Xiaoyu, 2020). Li Chengliang, Ma Yi to sports training to the understanding of physical structure as theory basis, using the literature method, questionnaire survey, expert interview, sports measurement, mathematical statistics method, from many indicators selected 10 indicators as outstanding young man basketball players physical evaluation index, for our country outstanding young men's basketball players physical evaluation has practical value, provide the basis for the coaches scientific planning athletes physical training, and provide reference for basketball project selection (Li Chengliang & Ma Yi, 2006). Zhang Shujie measurement and collected the Wuhan sports school men taekwondo athletes form, function, quality, special technical data, through SPSSv16.0 of 20 indicators test results correlation analysis and difference analysis, the indicators and sports performance significant index, body fat percentage, 15s left, 4x10m turn run, 15s supine lift legs, 100m, 30m and double flying eight. In addition to the above indicators, the maximum power of lower limbs, average power of lower limbs, 30 m, 800 m, running, 15s jumping, training years and 15s are significantly correlated with sports performance, and the above eight indicators of lower limbs, mean power, height, 15s jumping, training years and the frequency of 15s are significantly correlated with sports performance (Zhang Shujie, 2012). Zhao Yi takes the physical fitness evaluation index system of outstanding female taekwondo athletes as the research object, and mainly adopts the literature data method, expert interview

method, Delphi method, test method, mathematical statistics method and logical analysis method to select the physical fitness index; uses the Delphi method and mathematical statistics method to select the physical fitness evaluation index system; uses the percentile method to establish the physical fitness evaluation standard (Zhao Yi, 2021). Wang Zihao studied the literature data method, Delphi method, expert interview method, testing method, mathematical statistics method, Through the analysis of the physical condition of football players, The study of the evaluation system theory, The physical fitness evaluation index system of excellent male tai student football players is constructed, Screening, optimization, determine the male college football players physical development level of the main indicators is: the body form 2 (torole index, height), the body function 2 (maximum oxygen power, maximum oxygen consumption), sports quality five (five steps jump, long, 20m barrier-free dribbling, envelope running, transverse split), The individual score standard and comprehensive grade evaluation standard (Wang Zihao, 2021). Liu Wei to literature research and expert consultation, investigation on the basis of screening the northeast university male volleyball athletes special physical indicators, using hierarchical analysis to establish the weight of each index, formulated the northeast university male volleyball athletes physical evaluation standard, combining single evaluation and grade evaluation, the evaluation results can objectively reflect the physical level of college volleyball players. The completion of the index system, the establishment of the weight and evaluation criteria, marks the completion of the college volleyball athletes special physical evaluation system, and according to the established evaluation criteria of some college volleyball players, for athletes to further the actual competitive ability to provide the basis of examination and diagnosis (liu wei, 2005). Yang Zhiting, Wu Guodong, Peng Xiangyang studied the physical form, physical function and sports quality of athletes, discussed the relationship between various indicators, and formulated specific index evaluation system and standard. The selection of physical form and sports quality for athletes (Yang Zhiting, 2020, Wu Guodong, 2020; Peng Xiangyang, 2013). Zhu Junkai using literature, expert interview, questionnaire survey, video analysis, mathematical statistics of the Chinese national team men's football players position physical characteristics, aims to correctly understand the position of the football players, and

combined with the position game characteristics, preliminary exploration of physical training strategy, to provide reference for physical training and reference (Zhu Junkai, 2011). Wang Zhiming, Lu Liu, Wang Dongyue, Hu Faxin used literature data, questionnaire survey and interview, mathematical statistics, special physical fitness, test and logical analysis, based on modern physical fitness training theory, through primary selection, physical function and physical quality), and the special physical fitness index system (Wang Zhiming, 2012; Lu Liu, 2012; Wang Dongyue, 2011; Hu Faxin, 2011). Yao Xuxia took the special physical fitness evaluation and diagnosis of Chinese outstanding female long-distance swimmers aged 14-17 as the research object, and conducted the special physical fitness evaluation and diagnosis research on 30 Chinese outstanding female 800-meter freestyle athletes by interview method, questionnaire survey method, test method, mathematical statistics and other methods. The conclusions are as follows: The physical fitness evaluation index of Chinese excellent women's 800 m freestyle athletes aged 14-17 is composed of 4 first-level indicators, 12 second-level indicators and 17 third-level indicators. Among them, the first-level index of physical fitness evaluation of Chinese women 14-17-14-17: physical form 0.20, physical function 0.27, sports quality 0.39, and health level (injury) 0.14 (Yao Xuxia, 2010). Using the literature method, questionnaire survey and interview method, mathematical statistical method, test method and logic analysis method, and based on the modern physical fitness theory, Feng studied the athletes, determined the primary indicators (physical form, physical function, physical quality), secondary indicators (Feng Benyu, 2007; Han Wei, 2011). Sun Baogang paper using literature, questionnaire survey, testing, statistics and evaluation methods, in 2007 China PingXie children table tennis finals, Shandong table tennis school nuclear Beijing haidian sports school table tennis team 1046-12 years old children table tennis players, and draw the following conclusion: 1, different gender of children athletes in special sensitive (30 seconds jump rope), special force (side support), special flexible (sitting body forward) and return movement speed level there are obvious differences.2. There is a gap between children and male table tennis players of different ages in the level of explosive power level (smash stroke, standing long jump) and sideslip movement speed, and the ability level of these two indicators basically shows an increasing trend with the growth of age. At the same time, the level of

lateral lying support index showed a lower level with age.3. Female child athletes of different ages basically show the trend of increasing increase with age; the lateral lying support index shows "A" type change curve. The spike range increases with age; flexibility is highest before 11 and decreases with age (Sun Baogang, 2008). Research method: literature data method, expert interview method, questionnaire survey method, test method, logic analysis method and mathematical statistics method.

Conclusion: reflect the Vietnam elite badminton players special physical indicators is: ketole index, forearm / upper arm long x100, upper arm circumference, 30 seconds without oxygen work, lung capacity / weight, longitudinal jump, 10 times low center of gravity four corners, badminton far and one minute rope skipping nine indicators, can preliminary as Vietnam excellent badminton athletes special physical fitness evaluation standard, the Vietnam badminton athletes special physical fitness of individual and comprehensive index score evaluation and grade evaluation (Ruan Wen De, 2008).Ye Hui in the study by four level indicators, 11 secondary indicators and its representative (level 3) index and index weight, and the corresponding evaluation criteria of excellent men sanda athletes core competitive ability evaluation system, the logical analysis and quantitative inspection, has a high effectiveness, for sanda athletes core competitive ability development level evaluation and training monitoring provides a reference basis. At the same time, the theories, methods and steps of the establishment of the evaluation system also provide a reference for the establishment of the evaluation system of the core competitive ability of outstanding athletes for other unarmed combat events (Ye Wei, 2005). The following is a previous research table of the application of sports evaluation theory in physical fitness indicators.

Table 4 Research on the application of sports evaluation theory in physical fitness indicators

Author	Title	Body Shape	Physical function	Sport quality	Object of study
Peng Xiao, 2022	Research on physical evaluation index system of female rowers -- taking Jiangxi Province as an example	√	√	√	35athletes
Ren Yang, 2022	Research on special Physical evaluation index of Chinese excellent 110m hurdler	√	√	√	11athletes
Wang Panbo, 2022	Construction of special physical evaluation index system for Chinese elite male Dutch ball players	√	√	√	15athletes
Yahao Chen, 2022	Research on the construction of special physical evaluation index system for outstanding athletes of Breaking hip-hop program	√	√	√	9athletes
Zhao Yi, 2021	Research on the construction of physical evaluation index system for elite college female Taekwondo athletes	√	√	√	20athletes
Wang Zi hao, 2021	Construction of physical evaluation index system for excellent male college football players	√	√	√	21athletes
Guo Xiao yu, 2020	Construction and empirical study of special physical evaluation index system for Chinese elite rock climbers	√	√	√	15athletes
Xia Han, 2020	Construction of physical evaluation index system for excellent female college football players	√	√	√	15athletes

Table 4 (Continued)

Author	Title	Body Shape	Physical function	Sport quality	Object of study
Yang Zhiting, 2020	Study on physical characteristics and evaluation criteria of Chinese elite male short track speed skaters	√	√	√	70athletes
Wu dong liang ,2020	Construction and diagnosis of physical evaluation system for Chinese elite male boxing athletes	√	√	√	149athletes
Yan Jiarong, 2019	Study on construction and evaluation of physical fitness index system of Shaanxi U11 female soccer players	√	√	√	24athletes
Wang Hongliang, 2019	Construction of special physical evaluation index system for Chinese male ice hockey players	√	√	√	17athletes
Chong Chen, 2016	The establishment of physical evaluation index system and standard for Chinese U17 male football players	√	√	√	329athletes
Peng Xiangyang, 2013	Study on evaluation system of physical fitness index of female boxing athletes in Hubei Province	√	√	√	17athletes
Li Bing, 2013	Research on physical training theory and evaluation system of Chinese elite male dragon boat athletes	√	√	√	600athletes
And Wang Zhiming, 2012	Research on special physical characteristics and training of Chinese elite male competitive aerobics athletes	√	√	√	53athletes

Table 4 (Continued)

Author	Title	Body Shape	Physical function	Sport quality	Object of study
Shujie Zhang, 2012	Construction of physical fitness index evaluation system for men Taekwondo athletes in Wuhan Sports Institute	√	√	√	14athletes
Lu Liu, 2012	Study on evaluation and diagnosis of National Women's basketball team	√	√	√	30athletes
Wang Dongyue, 2011	Study on special physical characteristics and training of Chinese elite synchronized swimmers	√	√	√	41athletes
Zhang Jie, 2011	Research on the evaluation index system of special physical fitness of Chinese male weightlifters	√	√	√	223athletes
Zhu Junkai, 2011	Study on positional physical characteristics and training strategies of Chinese national men's soccer players	√	√	√	46athletes
Hu Faxin, 2011	Research on physical training theory of Chinese Women's Basketball Professional League players	√	√	√	319athletes
Han Wei, 2011	Research on physical training of Chinese elite men's rowing open class athletes	√	√	√	26athletes
Yao Xuxia, 2010	Study on the evaluation and diagnosis of special physical fitness of 14-17 year old elite female long distance swimmers in China	√	√	√	30athletes

Table 4 (Continued)

Author	Title	Body Shape	Physical function	Sport quality	Object of study
Sun Baogang, 2008	Research on the Status Quo and Evaluation Diagnosis of special Physical ability of Chinese elite child soldiers	√	√	√	104athletes
Ruan Wende, 2008	Study on Basic theory and evaluation method of special physical training for Vietnamese elite badminton players	√	√	√	36athletes
Chen Moon, 2007	Research on the theory and Practice of Physical training for Chinese elite short-distance speed skaters -- taking the 500-meter event as an example	√	√	√	49athletes
Feng benyu,2007	Research on the theory and practice of physical training for high-level trampoline athletes in China	√	√	√	52athletes
Li Chengliang, Ma Yi, 2006	Research on physical evaluation index system of Chinese elite young men's basketball players	√	√	√	110athletes
Liu Wei, 2005	Research on special physical evaluation index system of volleyball players in Northeast universities	√	√	√	30athletes
Ye wei，2005	Research on the evaluation system of core competitive ability of elite male athletes in China's Free Hand fighting event (Sanda)	√	√	√	70athletes
Yuan Yunping, 2002	Study on the theoretical system of physical fitness training for Chinese high-level male 100-meter runners	√	√	√	46athletes

Summary

Through the previous research on the common characteristics of physical fitness evaluation, the process of constructing the physical fitness evaluation system is generally divided into: one is to clarify the object and purpose of the evaluation, the second is to determine the evaluation index, the third is to determine the weight of the index, the fourth is to establish the evaluation standard, the fifth is the retrospective test of the evaluation standard. The object and final objective are generally regarded as the quantitative evaluation of the physical development level and general physical development level of specific items; the literature method, expert interview method, questionnaire method (Delphi method) and statistical screening method include the primary, secondary and tertiary indexes; the indexes are judged and determined by authoritative experts; the deviation method and percentile method are used to determine the evaluation criteria. Finally, the physical fitness evaluation system constructed is verified to test the scientific nature of the evaluation system. In addition, some scholars use the evaluation system and use the evaluation system to diagnose the physical development level of athletes, point out the advantages and disadvantages of athletes' physical fitness, and put forward the main indicators affecting the physical development of this special project, so as to provide reference for scientific training.

Summary of literature review

1. Through previous research on the concept of physical fitness, physical fitness characteristics are divided into three elements: body shape, physical function and sport quality. sport quality is the most important determinant of physical fitness, and body shape and physical function are the basic ability to form good physical fitness. Among them, the body shape reflects the height, circumference, length and width of the human growth and development, as well as the internal morphological characteristics such as the vertical diameter and the cross section of the muscle; the physical function reflects the function of the cardiovascular system and the organs; the sport quality of the athletes under the control of the central nervous system, such as strength, speed, endurance, flexibility and agility.

2. According to the research and analysis of the body shape characteristics of dragon boat athletes by predecessors, the ideal shape of competitive dragon boat athletes is tall and strong, with long and powerful upper limbs, broad shoulders, broad chest and thick waist, full body, inverted triangle torso, thick forearms and well-developed waist and back muscles. These indicators fully show the special characteristics of the shape of China's excellent dragon boat athletes.

3. According to the studies and analyses of the physical function characteristics of dragon boat athletes by predecessors, the cardiopulmonary function characteristics that reflect the basic physical functions of dragon boat athletes include heart rate, blood pressure, cardiac function index, vital capacity, etc., indicating that in the selection of dragon boat athletes, special attention should be paid to the athletes with large vital capacity, and the anaerobic valve that reflects the characteristics of the anaerobic capacity of dragon boat athletes. It shows that the dragon-boat athletes have higher requirements on anaerobic capacity, and the maximal oxygen uptake reflects the important index of aerobic capacity of the dragon-boat athletes.

4. According to the literature, the previous research and analysis of the sports quality characteristics of dragon boat athletes, the sports quality includes strength, speed, endurance, agility, flexibility, coordination and other aspects. In order to better reflect the difference of dragon boat athletes sports quality, find out the specific reasons of the dragon boat movement, most scholars think standing long jump, bench press maximum weight, pull-ups, bench pull maximum weight, a minute sit-ups, one minute bench press, one minute pull, sitting forward, prone, back, shoulder, sitting body forward, 500m, 100m, 30s vertical lying, word run of these indicators of dragon boat athletes sports quality characteristics have relevance, in the future material has important correlation with training;

5. According to previous studies on the comprehensive characteristics of dragon boat athletes' physical fitness, it is found that there are only two studies on the physical fitness of dragon boat athletes in dragon boat events, which mainly focus on the single latitude or two-dimensional Angle of physical structure elements. There is only one study on the comprehensive physical characteristics of Chinese male dragon-boat players from the perspective of three-dimensional physical fitness of dragon-boat players, and 500 meters is the most studied object. Thus, there are fewer studies on

the physical form, physical function and sports quality of Chinese female dragon-boat players.200 meters is a short track race, which is the most used event in international dragon boat races (Song qiang,2012). Taking 200 meters as the research object, the research on the comprehensive physical characteristics of Chinese female dragon boat athletes is blank. This study will take the 200m straight track race as the object, and strive to fill the gap in the research of physical evaluation index of Chinese excellent female dragon boat athletes.

CHAPTER III
RESEARCH METHODS

Research Design

In this study, The development a physical fitness evaluation indicators for Chinese female dragon boat athletes. The main research goal is to explore the development of the physical fitness evaluation indicators of Chinese female dragon boat athletes, understand the relationship between the influencing factors of the physical fitness evaluation indicators of Chinese female dragon boat athletes, development the physical fitness evaluation standard of Chinese female dragon boat athletes, and promote the development of the selection field of Chinese female dragon boat athletes. Investigation the physical characteristics of female dragon boat athletes based on theoretical knowledge of morphology, sports training, energy supply system and sports mechanics, The combination of qualitative and quantitative research is divided into three stages.

In the first stage, conduct a semi-structured interview with the team coaches, team leaders and managers of China Dragon Boat Association, This study clarified the influencing factors of development the physical fitness evaluation indicators of Chinese female dragon boat athletes through interviews.

In the second stage, the Delphi method was adopted to select the physical fitness evaluation indicators of Chinese female dragon boat athletes through experts, The weight value of each indicators is calculated by the analytic hierarchy process, and the physical evaluation indicators of Chinese female dragon boat athletes is proposed.

In the third stage, the physical fitness evaluation indicators of Chinese female dragon boat athletes proposed in this study is verified by measurement method. The details of each stage are detailed in the following sections.

This study was approved by the Human Ethics Committee on 31 October 2023 and the license is in the Appendix.

Phase 1 was completed from November 1- 15,2023.

phase2 was completed from November 20,2023 - Dec 29.

phase3 was completed from January 11 - February 20,2024.

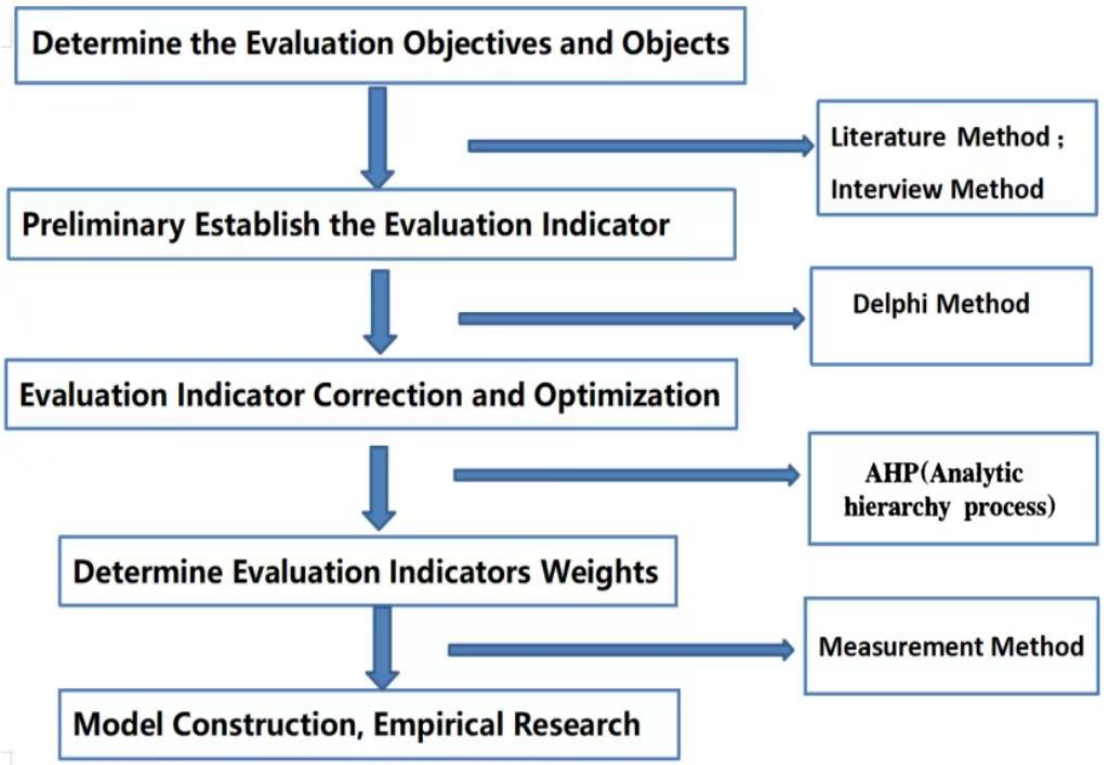

Figure 2 The Process of Physical Evaluation Indicators of Female Dragon Boat Athletes

Population

The study included coaches and leaders of dragon boat teams, Management personnel of the China Dragon Boat Association, University scholars in related fields, female dragon boat athletes, The reasons are as follows: Dragon boat team coach and team leader, Management personnel of the China Dragon Boat Association, Close contact with this sport, has rich experience in physical training and competition of the dragon boat team, Their opinions help to explore the factors influencing the development of the physical fitness evaluation indicators of Chinese female dragon boat athletes, Scholars in colleges and universities are all from the field of sports, and they have more attention and professional knowledge on the research of the physical fitness evaluation indicators of dragon boat athletes. Their opinions are helpful to analyze the relationship between the influencing factors of the physical fitness evaluation indicators of Chinese female dragon boat athletes, female dragon boat athletes, As direct participants, they meet the requirements of this

measurement object from the level of competition, competition and physical fitness. In order to achieve the purpose of this study, this study is divided into three stages.

Phase 1

Objective

To explore the influencing factors of development physical evaluation indicators of Chinese women dragon boat sport.

Subject

The first stage is mainly for the coach and leader of the Chinese female dragon boat team and the China Dragon Boat Association management staff. As senior scholars, they have rich practical experience and professional knowledge, has in-depth research on the physical training and actual situation of female dragon boat athletes, Interview them is helpful to understand the influencing factors of the physical fitness evaluation indicators of Chinese female dragon boat athletes.

Instrument

The purpose of the first stage is to understand the influencing factors of the development of the physical fitness evaluation indicators for Chinese female dragon boat athletes, The initial interview outline comes from literature review and theoretical research, and is designed according to the research purpose of this study. The interview outline is divided in two parts (See Appendix A), Mainly for the dragon boat team coach, team leader and the China Dragon Boat Association management staff. Part 1-12 were answered by the coach and leader of the dragon boat team, Its purpose is as follows: 1. Understand the influencing factors of development the physical fitness evaluation indicators of Chinese female dragon boat athletes.2. Explore and construct the relationship between the influencing factors of the physical fitness evaluation indicators of Chinese female dragon boat athletes. The second part of question 13-19 is answered by the management staff of China Dragon Boat Association, The purpose is: 1. Discuss the influencing factors of the physical fitness evaluation indicators development of Chinese female dragon boat athletes.2. Explore the development of the physical fitness evaluation indicators for Chinese female dragon boat athletes.

The validity of the interview syllabus was assessed using the Indexes of Item-Objective Congruence (IOC), by five-member expert panel (See Appendix V). Five experts from different research fields evaluated the interview outline and made suggestions from different perspectives. The expert group assessed the consistency between the research purpose and the question design at this stage. In the evaluation form, “-1” means the question is inconsistent with the purpose, “0” means uncertain, and the score “1” means the 43 question design is consistent with the research purpose. Scored by five experts, after calculation, when the value of IOC is greater than or equal to 0.5 (≥0.5), the project is valid (Ronna C. Turner & Laurie Carlson, 2003). In the first evaluation round, the scores of Q1 and Q13 were only 0.2， the scores of Q5 and Q14 were only 0.4，which did not meet the requirements of item validity， Experts offered to modify and delete it. The interview outline was redesigned and modified as recommended by the panel. After the modification, a second round of evaluation of the interview outline was conducted. The results of the second round of evaluation are as follows : In the evaluation table, "-1" indicates that the problem is inconsistent with the purpose, "0" indicates uncertainty, and the score "1" indicates that the problem design is consistent with the study purpose. by 5 experts, the item is valid when the IOC value is greater ≥ to 0.5 (0.5) （Ronna C. Turner & Laurie Carlson, 2003）. The list of experts is as follows Table 5:

Table 5 List of Evaluation Experts

Name	Area	University	Professional Title
LI ZY.	Science of national traditional sports	Wuzhou University	Professor
HUANG JW.	Science of national traditional sports	Wuzhou University	Associate professor
HUANG X.	Science of physical training	Guang zhou Sport University	Professor
TAN JG.	Sports Humanistic Sociology	Guang zhou Sport University	Professor
ZHOU JY.	Science of physical training	Xi'an City, Shanxi Province	Professor

Expert qualification criteria include:1. Associate professor title or above; 2. Engaged in sports scientific research for more than 10 years, with strong scientific research ability, and has certain achievements;3. Have a certain understanding of dragon boat sports.

A total of two rounds of research instrument evaluation were conducted in this phase, in the first round, the scores of Q1 and Q13 were only 0.2, the scores of Q5 and Q14 were only 0.4, which did not meet the requirements of item validity, Q2 and Q3, Q15 scored higher than 0.5, but experts suggested modifications. The interview outline and questionnaire were redesigned and modified following the recommendations of the expert group. After the modifications, a second round of evaluation of the interview outline and questionnaire, the further revised items, In the second round of IOC assessments, with an IOC value greater ≥ 0.8 (0.8), the study instrument had a confidence value of 0.929 (see Appendix B) and an IOC value greater > 0.8, indicating that the validity of the project content is reasonable (Ronna C. Turner & Laurie Carlson, 2003).

Sample Size and Sampling Procedure

The first stage, through the purpose sampling method and the snowball sampling method (Berg, 2001 ; Creswell, 2012), to the three dragon-boat team coaches, Two dragon boat leaders and five managers of China Dragon Boat Association conducted semi-structured interviews. The purpose of the interview was whether the sample was able to answer the research questions relatively completely and accurately (Xiao-e, 2012), with 5-25 participants, and was better able to conduct the study (Creswell, 1998). Therefore, these 10 respondents met the study requirements. First, for the purposes of sampling, Dragon Boat team coach Wu GJ is the head coach of the Dragon boat team of Guangxi University for Nationalities, the dean of the College of Sports and Health Science of Guangxi University for Nationalities, professor, discipline leader of traditional ethnic sports, master's supervisor, deputy secretary general of the Rowing Dragon Boat Branch of China University Sports Association, and has won the title of "Advanced Individual in National Minority Traditional Sports". Twenty-eight years ago, it was he who founded the first dragon boat team at Guangxi University for Nationalities, and since then, he has had an indisdisable bond with dragon boats.LV is the leader of Liaocheng

University Dragon boat team and director of the Cultural Development Center. She has led Liaocheng University Women's Dragon boat team to participate in international and national competitions and won the championship. She has rich practical experience and professional knowledge of dragon boat sport. SUN QB, the first class referee of Chinese Dragon Boat Sport, Vice president of the Chinese University Sports Association Rowing Dragon Boat Branch, has served as the head of the dragon boat race for many times, and has a deep research and attention to dragon boat sport. After contacting the three respondents individually, they recommended other relevant people to conduct interviews (Berg, 2001) in order to be able to obtain the maximum amount of information.

Data Collection Procedure

The interviews were conducted through face-to-face communication and online video. Before each interview, take the following actions:

1. The respondent was contacted by the researcher and the participant agreed on a suitable time and place. (2) The researcher briefly introduced the purpose of the interview so that the interviewees could provide better information. (3) All interviewees were told that they could withdraw from the study at any time and that the researchers would keep all their information confidential. To protect the privacy of the participants, the interview will not reveal their names. (4) The respondents were divided into three groups: Dragon boat team coach, Dragon boat team captain and manager of China Dragon Boat Association. The total interview duration is 60-90 minutes. Semi-structured questions that allow for open-ended questioning were used in the interview design, and descriptive language was used during the interview to better initiate and facilitate the interview (Merriam & Tisdell, 2016). Open-ended questions evoke longer responses with depth and relevance (Horton, Casey, Shaw, and Murphy, 2013). Each interview will be an audio recording, auditory cues and a live transcript made by the researcher. Through the interview process with the participants, field records and other data will be collected from the interviews to discuss and recommend answers to the research questions.

Data Analysis

According to the characteristics of the qualitative research, data analysis should run throughout the whole process of data collection (Patton, 1990). The

interviews were mainly conducted by the text analysis method. After each interview, the interview content was transcribed and conceptualized (Strauss, 1987). According to the theoretical ale of this study. The interview results sorted out the interview content, decomposed the data into manageable fragments, and coded the data by naming different segments, presenting three dimensions and 17 questions. Details will be explained in Chapter IV.

Summary

In the first stage, through literature review and interview, the influencing factors of the physical fitness evaluation indicators of Chinese female dragon boat athletes, the status quo of physical fitness development of Chinese female dragon boat athletes, and provided a reference for the establishment of physical fitness evaluation indicators in the second stage.

Phase 2

Objective

To analyze the relationship between the influencing factors of the physical fitness evaluation indicators of Chinese female dragon boat athletes, Development of Physical Fitness Evaluation Indicators of Female Dragon Boat Athletes in China.

Subject

The purpose of the second stage is to discuss the relationship between the influencing factors of the physical fitness evaluation indicators of Chinese female dragon boat athletes, Development of Physical Fitness Evaluation Indicators of Female Dragon Boat Athletes in China. Using the Delphi method, select the professional title of professor or doctoral supervisor qualification, Engaged in sports and related fields, And has a high level of enthusiasm, Familiar with the field of dragon-boat sports events, Have a certain working time, work energy, good cooperation of the four standards of personnel, formed a 13-person consultation expert group, Three rounds of screening were performed for the first, second and third level indicators, Establish the indicators, use the hierarchical analysis (AHP) method to calculate the weight value of each indicators.

Instrument

As a survey tool in this stage, the main purpose of questionnaire survey is to explore the relationship between factors influencing the development of physical evaluation indicators for Chinese female dragon boat athletes. Development of Physical Fitness Evaluation Indicators of Female Dragon Boat Athletes in China.

Through the reference to the relevant literature and the accumulated dragon boat team coaches, team leaders, Interview results of the manager of China Dragon Boat Association, Formulated about《Primary indicators of physical fitness evaluation of Chinese female dragon boat athletes》(See Appendix E), Among them, 3 first-level indicators, 12 second-level indicators and 90 third-level indicators were made into the expert questionnaire of "Physical Fitness Evaluation Indicators of Chinese Female Dragon Boat Athletes" (See Appendix F).The questionnaire design is divided into two parts. The first part is the general information of experts, and the second part compiles the evaluation indicators of all levels in the form of 5 points of Likert, and gives 5,4,3,2 and 1 points according to "very important", "important", "relatively important", "generally important", and "not important". Using the Delphi method, 13 experts were invited for three rounds of indicators screening.

Before the questionnaire is issued, the validity of the questionnaire should be tested. Validity testing was assessed using the Item-Objective Conformance indicators (IOC). According to the principle of consistency of purpose, 5 experts were invited to evaluate the interview outline and questionnaire and make suggestions from different perspectives. On the assessment form, "-1" means the problem is inconsistent with the purpose, "0" means uncertain, and a score of "1" means certain. In the evaluation form, "-1" indicates that the question is inconsistent with the purpose, "0" indicates uncertainty, and a score of "1" indicates that the question design is consistent with the purpose of the study. Rated by 5 experts, the project is calculated to be valid when the IOC value is greater≥0.5 (≥0.5) (Ronna C. Turner & Laurie Carlson, 2003).In the first round of evaluation, the tool's confidence value was 0.858 (See Appendix C), But Front squat, High snatch, Power clean, Points of three indicators is 0.4, IOC value <0.5, so delete; 30s diving tower score 0.2, IOC value lower than 0.5, so delete, Stand with eyes closed on one leg score 0, delete. The

questionnaire was redesigned and modified following the recommendations of the panel. After the modification, a second round of evaluation of the questionnaire was conducted, and for the further revised events, in the second round of IOC evaluation, the IOC value of each event is greater≥0.8 (≥0.8), the confidence value of the tool is 0.935 (See Appendix D), and the IOC value is greater than 0.8, indicating that the validity of the project content is reasonable (Ronald C. Turner & Laurie Carlson, 2003), indicating that all indicators are valid.

The questionnaires were translated before data collection. Since the data is collected in China, the language used in this paper is Chinese. Considering the accuracy of language expression, an expert in English translation first translated the questionnaire into Chinese. In addition, it was later translated from Chinese into English by another translator. Therefore, it can compare the meaning of the questions to ensure the accuracy of the questionnaire.

Sample Size

Delphi method, as an expert consultation method, has a high level of selection of experts, who have rich practical experience and high theoretical level in related fields, and have certain representativeness and authority in related fields (elbecq, Van, Gustafson, 1976; Fang, ZH, Wang, 2017).In general, it is only necessary to select 4 to 19 theoretical experts with high knowledge in related fields to obtain satisfactory results (Sue Hoyt K., Coyne EA., Peard AS. 2010).In this study, 13 experts and scholars in the fields of sports training, ethnic traditional sports and sports education, who are familiar with the physical fitness indicators of excellent female dragon boat athletes, were selected as the consulting expert group (Table 6).The list of experts to be invited is as follows:

Table 6 List of Experts

Name	Country	School	Professional title	Research direction
ZHANG S	China	Wuzhou University	Prof.	National Traditional Sports
Dr.WANG XC	China	Yulin Normal University	Prof.	Sports Training
XU M	China	Wuzhou University	Assoc. Prof.	Physical Education
TANG RJ	China	Wuzhou University	Assoc. Prof.	Sports Training
CHEN JJ	China	Guilin University	Assoc. Prof.	Sports Training
Dr.WEI JS	China	Guang zhou Sport University	Prof.	Physical Education
HAN HJ	China	Guang zhou Sport University	Prof.	Physical Education
LU ZY	China	Guangxi Normal University	Prof.	National Traditional Sports
CHEN ZY	China	GUANGXI MINZU UNIVERSITY	Prof.	National Traditional Sports
Dr.YUE JY	China	Guang zhou Sport University	Prof.	Sports Training
ZHU MW	China	Beijing Sport University	Prof.	Physical Education
Dr.PENG CC	China	Guangxi Normal University for Nationalities	Prof.	National Traditional Sports
CHEN CN	China	Yulin Normal University	Assoc. Prof.	National Traditional Sports

Sampling Procedure

The 13 Chinese experts must be selected on the following four conditions: (1) The professional title is a professor or has a doctoral supervisor qualification; (2) Engaged in sports and related fields, and have a high degree of enthusiasm; (3) Familiar with the field of dragon boat sports;(4) Personnel with certain four standards of working time, working energy and good cooperation.

13 experts from China. Professional fields are divided into sports training, Ethnic traditional physical education, Physical education has three directions, With more than 4 experts in each direction;

Data Collection Procedure

This stage is completed through four steps: the selection of expert group members, the selection of evaluation indicators, the revision of evaluation indicators, and the empowerment of evaluation indicators. Relying on the mean value of indicators score and coefficient of variation, the hierarchical method of weighting is adopted to calculate the weight value to ensure the scientificity.

The Delphi method was used to send and retrieve the expert questionnaire of Physical Evaluation Indicators of Chinese female Dragon boat Athletes to 13 experts through wechat and email, and the experts conducted three rounds of screening of the physical evaluation indicators, and finally determined the physical evaluation indicators of Chinese female dragon boat athletes. The first round: contact the experts in advance, send questionnaires to the experts, modify the first round of indicators selected by the experts according to the feedback of the experts on the screening of the Physical Evaluation indicators of Chinese Female Dragon Boat Athletes, remove unreasonable indicators, leave eligible indicators, and complete the first round of indicators screening. Round 2: After collecting, sorting out and integrating feedback from experts, I re-wrote the survey questionnaire of Physical Evaluation Indicators of Chinese Female Dragon Boat Athletes, sent the second round of survey questionnaire to 13 experts through wechat and email, and conducted expert screening, and so on. The third round of index screening also adopted the same method, and finally obtained the third round of indicators. The physical evaluation index of Chinese female dragon-boat athletes was established after the basic agreement was reached.

The weight of hierarchical analysis (AHP) is determined as follows: (1) Development hierarchical resul (2) Construct judgment matrix. (3) Single hierarchical sort consistency check. The maximum eigenroot λmax is obtained, and the eigenvector w is normalized, that is, the importance of each evaluation factor is sorted, that is, the weight is assigned. (4) Hierarchical total sorting and consistency checking. When CR<0.1 of matrix P or λmax = n, CI=0, it is considered that P has

satisfactory consistency, otherwise it is necessary to adjust the elements in P to make it have satisfactory consistency.

Data Analysis

SPSS21.0 was used to analyze the mean value, standard deviation and coefficient of variation of the expert rating table. According to the feedback of 13 experts, three rounds of indicators were screened. In this study, when experts screened indicators, according to the average rating of experts ≥4, the greater the average rating of experts, the higher the emphasis of experts on evaluation indicators; Coefficient of variation < 0.25 indicates that the degree of agreement between experts is higher; conversely, its value ≥0.25 indicates that the difference between experts is greater. In special cases, indicators are selected according to research needs and expert opinions. Finally, an effective indicators is determined and a perfect indicators evaluation is formed.

In this study, the analytic hierarchy process (AHP) is used to evaluate the weights of all levels of indicators. The analytic hierarchy process (AHP) is proposed by the American operations research scientist Saaty, which combines quantitative analysis with qualitative analysis, uses the experience of experts to judge the relative importance of the standards between which the goals can be achieved, and reasonably gives the weight of each standard. After the establishment of the hierarchical structure, it is necessary to compare the proportion of factors and subordinate indicators. In order to realize the qualitative to quantitative transformation, a quantitative scale is needed, and this process needs to be combined with expert scores to finally obtain a judgment matrix table. In this study, experts participating in the Delphi method are still used to assign weights to each indicators. Using 1-9 scale method, the weight value is calculated. Firstly, the eigenvector value is calculated, and the eigenvector indicators is obtained by using SPSS21.0. At the same time, the maximum characteristic root value (CI) is obtained, which is used for the next consistency check. The consistency test uses CR value for analysis. If CR value is less than 0.1, it indicates that the consistency test is passed; otherwise, it indicates that the consistency test is not passed.

Summary

In the second stage, the Delphi method is mainly used to explore the physical fitness evaluation indicators of Chinese female dragon boat athletes. After three rounds of screening by 13 experts, the indicators were finally established, and the weight of each indicator was calculated by using analytic hierarchy process to form a complete physical evaluation indicators for Chinese female dragon boat athletes, which was applied in the third stage of verification.

Phase 3

Objective

Through the test, the obtained data are analyzed to verify the physical fitness evaluation indicators of Chinese female dragon boat athletes

Subject

The third stage is mainly to verify the physical fitness evaluation indicators of Chinese female dragon boat athletes. Through three rounds of expert screening, determine the physical evaluation indicators of Chinese female dragon boat athletes. 66 female dragon boat athletes were selected as the test subjects for the indicators test, The standard percentile evaluation method is adopted to establish monomial evaluation standard, and the weight value of each indicators is used to establish a comprehensive evaluation standard for physical fitness. The 5-level evaluation method is adopted to establish a physical fitness evaluation grade standard.

Instrument

This stage is designed to verify the physical fitness evaluation indicators of Chinese female dragon boat athletes, According to the expert three rounds of screening, the final determination of 36 physical fitness evaluation of the third indicators, the research tool is the measurement method. Because of the test content and indicators are more, Subjects were recruited from different cities, This study used a test method of combining dispersion and concentration.

(1) Test location: Guangxi University for Nationalities of Traditional Ethnic Sports Training Base (Forecast), Huazhong University of Science and Technology dragon boat race training base, Dongchanghu Liaocheng University

dragon boat team training and practice base, Dongguan Wanjiang dragon boat training base.

(2) Test methods and instruments: Basis of this study (scientific selection of athletes, Reeser J.C., Verhagen E., Briner W.W., et al.2018), (Sports measurement and Methods, Wenhua Xing, 1992)(Functional evaluation method of excellent athletes, Zeng Fanhui, Wang Luude, Xing Wenhua, 1992) The theoretical principle of 36 indicators that can be directly measured, Detailed test rules and instruments (See Annex T), All the measurement processes are completed by myself and the research team in strict accordance with the test rules to ensure the consistency of the measurement methods. The research team is composed of 2 researchers in the field of traditional national sports, 2 teachers in the field of sports pedagogy and 2 teachers in the field of sports training. They have the title of associate professor or above, familiar with dragon boat sports, and have rich experience and professional knowledge in this field. This test conditions of these indicators are not high, easy to operate, the cost is relatively small, the requirements for the test equipment are not high, and the relative error is small.

(3) Test organization: Issue the test rules and method manual to the subject 5 days before the test, familiarize the subjects with the methods of test indicators and the use of instruments in advance, Before the test, the tester will give the subjects pre-test technical training and movement, and on-site demonstration of the instrument.

(4) Test requirements: Before the formal test, each group of testers is required to have a comprehensive, accurate and detailed understanding of each test task they are responsible for, and each tester is required to carefully understand and master the test rules and specific operation methods of the part they are responsible for and the problems that may occur during the test process, and be able to complete the test task accurately within the shortest possible time. And record the test results correctly (see Appendix S).

(5) Quality control: The tester is required to constantly correct the test instrument before and after each test, ensure that each test is completed by the same person during the test, and strictly implement the test rules, and ensure that the quality and quantity meet the requirements of the test conditions.

Pilot Test (TRY OUT)

The study conducted a pilot test before normal data collection. The purpose of the test is to ensure the validity and reliability of the measurement method, modify and adjust the problems in the research tool (Bernard, 2000) to better screen the recovered data. In this study, 30 female dragon boat athletes were selected as the prediction objects, This team from Guangxi Guangxi University for Nationalities is a team with rich competition experience and strong strength. They have won the championship of Nanning Dragon Boat Open and other awards. They are all professional athletes and can represent the physical level of national female dragon boat athletes. Therefore, the selection of 30 female dragon-boat athletes from Guangxi University for Nationalities as prediction samples in the third stage is scientific and meets the research requirements of this study. Test location Guangxi University for Nationalities of Traditional Ethnic Sports Training Base (Forecast), The test will be based on the indicator content, Standardize the operation process and test tools, I and the research team will conduct the test and strictly control the quality of the test.

SPSS Statistics 21.0 software was used to input and analyze the survey data, and 30 non-sample data were tested for reliability by internal consistency, SPSS was used to analyze Cronbach'sαvalue, and the reliability of the survey tool was tested. Cronbachαis often used to reflect the consistency and stability of measurement tools (Field, 2005). The acceptable lower limit of Cronbachαis usually 0.7.In some exploratory analyses, it may be reduced to 0.6, but a reliability factor considered good should be above 0.8 (J.Air, Black, Babin, Anderson, &Tatham, 2006).The quality and reliability of the tool are analyzed by calculating Kronbach's α-Kronbach coefficient. As shown in Table 7:

Table 7 Cronbach Reliability Analysis

Indicators	Correction for Item Total correlations (CITC)□	Item deleted α coefficient□	Cronbach α coefficient
C1Upper extremity length (cm)	0.91	0.849	
C2Calf length (cm)	0.571	0.854	
C3Arm span(cm)	0.565	0.85	
C4Lower limb length (cm)	0.926	0.847	
C5Shoulder width (cm)	0.895	0.853	
C6Hip width (cm)	0.607	0.852	
C7Upper arm tension (cm)	0.964	0.853	
C8 Calf circumference (cm)	0.958	0.855	
C9 Waist circumference (cm)	0.953	0.846	
C10 Thigh circumference (cm)	0.942	0.851	
C11 Chest circumference(cm)	0.905	0.851	
C12 Height (cm)	0.825	0.85	
C13 Body fat percentage （%）	0.784	0.851	
C14 The Ketole indicators (kg\cm）	0.717	0.839	0.855
C15 Quiet heart rate(min\time)	0.859	0.85	
C16 Heart Function indicators（L\min\m^2）	0.905	0.855	
C17 Maximal oxygen uptake （ml\cm\kg）	0.897	0.852	
C18 Maximum anaerobic power (W)	0.768	0.948	
C19 Vertical jump touch height (cm）	0.812	0.853	
C20 Core ventral bridge level 8 (level)	0.645	0.855	
C21 1RM pull-out (kg) （kg）	0.853	0.845	
C22 Back muscle endurance （S）	0.857	0.837	
C23 1RM bench press （kg）	0.845	0.838	
C24 Standing long jump (cm）	0.845	0.845	
C25 1RM Squat (kg)	0.868	0.848	
C26 1min pull-ups (time)	0.888	0.851	
C27 3000m run (min）	0.943	0.855	
C28 800m run (min）	0.927	0.856	

Table 7 (Continued)

Indicators	Correction for Item Total correlations (CITC)□	Item deleted α coefficient□	Cronbach α coefficient
C29 Seated forward bend (cm)	0.921	0.852	
C30 Cross fork (cm)	0.893	0.854	
C31 Shoulder rotation （cm）	0.902	0.855	
C32 400m run (s)	0.918	0.855	
C33 30 m Sprint (s)	0.895	0.856	
C34 1min jump rope (time)	0.896	0.847	
C35 Cross-shaped change direction run(s)	0.892	0.855	
C36 30s burpees(time)	0.853	0.852	

The reliability coefficient of the research data is 0.855 (See Table D), which is greater than 0.8, indicating that the reliability quality of the research data is high. For the "CITC" value, the CITC value of all indicators is greater than 0.4, indicating that the correlation between the indicators is high, and the test method adopted is feasible and can be used for further analysis.

Sample Size and Sampling Procedure

In this study, 66 female dragon-boat players who won the top three of the 200m short speed straight race in the final of the China Dragon Boat Open were selected as test subjects. The China Dragon Boat Open, Organized by the China Dragon Boat Association, it is one of the highest level and most influential dragon boat races in China, and they can represent the physical level of female dragon boat athletes in the country.

The selection criteria for volunteers must include the following four aspects: (1) All volunteers agree to participate in the study and fully understand the purpose of the study and all testing procedures. (2) The 66 female dragon boat Athletes must have participated in the China Dragon Boat Open Finals and have no obvious injuries in the past 3 months. (3) All athletes have to compete at the appropriate level. (4) The test time of all the volunteers is arranged in the non-training time, and will not affect the normal training and competition of the volunteers.

There are also specific criteria for excluding volunteers, mainly including: The athlete has not fully recovered from the past three months. (2) The athlete is taking his medication. (3) Unable to participate in all test procedures due to competition conflicts. (4) For other reasons, do not want to continue to participate in the test.

Data Collection Procedure

In this study, the relevant data of Chinese female dragon boat athletes' physical evaluation indicators were obtained through measurement, so as to formulate each individual rating table. The specific steps are: (1) Use spss software to calculate the mean value, standard deviation, minimum value and maximum value of the measured data; (2) K-S test was used to calculate the significance level of the measured data and test whether it obeyed the normal distribution; (3) Use percentile method to make individual scoring criteria. (4) Grade evaluation usually adopts a 5-level evaluation method, that is, excellent, good, medium, medium lower and poor. In this study, percentile method was used to establish the grade standard of athletes' physical fitness evaluation.

Data Analysis

In this study, the measurement data of 66 female dragon boat athletes were collected and analyzed using SPSS. 21.0 to establish the evaluation criteria. According to the mean value of each indicators data as the benchmark, the standard deviation is the unit, and then adjust the average scoring point according to the expert opinion and the maximum value and the minimum value of the measured data, Using K-S test, P is greater than 0.05, indicating that the normal distribution, using the standard percentile evaluation method, the 5th, 10,15..., 50,55,60..., 90,95th percentile indicators, the minimum value of the measured indicators is set as 0 points and the maximum value is 20 points. The indicators values of the 5th to 95th percentile were set as 1,2,3,4... 18,19, and the scoring criteria of individual physical indicators of Chinese female dragon boat athletes were formulated through the score values (Sun Zheng, Hao Wenting, Hongfeng, 2010), Combined with the weight, the comprehensive scoring standard of physical fitness is established, and the 5-level evaluation method is adopted to establish the grade standard of athlete physical fitness evaluation.

Summary

This mainly introduces the research methods and specific steps. This study is divided into three steps. The first step is to use literature method and interview method to understand the physical physical status of Chinese female dragon boat athletes and discuss the influencing factors; The second step is to use the Delphi method to development of physical fitness evaluation indicator of female dragon boat athletes in China, and to use the hierarchical analysis method to calculate the weight value of each index; The third step is to use the measurement method, 66 female dragon-boat athletes were selected as the test subjects, Use the percentile method, Establish evaluation standards, Conduct evaluation index. The research of this chapter guides the research of the later chapters.

Conducting research ethics

The researcher has requested ethics for human research regarding the 《Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes》To the Human Research Ethics Committee of Mahasarakham University as follows:

1. Create a project to consider the ethics of human research. according to the form of Mahasarakham University Human Research Ethics Committee.

2. Prepare a memorandum to propose research projects that are subject to expedited review. To request consideration of ethics in human research Through the thesis advisor Passed the approval of the Dean of the Faculty of Education.

3. Present to the Human Research Ethics Committee of Mahasarakham University, which Mahasarakham University Human Research Ethics Committee

4. Mahasarakham University Human Research Ethics Committee Consider Certification Intensive research project.

5. Mahasarakham University Human Research Ethics Committee Consider certification. Intensive research project on《Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes》From October 31, 2023 to October 30, 2024, certification number 446-498/2023

6. The researcher collects research data based on the research project received by the committee and consider research projects.

CHAPTER IV
RESULTS

The purpose of this chapter is to report the influencing factors of development the physical fitness evaluation indicators of Chinese female dragon boat athletes, Discuss the relationship between the influencing factors of the physical fitness evaluation indicators of Chinese female dragon boat athletes, Put forward Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China. The physical fitness evaluation indicators of Chinese female dragon boat athletes was also verified. The chapter is divided into three stages.

In the first stage, the influencing factors of development the physical fitness evaluation indicators of Chinese female dragon boat athletes are discussed, have a preliminary understanding of the construction of the physical fitness evaluation indicators of Chinese female dragon boat athletes. This stage of the three dragon boat team coaches, 2 dragon-boat team leaders, Five managers of the Chinese Dragon Boat Association conducted 10 interviews, The interview results show that, The development of the physical fitness evaluation indicators for Chinese female dragon boat athletes involves 3 dimensions and 12 factors and 95 sub-factors, and the detailed results are reported in the first stage.

In the second stage, the relationship between the influencing factors of physical fitness evaluation indicators of Chinese female dragon boat athletes, The whole process of indicators construction is expounded. Using the Delphi method, 13 experts were invited to conduct three rounds of screening of first, second and third indicators, Use Likert five points were evaluated and the weight value of each indicators was calculated by hierarchical analysis.

In the third stage, three rounds of expert selection will finally determine the physical fitness evaluation indicators of Chinese female dragon boat athletes,66 female dragon-boat athletes were selected as the test objects for the indicators test, The criterion percentile method is adopted to formulate the monomial evaluation criterion, and the weight value of each indicators is used to establish the comprehensive evaluation criterion of physical ability, and the 5 evaluation grade is

adopted, Establish a grade criterion for physical fitness evaluation, To verify the physical fitness evaluation indicators of Chinese female dragon boat athletes.

Results of This Study

The study results were divided into three parts. The first part is to development the influencing factors of the physical fitness evaluation indicators of Chinese female dragon boat athletes, The second part is the elaboration, The whole process of physical fitness evaluation indicators development of Chinese female dragon boat athletes, The third part is to verify the physical fitness evaluation indicators of Chinese female dragon boat athletes. Detailed results for each section are shown below.

Phase 1 Explore the influencing factors

The first stage explores the influencing factors of development the physical fitness evaluation indicators of Chinese female dragon boat athletes, On the physical fitness evaluation indicators of Chinese female dragon boat athletes, The sample of this phase was 10 respondents, It includes three dragon-boat team coaches, 2 dragon boat team leaders, 5 managers of the China Dragon Boat Association. It is divided into three parts, Part one: Introduce the general information of the interviewees; Part two is the detailed explanation of the interview content; Part three is a summary table of the experts to answer each question. The results of the interview are explained in detail below.

Part one: The sample of this phase is 10 respondents, Including 3 dragon boat team coaches, 2 dragon-boat team leaders, 5 managers of the China Dragon Boat Association.

Part two: 5 coaches and leaders of the dragon boat team answer questions 1-11, and 5 managers of the Chinese Dragon Boat Association answer questions 12-17. The following is a summary of the interview:

Q1: Introduce the number of athletes on your female dragon boat team? From the answers of the scholars, it can be seen that various regions and universities in China have a high degree of support for female's dragon boat sports, with a basic number of more than 50 people, which provides a reference for the later sample of this study.

Q2: What do you think are the current physical characteristics of female dragon boat athletes? According to the scholars' answers and inductive analysis, each expert has a different understanding of the physical fitness characteristics, and the frequency of the three elements of the composition of body shape, physical function and sport quality appears the most frequently.

Q3: What do you think are the factors that affect the construction of the physical fitness evaluation indicators of female dragon boat athletes? Each expert has different answers to the factors affecting the physical evaluation indicators of female dragon boat athletes. The highest frequency of occurrence is summarized as: length, circumference, width, height, derived indicators, body principal components, cardiopulmonary function, aerobic metabolic capacity, anaerobic metabolic capacity, recovery capacity, hormone level, strength, endurance, flexibility, speed, sensitivity and coordination.

Q4: What do you think of the relationship between the factors influencing the physical fitness evaluation indicators of Chinese female dragon boat athletes? By summarizing the experts' opinions, the factors affecting the physical evaluation indicators of female dragon boat athletes include sitting arm length, kneeling arm length, lower limb length and forearm length. Hip width, shoulder width, upper arm tension circumference, thigh circumference, waist circumference; Sit high, knee high; Welvik indicators, BMI; Heart rate, heart function indicators, blood pressure, vital capacity, anaerobic valve, relative maximum power, maximal oxygen uptake and hemoglobin, standing long jump, bench press maximum weight, pull-up, pull-down maximum strength, endurance and dynamometer 2000 meters, dynamometer 1000 meters, One minute sit-up, prone back extension, shoulder rotation, seated forward bend, speed and dynamometer 250 meters, dynamometer 500 meters; Sensitivity and repeated straddle, 6×6 meters round-trip running, height, weight, dynamometer 500 meters pelvis width, hand width, 1min jump rope, 30s burpees.

Q5: What do you think are the most important factors affecting the physical fitness evaluation indicators of female dragon boat athletes? Five experts have different views on this issue, and the summary analysis concludes: Sitting arm length, shoulder width, hip width, thigh circumference, Welvik indicators, Laurel

indicators, body weight, BMI, vital capacity, anaerobic threshold, VO2max, resting heart rate, longitudinal jump height, shoulder rotation, seated forward bend, dynamometer 1000 meters (s), dynamometer 2000 meters (S), 3000 meters running, lying down and other indicators are important factors.

Q6: What methods do you think are adopted for the selection of test indicators in this study? According to the expert's statement, the indicators test instruments are summarized as follows: (1) The body shape indicators uses the body composition analyzer (Korea Biospace InBody : 720), soft ruler, straight ruler, tape measure, centimeter ruler.(2) The sports quality indicators uses speed tester (American Time Brower infrared), TRX suspension rope (American NSCA production), longitudinal jump tester (Tongfang CSTF-ZT), sitting stereoscopic forward bending tester (Lanci TZCS-3), stopwatch, marker bar.(3) Use stethoscope, electronic sphygmomanometer, second variation, metronome, monomial float spirometer (0-7000 ml), dynamometer, heart rate monitor, 80-2 centrifuge, YO-YO tester (BP TEST test software).

Q7: In your opinion, how to select test subjects for this study and what is the appropriate sample size? According to the advice of experts, the selection of female dragon boat athletes is considered that only female athletes who have certain competition experience and have achieved excellent results in domestic or international dragon boat competitions can be qualified.

Q8: What problems do you think should be paid attention to in selecting test indicators in this study? According to the feedback of experts, during the test, the test content of the study is explained in detail, the consent is solicited, and the athletes with good physical fitness should be selected as the test object. The interviewees can withdraw from the study at any time. Respondents 'personal information will be retained and not disclosed, respondents' personal information will be used only for this study, and relevant data will be destroyed at the end of the study.

Q9: How do you think the weights of test indicators are determined in this study? According to the feedback of experts, the following methods to determine the weights are as follows:(1) The Delphi method: The determined evaluation indicators system was designed into a questionnaire and distributed to experts in the form of questionnaire anonymously. Each indicators is treated

quantitatively, and experts are invited to judge the importance of the indicators according to their personal views. The more important the indicators is, the higher the score is. In the continuous feedback and modification, the weight of the evaluation indicators is finally determined. Hierarchical analysis method (AHP method):The elements of each level are compared and judged relative to the elements of the previous level, so as to obtain the comparative weight of relative importance and establish the judgment matrix. Calculate the maximum feature root and the corresponding feature vector, and conduct the hierarchical monomial order; rank the elements of each level; sum the relative weight vector of the elements and rank the whole combination weight of the elements of each level relative to the overall goal of the system; and rank the scheme according to the size of the final weight.

According to the quantitative value, according to the degree of quantitative indicators, extremely important, strong, obvious, slightly important, 7,5,3 and 1 points, on the contrary, 1 / 9,1 / 7,1 / 5,1 / 3 and 1 points\（3）Principal component analysis method. Principal component analysis, also known as principal component analysis, aims to transform multiple indicators into a few comprehensive indicators with the idea of dimension reduction. Keeping the total variance of the variable constant in the mathematical transformation, so that the first variable has the largest variance, called the first principal component, the second variable, and not associated with the first variable, is called the second principal component. By analogy, one variable has one principal component.

Q10: How do you think the evaluation criteria for this study are established? Summarize the opinions of scholars, formulate the scoring criteria for the physical indicators of female dragon boat athletes, and the centile method is the most frequent.

Q11: What are your suggestions for this study? Five experts put forward that flexibility, endurance, strength, coordination, sensitivity, heart rate, blood pressure and lung capacity are important indicators to evaluate the physical fitness of female dragon boat athletes.

Q12: Introduce the current development trend of female's dragon boat sports in China? According to the feedback of scholars, the research direction of dragon boat sports in China mainly focuses on dragon boat technology and

competition skills and tactics. There is little research on the physical characteristics of athletes, and there is a lack of systematic and innovative physical training research. It can be seen that the training concept of competitive dragon boat is to attach attention to technology rather than physical ability, which is also the concept recognized by most dragon boat coaches. Technology is the only factor that determines the result of competition. Therefore, we often see the coaches lead the players to watch the game video repeatedly, find out the technical problems and study the technical characteristics, and they ignore that physical fitness is an important guarantee for playing technology.

Q13: Talk about the current status of physical training of outstanding female dragon boat athletes in China? Summing up the suggestions of the experts, we believe that the level of dragon boat competition is constantly improving, and the dragon boat sport, which carries the Chinese national culture, is no longer a "dominant" situation in China today. There is a big physical gap between Chinese dragon boat athletes and the athletes of European and American power countries. Nowadays, the world's dragon boat sports powers attach great importance to the physical training of athletes. Good physical training is the basis of technical and tactical training and improving sports performance, is the basis for athletes to bear heavy load training and high-intensity competition, and is also the basis for athletes to maintain a stable and good psychological state in training and competition.

Q14: A Brief discussion on the factors affecting the physical fitness level of China's outstanding female dragon boat athletes? All the experts give different opinions, believing that the physical evaluation of dragon boat athletes is mainly carried out from three aspects: body shape, physical function and sports quality. And height, weight, upper limbs, lower limbs, refers to distance, shoulder width, chest circumference, waist, hip circumference, thigh circumference, the indicators, body fat rate, strength, quality, endurance, aerobic and anaerobic ability, sensitivity and coordination, speed, cardiopulmonary function, core abdominal bridge level 8,1 RM horizontal pull, back muscle endurance, free pole bench press, vertical long jump are important indicators affecting the female's dragon boat athletes physical level.

Q15: How do you think to improve the physical training level of China's elite female dragon boat athletes? According to the opinions of experts, The

believe that physical characteristics include three elements: body shape, physical function and sports quality. According to the characteristics of dragon boat sports, it is proposed that shape, broad shoulders, long arm span, machine power and aerobic energy supply system, strength, endurance, speed, flexibility, agility and coordination are important indicators which are reflected through 1 RM squat, 1min pull-up, 30min dynamometer, 800 m running, cross cross, 400 m running, 30 m sprint run, cross running and other training methods.

Q16: What aspects do you think should be used to evaluate the physical fitness of China's excellent female dragon boat athletes? Summarize the opinions of the scholars: the movement of the human body cannot be separated from the energy supply of energy substances in the body. In the dragon boat race, the intense physical consumption of athletes is mainly supplied by the three physical energy systems, which determines the energy supply, we will develop the ATP system for female dragon boat athletes; dragon boat is a typical physical race speed project, must rely on the rapid contraction of muscles to produce strong muscle strength to meet the needs of sports. According to the principle of mechanics, in order to increase the ship speed, to improve the muscle contraction speed and strength, do more key development of fast muscle fiber physical training.

Q17: What are your suggestions for this study? Summarize the suggestions given by the scholars: in the daily training of female dragon boat athletes, attention should be paid to the muscle fatigue and recovery to ensure that the muscles can adapt to the needs of competition and training;

The interview results show that, The development of the physical fitness evaluation indicators for Chinese female dragon boat athletes involves 3 dimensions and 12 factors and 95 sub-factors, and the detailed results are reported in the first stage.

Phase 2 Analyzing the relationship between the influencing factors, development

In this stage, Analyzing the relationship between the influencing factors of the physical fitness evaluation indicators of Chinese female dragon boat athletes, Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China. through the relevant literature and the accumulated interview

results of the dragon boat team coaches, team leaders and the managers of the Chinese Dragon Boat Association, the primary physical evaluation indicators of Chinese female dragon boat athletes is formulated, Among them, 3 first-level indicators, 12 second-level indicators and 95 third-level indicators, Design the expert questionnaire of 《Physical Fitness Evaluation indicators of Chinese Female Dragon Boat Athletes 》 (see Annex 6),Using the Delphi method, 13 experts were invited to select three rounds of physical fitness evaluation indicators, Establish the of the physical fitness evaluation indicators of Chinese female dragon boat athletes, The hierarchical analysis method was used to calculate the weight values of each indicators.

This stage is divided into four part, Part one, Basic information of the 13 assessment experts: Part two, The questionnaire validity was assessed using item-objective consistency (IOC), Part three, The Delphi method is adopted for experts to screen the indicators and establish the indicators of physical fitness evaluation: The part fourth is to use the hierarchical analysis method to calculate the weight value of each indicators. The results of the three parts are explained in detail below.

1. Evaluation expert

The 13 experts selected, There are 9 men and 4 female, 4 professors in the field of sports training studies. 4 professors in the field of physical education, 5 professors in the field of ethnic traditional physical education, They are all from China, and they have a very high level of scientific research, they has rich practical experience and high theoretical level in related fields, and has certain representativeness and authority in related fields (elbecq, Van, Gustafson, 1976). In general studies, only 4 to 19 theoretical experts in related fields should be selected to obtain relatively satisfactory results (Sue Hoyt K., Coyne EA., Peard AS. 2010).In this study, 13 experts were selected to meet the requirements.

2. IOC results

Five evaluation experts were invited to evaluate the content validity of the Physical fitness primary indicators for Chinese female dragon boat athletes (see Appendix E) through the IOC. In the evaluation table, "-1" indicates that the problem is inconsistent with the purpose, "0" indicates uncertainty, and the score "1" indicates that the problem design is consistent with the study purpose. Scorcore by 5 experts,

calculated to be valid for IOC greater than or equal to 0.5 (0.5) (Ronna C. Turner & Laurie Carlson, 2003). In the first round of evaluation, the tool's confidence value was 0.858 (See Appendix C). In the second round, the questionnaire was redesigned and modified according to the recommendations of the panel, and if it did not meet the project validity requirements, modified and deleted. The IOC value for each item is greater than or equal to 0.8 (0.8), the confidence value of the tool is 0.935 (See Appendix D), IOC values greater than 0.8 indicate that the validity of the project content is reasonable (Ron C Turner & Law Carlson, 2003).

3. Delphi method of the results Analysis

In order to ensure the scientific nature and effective operation of the evaluation indicators, This paper uses the Delphi method, with the experience of experts, to screen the indicators, The indicators determined by the primary election were made into the expert questionnaire survey of 《Physical Fitness Evaluation indicators of Chinese Female Dragon Boat Athletes》 (Appendix F), It was distributed to 13 experts in the form of E-mail in three rounds. The Likert 5 rating scale was used to give 5,4,3,2,1 "respectively," is very important "," is important "," is generally important "and" is not important ". The experts were invited to score the primary indicators. Using SPSS21.0 statistical analysis, combined with the scores of each indicator in the questionnaire, Calculate the mean value and criterion deviation value, and then calculate according to the formula: coefficient of variation = (criterion deviation/mean value) x100% to calculate the coefficient of variation, and find the coefficient of variation of each coefficient of variation. The indicators with an average score of 4 and variation coefficient <0.25 were retained (Niu Xuesong, Bai Ye, Wang Bo, 2018), and otherwise were removed to form the physical fitness evaluation indicators of Chinese female dragon boat athletes in this study.

1) Results of the first round of expert consultation

The indicators determined by the primary election were made into the expert questionnaire survey of 《Physical Fitness Evaluation indicators of Chinese Female Dragon Boat Athletes》(see Annex 6),It was distributed to 13 experts for indicators scoring and screening. According to the average of the score obtained by the experts, the greater the average of the indicators, the higher the importance,

and the lower the versa. The smaller the score of the coefficient of variation, the higher the degree of agreement of the expert opinion, When the value of the coefficient of variation is ＜0.25, it indicates a high degree of consistency among experts, If ＞0.25, it indicates that the degree of consistency of expert opinions is low, and the mean score of importance is rounded to retain two digits (Zhang Min, 2020).

In the first round of questionnaires, 13 copies were distributed and 13 copies were recovered, and the recovery rate reached 100% and the efficiency rate was 100%. The following analyzes the results of indicators screening (see Appendix G).

Survey results and analysis of the first-level indicators of physical fitness evaluation of Chinese female dragon boat athletes

According to the results of the first round of primary indicators scored by experts, The body shape, physical function and sport quality Mean values ＞4, with coefficient of variation ＜0.25, It shows that experts believe that the physical fitness evaluation indicators of female dragon boat athletes can be reflected by body shape, physical function and sports quality, and the coordination of these three indicators is high, Due to the high score and small error of the first-round indicators, there is no survey content of the first-level indicators in the second round of the questionnaire. Three final first level indicators were determined, as shown in Table 10:

Table 8 First level indicators expert survey results (first round)

Number	Level 1 Indicators	Mean	criterion deviation	Variable coefficient	Result
A1	Body Shape	4.62	0.51	0.11	pass
A2	Physical Function	4.62	0.51	0.11	pass
A3	Sport Quality	4.62	0.65	0.14	pass

Survey results and analysis of the second-level indicators of physical fitness evaluation of Chinese female dragon boat athletes

According to the results of the first round of second indicators scored by experts, There are 11 secondary indicators with averages all> 4 points, Indicators with a coefficient of variation all <0.25, Discrete degree is small, all can be retained, It shows that the degree of coordination of the experts is relatively hig. However, the average score of the height indicators is ＜ 4 points, and the coefficient of variation is ＞ 0.25, and experts believe that the indicators was removed. 11 second indicators were finalized, as shown in Table 11:

Table 9 Second level indicators expert survey results (first round)

Number	Second-level indicators	Mean	criterion deviation	Variable coefficient	Result
B1	B1 Length	4.31	0.86	0.20	Pass
B2	B2 Width	4.62	0.51	0.11	Pass
B3	B3 Girth	4.62	0.51	0.11	Pass
B4	B4 Body principal component	4.62	0.65	0.14	Pass
B5	B5 Cardio-pulmonary function	4.46	0.66	0.15	Pass
B6	B6 Energy supply system	4.23	0.93	0.22	Pass
B7	B7 Strength	4.46	0.66	0.15	Pass
B8	B8 Endurance	4.69	0.63	0.13	Pass
B9	B9 Speed	4.39	0.87	0.20	Pass
B10	B10 Flexibility	4.62	0.51	0.11	Pass
B11	B11 Sensitive	4.31	0.86	0.20	Pass

Survey results and analysis of the third-level indicators of physical fitness evaluation of Chinese female dragon boat athletes

According to the scoring results of the first round of three-level indicators, the suggestions of 13 experts and the relevant conclusions of the three-level indicators are listed below:

B1 Length ：There are 11 tertiary indicators, The coefficient of variation of “arm length” was 0.18, indicating little difference between the variables of the indicators, But it also shows that the "hand length" setting of the experts in the "length" is not consistent with the views of other experts, Some experts believe that the "arm length" of athletes plays an important role in the body shape of female dragon boat athletes, But some experts believe that "arm length" has little impact, The gap between the athletes is small and negligible, It was therefore decided to keep the "arm length" until the next stage. All the experts believe that the "Arm span" is very important for the body shape of the female dragon boat athletes. Finally, "upper limb length" and "lower leg length" and "lower limb length" were selected into the second round of three-level physical fitness evaluation of female dragon boat athletes.

B2 Width：7 three-level indicators are set in this paper, All the means of "hip width" and "shoulder width" and "pelvic width" were less than 4 points, Therefore, the "hip width" and "hip width" pelvis width ", the coefficient of variation of" hip width "and" shoulder width "and" pelvis width " were 0.19 and 0.15,0.21, less than 0.25, respectively, Select the second round.

B3 Girth：9 three-level indicators are set in this paper, The average value of "chest circumference" is 4.46, and the coefficient of variation is 0.17, indicating that experts generally believe that "chest circumference" can reflect the fullness of the trunk muscles of female dragon boat athletes. The average score of "thigh circumference" and "upper arm tension circumference", "calf circumference", "waist circumference" and "upper arm relaxation circumference" is more than 4, and the coefficient of variation is less than 0.25, It shows that experts believe that these two indicators are important factors affecting the body shape of female dragon boat

athletes, and more attention should be paid to the influence of these indicators in later studies.

B4 Height：3 tertiary indicators are set up in this paper, The average of "sitting high" and "knee high" was less than 4 points, so the indicators were excluded. The average value of "height" is greater than 4 points, Coefficient of variation were all less than 0.25, All go into the second round, However, experts proposed that height should belong to body composition circumference, so height is included in body composition circumference.

B5 Body principal component：7 three-level indicators are set in this paper, The average of "lean body mass", "Laurel indicators", "Vilwick indicators" and "BMI" was less than 4 points, so the indicators were excluded. The average value of the remaining indicators was greater than 4 points, Coefficient of variation were all less than 0.25, All go into the second round.

B6 Cardio-pulmonary function：4 three-level indicators are set in this paper, The average value of the three indicators is greater than 4 points, retained, and entered the second round. However, the mean value of "blood pressure" was less than 4 points, and the coefficient of variation was greater than 0.25, so the indicators was excluded.

B7 Energy supply system：7 three-level indicators are set in this paper, Experts strongly agree with these two indicators, saying that "maximum oxygen uptake" and "oxygen-free valve" are important parts of the body function of female dragon-boat athletes, Only when these indicators are perfect can the physical fitness evaluation system be complete, The average value of "maximum speed" was less than 4 points, so it was excluded. With a mean value greater than 4 points, The coefficient of variation of "five-pulp average power" and "fatigue indicators" are 0.49 and 0.31, excluding this indicators,"20S full pull slurry distance" and "maximum anaerobic power" enter the second round.

B8 Strength: Set up 13 three-level indicators, Average more than 4 have "vertical jump touch high", "core abdominal bridge 8", "1 RM", "back muscle endurance", "vertical" push "," standing long jump "," 1 RM squat "" 1min

pull-up " 8 indicators, the coefficient of variation is less than 0.25, that experts think these indicators is the evaluation of female dragon boat athletes essential test.

B9 Endurance：9 three-level indicators are set in this paper, "3000 m run" and "800 m run" "dynammeter 1000 m" dynammeter 2000 m " are considered by experts to reflect the physical evaluation of female dragon boat athletes.

B10 Flexibility：6 three-level indicators are set in, "Sitting forward flexion", "cross fork" and "shoulder flexibility test" were selected into the second round of indicators by experts, experts believe that these three indicators are in line with the special characteristics and can better reflect the sports quality of female dragon boat athletes.

B11 Speed：5 three-level indicators are set in, The average value of "30-meter sprint" and "400-m" and "500-meter meter" was more than 4 points, and the coefficient of variation was less than 0.25, which was used as the screening indicators for the next round.

B12 Sensitive：8 three-level indicators are set in, The average value of "curve running test", "hexagon test", "1min jump rope", "cross variable running" and "30s standing sleeper" are more than 4 points, and the coefficient of variation is less than 0.25, entering the second round of indicators screening.

According to the classification and suggestions of experts on the three-level indicators, the indicators with average score> 4 and coefficient of variation <0.25 were selected, the remaining indicators that did not meet the requirements were deleted, and 48 three-level indicators were finally determined, as shown in Table 12 below：

Table 10 Third level indicators expert survey results (first round)

Number	Second-level indicators	Mean	Criterion deviation	Variable coefficient	Result
1	C1 Upper extremity length (cm)	4.62	0.65	0.14	pass
2	C2 Calf length (cm)	4.46	0.78	0.17	pass
3	C3 Arm span(cm)	4.46	0.66	0.15	pass
4	C4 Lower limb length (cm)	4.15	0.56	0.13	pass
5	C5 Arm long	4.00	0.71	0.18	pass
6	C6 Shoulder width (cm)	4.39	0.65	0.15	pass
7	C7Hip wide	4.08	0.86	0.21	pass
8	C8 Pelvic width	4.15	0.80	0.19	pass
9	C9 Calf circumference (cm)	4.08	0.86	0.21	pass
10	C10 Waist circumference (cm)	4.15	0.80	0.19	pass
11	C11 Thigh circumference (cm)	4.31	0.75	0.17	pass
12	C12 Chest circumference(cm)	4.00	1.08	0.27	pass
13	C13 Upper arm tension (cm)	4.46	0.78	0.17	pass
14	C14 Relax your upper arm	4.15	0.80	0.19	pass
15	C15 Height (cm)	4.46	0.66	0.15	pass
16	C16 Body fat percentage	4.39	0.77	0.18	pass
17	C17 The Ketole indicators	4.31	0.75	0.17	pass
18	C18 Weight	4.00	0.71	0.18	pass
19	C19 Quiet heart rate(Time)	4.31	0.86	0.20	pass
20	C20 Heart Function indicators (Time)	4.23	0.93	0.22	pass
21	C21Vital capacity	4.54	0.66	0.15	pass
22	C22Maximal oxygen uptake (VVO2ma)	4.08	0.76	0.19	pass
23	C23 Oxygen-free valve	4.31	0.75	0.17	pass
24	C24 Maximum anaerobic power(W)	4.39	0.87	0.20	pass

Table 10 (Continued)

Number	Second-level indicators	Mean	Criterion deviation	Variable coefficient	Result
25	C25 20s full pull slurry distance	4.00	1.00	0.25	pass
26	C26 Vertical jump touch height	4.23	0.83	0.20	pass
27	C27 Core ventral bridge level 8	4.23	0.83	0.20	pass
28	C28 1RM pull-out (kg)	4.46	0.78	0.17	pass
29	C29 Back muscle endurance	4.39	0.87	0.20	pass
30	C30 Free pole sleeper push	4.54	0.66	0.15	pass
31	C31 Standing long jump	4.77	0.60	0.13	pass
32	C32 1RM bench press	4.46	0.66	0.15	pass
33	C33 1min pull-ups	4.39	0.77	0.18	pass
34	C34 1RM Squat (kg)	4.00	0.82	0.20	pass
35	C35 800 m	4.62	0.65	0.14	pass
36	C36 3000m	4.62	0.65	0.14	pass
37	C37 Dynamometer 1000 m	4.00	0.82	0.20	pass
38	C38 Dynamometer 2000 m	4.00	0.82	0.20	pass
39	C39 Seated forward bend (cm)	4.31	0.95	0.22	pass
40	C40 Cross fork(cm)	4.62	0.65	0.14	pass
41	C41 Shoulder rotation	4.46	0.66	0.15	pass
42	C42 Dynamometer 500 m	4.77	0.60	0.13	pass
43	C43 30 m Sprint (s)	4.00	0.71	0.18	pass
44	C44 400m run(s)	4.54	0.66	0.15	pass
45	C45 1min jump rope	4.08	0.95	0.23	pass
46	C46 Cross-shaped change direction run	4.39	0.77	0.18	pass
47	C47 30s burpees	4.54	0.66	0.15	pass
48	C48 The hexagon test	4.85	0.38	0.08	pass

According to the first round of expert assignments, First level and second level are more ideal, Explain the expert to the indicators more recognition, Therefore, all the first-level indicators are retained, The second and third level indicators have

been partially modified in combination with expert opinions, Delete 1 second level indicators, 42 third-level indicators, 3 first-level indicators were finally determined, Second level indicators of 11 items, 48 third-level indicators, Entering the second round of screening, no new indicators were added (See Appendix H).

2) Results of the second round of expert consultation

The results of the selection of the first round of indicators by the experts are revised and integrated according to the opinions of the experts, It was made into the second round of expert questionnaire of 《Physical Fitness Evaluation indicators of Chinese female Dragon Boat Athletes》(Appendix I), The questionnaire was distributed to 13 experts, Experts are invited to use the Likert five-level scoring method, just like the method in the first round, According to the collected questionnaire, the average score of each indicators was calculated. The indicators with 4 points and coefficient of variation <0.25 were selected, and other indicators were removed. In the first round of expert questionnaire, due to the consensus of experts on the first-level indicators, there was no survey of first-level indicators in the second round of questionnaire, but the second-level three indicators were used for the interview and approved by the experts.

In the second round of questionnaires, 13 copies were distributed and 13 copies were recovered, and the recovery rate reached 100% and the response rate was 100%. The following analyzes the specific screening results of the indicators by experts (see Appendix 10).

Survey results and analysis of the second-level indicators of physical fitness evaluation of Chinese female dragon boat athletes

According to the results of the second round of secondary indicators scored by expert, There are 11 second-level indicators with averages all> 4 points, Indicators with a coefficient of variation all <0.25, All can be retained, It shows that the degree of coordination of the experts is relatively high. In the second round of expert questionnaire, due to the consensus of the experts on the secondary indicators, in the third round of questionnaire, there was no survey of the secondary indicators, but the three-level indicators were used for the expert questionnaire survey, which was unanimously recognized by the experts. 11 secondary indicators (See Table 13):

Table 11 Second level indicators expert survey results (second round)

Number	Second-level indicators	Mean	Criterion deviation	Variable coefficient	Result
1	B1 Length	4.46	0.66	0.15	pass
2	B2 Width	4.69	0.48	0.10	pass
3	B3 Girth	4.69	0.48	0.10	pass
4	B4 Body principal component	4.77	0.44	0.09	pass
5	B5Cardio-pulmonary function	4.54	0.52	0.11	pass
6	B6 Energy supply system	4.39	0.77	0.18	pass
7	B7 Strength	4.54	0.52	0.11	pass
8	B8 Endurance	4.69	0.63	0.13	pass
9	B9 Speed	4.46	0.78	0.17	pass
10	B10Flexibility	4.69	0.48	0.10	pass
11	B11 Sensitive	4.46	0.78	0.17	pass

Survey results and analysis of the third-level indicators of physical fitness evaluation of Chinese female dragon boat athletes

According to the scoring results of the second round of three-level indicators, the suggestions of 13 experts and the relevant conclusions of the three-level indicators are listed below:

B1 Length: There are 5 third-level indicators, The mean score of "arm length" was <4 points, and the coefficient of variation was 0.29, greater than 0.25, which did not meet the requirements, so it was excluded. All experts believe that "long forearm" is very important for the body shape of female dragon boat athletes. Finally, the "finger distance indicators" and "lower leg length", "lower limb length" and "upper limb length" were selected into the third round of the physical fitness evaluation indicators of female dragon boat athletes.

B2 Width ：3 tertiary indicators are set in, Except for "hip width" and "shoulder width", all other indicators are less than 4 points, so excluded, The mean scores of "hip width" and "shoulder width" were 4.39,4.62, and the coefficient of variation was 0.15 and 0.11, less than 0.25, respectively, for the third round.

B3 Girth ：6 three-level indicators are set in, The average value of "chest circumference" is 4.62, and the coefficient of variation is 0.11, indicating that experts generally believe that "chest circumference" can reflect the fullness of the trunk muscles of female dragon boat athletes. The average score of "thigh circumference" and "upper arm tension circumference", "calf circumference" and "waist circumference" are more than 4 points, and the coefficient of variation is less than 0.25, indicating that experts believe that these indicators are important factors affecting the body shape of female dragon boat athletes, and more attention should be paid to the influence of these indicators in the later study.

B4 Body principal component ： 4 three-level indicators are set in, The average value of "height", "body fat rate" and "ktorole indicators" is more than 4 points, and the coefficient of variation is less than 0.25, so the indicators is retained and entered the third round.

B5 Cardio-pulmonary function ：3 tertiary indicators are set in, The average value of the two indicators is greater than 4 points, retained, and entered the second round. However, the mean value of "vital capacity" was less than 4 points, and the coefficient of variation was greater than 0.25, so the indicators was excluded.

B6 Energy supply system ：4 three-level indicators are set in, Experts strongly agree with this indicators, believing that "maximum oxygen uptake" and "maximum oxygen power" are an important part of the body function of female dragon boat athletes. Only when these indicators are perfect can the physical fitness evaluation system be complete, and the average value of "oxygen valve" and "20S full pull distance" is less than 4 points, so it is excluded.

B7 Strength ：9 third-level indicators were set in, Average more than 4 have "vertical jump touch high", "core abdominal bridge 8", "1 RM",

"back muscle endurance", "vertical" push "," standing long jump "," 1 RM squat "" 1min pull-up " 8 indicators, the coefficient of variation is less than 0.25, that experts think these indicators is the evaluation of female dragon boat athletes essential test. The mean score of "1 RM bench press" was <4 points, so it was excluded.

B8 Endurance : 4 three-level indicators are set in, The "3000 meter run" and "800 meter run" are considered by experts to be the indicators of the physical evaluation of female dragon boat athletes.

B9 Flexibility : 3 tertiary indicators are set in, "Sitting forward flexion", "cross fork" and "shoulder flexibility test" were selected into the third round of indicators by experts. Experts believe that these three indicators are in line with the special characteristics and can better reflect the sports quality of female dragon boat athletes.

B10 Speed : 3 tertiary indicators are set in, The mean values of "30 m sprint" and "400 m" were greater than 4 points, and the coefficient of variation was less than 0.25, which was used as the screening indicators for the next round.

B11 Sensitive : 3 tertiary indicators are set in, The average value of "1min rope skipping", "cross variable running" and "30s standing lying" is more than 4 points, and the coefficient of variation is less than 0.25, entering the third round of indicators screening.

According to the second round of experts on the three level of the assignment and suggestions, Will average score> 4,The indicators with a coefficient of variation <0.25 were screened out, into the third round; Other indicators that do not meet the requirements are deleted, The physical fitness evaluation indicators has 36 third-level indicators with an average value of more than 4 points, Moreover, the coefficient of variation is less than 0.25, indicating that experts have high recognition of third-level indicators and small differences.36 tertiary indicators were finally determined, as shown in Table 14:

Table 12 Third level indicators expert survey results（second round）

First Level indicators (3)	Second Level indicators (11)	Third Level indicators (36)	Mean	Criterion deviation	Variable coefficient	Result
A1 Body Shape	B1 Length	C1Upper extremity length (cm)	4.85	0.38	0.08	Pass
		C2 Calf length (cm)	4.69	0.48	0.10	Pass
		C3 Arm span(cm)	4.62	0.51	0.11	Pass
		C4 Lower limb length (cm)	4.54	0.52	0.11	Pass
	B2 width	C5 Shoulder width (cm)	4.69	0.48	0.10	Pass
		C6 Hip width (cm)	4.54	0.66	0.15	Pass
	B3 Girth	C7 Upper arm tension (cm)	4.54	0.52	0.11	Pass
		C8 Calf circumference (cm)	4.62	0.51	0.11	Pass
		C9 Waist circumference (cm)	4.62	0.51	0.11	Pass
		C10 Thigh circumference (cm)	4.62	0.51	0.11	Pass
		C11 Chest circumference(cm)	4.54	0.52	0.11	Pass
	B4 Body principal component	C12Height (cm)	4.54	0.52	0.11	Pass
		C13 Body fat percentage	4.62	0.51	0.11	Pass
		C14 The Ketole indicators	4.54	0.52	0.11	Pass
A2 Physical Function	B5 Cardio-pulmonary function	C15 Quiet heart rate (Time)	4.62	0.51	0.11	Pass
		C16 Heart Function indicators (Time)	4.62	0.51	0.11	Pass

Table 12 (Continued)

First Level indicators (3)	Second Level indicators (11)	Third Level indicators (36)	Mean	Criterion deviation	Variable coefficient	Result
A3 Sport Quality	B6 Energy supply system	C17 Maximal oxygen uptake (VVO2ma)	4.62	0.51	0.11	Pass
		C18 Maximum anaerobic power(W)	4.62	0.51	0.11	Pass
	B7 Strength	C19 Vertical jump touch height	4.54	0.52	0.11	Pass
		C20 Core ventral bridge level 8	4.69	0.48	0.10	Pass
		C21 1RM pull-out (kg)	4.77	0.44	0.09	Pass
		C22 Back muscle endurance	4.85	0.38	0.08	Pass
		C23 1RM bench press	4.77	0.44	0.09	Pass
		C24 Standing long jump	4.92	0.28	0.06	Pass
		C25 1RM Squat (kg)	4.69	0.48	0.10	Pass
		C26 1min pull-ups	4.62	0.51	0.11	Pass
	B8 Endurance	C27 3000m run	4.77	0.44	0.09	Pass
		C28 800m run	4.69	0.48	0.10	Pass
	B9 Flexibility	C29 Seated forward bend (cm)	4.69	0.48	0.10	Pass
		C30 Cross fork(cm)	4.77	0.44	0.09	Pass
		C31Shoulder rotation	4.54	0.52	0.11	Pass
	B10 Speed	C32 400m run(s)	4.92	0.28	0.06	Pass
		C33 30 m Sprint (s)	4.77	0.44	0.09	Pass
	B11 Sensitive	C34 1min jump rope	4.54	0.52	0.11	Pass
		C35 cross-shaped change direction run	4.77	0.44	0.09	Pass
		C36 30s burpees	4.92	0.28	0.06	Pass

According to the grading and modification opinions of the second round of experts, the second-level indicators were ideal and needed no change.

12 third-level indicators were removed and no new indicators were added (see Appendix K).

3) Results of the three round of indicators screening

Select the results of the second round of screening of indicators, According to the opinions of the experts, the revision and synthesis of the evaluation indicators includes: first-level indicators (3), second-level indicators (11) and third-level indicators (36),The questionnaire was made into the three round of expert questionnaire on《Physical Fitness Evaluation indicators of Chinese Female Dragon Boat Athletes》 (Appendix L). Issuing questionnaires to 13 experts, Ask experts to use the Likert five-level scoring method, like the second round method, to score the indicators, According to the collected questionnaire, the average score of each indicators was calculated. The indicators with 4 points and coefficient of variation <0.25 were selected, and other indicators were removed.

In the three round of questionnaires, 13 copies were distributed and 13 copies were recovered, and the recovery rate reached 100% and the response rate was 100%. The following analyzes the specific screening results of the indicators by experts (See Appendix M).

Survey results and analysis of the third-level indicators of physical fitness evaluation of Chinese female dragon boat athletes

According to the survey results of the three round of third-level indicators by experts, the suggestions of 13 experts and the relevant conclusions of the three-level indicators are listed below:

B1 Length: There are 4 third-level indicators, The average value is> 4 points, and the coefficient of variation is <0.25. It can be seen that all experts believe that "upper limb length", "calf length", "open arm span" and "lower limb length" are very important for the body shape of female dragon boat athletes.

B2 Width ：2 third-level indicators are set in, The mean values of "hip width" and "shoulder width" were 4.15,4.39, respectively, and the coefficients of variation were 0.19 and 0.15, respectively, which were less than 0.25, indicating that experts believe that these two indicators are important factors affecting the body shape of female dragon boat athletes.

B3 Girth: 5 third-level indicators are set in, The average value of "chest circumference" is 4.31, and the coefficient of variation is 0.17, indicating that experts generally believe that "chest circumference" can reflect the fullness of the trunk muscles of female dragon boat athletes. The average score of "thigh circumference" and "upper arm tension circumference", "calf circumference" and "waist circumference" is more than 4 points, and the coefficient of variation is less than 0.25, indicating that experts believe that these indicators are important factors affecting the body shape of female dragon boat athletes, and more attention should be paid to the influence of these indicators in the later research.

B4 Body principal component: 3 third-level indicators are set in, The average "height of the indicators" is more than 4 points, and the coefficient of variation is less than 0.25, which is considered by experts to reflect the physical evaluation of female dragon boat athletes. The average value of "body fat rate" and "torole indicators" is greater than 4 points, indicating that experts believe the importance of this indicators; the coefficient of variation is less than 0.25, indicating a high degree of agreement among experts.

B5 Cardio-pulmonary function: 2 third-level indicators are set in, The average value of the two indicators was greater than 4 points, and the coefficient of variation was greater than 0.25, indicating a high degree of consistency of experts.

B6 Energy supply system: 2 third-level indicators are set in, Experts strongly agree with these two indicators, believing that "maximum anaerobic power" and "maximum oxygen consumption" are an important part of the body function of female dragon boat athletes. Only when these indicators are perfect can the physical fitness evaluation system be complete.

B7 Strength: 8third-level indicators are set in, Including "vertical jump touch high", "core abdominal bridge level 8", "1 RM lie pull", "back muscle endurance", "vertical push", "vertical" jump "," 1 RM squat "" 1min pull-up " 8 indicators, the average is> 4 points, the coefficient of variation is less than 0.25, that experts think these indicators is the evaluation of female dragon boat athletes essential test.

B8 Endurance: 2 third-level indicators are set in, The average value of "3000 m run" and "800 m run" is 4.62, and the coefficient of variation is 0.11, which is considered by experts to reflect the physical evaluation of female dragon boat athletes.

B9 Flexibility: 3 third-level indicators are set in, The average value of "sitting forward flexion", "cross fork" and "shoulder flexibility test" is> 4, and the coefficient of variation is <0.25. Experts believe that these three indicators are in line with the special characteristics and can better reflect the sports quality of female dragon boat athletes.

B10 Speed: 2 third-level indicators are set in, The average value of "30 m sprint" and "400 m" was more than 4 points, and the coefficient of variation was less than 0.25, indicating a high agreement of expert opinions.

B11 Sensitive: 3 third-level indicators are set in, The average value of "1min rope skipping", "cross running" and "30s standing lying" is more than 4 points, and the coefficient of variation is less than 0.25. Experts believe that these three indicators are in line with the special characteristics and can better reflect the sports quality of female dragon boat athletes.

According to the grading situation and suggestions of the third round of experts on the three-level indicators, The indicators with mean score> 4 points and coefficient of variation <0.25, The average value of 36 third-level indicators was more than 4 points, and the coefficient of variation was less than 0.25, indicating that experts had a high recognition of the third-level indicators and there were a small differences. Finally, 36 third-level indicators were determined. After the previous two rounds of screening, the coefficient of variation of the third round of indicators was <0.25, indicating that the expert evaluation of the indicators was more consistent. As shown in Table 15:

Table 13 Third level indicators expert survey results (three round)

First Level indicators (3)	Second Level indicators (11)	Third Level indicators (36)	Mean	Criterion deviation	Variable coefficient
A1 Body Shape	B1 Length	C1Upper extremity length (cm)	4.31	0.75	0.17
		C2 Calf length (cm)	4.39	0.77	0.18
		C3 Arm span(cm)	4.23	0.83	0.20
		C4 Lower limb length (cm)	4.15	0.56	0.13
	B2 width	C5 Shoulder width (cm)	4.39	0.65	0.15
		C6 Hip width (cm)	4.15	0.80	0.19
	B3 Girth	C7 Upper arm tension (cm)	4.15	0.80	0.19
		C8 Calf circumference (cm)	4.08	0.86	0.21
		C9 Waist circumference (cm)	4.15	0.80	0.19
		C10 Thigh circumference (cm)	4.46	0.66	0.15
	B4 Body principal component	C11 Chest circumference(cm)	4.31	0.75	0.17
		C12Height (cm)	4.46	0.66	0.15
		C13 Body fat percentage	4.39	0.77	0.18
		C14 The Ketole indicators	4.31	0.75	0.17
A2 Physical Function	B5 Cardio-pulmonary function	C15 Quiet heart rate(Time)	4.31	0.86	0.20
		C16 Heart Function indicators (Time)	4.23	0.93	0.22

Table 13 (Continued)

First Level indicators (3)	Second Level indicators (11)	Third Level indicators (36)	Mean	Criterion deviation	Variable coefficient
A3 Sport Quality	B6 Energy supply system	C17 Maximal oxygen uptake (VVO2ma)	4.31	0.75	0.17
		C18 Maximum anaerobic power(W)	4.39	0.87	0.20
	B7 Strength	C19 Vertical jump touch height	4.23	0.83	0.20
		C20 Core ventral bridge level 8	4.23	0.83	0.20
		C21 1RM pull-out (kg)	4.46	0.78	0.17
		C22 Back muscle endurance	4.39	0.87	0.20
		C23 1RM bench press	4.54	0.66	0.15
		C24 Standing long jump	4.77	0.60	0.13
		C25 1RM Squat (kg)	4.46	0.66	0.15
		C26 1min pull-ups	4.39	0.77	0.18
	B8 Endurance	C27 3000m run	4.62	0.65	0.14
		C28 800m run	4.62	0.65	0.14
	B9 Flexibility	C29 Seated forward bend (cm)	4.31	0.95	0.22
		C30 Cross fork(cm)	4.62	0.65	0.14
		C31Shoulder rotation	4.46	0.66	0.15
	B10 Speed	C32 400m run(s)	4.77	0.60	0.13
		C33 30 m Sprint (s)	4.54	0.66	0.15
	B11 Sensitive	C34 1min jump rope	4.39	0.77	0.18
		C35 cross-shaped change direction run	4.54	0.66	0.15
		C36 30s burpees	4.46	0.66	0.15

According to the grading and modification opinions of the three round of experts, 3 first-level indicators, 11 second-level indicators and 36 third-level

indicators were determined. No new indicators were added. The screening of the evaluation indicators of this study was completed (See Appendix N).

4) Determination of the physical fitness evaluation indicators for Chinese female dragon boat athletes

After three rounds of expert questionnaire survey, a set of physical fitness evaluation indicators of Chinese female dragon boat athletes was formulated, which included 3 first-level indicators, 11 second-level indicators and 36 third-level indicators. The physical fitness evaluation indicators of Chinese female dragon boat athletes was finally confirmed (See Table O).

Table 14 Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China

First Level indicators (3)	Second Level indicators (11)	Third Level indicators (36)
A1 Body Shape	B1 Length	C1Upper extremity length (cm)
		C2Calf length (cm)
		C3Arm span(cm)
		C4Lower limb length (cm)
	B2 width	C5Shoulder width (cm)
		C6Hip width (cm)
	B3 Girth	C7Upper arm tension (cm)
		C8 Calf circumference (cm)
		C9 Waist circumference (cm)
		C10 Thigh circumference (cm)
		C11 Chest circumference (cm)
	B4 Body principal component	C12 Height (cm)
		C13 Body fat percentage (%)
		C14 The Ketole indicators (kg\cm)
A2 Physical Function	B5 Cardio-pulmonary function	C15 Quiet heart rate (min\time)
		C16 Heart Function indicators (L\min\㎡)
	B6 Energy supply system	C17 Maximal oxygen uptake (ml\cm\kg)
		C18 Maximum anaerobic power (W)

Table 14 (Continued)

First Level indicators (3)	Second Level indicators (11)	Third Level indicators (36)
A3 Sport Quality	B7 Strength	C19 Vertical jump touch height (cm)
		C20 Core ventral bridge level 8 (level)
		C21 1RM pull-out (kg)
		C22 Back muscle endurance (S)
		C23 1RM bench press (kg)
		C24 Standing long jump (cm)
		C25 1RM Squat (kg)
		C26 1min pull-ups(time)
	B8 Endurance	C27 3000m run (min)
		C28 800m run (min)
	B9 Flexibility	C29 Seated forward bend (cm)
		C30 Cross fork(cm)
		C31 Shoulder rotation (cm)
	B10 Speed	C32 400m run (s)
		C33 30 m Sprint (s)
	B11 Sensitive	C34 1min jump rope (time)
		C35 Cross-shaped change direction run (s)
		C36 30s burpees (time)

4) Analysis of the weight value results of physical fitness indicators Hierarchical analysis method (AHP)

The hierarchical analysis method was used in this study. The analytic hierarchy process (AHP), proposed by the American operations research scientist Saaty, is a weighting method by which experts directly determine the weight coefficient of the factors at each level of the evaluated indicators system according to their importance, experience and relevant professional knowledge. Hierarchical analysis is a systematic analysis method that combines qualitative evaluation and

quantitative evaluation. Based on different experts, judging the relative importance of each factor in each level. The expert evaluation is transformed into several factors through the hierarchy structure, and the importance of the two indicators in the same level indicators is compared, so that the qualitative evaluation which is difficult to be quantified is transformed into quantitative evaluation, and then the weight coefficient of each indicators is calculated according to the comparative results.

First, Determine the hierarchical order structure

The evaluation indicators was divided into four levels, The top level is the target layer, only one target or factor is to determine the weight of evaluation indicators, the following are the first, second and third level indicators (Table 17).

Table 15 Hierarchical structure of physical fitness evaluation indicators for Chinese female dragon boat athletes

Hierarchical structure of physical fitness evaluation indicators for Chinese female dragon boat athletes	A1 Body Shape	B1 Length	C1Upper extremity length (cm)
			C2Calf length (cm)
			C3Arm span (cm)
			C4Lower limb length (cm)
		B2 width	C5Shoulder width (cm)
			C6Hip width (cm)
		B3 Girth	C7Upper arm tension (cm)
			C8 Calf circumference (cm)
			C9 Waist circumference (cm)
			C10 Thigh circumference (cm)
			C11 Chest circumference(cm)
		B4 Body principal component	C12 Height (cm)
			C13 Body fat percentage (%)
			C14 The Ketole indicators （kg\cm）

Table 15 (Continued)

A2 Physical Function	B5 Cardio-pulmonary function	C15 Quiet heart rate (min\time)
		C16 Heart Function indicators (L\min\m^2)
	B6 Energy supply system	C17 Maximal oxygen uptake (ml\cm\kg)
		C18 Maximum anaerobic power (W)
A3 Sport Quality	B7 Strength	C19 Vertical jump touch height (cm)
		C20 Core ventral bridge level 8 (level)
		C21 1RM pull-out (kg)
		C22 Back muscle endurance (S)
		C23 1RM bench press (kg)
		C24 Standing long jump (cm)
		C25 1RM Squat (kg)
		C26 1min pull-ups (time)
	B8 Endurance	C27 3000m run (min)
		C28 800m run (min)
	B9 Flexibility	C29 Seated forward bend (cm)
		C30 Cross fork (cm)
		C31 Shoulder rotation (cm)
	B10 Speed	C32 400m run (s)
		C33 30 m Sprint (s)
	B11 Sensitive	C34 1min jump rope (time)
		C35 Cross-shaped change direction run (s)
		C36 30s burpees (time)

Second, Construct the judgment matrix

In order to reduce as much as possible the difficulty and uncertainty of comparing various indicators of different nature and improve the accuracy, we do not compare all indicators together, but compare each other in pairs, and the relative scale is used to express the importance of the two indicators in quantity when comparing,

so that we can quantify the subjective judgment. In accordance with the usual practice of psychological research and analytic hierarchy process, we use a scale of 1-5 to compare different indicators in pairs (Table 18).

Table 16 Scale table of peer indicators judgment matrix scoring

Judging scale	**Definition**	**Meaning**
1	Equally important	Indicates that two elements are of equal importance
3	Slightly important	Indicates that the former is slightly more important than the latter
5	Obviously important	Indicates that the former is significantly more important than the latter
7	Strongly important	Indicates that the former is more important than the latter
9	Extremely important	Indicates that the former is more important than the latter
2,4,6,8		Represents the scale when there is a compromise between adjacent scales
The inverse of 1 to 9		The latter is more important than the former

After pairwise comparison of n indicators, the judgment matrix P= (a ij) n n. In order to make the judgment as scientific and impartial as possible, the study still enforces the indicators by the experts participating in the Delphi study, The questionnaire of 《Evaluation indicators Weight Value of Chinese female Dragon Boat Athletes》 was issued to 13 experts (Appendix O). Through the collation and analysis of the survey data of experts, the reliable judgment matrix of each layer is determined (Table 19) (Figure 3).

Table 17 Quantitative significance of first-level indicators

First-level indicators	A1 Body Shape	A2 Physical Function	A3 Sport Quality
A1 Body Shape	1	1/2	1/5
A2 Physical Function	2	1	1/4
A3 Sport Quality	5	4	1

$$P = \begin{bmatrix} 1 & 1/2 & 1/5 \\ 2 & 1 & 1/4 \\ 5 & 4 & 1 \end{bmatrix}$$

Figure 3 Judgment results matrix diagram

Third, Hierarchical sorting and consistency test

The purpose of hierarchical monomial sorting is to determine the importance degree of the elements related to a certain target element at the next level. This step requires calculating the maximum eigenvector W corresponding to the maximum feature root λ max of the judgment matrix, which represents the influence degree of the elements of the present level on the target elements of the previous level, that is, the weight value.

The equations are as follows: $A_w = \lambda_{max} \cdot w$

The purpose of consistency test is to judge the consistency of thinking logic and minimize the error of interference of human subjective elements. The consistency testing is mainly based on the matrix theory. The consistency indicators is calculated from the CI, and the value of the CI. When the CI is equal to 0, it indicates that the indicators has complete consistency; When the CI is close to 0, it represents a satisfactory consistency; The greater the value of the resulting CI, the greater the degree of inconsistency. The stochastic consistency indicator RI was presented to measure the magnitude of the CI. As shown in Table 20:

Table 18 Results of AHP hierarchy analysis

First-level indicators	Feature vector	Weight value	Maximum eigenvalue	CI Value
A1 Body Shape	0.354	0.1179		
A2 Physical Function	0.604	0.2014	3.025	0.012
A3 Sport Quality	2.042	0.6806		

By SPSS, the Feature vector of the first level indicators of physical fitness evaluation of Chinese female dragon boat athletes is 3.025,The λ max value of the A1 body shape was 0.354,The weight value was 0.1179.The λ max value of A2 physical function was 0.604,The weight value was 0.2014.The λ max value for A3 sport quality was 2.042,The weight value is 0.6806 (See Table T).thus it can be seen, The highest weight value is the sports quality, The second is the physical function, And finally, the body shape. As can be seen from the table, the CI value of the first-level indicators is 0.012, indicating that the indicators has complete consistency.

Positive correlation between the random consistency indicators RI and the order of the judgment matrix, generally speaking, The possibility of random deviation of consistency becomes larger as the matrix order increases, that is, the more the matrix order is, the greater the probability of random deviation of consistency becomes, and the corresponding relationship is shown in the table (Table 21). For Chinese female dragon boat athletes, the RI value is 0.52.

Table 19 Average random consistency indicators RI criterion values

n	1	2	3	4	5	6	7	8	9
RI	0	0	0.52	0.89	1.12	1.26	1.36	1.41	1.46

CR is the test coefficient appearing in testing to determine whether the matrix has satisfactory consistency, This is the test coefficient considering that the deviation from consistency may be due to random reasons, The test coefficient is

comparing the CI with the random consistency indicators RI with the following formula: CR=CI/RI

CR=CI/RI In general, the judgment matrix is considered to pass the consistency test at CR <0.1, or not to have satisfactory consistency at CR 0.1. According to the calculation of the first-level indicators of Chinese female dragon boat athletes (Table 22), the CR value was 0, <0.1, and the consistency test result was passed. It shows that the first-level indicators of physical fitness evaluation of Chinese female dragon boat athletes is reasonable.

Table 20 Results of consistency test of first-level indicators

Maximum eigenvalue	CI value	RI value	CR value	Results of the consistency test
3.025	0.012	0.52	0.024	Pass

According to the above methods, the secondary indicators and the tertiary indicators are calculated respectively to get the weight value of the physical fitness evaluation indicators of Chinese female dragon boat athletes. After calculating the weights of all indicators, the weight table of physical fitness evaluation indicators of Chinese female dragon boat athletes was established (See Table 23):

Table 21 Weight Table of physical fitness evaluation indicators of Chinese female dragon boat athletes

First Level indicators	**weighted value**	**Second Level indicators**	**weighted value**	**Third Level indicators**	**weighted value**
A1 Body Shape	0.1179	B1 Length	0.0803	C1Upper extremity length (cm)	0.04331
				C2Calf length (cm)	0.00497
				C3Arm span(cm)	0.02232
				C4Lower limb length (cm)	0.00967
		B2 width	0.0059	C5Shoulder width (cm)	0.00196
				C6Hip width (cm)	0.00393

Table 21 (Continued)

First Level indicators	weighted value	Second Level indicators	weighted value	Third Level indicators	weighted value
		B3 Girth	0.0123	C7Upper arm tension (cm)	0.00501
				C8 Calf circumference (cm)	0.00118
				C9 Waist circumference (cm)	0.00360
				C10 Thigh circumference (cm)	0.00182
				C11 Chest circumference (cm)	0.00072
		B4 Body principal component	0.0194	C12 Height (cm)	0.00188
				C13 Body fat percentage (%)	0.01205
				C14 The Ketole indicators (kg\cm	0.00553
A2 Physical Function	0.2014	B5 Cardio-pulmonary function	0.0671	C15 Quiet heart rate(min\time)	0.00671
				C16 Heart Function indicators (L\min\m^2)	0.06042
		B6 Energy supply system	0.1343	C17 Maximal oxygen uptake (ml\cm\kg)	0.11190
				C18 Maximum anaerobic power (W)	0.02238
A3 Sport Quality	0.6806	B7 Strength	0.2895	C19 Vertical jump touch height (cm)	0.00912
				C20 Core ventral bridge level 8 (level)	0.06965
				C21 1RM pull-out (kg)	0.09474
				C22 Back muscle endurance (S)	0.02524
				C23 1RM bench press (kg)	0.01391
				C24 Standing long jump (cm)	0.01012
				C25 1RM Squat (kg)	0.04934
				C26 1min pull-ups (time)	0.01737
		B8 Endurance	0.1782	C27 3000m run (min)	0.11881
				C28 800m run (min)	0.05940

Table 21 (Continued)

First Level indicators	weighted value	Second Level indicators	weighted value	Third Level indicators	weighted value
		B9 Flexibility	0.0317	C29 Seated forward bend (cm)	0.01977
				C30 Cross fork (cm)	0.00436
				C31 Shoulder rotation (cm)	0.00760
		B10 Speed	0.1110	C32 400m run (s)	0.01850
				C33 30 m Sprint (s)	0.09250
		B11 Sensitive	0.0702	C34 1min jump rope (time)	0.01207
				C35 Cross-shaped change direction run (s)	0.00546
				C36 30s burpees (time)	0.05268

Phase3 Development evaluation criterion and grade criterion

The purpose of the third stage is to verify the physical fitness evaluation indicators of Chinese female dragon boat athletes and formulate the evaluation criterions. It is divided into three parts, The first part has analyzed the demographic characteristics of the formal sample,66 female dragon boat athletes were obtained the data of physical indicators of Chinese female dragon boat athletes, Reliability was tested using internal consistency, the α values of Cronbach were analyzed using SPSS21.0 and the reliability of the survey tool was tested. The second part uses the percentile method to formulate the scoring criterion, according to the 5th level equivalent, the comprehensive physical fitness evaluation of Chinese female dragon boat athletes, The third part verifies the scientificity and practicability of the physical fitness evaluation indicators of Chinese female dragon boat athletes.

measurement method

Based on the feasibility of the prediction data reliability, this study uses a uniform test rule protocol (See Appendix T),66 female dragon boat athletes were tested to obtain relevant data on the physical fitness indicators of Chinese female dragon boat athletes (See Appendix S), This step of the investigation consists of two parts. The first part of demographic characteristics analysis; The second part was a

reliability test using internal consistency, using SPSS for the α values of Cronbach and the reliability of the survey tool.

Demographic characteristics

In this study, 66 female dragon-boat players who won the top three places in the 2023 China Dragon Boat Open Finals were selected as test subjects. The China Dragon Boat Open, organized by the China Dragon Boat Association, is one of the highest level and most influential dragon boat races in China, and they can represent the physical level of the national female dragon boat athletes (See Table 24).

Table 22 List and results of China Dragon Boat Open Final short straight race

Team	200m Final placing
Female dragon boat team of Huazhong University of Science and Technology	1
Dragon boat team of Liaocheng University	2
Dongguan Wan Nanfang technology dragon boat team	3

The 66 athletes of the three female's dragon boat teams are all professional athletes, and most of them have experienced national competitions. The test subjects are representative. For specific information (See Table 25).

Table 23 Total demographic table information

Name	Sample size	Mean	Criterion deviation	Median	Variance	Criterion error	Kurtosis	Measure skewness
Age	66	24.545	2.883	24	8.313	0.355	3.527	1.655
occupation	66	2.97	0.554	3	0.307	0.068	8.764	-1.138
Education	66	1.121	0.329	1	0.108	0.04	3.756	2.376
Training years	66	4.591	1.252	4	1.569	0.154	0.373	0.829

Table 24 Results of the age analysis

Definition	Age	Frequency	Percentage (%)	Accumulative perception (%)
18-25years old (n=53)	20	2	3.77	3.77
	21	4	7.55	11.32
	22	6	11.32	22.64
	23	6	11.32	33.96
	24	28	52.83	86.79
	25	7	13.21	100
26-45years old (n=13)	26	3	23.08	23.08
	27	2	15.38	38.46
	28	2	15.38	53.85
	29	1	7.69	61.54
	30	1	7.69	69.23
	31	1	7.69	76.92
	33	2	15.38	92.31
	35	1	7.69	100
46-60years old (n=0)	0	0	0	0
Total		66	100	100

In terms of age, without respondents under 18,53 respondents aged 18-25, accounting for 80.3%, 13 respondents aged 26-45,19.7%; 0 respondents aged 46-60. This shows that most of the respondents who participated in the physical fitness evaluation indicators test of Chinese female dragon boat athletes are concentrated in

middle and young people. They have a high interest in dragon boat sports and are willing to adhere to long-term training and strive to achieve better results in the competition.

Table 25 Occupation

Occupation	Frequency	Percentage (%)	Accumulative perception (%)
Staff members of public institutions	4	6.06%	6.06%
Civil servant	4	6.06%	12.12%
Student	58	87.88%	100.00%
Total	66	100.00%	

Table 26 Education

Total	Frequency	Percentage (%)	Accumulative perception (%)
Undergraduate	58	87.88%	87.88%
Master	8	12.12%	100.00%
Total	66	100.00%	

From the perspective of occupation, the proportion of students is the largest, with 58 students, accounting for 87.88%, followed by public institution staff and civil servants, 4 students and 4 students each, accounting for 6.06% and 6.06%; From the perspective of education level, it is mainly concentrated in the undergraduate level. The number of undergraduates is 58 students, accounting for 87.88%, followed by Master, and 8 people, accounting for 12.12%, indicating that the education level of female dragon boat athletes belongs to the high education level.

Table 27 Training years

Years	Frequency	Percentage (%)	Accumulative perception (%)
3	12	18.18%	18.18%
4	24	36.36%	54.55%
5	17	25.76%	80.30%
6	7	10.61%	90.91%
7	4	6.06%	96.97%
8	2	3.03%	100.00%
Total	66	100.00%	

As can be seen from Table 29, the training years of female dragon boat athletes are more than 3 years, and the longest time is more than 8 years. These athletes have a bachelor's degree or above, and some are still students. They have participated in national competitions for many times and achieved excellent results, which can represent the physical level of female dragon boat athletes in China.

Analysis of test results of female dragon boat athletes

The feasibility of this study on the basis of the predicted data reliability, Using the unified test rules (See Annex T), 66 female dragon boat athletes were formally tested to obtain the relevant data on the physical fitness indicators of Chinese female dragon boat athletes, Reliability was tested using internal consistency, the α values of Cronbach were analyzed using SPSS and the reliability of the survey tool Cronbachα is often used to reflect the consistency and stability of measurement tools (Field, 2005).The acceptable lower limit of Cronbachα is usually 0.7. In some exploratory analyses, it may be reduced to 0.6, but a reliability factor considered good should be above 0.8 (J. Air, Black, Babin, Anderson, &Tatham, 2006).The quality and reliability of the tool are analyzed by calculating Kronbach's α-Kronbach coefficient. The results are shown in Table 30 below:

Table 28 Form Cronbach reliability analysis

Third level indicators	Correction for Item Total correlations (CITC)	Item deleted α coefficient	Cronbach α coefficient
C1 Upper extremity length (cm)	0.501	0.847	
C2 Calf length (cm)	0.569	0.848	
C3 Arm span (cm)	0.647	0.842	
C4 Lower limb length (cm)	0.907	0.841	
C5 Shoulder width (cm)	0.839	0.848	
C6 Hip width (cm)	0.705	0.844	
C7 Upper arm tension (cm)	0.939	0.847	
C8 Calf circumference (cm)	0.937	0.849	
C9 Waist circumference (cm)	0.948	0.839	
C10 Thigh circumference (cm)	0.929	0.845	
C11 Chest circumference (cm)	0.509	0.848	
C12 Height (cm)	0.761	0.844	
C13 Body fat percentage (%)	0.791	0.845	
C14 The Ketole indicators (kg\cm)	0.716	0.832	
C15 Quiet heart rate (min\time)	0.861	0.844	0.85
C16 Heart Function indicators (L\min\m^2)	0.908	0.849	
C17 Maximal oxygen uptake (ml\cm\kg)	0.89	0.846	
C18 Maximum anaerobic power (W)	0.766	0.939	
C19 Vertical jump touch height (cm)	0.866	0.846	
C20 Core ventral bridge level 8 (level)	0.717	0.849	
C21 1RM pull-out (kg)	0.868	0.838	
C22 Back muscle endurance (S)	0.878	0.828	
C23 1RM bench press (kg)	0.874	0.83	
C24 Standing long jump (cm)	0.873	0.837	
C25 1RM Squat (kg)	0.883	0.841	
C26 1min pull-ups (time)	0.487	0.848	
C27 3000m run (min)	0.947	0.849	

Table 28 (Continued)

Third level indicators	Correction for Item Total correlations (CITC)	Item deleted α coefficient	Cronbach α coefficient
C28 800m run (min)	0.93	0.85	
C29 Seated forward bend (cm)	0.929	0.846	
C30 Cross fork (cm)	0.501	0.849	
C31 Shoulder rotation (cm)	0.52	0.849	
C32 400m run (s)	0.522	0.85	
C33 30 m Sprint (s)	0.534	0.85	
C34 1min jump rope (time)	0.51	0.845	
C35 Cross-shaped change direction run (s)	0.499	0.85	
C36 30s burpees(time)	0.517	0.847	

The reliability coefficient of the study data is 0.85, which is greater than 0.8, indicating that the study data is of high quality, For the 'CITC' value, All indicators CIC values were greater than 0.4,Indicating the high correlation between the indicators, It also shows that the test method used is feasible and the measured data can be used for further analysis.

1) Development physical fitness evaluation criterion

The evaluation criterion is the specific requirement that the evaluation target actually reaches the indicators degree. criterions have two meanings: one is the scale of measurement, namely the criterion, such as the ruler used to measure the length; the other refers to the critical point of the matter. The so-called evaluation criterion is the specific requirements of the properties or aspects to be evaluated. Evaluation criterion is the logical premise of evaluation activities, that is to say, the evaluation criterion cannot be carried out. If the evaluation criterion is not clear, the evaluation activity will become vague; the evaluation criterion is improper, and the evaluation result is difficult to correct. The evaluation criterion is also a part of the evaluation system, and the indicators system without the evaluation criterion is incomplete. In order to objectively reveal the differences in the physical fitness level

of Chinese female dragon boat athletes, we need to formulate unified evaluation criteria that can be compared, so as to make the differences more intuitive and quantitative reflection. In this study, the percentile method is used to establish a monomial indicators score table, which is used as the evaluation criterion of each three indicators, and according to this, the physical fitness level of Chinese female dragon boat athletes is comprehensively evaluated.

2) Development monomial individual evaluation criteria

After passing the test, the relevant data of the physical fitness evaluation indicators of Chinese female dragon boat athletes will be obtained to formulate the scoring table of each individual item. standard deviation, maximum and minimum values of the measured data were calculated by SPSS21.0 software (Wang Panbo, 2019), as shown in Table 31.

Table 29 Physical evaluation indicators scale of Chinese female dragon boat athletes

First Level indicators	Second Level indicators	N	minimum value	maximal value	mean value	standard deviation
A1 Body Shape	C1Upper extremity length (cm)	66	71.9	87	79.0576	2.8037
	C2Calf length (cm)	66	30.8	35.6	32.9212	1.3301
	C3Arm span (cm)	66	156	172	162.7121	4.9854
	C4 Lower limb length (cm)	66	95.18	115.7	107.3953	3.8243
	C5Shoulder width (cm)	66	35.8	39.6	37.9045	1.1032
	C6Hip width (cm)	66	71.7	86.8	78.0076	3.0331
	C7Upper arm tension (cm)	66	26.8	33.3	29.3939	1.1554
	C8 Calf circumference (cm)	66	29.8	33.4	31.503	0.6645
	C9 Waist circumference (cm)	66	65	80	71.5455	4.3999
	C10 Thigh circumference (cm)	66	48.4	57.4	53.5955	2.1117
	C11 Chest circumference(cm)	66	83	90	86.8636	1.8388
	C12 Height (cm)	66	165	175	169.7121	3.0421
	C13 Body fat percentage (%)	66	18.2	28	22.8788	2.508
	C14 The Ketole indicators (kg\cm)	66	336	383	359.3333	13.5128

Table 29 (Continued)

First Level indicators	Second Level indicators	N	minimum value	maximal value	mean value	standard deviation
A2 Physical Function	C15 Quiet heart rate(min\time)	66	56	65	60.7727	2.7724
	C16 Heart Function indicators (L\min\m^2)	66	9.31	12.5	10.5821	0.6628
	C17 Maximal oxygen uptake (ml\cm\kg)	66	46.8	53.6	50.0773	1.5511
	C18 Maximum anaerobic power (W)	66	392.7	609.6	477.5636	42.996
A3 Sport Quality	C19 Vertical jump touch height (cm)	66	246	265	255.4091	5.7646
	C20 Core ventral bridge level 8 (level)	66	6	8	6.9697	0.7839
	C21 1RM pull-out (kg)	66	71	95	83.7273	5.0078
	C22 Back muscle endurance (S)	66	152	185	167.9242	10.2677
	C23 1RM bench press (kg)	66	47	80	61.9545	9.2992
	C24 Standing long jump (cm)	66	246	265	255.3333	5.4782
	C25 1RM Squat (kg)	66	71	90	81.697	3.6647
	C26 1min pull-ups (time)	66	17	23	19.9242	1.9947
	C27 3000m run (min)	66	9.38	11	10.1606	0.4628
	C28 800m run (min)	66	2.12	2.25	2.1873	0.0364
	C29Seated forward bend (cm)	66	25.5	30.8	27.9848	1.5652
	C30 Cross fork (cm)	66	11.2	15.3	13.5985	0.9489
	C31 Shoulder mobility (cm)	66	1.25	4	2.5414	0.6627
	C32 400m run (s)	66	57.1	60	58.3318	0.5837
	C33 30m Sprint (s)	66	4.31	4.7	4.4806	0.0791
	C34 1min jump rope (time)	66	170	185	176.9545	4.2803
	C35 Cross-shaped change direction run (s)	66	13	13.9	13.4955	0.2628
	C36 30s burpees (time)	66	14	21	17.5606	2.1918

Normal distribution is a continuous probability distribution. Its probability density function is a bell-shaped, that is, the middle is high, the two sides are low, and the left and right symmetry. The expectation of normal distribution is the center of the

distribution, reflecting the evaluation level of the distribution. In measurement, a normal distribution is often used to describe the distribution of measurement data, and the error of measurement usually complies with the normal distribution (Zhang Jie, 2011). Normality test studies whether the quantitative data analysis has normal distribution trait, including S-W test for small samples (less than 50), and K-S test for large samples (more than 50). If the p-value is less than 0.05 or 0.01, it indicates that the item has normal distribution trait (Wang Hongliang, 2019; Liu Wei, 2005). The sample size of this study was 66, so K-S was used to test the significance level, and SPSS21.0 software was used for data analysis. The test results were: P <0.05 (see Table 32), Therefore, the measured data is considered to follow the normal distribution and can be used to establish the evaluation criteria (Peng Xiangyang, 2013).

Table 30 Test of normal distribution of Chinese female dragon boat athletes

Third level indicators	**Sample size**	**Standard deviation**	**Kolmogorov-Smirnov examine**	
			Statistics D values	***p***
C1 Upper extremity length (cm)	66	2.804	0.076	0.461
C2 Calf length (cm)	66	1.33	0.082	0.336
C3 Arm span (cm)	66	4.985	0.104	0.073
C4 Lower limb length (cm)	66	3.824	0.104	0.071
C5 Shoulder width (cm)	66	1.103	0.095	0.143
C6 Hip width (cm)	66	3.033	0.099	0.113
C7 Upper arm tension (cm)	66	1.155	0.074	0.502
C8 Calf circumference (cm)	66	0.664	0.109	0.051
C9 Waist circumference (cm)	66	4.4	0.107	0.059
C10 Thigh circumference (cm)	66	2.112	0.096	0.142
C11 Chest circumference (cm)	66	1.839	0.107	0.059
C12 Height (cm)	66	3.042	0.102	0.088
C13 Body fat percentage (%)	66	2.508	0.099	0.111
C14 The Ketole indicators (kg\cm)	66	13.513	0.087	0.251

Table 30 (Continued)

Third level indicators	Sample size	Standard deviation	Kolmogorov-Smirnov examine	
			Statistics D values	*p*
C15 Quiet heart rate (min\time)	66	2.772	0.108	0.052
C16 Heart Function indicators (L\min\m^2)	66	0.663	0.08	0.377
C17 Maximal oxygen uptake (ml\cm\kg)	66	1.551	0.073	0.510
C18 Maximum anaerobic power (W)	66	42.996	0.082	0.338
C19 Vertical jump touch height (cm)	66	1.915	0.107	0.059
C20 Core ventral bridge level 8 (level)	66	0.784	0.21	0.082
C21 1RM pull-out (kg)	66	5.008	0.079	0.396
C22 Back muscle endurance (S)	66	10.268	0.1	0.108
C23 1RM bench press (kg)	66	9.299	0.09	0.208
C24 Standing long jump (cm)	66	5.478	0.081	0.355
C25 1RM Squat (kg)	66	3.665	0.071	0.570
C26 1min pull-ups (time)	66	1.995	0.109	0.052
C27 3000m run (min)	66	0.463	0.089	0.217
C28 800m run (min)	66	0.036	0.107	0.059
C29 Seated forward bend (cm)	66	1.565	0.102	0.086
C30 Cross fork (cm)	66	0.949	0.08	0.365
C31 Shoulder rotation (cm)	66	0.663	0.051	0.937
C32 400m run (s)	66	0.584	0.077	0.423
C33 30 m Sprint (s)	66	0.079	0.077	0.440
C34 1min jump rope (time)	66	4.28	0.089	0.224
C35 Cross-shaped change direction run (s)	66	0.263	0.105	0.069
C36 30s burpees (time)	66	2.192	0.102	0.083

According to the measurement evaluation theory, a unified standard and a 20-point scoring method was adopted for each selected indicators, and each monomial scoring scale was summarized into a monomial scoring scale for the selected indicators (Liu Wei, 2005). The concrete steps are as follows: First, find out the maximum and minimum values of indicators; Secondly, the indicators values of the 5th and 10th · 95th percentiles were calculated respectively. Finally, the minimum value is set as 0 points, the indicators of the 5th to 95th percentile is set as 1 to 19 points, and the maximum is set as 20 points, which will become the score value of this score when included in the table (Xing Wenhua, 1985).According to this monomial evaluation table, the position and level of the athletes can be evaluated (Cao Jingwei, 1999; Wang Hongliang, 2019; Sun Zheng, Hao Wenting, Hongfeng, 2010).Because the larger the value of some indicators, the worse the physical fitness of the athletes, so it should be treated differently. For example, at 800 meters, the greater the 30 meters running time, the worse the performance and the lower the score. By the value of the athletes and the score one by one, the physical indicators of Chinese female dragon boat athletes can be obtained. The following (Table 33) are the scoring criteria for body morphology, physical function and physical quality (Appendix P)

Table 31 Chinese female dragon boat athletes body shape evaluation criterion table

Score	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
0	71.9	30.8	156	95.18	35.8	71.7	26.8	29.8	65	48.4	83	165	28	336
1	72.655	31.04	156.8	96.206	35.99	72.455	27.125	29.98	65.75	48.85	83.35	165.5	27.51	338.35
2	73.41	31.28	157.6	97.232	36.18	73.21	27.45	30.16	66.5	49.3	83.7	166	27.02	340.7
3	74.165	31.52	158.4	98.258	36.37	73.965	27.775	30.34	67.25	49.75	84.05	166.5	26.53	343.05
4	74.92	31.76	159.2	99.284	36.56	74.72	28.1	30.52	68	50.2	84.4	167	26.04	345.4
5	75.675	32	160	100.31	36.75	75.475	28.425	30.7	68.75	50.65	84.75	167.5	25.55	347.75
6	76.43	32.24	160.8	101.336	36.94	76.23	28.75	30.88	69.5	51.1	85.1	168	25.06	350.1
7	77.185	32.48	161.6	102.362	37.13	76.985	29.075	31.06	70.25	51.55	85.45	168.5	24.57	352.45
8	77.94	32.72	162.4	103.388	37.32	77.74	29.4	31.24	71	52	85.8	169	24.08	354.8
9	78.695	32.96	163.2	104.414	37.51	78.495	29.725	31.42	71.75	52.45	86.15	169.5	23.59	357.15
10	79.45	33.2	164	105.44	37.7	79.25	30.05	31.6	72.5	52.9	86.5	170	23.1	359.5
11	80.205	33.44	164.8	106.466	37.89	80.005	30.375	31.78	73.25	53.35	86.85	170.5	22.61	361.85
12	80.96	33.68	165.6	107.492	38.08	80.76	30.7	31.96	74	53.8	87.2	171	22.12	364.2
13	81.715	33.92	166.4	108.518	38.27	81.515	31.025	32.14	74.75	54.25	87.55	171.5	21.63	366.55
14	82.47	34.16	167.2	109.544	38.46	82.27	31.35	32.32	75.5	54.7	87.9	172	21.14	368.9

Table 31 (Continued)

Score	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
15	83.225	34.4	168	110.57	38.65	83.025	31.675	32.5	76.25	55.15	88.25	172.5	20.65	371.25
16	83.98	34.64	168.8	111.596	38.84	83.78	32	32.68	77	55.6	88.6	173	20.16	373.6
17	84.735	34.88	169.6	112.622	39.03	84.535	32.325	32.86	77.75	56.05	88.95	173.5	19.67	375.95
18	85.49	35.12	170.4	113.648	39.22	85.29	32.65	33.04	78.5	56.5	89.3	174	19.18	378.3
19	86.245	35.36	171.2	114.674	39.41	86.045	32.975	33.22	79.25	56.95	89.65	174.5	18.69	380.65
20	87	35.6	172	115.7	39.6	86.8	33.3	33.4	80	57.4	90	175	18.2	383

Note: C1-C14 respectively represent respectively:C1Height (cm), C2 Calf length (cm), C3 Arm span(cm), C4 Lower limb length (cm), C5 Shoulder width (cm), C6 Hip width (cm), C7 Upper arm tension (cm), C8 Calf circumference (cm), C9 Waist circumference (cm)、C10 Thigh circumference (cm), C11 Chest circumference(cm), C12Height (cm), C13 Body fat percentage (%), C14 The Ketole indicators.

Each physical fitness test data has a corresponding score value in the corresponding numerical interval, By substituting the test data of 66 female dragon boat athletes to get the score of individual corresponding indicators, Organize it into a table to get the evaluation results of each monoidal indicator of Chinese female dragon boat athletes. The following (Appendix Z) are the results of body shape indicators, Results of evaluation scores of physical function and sport quality indicators (Appendix G).

Physical fitness comprehensive score results

The unweighted score result of a single indicators is only a reflection of the score of a single indicators, which cannot effectively reflect the complex performance of athletes. Weight is a reflection of the importance of the indicators in the evaluation system. Only when the score of each indicators is weighted, the weighted score of each indicators is obtained, and the weighted score of the same level is summed, can the comprehensive score reflecting the complex energy level of the athletes be obtained (Wang Hongliang, 2019).

Weighted calculation formula: C1=10× weight value (0.04331) =0.4331, and so on. The following (Appendix AB) are the weighted scoring results of each body shape indicators, and the weighted scoring results of each physical function and sport quality indicators (Appendix R).

After the single scoring of each evaluation indicators of Chinese female dragon boat athletes, the three level indicators score under the first level indicators is summed to get the score of the first level indicators. Then the score of the first-level indicators is weighted to get the weighted first-level indicators score, and the weighted first-level indicators score is added up to obtain the comprehensive score (Wang Panbo, 2019; Zhang Jie 2011). Calculation formula of the first-level indicators: A1 (body shape) =C1 (weight value)+ C2 (weight value) + C3.....C14, and so on; Calculation formula of athletes' comprehensive physical fitness score: physical fitness comprehensive score =A1 + A2 + A3, the specific data are shown below in (Appendix AC).

5） Development and results of physical fitness evaluation grade standards

Pass the score value of the indicators scoring standards represents the overall size of the athlete, However, it is impossible to classify the movement level more intuitively, Based on the data of Chinese female dragon boat athletes' physical fitness rating table, The percentile method commonly used in statistics was used to obtain the score values corresponding to the 20th, 40th, 60th and 80th percentiles (Qi Guoying, 2005), and different score ranges were divided into different grades, and different grades corresponded to different standards. Using the fifth-grade evaluation method for grade classification, They are set as excellent, good, middle and Lower, weak, five grades (Wang Hongliang, 2019),The physical fitness grade evaluation standard of Chinese female dragon boat athletes is determined through the division of grades.

The fifth grade evaluation can use either the separation method or the percentile method, However, because the separation method takes the mean as the reference value and the standard deviation as the discrepancy distance, it is generally only applicable to normally distributed data. The percentile method is based on the median as the base value and the other percentile as the discretization to divide the evaluation grade, which is applicable to normal distribution, similar to normal distribution or non-normal distribution (Xing Wenhua, 1985). Therefore, this study used the percentile method to establish the physical fitness rating evaluation standard of Chinese female dragon boat athletes (Han Wei, 2011; Liu Wei, 2005), and the results are shown in (Appendix X).

The test results of 66 female dragon boat athletes were divided into five grades: excellent, good, middle, Lower and poor, Result display: Comprehensive score≧11.7033 was excellent,10.9560-11.7033 was good,10.2585-10.9560 was Middle, 9.4612-10.2085 was Lower, ≦9.4612was poor.

The body shape, physical function, sports quality and comprehensive score of Chinese female dragon boat athletes were compared with the comprehensive rating standard table, Get the physical fitness evaluation results table of Chinese

female dragon boat athletes, From (Appendix Y), the level of different indicators and the comprehensive score level of each athlete are clearly known.

The scores of the body shape, physical function, sports quality and comprehensive score of the 66 Chinese female dragon boat athletes were compared with the comprehensive grade scoring standard table, The results show that there are 13 in excellent, 15 in Good, 12 in Middle, 15 in Lower and 11 in Poor. Different athletes have different performance in different indicators program tests, and some athletes have an advantage in body morphology, However, the sport quality is general, and the athletes whose body shape is not an absolute advantage may also have Good sport quality, which fully reflects the relativity of individual Poor sex and athletic ability of the athletes. This requires in the future training and competition process, for the individual physical advantage focus on the development, improve the competitive ability. At the same time for the weak physical indicators to make up lessons, to prevent the emergence of "bucket effect".

Analysis reasons:(1) According to the characteristics of dragon boat events, there are 22 and 12 dragon boat events. The location of the dragon boat is determined according to the individual characteristics, strength and experience of the team members, such as: The team members with strong body, good physical function and good sport quality serve as rowers, while the team members with light body, good flexibility and good agility and coordination are more suitable for serving as drummers. The requirements for athletic quality of these team members are not so high, and the helmsman needs to have strong command ability and dragon boat driving experience. In addition, the coordination and cooperation of the athletes need to be considered. (2) According to the physical characteristics of female dragon boat athletes: each dragon boat athlete has its own physical characteristics, that is, some indicators in physical fitness are their own advantages, but also have shortcomings, can not achieve the comprehensive excellent physical indicators, even the world's best dragon boat athletes can not take into account all physical indicators are excellent. Excellent dragon boat athletes have some outstanding physical abilities, such as strength, explosive power, flexibility, etc., which can be better displayed in the competition to create their own advantages. Usually, having one or several excellent physical abilities and being able to play them can support dragon boat athletes to

participate in high-level competitive competitions. (3) Training and tactical arrangement of the coaches: The coaches can evaluate the dragon boat athletes as the above analysis. They believe that scientific discovery of the physical characteristics of dragon boat athletes and purposeful development and training can achieve the purpose of improving their competitive ability. For dragon boat athletes in different positions, they will focus on designing physical training, focusing on strengthening the training of superior physical indicators needed in the competition. At the same time, according to the personal characteristics of the team members, in order to better support the technical implementation of the team. (4) Relativity of the evaluation results: Because this study was tested and evaluated on Chinese female dragon-boat athletes, The tested athletes are the top three players in the final of the China Dragon Boat Open, The comprehensive score and grade level are relative. The athletes with high scores are only relatively excellent, and the athletes with low scores are not absolute Poor, but relatively Poor in this g

CHAPTER V

CONCLUSION, DISCUSSION, AND SUGGESTIONS

The aim of this study was to analyze the process of constructing the evaluation indicators for Chinese female dragon boat athletes and validate the physical fitness . This is also a contribution to the study of the physical fitness evaluation indicators of Chinese female dragon boat athletes. In this chapter, the study is summarized and the investigators' discussions and suggestions are presented. Specifically, Section 1 provides conclusions, Section 2 provides discussion, and Section 3 summarizes the applications and limitations of this study, and provides implications and suggestions for further research.

Conclusion

The results analyze the development process of the physical fitness evaluation indicators of Chinese female dragon boat athletes, Test the physical fitness.

Influencing factors of physical evaluation indicators of Chinese female dragon boat athletes

This study was conducted on three female dragon boat team coaches. Two dragon boat leaders And 5 managers of the China Dragon Boat Association Semi-structured interviews were conducted. Through interviews with 10 respondents, Concluded that： Influencing factors of physical evaluation indicators of Chinese female dragon boat athletes， It mainly involves 3 dimensions, 12 factors and 95 sub-factors. According to the interview, physical fitness includes three dimensions: body shape, physical function and sports quality. On the evaluation indicators of body shape, Should be considered in length, width, circumference, height, body composition, Mainly include arm length, upper limb length, hand length, Achilles tendon length, foot length, forearm length, arm length, leg length, calf, distance indicators, lower limb length, kneeling arm length, shoulder length, width, hip width, elbow width, ankle width, foot width, foot width, pelvis width, hand width, upper arm circumference, calf circumference, breathing difference, waist circumference, upper arm circumference, thigh circumference, hip circumference, forearm circumference,

chest circumference, chest circumference, knee height, height, sitting height, body fat rate, stock indicators, vilvik indicators, etc.; In the evaluation indicators of physical function, Should consider the cardiopulmonary function, the energy supply system ,It mainly includes quiet heart rate, heart function indicators, blood pressure, lung capacity, step indicators, oxygen-free valve, maximum oxygen uptake, maximum aerobic speed, five pulp average power of dynamometer, fatigue indicators, maximum anaerobic power, 20s full pull distance; In the evaluation indicators of sports quality, Should be considered for strength, endurance, speed, flexibility, sensitivity, Mainly includes the vertical jump to touch the high, Core ventrbridge level 8, 1 RM recumbent, Before throwing the solid ball, Dorsal muscle endurance, 1 RM bench press, hop skip and jump, Vertical jump, standing long jump, Plate support, 1 RM squat, 1min pull-up, The 3,000 m run, dynamometer 1000 meters, 1min sit-ups, The 800-m run, YOYO test, push-up, The 1,000-m run, The ergometer is a 2000 m run, Lying down, Sitting body forward flexion, Squch arm distance, Leg lift in the supine position, The prone back body, parallel split, Shoulder rotation, dynamometer 500 meters, The 400-m run, dynamometer 250 meters, The 30 m sprint, The 100-m run, 1min rope skipping, The word of the run, 66 The return run, Hexagon test, Cross change to run, Curve-running test, Repeated across the line, 30s vertical sleeper, etc.

Development of the physical fitness evaluation indicators of Chinese female dragon boat athletes

This study illustrates the whole process of development the physical fitness evaluation indicators for Chinese female dragon boat athletes, Using the Delphi method, inviting 13 experts, Conducted three rounds of screening of the first level, second level and third level indicators using the Likert five-point scale, From the initial 3 first-level indicators, 12 second-level indicators, 95 third-level indicators, The final screening was 3 first-level indicators (body shape, physical function, sports quality);11 second-level indicators (length, width, girth, body principal component, cardiopulmonary function, energy supply system, strength, endurance, speed, flexibility, sensitivity); 36 third-level indicators (Upper extremity length (cm), Calf length (cm), Arm span (cm), Lower limb length (cm), Shoulder width (cm), Hip width (cm), Upper arm tension (cm), Calf circumference (cm), Waist

circumference (cm), Thigh circumference (cm, Chest circumference (cm), Body fat percentage (%), The Ketole indicators (kg\cm), Height (cm), Quiet heart rate(min\time), Heart Function indicators (L\min/m^2), Maximal oxygen uptake (ml\cm\kg), Maximum anaerobic power (W), Vertical jump touch height (cm), Core ventral bridge level 8 (level) 1RM pull-out (kg), Back muscle endurance (S), 1RM bench press (kg), Standing long jump (cm), 1RM Squat (kg), 1min pull-ups (time), 3000m run (min), 800m run (min), Seated forward bend (cm), Cross fork (cm), Shoulder rotation (cm), 400m run (s), 30 m Sprint (s), 1min jump rope (time), Cross-shaped change direction run (s), 30s burpees (time), The mean of the 36 three-level indicators is above 4, between 4.23 and 4.92; the coefficient of variation is below 0.25, between 0.06 and 0.17.From the numerical point of view, the experts on the third round of the third level of indicators are very recognized, to determine the final indicators.

The hierarchical analysis method (AHP) is used to calculate the weight value of each indicators. first level indicators (Body shape 0.1179, physical function 0.2014, sport quality 0.6806), Second level indicators (length, 0.0803, width 0.0059, girth 0.0124, body principal component 0.0194, cardiopulmonary function 0.0671, energy supply system 0.1343, strength 0.2895, endurance 0.1782, flexibility 0.0317, speed 0.1110, sensitivity 0.07020), Weight values of the 36 third-level indicators.

Results of the physical fitness scoring standards and grade standards for Chinese female dragon boat athletes

Each indicators is scored by standard percentage method, and the scoring standard of each individual indicators is formulated. The five-level evaluation method is adopted to classify the grades and establish the evaluation standards for the physical fitness of Chinese female dragon boat athletes. The grading range was determined to be excellent, good, medium, lower, poor 5 grades, combined with the weight, to establish the comprehensive evaluation of physical fitness grade standards. Combined score, classified≥11.7033 was excellent, 10.9560-11.7033 was good, 10.2585-10.9560 was Middle, 9.4612-10.2085 was lower, and 9.4612 was poor. The

scores of the body shape, physical function, sports quality and comprehensive score of the 66 Chinese female dragon boat athletes were compared with the comprehensive grade scoring standard table, The results show that there are 13 people in the excellent grade, 15 in the good grade, 12 in the middle grade, 15 in the lower grade, and 11 in the poor grade.

Discussion

1. The purpose of this study is to explore the current physical fitness status of Chinese female dragon boat athletes and analyze the factors influencing the construction of physical fitness evaluation indicators for Chinese female dragon boat athletes. This study is based on literature and theory, as well as interviews.

The research results: in terms of the components of physical fitness, can be seen that they are composed of three dimensions: body shape, physical functions and sport quality, which is consistent with Matveyev's view on the physical characteristics of athletes in the 《Theory of Competitive Sports》, The theory proposes that sport quality is divided into strength, endurance, speed, flexibility and Sensitive. Physical functions are divided into nervous system functions, muscle system functions and energy metabolism systems (Matveyev, 1997); At the same time, it is consistent with the《Concept in Sports Training Theory》, a correspondence textbook for sports colleges and universities, which mentions that the physical fitness of athletes includes body shape, physical function, body health and sports quality, among which sports quality is the most important physical exercise ability, and body shape, physical function and body health are the basic ability to form good sports quality (Tian Maijiu, 2000). This is consistent with the views of most researchers (Peng Xiao, 2022; Ren Yang, 2022; Wang Panbo, 2022; Chen Yahao, 2022; Zhao Yi, 2021; Wang Zihao, 2021),In the interview, interview experts Coach Wu and Coach Yu also put forward the same point of view, that the characteristics of physical fitness are composed of body shape, physical function and sports quality; However, interview expert Feng coach believes that physical fitness also includes health level; Interview expert Lu coach believes that physical fitness also includes health level and psychological elements; According to the《Theory of Human Morphology》(Wu

Yuming, You Yanwen, 2021); 《Theory of Sports Measurement and Evaluation 》(Sun Celebration, 2006; Yuan Zizhou & Huang Hai, 2011);The body shape of athletes generally includes length, width, Girth, height, body composition and other factors, which are divided into upper limb length, lower limb length, arm length, sitting arm length, calf length, hip width, shoulder width, pelvic width, waist circumference, chest circumference, calf circumference, thigh circumference, height, weight, fat percentage and other indicators (Feng Xiaoyu, 2021; Wang Ze qun,2021; Liu Xiao, 2020),Interview scholar coach Feng also put forward the same point of view in his answer, saying: Body shape reflects the external morphological characteristics such as height, Girth, length and width of each link of human growth and development, as well as the internal morphological characteristics such as the vertical and horizontal diameter of the heart and the cross section of the muscle; Physical function involves cardiopulmonary function, energy metabolism, energy supply system and other factors, including vital capacity, cardiac function index, aerobic metabolic capacity and anaerobic metabolic capacity, maximal oxygen uptake and other indicators (Yaoyao Zhang, 2012; Xiao Qin&Liu Meng, 2010),Interview scholar Coach Wu also put forward the same point of view in the answer, said: the physical function is divided into nervous system function, muscle system function and energy metabolism system function; Sport quality includes strength, endurance, speed, flexibility, sensitive and other factors, which are divided into longitudinal jump height, core abdominal bridge 8 level, 1RM lie down, back muscle endurance, 1RM bench press, standing jump, 1RM squat, 1min pull-up, 3000m run, 800m run, YOYO test, sit forward bend, cross fork, shoulder joint flexibility, 400m run, 30 meters sprint, 1min jump rope, cross change direction running, 30s burpees and other indicators; This is consistent with the views of most researchers (Jian Sun& Yu lu, 2020; Yu Cheng Cheng& Xie zhi 2019; Tian Zhen hua, 2008),Interview scholar Coach Lu also put forward the same point of view in the answer, said: sports quality through muscle activities to show a variety of basic motor abilities, in the exercise performance of strength, speed, endurance, flexibility and sensitive coordination; By interviewing experts, this paper discusses the influencing factors of development physical evaluation indicators for Chinese female dragon boat athletes. Expert Coach Wu said: as a length indicator factor, the obvious indicators are upper limb length, arm length,

lower limb length and calf length; The width factors reflect hip width, shoulder width and girth reflect upper arm tension circumference, thigh circumference and waist circumference. Height reflects sitting height and knee height; The derived indexes reflect Welvik index and BMI;Expert Coach Feng said: In the evaluation of female dragon boat athletes' physical fitness indicators, heart rate, heart function index, blood pressure, vital capacity indicators and cardiopulmonary function are closely related; Anaerobic valve, relative maximum power index and anaerobic metabolic capacity are closely related; Maximal oxygen uptake can reflect aerobic metabolic capacity. Experts Zhu team leader and Lu coach, said: the strength factor is closely related to the standing long jump, bench press maximum weight, pull-up, lying down maximum strength indicators; Expert Yu team leader proposed, There is a relationship between the factors of sports quality and pull-up, bench press, horizontal pull, sitting forward flexion and 30s vertical sleeper indicators; The index factors of body shape were associated with the length of upper limbs, lower limbs, sitting arm length, pelvis width, hand width, upper arm tension circumference, thigh circumference, sitting height, and Laurel indicators; The correlation of physical function and heart rate, cardiac function index, vital capacity, and maximum oxygen uptake, These views are consistent with those of most researchers (Liu Xiang, 2022; Wang Zequn, 2021; Feng Xiaoyu, 2021; Jian Sun, 2020; Yu Cheng Cheng, 2019; Li Bing, 2013; Zhang Pu qiang, 2010; Liu de qiong, 2001; Tian Zhen hua, 2008; Feng Lian-Shi, 2003; Cao Yingying, 2022; Tan Yuqing, 2022; Wang Zequn, 2021; Xue Wang, 2020).

Through theory and previous studies, most scholars believe that physical fitness includes three elements: body shape, physical function and sports quality, and sports quality is the most important element. Some scholars believe that physical fitness should also include health level, skills and tactics, and psychological factors. According to morphological analysis, the body shape reflects the external morphological characteristics such as height, circumference, length and width of each link of human growth and development, as well as the internal morphological characteristics such as the vertical and horizontal diameter of the heart and the cross section of the muscle. Physical function involves cardiopulmonary function, energy metabolism, energy supply system and other factors, which can be divided into vital

capacity, cardiac function index, aerobic and anaerobic metabolic capacity, maximal oxygen uptake and other indicators; Sports quality is a variety of basic sports ability shown by muscle activities, which is manifested in strength, speed, endurance, flexibility and sensitive coordination ability during sports. Strength is the most important quality in athletes' physical fitness, and more exercises can be done to improve strength in the training of dragon boat athletes.

2. The purpose of this study is to elaborate the whole process of development physical evaluation indicators for Chinese female dragon boat athletes. Using the Delphi method, 13 experts were invited for three rounds of screening for the first, second and third-level indicators (Zhang Puqiang & Liu Hui 2012; Li Li 2016; Wang Kai, Lv Xiaowei & He Jiangchuan 2011),The results show that 3 first-level indicators, 11 second-level indicators and 36 third-level indicatorses were finally selected. At present, according to previous studies, many physical components are applied to various sports projects (Cao Yingying et al., 2022; Tan Yuqing, 2022; Campbell Madeleine L.H..2021; Bao Han, 2016; and Xiaoyu Feng, 2021; Ho Sarah R, Smith Richard M, Chapman Philip G & Funato Kazuo, 2013).The research on the physical fitness of the dragon boat project mainly focuses on the single latitude study of physical structure, From the perspective of physical fitness, the physical fitness evaluation indicators of female dragon boat athletes was rarely studied, and previous studies mainly focused on the development level of women's dragon boat competitions (Chen Chong, 2016, Li Chengliang & Ma Yi, 2006; Zhang Shujie, 2012; Peng Xiao, 2022; Zhao Yi, 2021; Wang Zihao, 2021,2,2022, Zhang Jie, 2011, Liu Wei, 2005),Most of the evaluation indicators lack pertinence, are relatively macro and involve a wide range of areas. There is no special evaluation for their physical ability, which is almost blank. Consistent with the prior studies, This study just fills the gap in this aspect, captures this innovation point, The development of physical fitness evaluation indicators of Chinese female dragon boat athletes from three dimensions of body shape, physical function and sports quality. The hierarchical analysis method is used to calculate the weight value of each indicators. result display: first-level indicators (body shape 0.1179, physical function 0.2014, sports quality 0.6806), The sport quality is the highest; second-level indicators (length 0.0803,0 width 0.0059, girth0.0.0124, body composition 0.0194, cardiopulmonary function 0.0671, energy

supply system 0.1343, strength 0.2895, endurance 0.1782, flexibility 0.0317,0.10 speed 0.1110, sensitivity 0.07020), and 36 third-level indicators.

Through Delphi method and three rounds of screening by experts, the physical fitness evaluation indicators of Chinese female dragon boat athletes are determined, and the weight value of each indicator is calculated by AHP analytic hierarchy process. Among the first-level indicators, the weight value of sports quality is the highest, indicating that sports quality index is the most important factor to improve the physical fitness level and sports level of female dragon boat athletes. The weight value of strength quality is the highest. Among the three indexes, the weight value of 3000m running is the highest. These variables belong to the dimension of sports quality, which is corresponding to the previous analysis, indicating that coaches should pay attention to strength training in the daily training of female dragon boat athletes.

3. The objective of this study is to test the of the evaluation indicators of Chinese female dragon boat athletes. Through the test, the relevant data on the physical fitness evaluation indicators of Chinese female dragon boat athletes will be obtained, According to the《Theory of Sports Measurement and Evaluation》 (Sun qing zhu, 2006; Yuan Zizhou & Huang Hai, 2011),By adopting a unified standard and adopting a 20-point scoring method for each selected indicators, the scoring table for each individual indicators can be formulated to evaluate the position and level of each indicators of athletes (Cao Jingwei, 1999; Wang Hongliang, 2019; Sun Celebration, Hao Wenting, Hong Feng, 2010).Combined with the weight value, establish the comprehensive scoring standard of physical fitness. The score value of the indicators scoring standard indicates the overall size of the athlete, but it cannot be more intuitive to grade and classify the sports level. Based on the data of Chinese female dragon boat athletes' physical fitness rating table, Score values corresponding to the 20th, 40th, 60th and 80th percentiles were obtained by using percentile method commonly used in statistics (Qi Guoying, 2005).The five-level evaluation method was adopted to classify the grades, which were respectively set as excellent, good, middle, lower, and poor by five grades (Wang Hongliang, 2019).result display: Comprehensive score≧11.7033 for the excellent, 10.9560-11.7033 for good,

10.2585-10.9560 for the middle，9.4612-10.2085 for lower，≦9.4612 for poor. The scores of body shape, physical function, sports quality and comprehensive scores of 66 Chinese female dragon boat athletes were compared with the comprehensive rating standard table. result display: There are 13 people in the excellent grade, 15 in the good grade, 12 in the middle grade, 15 in the lower grade and 11 in the poor grade.

It can be seen that different athletes have different performances in different index tests. Some athletes have advantages in body shape, but their athletic quality is not so good. Athletes who do not have absolute advantages in body shape may also have good athletic quality, which fully reflects the individual difference of athletes and the relativity of athletic ability. The grade of comprehensive physical fitness index of each athlete is not the same, each has its own advantage and disadvantage index, and no athlete has reached the perfect physical fitness level. It is necessary to focus on the development of individual physical advantages and improve competitive ability in the future training and competition process. At the same time, make up for the weak physical indicators to prevent the "bucket effect".

Summary

This study investigated the physical fitness status of Chinese female dragon boat athletes and explored the variables affecting the construction of physical fitness evaluation indicators of Chinese female dragon boat athletes. Based on previous human research and theory and the interviews, Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China，It elaborated the whole process of indicators construction, And the hierarchical analysis method is used to calculate the weight value of each indicators. Through the test, the relevant data of the physical evaluation indicators of Chinese female dragon boat athletes will be obtained, and the evaluation standards and grade standards can be formulated to evaluate the position and level of the athletes' indicators. The results show that the evaluation indicators can well reflect the physical fitness level of Chinese female dragon boat athletes, and the existing problems can be found according to the evaluation indicators, which can provide reference for the physical training of Chinese female dragon boat athletes.

Suggestions

1. With the continuous development of dragon boat sport, athletes' physical fitness level and competitive level are getting higher and higher. It is suggested to revise and improve the content and evaluation criteria of female dragon boat athletes' physical fitness evaluation indicators according to the development and change of dragon boat events and the improvement of athletes' physical development level in the future, so as to adapt to the development of dragon boat events.

2. There are some differences between individual athletes, so the physical fitness level of athletes will be uneven. It is suggested that coaches should take measures in future training. Different physical fitness indicators can reflect different athletic abilities, and the physical fitness evaluation system built by this research can be combined with the development of indicators with higher weight value. Mainly in order to promote the efficient female dragon boat athletes to improve the physical level.

Limitations of the study

In this study, through theory, literature and interview, the primary indicators was obtained, and the use Delphi method, 13 experts were selected, and finally established the physical fitness evaluation indicators, and used the hierarchical analysis method to calculate the weight value. The standard percentage method is used to assign scores to each indicators, Formulate the scoring criteria for each individual indicators, Using the fifth class evaluation method for classification, establish the comprehensive grade evaluation standard of Chinese female dragon boat athletes, However, there are still some limitations in this research, because in the process of writing the paper, it has not been applied to the dragon boat athletes, which becomes the limitation of this research.

Late-stage study

This study is based on the physical fitness evaluation indicators of Chinese female dragon boat athletes. Study and excavate the individual events of women's short straight race, In the next study, the research and mining can be conducted on the women's long straight race, which can strengthen the scientific and systematic

selection of indicators, Select indicators from a wider perspective, such as technology and tactics, psychology and so on to design more detailed physical fitness evaluation test indicators, Design a more systematic and scientific research process. Using the physical fitness evaluation indicators, the existing problems are found, and the comprehensive evaluation standard of physical fitness is formulated.

The evaluation criteria and grade criteria developed in this study are aimed at high-level female dragon boat athletes, Further research on the physical level of amateur female dragon boat athletes should develop different scoring criteria and grade standards.

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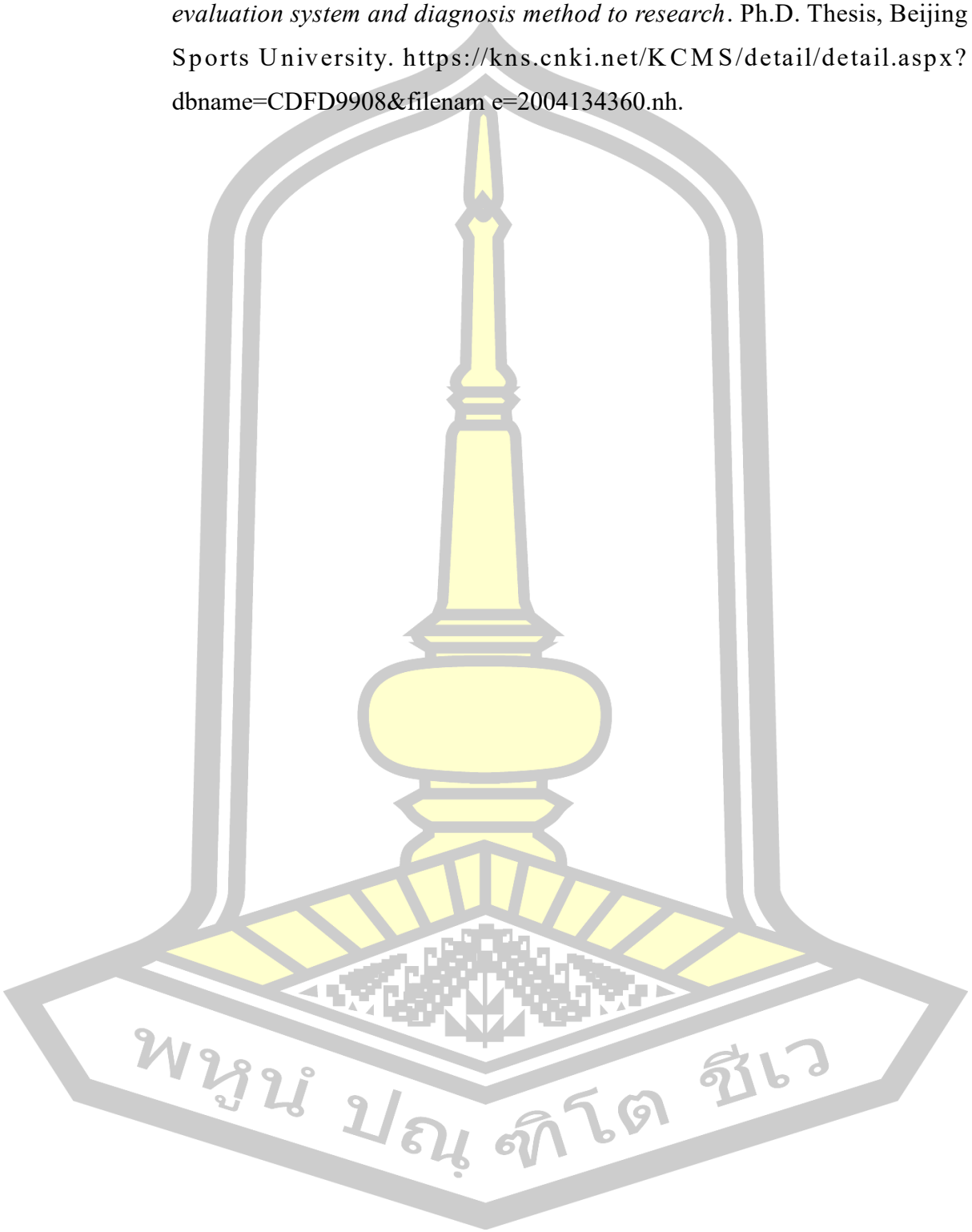


APPENDIX

APPENDIX A

Interviews

Summary of interviews with Dragon boat team coach and team leader

Q1: Introduce the number of athletes on your female dragon boat team?

Q2: What do you think are the current physical characteristics of female dragon boat athletes?

Q3: What do you think are the factors that affect the construction of the physical fitness evaluation index of female dragon boat athletes?

Q4: What do you think of the relationship between the factors influencing the physical fitness evaluation indicators of Chinese female dragon boat athletes?

Q5: What do you think are the most important factors affecting the physical fitness evaluation index of female dragon boat athletes?

Q6: What methods do you think are adopted for the selection of test indicators in this study?

Q7: In your opinion, how to select test subjects for this study and what is the appropriate sample size?

Q8: What problems do you think should be paid attention to in selecting test indicators in this study?

Q9: How do you think the weights of test indicators are determined in this study?

Q10: How do you think the evaluation criteria for this study are established?

Q11: What are your suggestions for this study?

Summary of interviews with Management staff of the Dragon Boat Association

Q12: Introduce the current development trend of women's dragon boat sports in China?

Q13: Talk about the current status of physical training of outstanding female dragon boat athletes in China?

Q14:A Brief discussion on the factors affecting the physical fitness level of China's outstanding female dragon boat athletes?

Q15: How do you think to improve the physical training level of China's elite female dragon boat athletes?

Q16: What aspects do you think should be used to evaluate the physical fitness of China's excellent female dragon boat athletes?

Q17: What are your suggestions for this study?

Dimensions	Sub-Factors	Quote
Body Shape	length ; width ; Girth; height ; Body principal component ;	Feng Xiaoyu, 2021; Wang Zequn, 2021; Liu Xiao, 2020; Jian Sun, et al., 2020; Yu Cheng Cheng et al., 2019; Tian Zhenhua, et al., 2008; Li Bing,2013; Yaoyao Zhang, 2012; Xiao Qin, Liu Meng, 2010; Pu Junzong, 1989
Physical Function	cardio-pulmonary function; Aerobic capacity; Anaerobic capacity; biochemical criterion;	Liu Xiang, 2022; Wang Zequn, 2021; Feng Xiaoyu, 2021; Jian Sun, et al., 2020; Yu Cheng Cheng et al., 2019; Li Bing, 2013; Zhang Pu qiang, et al., 2010; Liu de qiong,2001; Tian Zhen hua et al., 2008; Feng Lian-Shi,et al., 2003
Sport Quality	Strength ; endurance ; speed ; Flexibility ; Delicacy;	Cao Yingying et al, 2022; Tan Yuqing, 2022; Feng Xiaoyu, 2021; Wang Zequn, 2021; Xue Wang, 2020; Liu Xiao, 2020; Jian Sun, et al., 2020; Wang Gang et al., 2017; Li Li, 2016; Yaoyao Zhang, 2012; Tian Zhenhua, et al., 2008

APPENDIX B

Interview Structure IOC

Interview structure （Dragon boat team coach and team leader\Management staff of the Dragon Boat Association）

No	ITEM	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	IOC
Q1	Introduce the number of athletes on your female dragon boat team?	1	1	1	1	1	5	1
Q2	What do you think are the current physical characteristics of female dragon boat athletes?	1	1	1	1	1	5	1
Q3	What do you think are the factors that affect the construction of the physical fitness evaluation index of female dragon boat athletes?	0 3 and 5 look almost the same.	1	1	1	1	5	0.8
Q4	What do you think of the relationship between the factors influencing the physical fitness evaluation indicators of Chinese female dragon boat athletes?	1	1	1	1	1	5	1
Q5	What do you think are the most important factors affecting the physical fitness evaluation index of female dragon boat athletes?	1	1	1	1	0 Get the answer from 3	4	0.8

No	ITEM	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	IOC
Q6	What methods do you think are adopted for the selection of test indicators in this study?	1	1	1	1	1	5	1
Q7	In your opinion, how to select test subjects for this study and what is the appropriate sample size?	1	1	1	1	1	5	1
Q8	What problems do you think should be paid attention to in selecting test indicators in this study?	0 6 is very similar to 8	1	1	1	1	4	0.8
Q9	How do you think the weights of test indicators are determined in this study?	1	1	1	1	1	5	1
Q10	How do you think the evaluation criteria for this study are established?	1	1	1	1	1	5	1
Q11	What are your suggestions for this study?	1	1	1	1	1	5	1
Q12	Introduce the current development trend of women's dragon boat sports in China?	1	1	1	1	0 Get the answer from 13	4	0.8

No	ITEM	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	IOC
Q13	Talk about the current status of physical training of outstanding female dragon boat athletes in China?	1	1	1	1	1	5	1
Q14	A Brief discussion on the factors affecting the physical fitness level of China's outstanding female dragon boat athletes?	1	1	1	1	1	5	1
Q15	How do you think to improve the physical training level of China's elite female dragon boat athletes?	0 15 is about the same as 13	1	1	1	1	4	0.8
Q16	What aspects do you think should be used to evaluate the physical fitness of China's excellent female dragon boat athletes?	1	1	0 12-13-15 Get the answer	1	1	4	0.8
Q17	What are your suggestions for this study?	1	1	1	1	1	5	1
				The confidence value of the tool				**0.929**

APPENDIX C

The first round of IOC of physical primary indicators for Chinese female dragon boat athletes

Number	Indicators	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	Result IOC
Level 1 Indicators	Body shape	1	1	1	1	1	5	1
	Physical function	1	1	0	1	1	4	0.8
	Sport quality	1	1	1	1	1	5	1
Level 2 Indicators	Length	1	1	1	1	1	5	1
	width	1	1	1	1	1	5	1
	Girth	1	0	1	1	1	4	0.8
	Height	1	1	1	0	1	4	0.8
	Body principal component	1	1	1	0	1	4	0.8
	Cardio-pulmonary function	-1	1	1	1	1	4	0.8
	Energy supply system	1	0	1	1	1	4	0.8
	Strength	1	1	1	1	1	5	1
	Endurance	1	1	1	1	1	5	1
	Flexibility	1	1	1	1	1	5	1
	Speed	1	1	0	0	1	3	0.6
	Sensitive	1	1	1	1	1	5	1
Level 3 Indicators	Arm length (cm)	1	1	0	1	1	4	0.8
	Upper limb length (cm)	1	1	1	1	1	5	1
	Hand length (cm)	1	0	1	1	1	4	0.8
	Achilles tendon length	1	1	1	-1	0	3	0.6
	Foot length (cm)	1	1	1	1	1	5	1
	Forearm length (cm)	1	0	1	1	1	4	0.8
	Upper extremity length (cm)	1	1	1	1	1	5	1
	Calf length (cm)	1	1	0	1	0	3	0.6
	arm span (cm)	1	1	1	1	1	5	1

Number	Indicators	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	Result IOC
	Lower limb length (cm)	1	1	1	1	1	5	1
	Front squat	0 inconformity with the project	0 inconformity with the project	-1 need to adjust	1	1	2	0.4
	Kneeling arm length (cm)	1	0	1	1	1	4	0.8
	Shoulder width (cm)	1	1	0	1	1	4	0.8
	Hip width (cm)	1	0	1	1	1	4	0.8
	Elbow width	1	1	0	1	1	4	0.8
	Ankle breadth	1	1	1	1	1	5	1
	Foot breadth	1	1	1	1	1	5	1
	Pelvic breadth	1	1	1	1	1	5	1
	Hand length	1	0	1	1	1	4	0.8
	Upper arm tension (cm)	1	1	1	1	1	5	1
	Calf circumference (cm)	1	1	1	1	1	5	1
	Poor respiration	1	1	1	1	1	5	1
	Waist circumference (cm)	1	1	1	1	1	5	1
	High snatch	0 inconformity with the project	1	0 inconformity with the project	1	0 need to adjust	2	0.4
	Sitting height (cm)	1	1	1	1	1	5	1
	Relax upper arm circumference	1	1	1	1	1	5	1
	Thigh circumference (cm)	1	0	1	0	1	3	0.6
	Hip circumference	1	1	0	1	1	4	0.8

Number	Indicators	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	Result IOC
	Forearm circumference	1	1	1	1	1	5	1
	Chest circumference (cm)	1	-1	1	1	1	4	0.8
	Knee height (cm)	1	1	1	1	1	5	1
	Height (cm)	1	0	1	1	1	4	0.8
	Power clean	1	1	0 inconformity with the project	-1 inconformity with the project	0 inconformity with the project	2	0.4
	Body fat percentage	1	1	1	1	1	5	1
	Lean body mass	1	1	1	1	1	5	1
	The Ketole index	1	1	1	1	1	5	1
	Laurel index	1	1	1	1	1	5	1
	BMI	1	1	1	1	1	5	1
	Weight (kg)	1	1	1	1	1	5	1
	Wervik index	1	0	1	1	1	4	0.8
	Resting heart rate (Time)	1	1	0	1	1	4	0.8
	Heart Function Index (Time)	0	-1	1	1	1	3	0.6
	Blood pressure (mmHg)	1	1	1	1	1	5	1
	Vital capacity (ml)	1	1	1	1	1	5	1
	Step index	1	0	1	1	1	4	0.8
	Anaerobic threshold	1	1	1	1	1	5	1
	Maximal oxygen uptake (VVO2ma)	1	1	1	1	1	5	1
	Maximum aerobic velocity	1	0	1	1	1	4	0.8

Number	Indicators	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	Result IOC
	Dynamometer five pulp Maximum Power	1	1	1	1	1	5	1
	Fatigue index	1	1	1	0	0	3	0.6
	Maximum anaerobic power	1	1	1	1	1	5	1
	20s Full paddle distance	1	1	1	1	1	5	1
	Vertical jump touch height	1	0	1	1	1	4	0.8
	Core ventral bridge level 8	1	1	0	1	1	4	0.8
	1RM pull-out (kg)	0	0	1	1	1	3	0.6
	Forward throw solid ball	1	1	1	1	1	5	1
	Back muscle endurance	1	1	1	1	1	5	1
	Free bar bench press	1	0	1	1	1	4	0.8
	Skip skip	1	1	1	1	1	5	1
	Vertical jump	1	1	1	1	1	5	1
	Standing long jump	1	1	1	1	1	5	1
	Plank	1	1	1	1	1	5	1
	1RM Squat (kg)	1	1	1	1	1	5	1
	1min pull-ups	1	1	1	1	1	5	1
	1RM bench Press (kg)	1	1	1	1	1	5	1
	3000m	1	0	1	1	1	4	0.8
	Dynamometer 1000m (s)	1	1	0	1	1	4	0.8
	1min sit-ups	1	1	1	1	1	5	1
	800m run	1	1	1	1	1	5	1
	30s diving tower	1	-1 no obvious effects	0 inconformity with the project	0 need to adjust	1	1	0.2

Number	Indicators	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	Result IOC
	YOYO test	1	0	1	1	0	4	0.6
	Push-up	1	1	1	1	1	5	1
	1000m run (s)	1	0	1	1	1	4	0.8
	Dynamometer 2000m (s)	1	1	1	1	1	5	1
	Lying (kg) \ times (1min)	1	1	1	0	0	3	0.6
	Seated forward bend (cm)	1	1	1	1	1	5	1
	Squat arm length (cm)	1	1	1	1	1	5	1
	Leg lift on back position	1	1	1	1	1	5	1
	Shoulder and stretch	1	0	1	1	1	4	0.8
	Cross fork(cm)	1	1	0	1	1	4	0.8
	Shoulder flexibility test	1	1	1	1	1	5	1
	Dynamometer 500m (s)	1	0	1	0	1	3	0.6
	400m run (s)	1	1	1	1	1	5	1
	Dynamometer 250m (s)	1	0	1	1	1	4	0.8
	30 m Sprint (s)	1	1	0	1	0	3	0.6
	100m run(s)	1	1	1	1	1	5	1
	1min jump rope	1	1	1	1	1	5	1
	Z-run (s)	1	0	1	1	1	4	0.8
	6×6 Return (s)	1	1	-1	1	0	3	0.6
	Hexagon test	1	0	0	1	1	3	0.6
	Cross change direction run	1	1	1	1	1	5	1
	Stand with eyes closed on one leg	0 no obvious effects	-1 inconformity with the project	0 inconformity with the project	0 inconformity with the project	0 inconformity with the project	0	0
	Curve run test	1	1	1	1	1	5	1
	Cross-over	1	1	1	0	1	4	0.8
	30s Burpees	1	1	0	-1	1	3	0.6
The confidence value of the tool								0.858

APPENDIX D

The second round of physical primary indicators for Chinese female dragon boat athlete

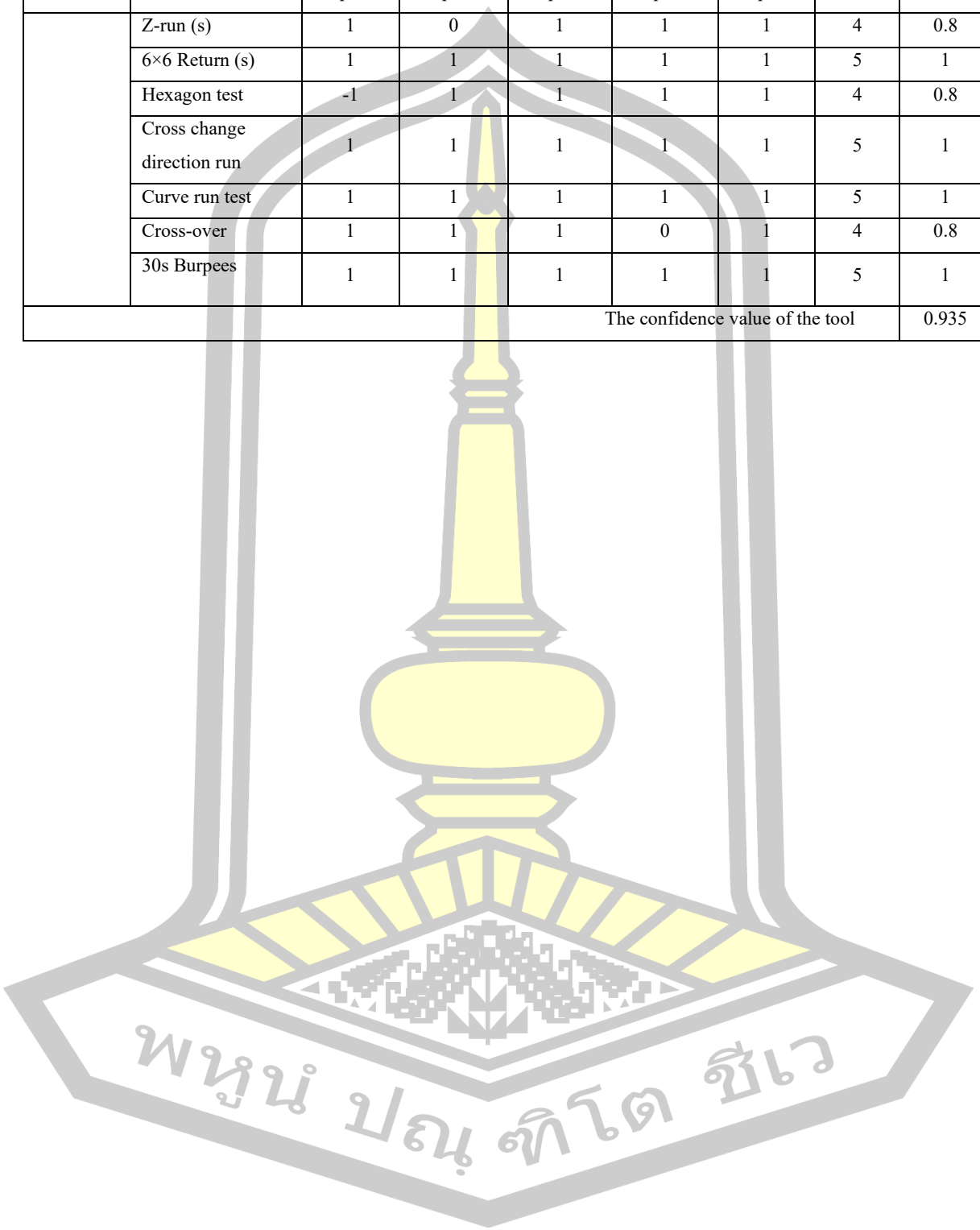
Number	Indicators	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	Result IOC1
Level 1 Indicators	Body shape	1	1	1	1	1	5	1
	Physical function	1	1	1	1	1	5	1
	Sport quality	1	1	1	1	1	5	1
Level 2 Indicators	Length	1	1	1	1	1	5	1
	width	1	1	1	1	1	5	1
	Height	1	1	1	1	1	5	1
	Girth	1	1	1	1	1	5	1
	Body principal component	1	1	1	1	1	5	1
	Cardio-pulmonary function	-1	1	1	1	1	4	0.8
	Energy supply system	1	1	1	1	1	5	1
	Strength	1	1	1	1	1	5	1
	Endurance	1	1	1	1	1	5	1
	Flexibility	1	1	1	1	1	5	1
	Speed	-1	1	1	1	1	4	0.8
	Sensitive	1	1	1	1	1	5	1
Level 3 Indicators	Arm length (cm)	1	1	0	1	1	4	0.8
	Upper limb length (cm)	1	1	1	1	1	5	1
	Hand length (cm)	1	0	1	1	1	4	0.8
	Achilles tendon length	-1	1	1	1	1	4	0.8
	Foot length (cm)	1	1	1	1	1	5	1
	Forearm length (cm)	1	0	1	1	1	4	0.8
	Upper extremity length(cm)(cm)	1	1	1	1	1	5	1
	Calf length (cm)	-1	1	1	1	1	4	0.8
	Arm Span (cm)	1	1	1	1	1	5	1
	Lower limb length (cm)	1	1	1	1	1	5	1

Number	Indicators	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	Result IOC1
	Kneeling arm length (cm)	1	0	1	1	1	4	0.8
	Shoulder width (cm)	1	1	0	1	1	4	0.8
	Hip width (cm)	1	0	1	1	1	4	0.8
	Elbow width	1	1	0	1	1	4	0.8
	Ankle breadth	1	1	1	1	1	5	1
	Foot breadth	1	1	1	1	1	5	1
	Pelvic breadth	1	1	1	1	1	5	1
	Hand length	1	0	1	1	1	4	0.8
	Upper arm tension (cm)	1	1	1	1	1	5	1
	Calf circumference (cm)	1	1	1	1	1	5	1
	Poor respiration	1	1	1	1	1	5	1
	Waist circumference (cm)	1	1	1	1	1	5	1
	Sitting height (cm)	1	1	1	1	1	5	1
	Relax upper arm circumference	1	1	1	1	1	5	1
	Thigh circumference (cm)	-1	1	1	1	1	4	0.8
	Hip circumference	1	1	0	1	1	4	0.8
	Forearm circumference	1	1	1	1	1	5	1
	Chest circumference (cm)	1	-1	1	1	1	4	0.8
	Knee height (cm)	1	1	1	1	1	5	1
	Height (cm)	1	0	1	1	1	4	0.8
	Body fat percentage	1	1	1	1	1	5	1
	Lean body mass	1	1	1	1	1	5	1
	The Ketole index	1	1	1	1	1	5	1
	Laurel index	1	1	1	1	1	5	1

Number	Indicators	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	Result IOC1
	BMI	1	1	1	1	1	5	1
	Weight (kg)	1	1	1	1	1	5	1
	Wervik index	1	0	1	1	1	4	0.8
	Resting heart rate (Time)	1	1	0	1	1	4	0.8
	Heart Function Index (Time)	-1	1	1	1	1	4	0.8
	Blood pressure (mmHg)	1	1	1	1	1	5	1
	Vital capacity (ml)	1	1	1	1	1	5	1
	Step index	1	0	1	1	1	4	0.8
	Anaerobic threshold	1	1	1	1	1	5	1
	Maximal oxygen uptake (VVO2ma)	1	1	1	1	1	5	1
	Maximum aerobic velocity	1	0	1	1	1	4	0.8
	Dynamometer five pulp Maximum Power	1	1	1	1	1	5	1
	Fatigue index	-1	1	1	1	1	4	0.8
	Maximum anaerobic power	1	1	1	1	1	5	1
	20s Full paddle distance	1	1	1	1	1	5	1
	Vertical jump touch height	1	1	1	1	1	5	1
	Core ventral bridge level 8	1	1	0	1	1	4	0.8
	1RM pull-out (kg)	-1	1	1	1	1	4	0.8
	Forward throw solid ball	1	1	1	1	1	5	1
	Back muscle endurance	1	1	1	1	1	5	1
	Free bar bench press	1	0	1	1	1	4	0.8
	Skip skip	1	1	1	1	1	5	1
	Vertical jump	1	1	1	1	1	5	1

Number	Indicators	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	Result IOC1
	Standing long jump	1	1	1	1	1	5	1
	Plank	1	1	1	1	1	5	1
	1RM Squat (kg)	1	1	1	1	1	5	1
	1min pull-ups	1	1	1	1	1	5	1
	1RM bench Press (kg)	1	1	1	1	1	5	1
	3000m	1	0	1	1	1	4	0.8
	Dynamometer 1000m (s)	1	1	1	1	1	5	1
	1min sit-ups	1	1	1	1	1	5	1
	800m run	1	1	1	1	1	5	1
	YOYO test	-1	1	1	1	1	4	0.8
	Push-up	1	1	1	1	1	5	1
	1000m run (s)	1	1	1	1	1	5	1
	Dynamometer 2000m (s)	1	1	1	1	1	5	1
	Lying (kg) \ times (1min)	-1	1	1	1	1	4	0.8
	Seated forward bend (cm)	1	1	1	1	1	5	1
	Squat arm length (cm)	1	1	1	1	1	5	1
	Leg lift on back position	1	1	1	1	1	5	1
	Shoulder and stretch	1	1	1	1	1	5	1
	Cross fork(cm)	1	1	0	1	1	4	0.8
	Shoulder flexibility test	1	1	1	1	1	5	1
	Dynamometer 500m (s)	-1	1	1	1	1	4	0.8
	400m run (s)	1	1	1	1	1	5	1
	Dynamometer 250m (s)	1	0	1	1	1	4	0.8
	30 m Sprint (s)	1	1	1	1	1	5	1
	100m run (s)	1	1	1	1	1	5	1
	1min jump rope	1	1	1	1	1	5	1

Number	Indicators	Research Expert 1	Research Expert 2	Research Expert 3	Research Expert 4	Research Expert 5	Value	Result IOC1
	Z-run (s)	1	0	1	1	1	4	0.8
	6×6 Return (s)	1	1	1	1	1	5	1
	Hexagon test	-1	1	1	1	1	4	0.8
	Cross change direction run	1	1	1	1	1	5	1
	Curve run test	1	1	1	1	1	5	1
	Cross-over	1	1	1	0	1	4	0.8
	30s Burpees	1	1	1	1	1	5	1
The confidence value of the tool								0.935



APPENDIX E

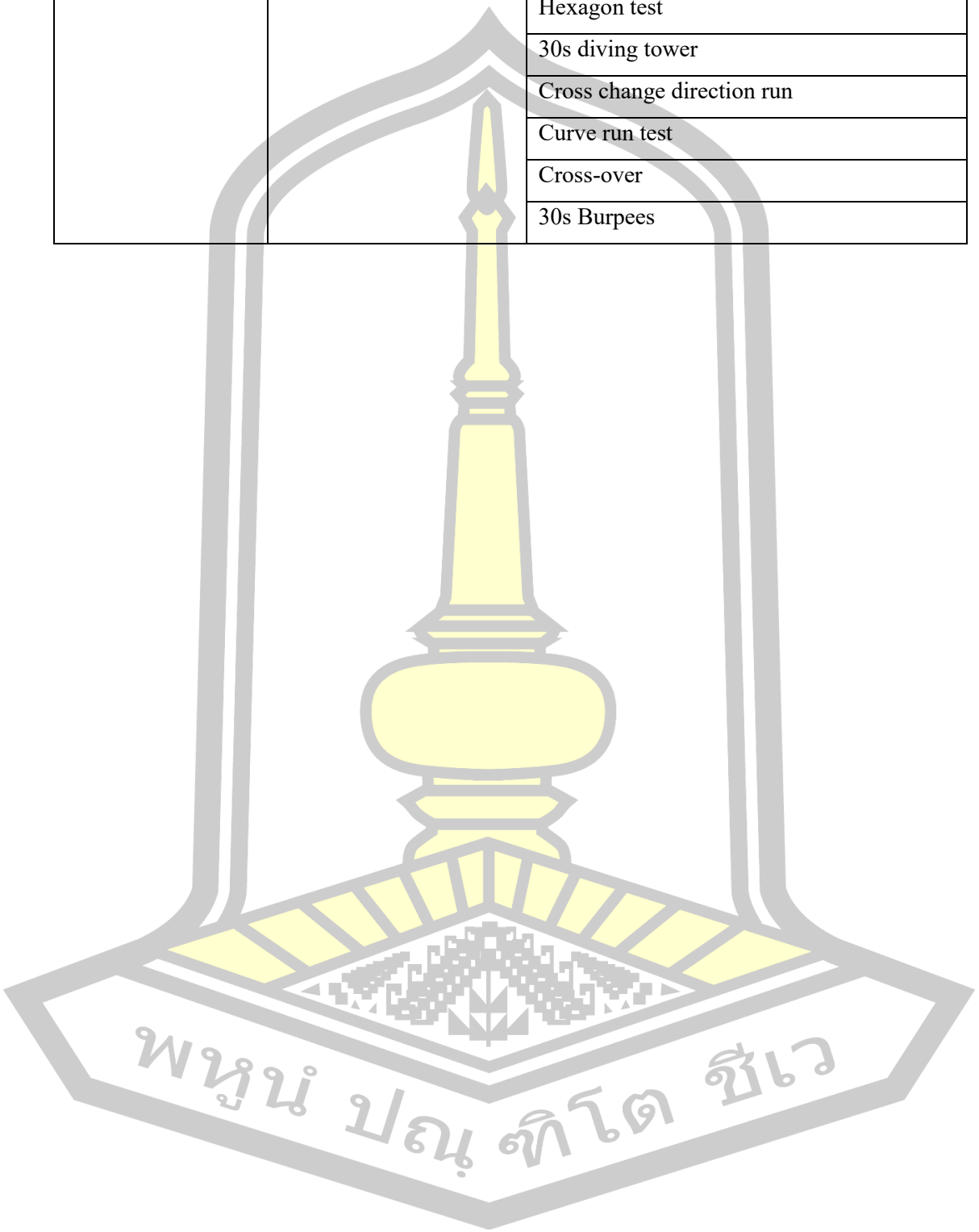
Physical fitness evaluation primary election indicators of female dragon boat athletes in China

level 1 indicators	level 2 indicators	level 3 indicators
Body Shape	Length	Upper extremity length (cm)
		Upper limb length (cm)
		Hand length （cm）
		Achilles tendon length
		Foot length (cm)
		Forearm length (cm)
		Sitting arm length (cm)
		Calf length (cm)
		Arm Span(cm)
		Lower limb length (cm)
		Kneeling arm length (cm)
	width	Shoulder width (cm)
		Hip width (cm)
		Elbow width
		Ankle breadth
		Foot breadth
		Pelvic breadth
		Hand length
	Girth	Upper arm tension (cm)
		Calf circumference (cm)
		Poor respiration
		Waist circumference (cm)
		Relax upper arm circumference
		Thigh circumference (cm)
		Hip circumference
		Forearm circumference
		Chest circumference(cm)

level 1 indicators	level 2 indicators	level 3 indicators
	Height	Knee height (cm)
		Height (cm)
		Sitting height (cm)
	Body principal component	Body fat percentage
		Lean body mass
		The Ketole index
		Laurel index
		BMI
		Weight (kg)
		Wervik index
Physical Function	Cardio-pulmonary function	Resting heart rate (Time)
		Heart Function Index (Time)
		Blood pressure (mmHg)
		Vital capacity (ml)
		Step index
	Energy supply system	Anaerobic threshold
		Maximal oxygen uptake (VVO2ma)
		Maximum aerobic velocity
		Dynamometer five pulp Maximum Power
		Fatigue index
		Maximum anaerobic power
		20s Full paddle distance
Sport Quality	Strength	Vertical jump touch height
		Core ventral bridge level 8
		1RM pull-out (kg)
		Forward throw solid ball
		Back muscle endurance
		Free bar bench press
		Skip skip
		Vertical jump
		Front squat

level 1 indicators	level 2 indicators	level 3 indicators
		Standing long jump
		High snatch
		Plank
		1RM Squat (kg)
		1min pull-ups
		1RM bench Press (kg)
	Endurance	3000m(min)
		Dynamometer1000m (s)
		1min sit-ups
		power clean
		800m run
		YOYO test
		Push-up
		1000m run (s)
		Dynamometer2000m (s)
		Lying (kg) \ times (1min)
	Flexibility	Seated forward bend (cm)
		Squat arm length (cm)
		Leg lift on back position
		Shoulder and stretch
		Cross fork(cm)
		Shoulder flexibility test
	Speed	Dynamometer 500m (s)
		400m run (s)
		Dynamometer 250m (s)
		30 m Sprint (s)
		100m run (s)
	Sensitive	1min jump rope
		Z-run (s)
		Stand with eyes closed on one leg
		6×6 Return (s)

level 1 indicators	level 2 indicators	level 3 indicators
		Hexagon test
		30s diving tower
		Cross change direction run
		Curve run test
		Cross-over
		30s Burpees



A APPENDIX F

Expert Questionnaire of Physical Fitness Evaluation Indicators of Chinese Female Dragon Boat Athletes (first round)

Dear experts:

Hello! First of all, thank you for taking time out of your busy schedule to assist this research! I would like to express my sincere thanks for your attention and support. I am Ms. Li Bing Chen. Ph.D. student, Department of Health and Sport Science, MahaSarakham University is now doing on research name Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China. In this study, the Delphi method, which is commonly used in the society, was adopted in the process of constructing the physical fitness index . Therefore, you need to rely on your solid theoretical knowledge and rich scientific research experience. In the preliminary work, this study has completed the collection and sorting of literature and interviews with experts, summarized the information about female dragon boat athletes' physical fitness indicators, and preliminarily completed the framework of female dragon boat athletes' physical fitness indicators. The Delphi method of expert investigation is mainly used to supplement, delete and modify the primary indicators with the help of the expert's professional knowledge, so as to build a comprehensive and scientific physical evaluation indicators.

This investigation is divided into three parts: first, the basic information of the experts investigation (confidential); Second, the importance and feasibility of the evaluation index of female dragon-boat athletes; Please act according to your real idea.

Thank you for your support and help!

Advisor：Watthanapong Khongsuebsor

Ph.D. student：Li bing Chen

一、Expert basic information investigation

Name		Sex	
Age		Work unit	
Professional		Education	
Years of professional experience		Duties	

二、Opinions on the importance and feasibility of the physical fitness evaluation indicators of Chinese female dragon boat athletes

Filling explanation:

On the basis of literature review and expert consultation, this study has preliminarily formulated 3 first-level indicators (Table 2), 12 second-level indicators (Table 3) and 90 third-level indicators (Table 4). Please evaluate the first, second and third-level indicators respectively. Please evaluate the importance of the index. The importance is divided into 5 measures: very important = 5; important = 4; relatively important = 3; generally important = 2; not important = 1. If you approve of the indicator, call "✓" at the "agree" place.

First-level indicators

First-level indicators	degree of importance				
	5	4	3	2	1
A1 Body Shape					
A2 Physical Function					
A3 Sport Quality					
Suggestions on revision					

Second-level indicators

First-level indicators	Second-level indicators	Degree of importance				
		5	4	3	2	1
A1 Body Shape	B1 Length					
	B2 width					
	B3 Girth					
	B4 Height					
	B5 Body principal component					
A2 Physical Function	B6 Cardio-pulmonary function					
	B7 Energy supply system					
A3 Sport Quality	B8 Strength					
	B9 Endurance					
	B10 Flexibility					
	B11 Speed					
	B12 Sensitive					
Suggestions on revision						

Third-level indicators

First-level indicators	Second-level indicators	Third-level indicators	Degree of importance				
			5	4	3	2	1
A1 Body Shape	B1 Length	C1 Upper extremity length (cm)					
		C2 Calf length (cm)					
		C3 Arm span (cm)					
		C4 Lower limb length (cm)					
		C5 Arm long					
		C6 Refers to the distance index					
		C7 Achilles tendon is long					
		C8 feet long					

First-level indicators	Second-level indicators	Third-level indicators	Degree of importance				
			5	4	3	2	1
		C9 forearm long					
		C10 kneeling arm long					
		C11 Hand long					
	B2 width	C5 Shoulder width (cm)					
		C13 Hand wide					
		C14 Pelvic width					
		C6 Hip width (cm)					
		C16 Elbow width					
		C17 Naked wide					
		C18Foot width					
	B3 Girth	C19Calf circumference (cm)					
		C20Waist circumference (cm)					
		C21 Thigh circumference (cm)					
		C22 Respiration difference					
		C23 Hip circumference					
		C24 Forearm circumference					
		C25Relax your upper arm					
		C26Chest circumference(cm)					
		C27Upper arm tension (cm)					
	B4 Height	C28 Sitting height					
		C29 Knee height					
		C30 Height (cm)					
	B5 Body principal component	C31Fat-free body weight					
		C32Body fat percentage					
		C33The Ketole index					
		C34Weight					
		C35 Rohrer's index					
		C36 BMI					
		C37The Vilwick Index					

First-level indicators	Second-level indicators	Third-level indicators	Degree of importance				
			5	4	3	2	1
A2 Physical Function	B6 Cardio-pulmonary function	C38 Quiet heart rate (Time)					
		C39Heart Function Index (Time)					
		C40Vital capacity					
		C41Blood pressure					
		C42Steps index					
	B7 Energy supply system	C43Oxygen-free valve					
		C44Maximum speed					
		C45Maximal oxygen uptake (VVO2ma)					
		C46 Maximum anaerobic power(W)					
		C47Average power of five pulp					
		C48 Index of fatigue					
		C4920SPull the distance to the pulp					
A3 Sport Quality	B8 Strength	C50Vertical jump touch height					
		C51 Core ventral bridge level 8					
		C521RM pull-out (kg)					
		C53Back muscle endurance					
		C54 1RM bench press					
		C55 Standing long jump					
		C56 1RM Squat (kg)					
		C57 1min Pull-ups					
		C58 Hop skip and jump					
		C59 Vertical jump					
		C60 Flat plate support					
		C61Free pole sleeper push					
		C62The front throw solid ball					

First-level indicators	Second-level indicators	Third-level indicators	Degree of importance				
			5	4	3	2	1
	B9 Endurance	C63 3000 m (min)					
		C64 800m (min)					
		C65 Dynamometer 1000 m					
		C66 1Min Sit-up					
		C67 YOYO Test					
		C68 Push-up					
		C69 Lying pull					
		C70 1000m (min)					
		C71 Dynamometer 2000 m					
	B10 Flexibility	C72Seated forward bend (cm)					
		C73 Cross fork(cm)					
		C74 Squat the arm distance					
		C75 Lift your legs in a supine position					
		C76 Lie prone back stretch					
		C77 Shoulder rotation					
	B11 Speed	C78 400m (min)					
		C79 Dynamometer 500 m					
		C80 Dynamometer 250 m					
		C81 100m (min)					
		C82 30m (min)					
	B12 Sensitive	C83 Z word run					
		C84 6 Vacal acid 6 turn back					
		C85 The hexagon test					
		C86 Curve run test					
		C87 Repeatedly across					
		C881min jump rope					
		C89 Cross-shaped change direction run					
		C90 30s Burpees					
Suggestions on revision							

APPENDIX G

Expert Survey results of Physical Fitness Evaluation of Chinese Female Dragon Boat Athletes (first round)

Number	First-level indicators	Mean	Standard deviation	Variable coefficient	Result
1	A1 Body shape	4.62	0.51	0.11	Pass
2	A2 Physical function	4.62	0.51	0.11	Pass
3	A3 Sport quality	4.62	0.65	0.14	Pass

Number	Second-level indicators	Mean	Standard deviation	Variable coefficient	Result
1	B1 Length	4.31	0.86	0.20	Pass
2	B2 width	4.62	0.51	0.11	Pass
3	B3 Girth	4.62	0.51	0.11	Pass
4	B4 Height	3.31	0.86	0.26	Delete
5	B5 Body principal component	4.62	0.65	0.14	Pass
6	B6 Cardio-pulmonary function	4.46	0.66	0.15	Pass
7	B7 Energy supply system	4.23	0.93	0.22	Pass
8	B8 Strength	4.46	0.66	0.15	Pass
9	B9 Endurance	4.69	0.63	0.13	Pass
10	B10 Speed	4.39	0.87	0.20	Pass
11	B11Flexibility	4.62	0.51	0.11	Pass
12	B12 Sensitive	4.31	0.86	0.20	Pass

Number	Third-level indicators	Mean	Standard deviation	Variable coefficient	Result
1	C1 Upper extremity length (cm)	4.62	0.65	0.14	Pass
2	C2 Calf length (cm)	4.46	0.78	0.17	Pass
3	C3 Arm span(cm)	4.46	0.66	0.15	Pass
4	C4 Lower limb length (cm)	4.15	0.56	0.13	Pass
5	C5 Arm long	4.00	0.71	0.18	Pass
6	C6 Refers to the distance index	2.39	0.96	0.40	Delete
7	C7 Achilles tendon is long	3.08	0.76	0.25	Delete
8	C8 feet long	3.31	0.86	0.26	Delete
9	C9 forearm long	2.92	0.76	0.26	Delete
10	C10 kneeling arm long	3.39	1.19	0.35	Delete
11	C11 Hand long	3.00	0.71	0.24	Delete
12	C12 Shoulder width (cm)	4.39	0.65	0.15	Pass
13	C13 Hand wide	2.62	0.65	0.25	Delete
14	C14 Pelvic width	4.08	0.86	0.21	Pass
15	C15 Hip width (cm)	4.15	0.80	0.19	Pass
16	C16 Elbow width	3.31	0.63	0.19	Delete
17	C17 Naked wide	3.54	0.78	0.22	Delete
18	C18 Foot width	3.31	0.86	0.26	Delete
19	C19 Calf circumference (cm)	4.08	0.86	0.21	Pass
20	C20 Waist circumference (cm)	4.15	0.80	0.19	Pass
21	C21 Thigh circumference (cm)	4.31	0.75	0.17	Pass
22	C22 Respiration difference	2.92	0.64	0.22	Delete
23	C23 Hip circumference	2.15	0.90	0.42	Delete
24	C24 Forearm circumference	2.23	0.73	0.33	Delete
25	C25 Relax your upper arm	4.00	1.08	0.27	Pass
26	C26 Chest circumference(cm)	4.46	0.78	0.17	Pass
27	C27 Upper arm tension (cm)	4.15	0.80	0.19	Pass
28	C28 Sitting height	3.92	0.95	0.24	Delete
29	C29 Knee height	2.31	1.03	0.45	Delete
30	C30 Height (cm)	4.46	0.66	0.15	Pass
31	C31 Fat-free body weight	2.31	0.63	0.27	Delete

Number	Third-level indicators	Mean	Standard deviation	Variable coefficient	Result
32	C32 Body fat percentage	4.39	0.77	0.18	Pass
33	C33 The Ketole index	4.31	0.75	0.17	Pass
34	C34 Weight	4.00	0.71	0.18	Pass
35	C35 Rohrer's index	2.23	0.44	0.20	Delete
36	C36 BMI	2.46	0.66	0.27	Delete
37	C37 The Vilwick Index	2.39	0.51	0.21	Delete
38	C38 Quiet heart rate(Time)	4.31	0.86	0.20	Pass
39	C39 Heart Function Index (Time)	4.23	0.93	0.22	Pass
40	C40Vital capacity	4.54	0.66	0.15	Pass
41	C41Blood pressure	2.77	0.73	0.26	Delete
42	C42Steps index	2.85	0.69	0.24	Delete
43	C43Oxygen-free valve	4.08	0.76	0.19	Pass
44	C44Maximum speed	2.92	0.64	0.22	Delete
45	C45Maximal oxygen uptake (VVO2ma)	4.31	0.75	0.17	Pass
46	C46 Maximum anaerobic power (W)	4.39	0.87	0.20	Pass
47	C47Average power of five pulp	2.46	1.20	0.49	Delete
48	C48 Index of fatigue	2.08	0.64	0.31	Delete
49	C4920SPull the distance to the pulp	4.00	1.00	0.25	Pass
50	C50Vertical jump touch height	4.23	0.83	0.20	Pass
51	C51 Core ventral bridge level 8	4.23	0.83	0.20	Pass
52	C521RM pull-out (kg)	4.46	0.78	0.17	Pass
53	C53Back muscle endurance	4.39	0.87	0.20	Pass
54	C54 1RM bench press	4.54	0.66	0.15	Pass
55	C55 Standing long jump	4.77	0.60	0.13	Pass
56	C56 1RM Squat (kg)	4.46	0.66	0.15	Pass
57	C57 1min Pull-ups	4.39	0.77	0.18	Pass
58	C58 Hop skip and jump	2.08	0.95	0.46	Delete
59	C59 Vertical jump	2.77	0.73	0.26	Delete

Number	Third-level indicators	Mean	Standard deviation	Variable coefficient	Result
60	C60 Flat plate support	1.85	0.80	0.43	Delete
61	C61Free pole sleeper push	4.00	0.82	0.20	Pass
62	C62The front throw solid ball	1.54	0.66	0.43	Delete
63	C63 3000 m (min)	4.62	0.65	0.14	Pass
64	C64 800m (min)	4.62	0.65	0.14	Pass
65	C65 Dynamometer 1000 m	4.00	0.82	0.20	Pass
66	C66 1Min Sit-up	2.39	0.96	0.40	Delete
67	C67 YOYO Test	2.15	0.80	0.37	Delete
68	C68 Push-up	2.39	0.77	0.32	Delete
69	C69 Lying pull	2.92	0.64	0.22	Delete
70	C70 1000m (min)	2.15	0.99	0.46	Delete
71	C71 Dynamometer 2000 m	4.00	0.82	0.20	Pass
72	C72Seated forward bend (cm)	4.31	0.95	0.22	Pass
73	C73 Cross fork(cm)	4.62	0.65	0.14	Pass
74	C74 Squat the arm distance	1.77	0.83	0.47	Delete
75	C75 Lift your legs in a supine position	1.85	0.80	0.43	Delete
76	C76 Lie prone back stretch	2.00	0.82	0.41	Delete
77	C77 Shoulder rotation	4.46	0.66	0.15	Pass
78	C78 400m (min)	4.77	0.60	0.13	Pass
79	C79 Dynamometer 500 m	4.00	0.71	0.18	Pass
80	C80 Dynamometer 250 m	2.23	0.73	0.33	Delete
81	C81 100m (min)	2.23	0.73	0.33	Delete
82	C82 30m (min)	4.54	0.66	0.15	Pass
83	C83 Z word run	2.23	0.73	0.33	Delete
84	C84 6 Vacal acid 6 turn back	2.54	0.78	0.31	Delete
85	C85 The hexagon test	4.08	0.95	0.23	Pass
86	C86 Curve run test	3.00	1.00	0.33	Pass
87	C87 Repeatedly across	3.39	1.04	0.31	Delete
88	C881min jump rope	4.39	0.77	0.18	Pass
89	C89 Cross-shaped change direction run	4.54	0.66	0.15	Pass
90	C90 30s Burpees	4.85	0.38	0.08	Pass

APPENDIX H

Physical Fitness Evaluation Indicator of Chinese female dragon boat athletes (first round)

First-level indicators	Second-level indicators	Third-level indicators
A1 Body Shape	B1 Length	Upper extremity length (cm), Calf length (cm), Arm span (cm), Lower limb length (cm), Arm long
	B2 width	Shoulder width (cm)、Hip width (cm)、The pelvis wide
	B3 Girth	Calf circumference (cm), Waist circumference (cm), Thigh circumference (cm), Chest circumference(cm), Upper arm tension (cm), Relax your upper arm
	B5 Body principal component	Height (cm), Body fat percentage, The Ketole index, Weight
A2 Physical Function	B6 Cardio-pulmonary function	Quiet heart rate (Time), Heart Function Index (Time), Vital capacity
	B7 Energy supply system	Maximal oxygen uptake (VVO2ma), 20s full pull slurry distance, Maximum anaerobic power (W), Oxygen-free valve
A3 Sport Quality	B8 Strength	Vertical jump touch height, Core ventral bridge level 8, 1RM pull-out (kg), Back muscle endurance, 1RM bench press, Standing long jump, 1RM Squat (kg), 1min pull-ups, Free pole sleeper push
	B9 Endurance	3000 m, 800 m, Dynamometer 1000 m, Dynamometer 2000 m
	B9 Flexibility	Seated forward bend (cm), Cross fork (cm), Shoulder rotation
	B10 Speed	400m run (s), 30 m Sprint (s), Dynamometer 500 m
	B11 Sensitive	1min jump rope, Cross-shaped change direction run, C36 30s burpees, The hexagon test

APPENDIX I

Expert Questionnaire of Physical Fitness Evaluation Index of Chinese Female Dragon Boat Athletes (second round)

Dear experts:

Hello! First of all, thank you for taking time out of your busy schedule to assist this research! I would like to express my sincere thanks for your attention and support. I am Ms. Li Bing Chen. Ph.D. student, Department of Health and Sport Science, MahaSarakham University is now doing on research name Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China. In this study, the Delphi method, which is commonly used in the society, was adopted in the process of constructing the physical fitness index . Therefore, you need to rely on your solid theoretical knowledge and rich scientific research experience. At present, the first round of expert evaluation has been completed in this study, and the evaluation indicators have been modified and adjusted according to the evaluation opinions of experts, and the second round of expert evaluation table has been determined. Experts are invited to assess the indicators according to the specific filling requirements with their own professional knowledge. This investigation is divided into two parts: first, the basic information of the experts investigation (confidential); Second, the importance and feasibility of the evaluation indicator of female dragon-boat athletes; This survey will be divided into two rounds, please follow your real ideas.

Thank you for your support and help!

Advisor：Watthanapong Khongsuebsor

Ph.D student：Li bing Chen

一、Expert basic information investigation

Name		Sex	
Age		Work unit	
Professional		Education	
Years of professional experience		Duties	

二、Opinions on the importance and feasibility of the physical fitness evaluation

Filling explanation:

At present, the first round of expert evaluation has been completed in this study, and the evaluation indicators have been modified and adjusted according to the evaluation opinions of experts, and the second round of expert evaluation table has been determined. 3 first-level indicators, 11 second-level indicators and 48 third-level indicators are proposed. Please evaluate the second-level and third-level indicators. If you agree with the indicator, type "✓" in "agree"; At the same time, please rate the importance of the indicator, which is divided into five measures: Very important = 5; Important = 4; More important = 3; General importance = 2; Not important = 1.

Second-level indicators

First-level indicators	Second-level indicators	Degree of importance				
		5	4	3	2	1
A1 Body Shape	B1 Length					
	B2 width					
	B3 Girth					
	B4 Body principal component					
A2 Physical Function	B5 Cardio-pulmonary function					
	B6 Energy supply system					
A3 Sport Quality	B7 Strength					
	B8 Endurance					
	B9 Flexibility					
	B10 Speed					
	B11 Sensitive					
Suggestions on revision						

Third-level indicators questionnaire

First-level indicators	Second-level indicators	Third-level indicators	Degree of importance				
			5	4	3	2	1
A1 Body Shape	B1 Length	C1 Upper extremity length (cm)					
		C2 Calf length (cm)					
		C3 Arm span(cm)					
		C4 Lower limb length (cm)					
		C5 Arm long					
	B2 width	C6 Shoulder width (cm)					
		C7Hip wide					
		C8 Pelvic width					
	B3 Girth	C9 Calf circumference (cm)					
		C10 Waist circumference (cm)					
		C11 Thigh circumference (cm)					
		C12 Chest circumference(cm)					
		C13 Upper arm tension (cm)					
		C14 Relax your upper arm					
	B4 Body principal component	C15 Height (cm)					
		C16 Body fat percentage					
		C17 The Ketole index					
		C18 Weight					
A2 Physical Function	B5 Cardio-pulmonary function	C19 Quiet heart rate(Time)					
		C20 Heart Function Index (Time)					
		C21Vital capacity					
	B6 Energy supply system	C22Maximal oxygen uptake (VVO2ma)					
		C23 Oxygen-free valve					
		C24 Maximum anaerobic power (W)					
		C25 20s full pull slurry distance					

First-level indicators	Second-level indicators	Third-level indicators	Degree of importance				
			5	4	3	2	1
A3 Sport Quality	B6 Energy supply system	C26 Vertical jump touch height					
		C27 Core ventral bridge level 8					
		C28 1RM pull-out (kg)					
		C29 Back muscle endurance					
		C30 Free pole sleeper push					
		C31 Standing long jump					
		C32 1RM bench press					
		C33 1min pull-ups					
		C34 1RM Squat (kg)					
	B8 Endurance	C35 800 m					
		C36 3000m					
		C37 Dynamometer 1000 m					
		C38 Dynamometer 2000 m					
	B9 Flexibility	C39 Seated forward bend (cm)					
		C40 Cross fork (cm)					
		C41 Shoulder rotation					
	B10 Speed	C42 Dynamometer 500 m					
		C43 30 m Sprint (s)					
		C44 400m run (s)					
	B11 Sensitive	C45 1min jump rope					
		C46 Cross-shaped change direction run					
		C47 30s burpees					
		C48 The hexagon test					

APPENDIX J

Expert Survey results of Physical Fitness Evaluation of Chinese Female Dragon Boat Athletes (Second round)

Number	Second-level indicators	Mean	Standard deviation	Variable coefficient	Result
1	B1 Length	4.46	0.66	0.15	pass
2	B2 width	4.69	0.48	0.10	pass
3	B3 Girth	4.69	0.48	0.10	pass
4	B4 Body principal component	4.77	0.44	0.09	pass
5	B5 Cardio-pulmonary function	4.54	0.52	0.11	pass
6	B6 Energy supply system	4.39	0.77	0.18	pass
7	B7 Strength	4.54	0.52	0.11	pass
8	B8 Endurance	4.69	0.63	0.13	pass
9	B9 Speed	4.46	0.78	0.17	pass
10	B10 Flexibility	4.69	0.48	0.10	pass
11	B11 Sensitive	4.46	0.78	0.17	pass

First-level indicators	Second-level indicators	Third-level indicators	Mean	Standard deviation	Variable coefficient	Result
A1 Body Shape	B1 Length	C1 Upper extremity length (cm)	4.31	0.75	0.17	pass
		C2 Calf length (cm)	4.39	0.77	0.18	pass
		C3 Arm span(cm)	4.23	0.83	0.20	pass
		C4 Lower limb length (cm)	4.15	0.56	0.13	pass
		C5 Arm long	3.23	0.93	0.29	Delete
	B2 width	C6 Shoulder breadth	4.39	0.65	0.15	pass
		C7 Hip wide	4.15	0.80	0.19	pass
		C8 Pelvis wide	3.54	0.66	0.19	Delete

First-level indicators	Second-level indicators	Third-level indicators	Mean	Standard deviation	Variable coefficient	Result
	B3 Girth	C9 Calf circumference (cm)	4.08	0.86	0.21	pass
		C10 Waist circumference (cm)	4.15	0.80	0.19	pass
		C11 Thigh circumference (cm)	4.46	0.66	0.15	pass
		C12 Relax your upper arm	3.08	0.76	0.25	Delete
		C13 Chest circumference(cm)	4.31	0.75	0.17	pass
		C14 Upper arm tension (cm)	4.15	0.80	0.19	pass
	B4 Body principal component	C15 Height (cm)	4.46	0.66	0.15	pass
		C16 Body fat percentage	4.39	0.77	0.18	pass
		C17 The Ketole index	4.31	0.75	0.17	pass
		C18 Weight	2.92	0.76	0.26	Delete
A2 Physical Function	B5 Cardio-pulmonary function	C19 Quiet heart rate(Time)	4.31	0.86	0.20	pass
		C20 Heart Function Index (Time)	4.23	0.93	0.22	pass
		C21Vital capacity	2.77	0.83	0.30	Delete
	B6 Energy supply system	C22 Oxygen-free valve	2.92	0.64	0.22	Delete
		C23 Maximum anaerobic power (W)	4.31	0.75	0.17	pass
		C24 Maximal oxygen uptake (VVO2ma)	4.39	0.87	0.20	pass
		C25 20s full pull slurry distance	3.31	0.75	0.23	Delete
A3 Sport Quality	B7 Strength	C26 Vertical jump touch height	4.23	0.83	0.20	pass
		C27 Core ventral bridge level 8	4.23	0.83	0.20	pass
		C28 1RM pull-out (kg)	4.46	0.78	0.17	pass
		C29 Back muscle endurance	4.39	0.87	0.20	pass
		C31 Standing long jump	4.54	0.66	0.15	pass
		C32 1RM bench press	4.77	0.60	0.13	pass
		C33 1min pull-ups	4.46	0.66	0.15	pass
		C34 1RM Squat (kg)	4.39	0.77	0.18	pass

First-level indicators	Second-level indicators	Third-level indicators	Mean	Standard deviation	Variable coefficient	Result
		C35 Free pole sleeper push	3.39	0.51	0.15	Delete
	B8 Endurance	C36 3000 m	4.62	0.65	0.14	pass
		C37 800m	4.62	0.65	0.14	pass
		C38 Dynamometer 1000 m	3.15	0.56	0.18	Delete
		C39 Dynamometer 2000 m	3.31	0.63	0.19	Delete
	B9 Flexibility	C40 Seated forward bend (cm)	4.31	0.95	0.22	pass
		C41 Cross fork(cm)	4.62	0.65	0.14	pass
		C42 Shoulder rotation	4.46	0.66	0.15	pass
	B10 Speed	C43 400m run(s)	4.77	0.60	0.13	pass
		C42 Dynamometer 500 m	3.69	0.63	0.17	Delete
		C44 30 m Sprint (s)	4.54	0.66	0.15	
	B11 Sensitive	C45 The hexagon test	3.15	0.80	0.25	Delete
		C46 1min jump rope	4.39	0.77	0.18	pass
		C47 Cross-shaped change direction run	4.54	0.66	0.15	pass
		C48 30s burpees	4.46	0.66	0.15	pass

APPENDIX K

Physical Fitness Evaluation Indicator of Chinese female dragon boat athletes (Second round)

First Level indicators (3)	Second Level indicators (11)	Third Level indicators（36）
A1 Body Shape	B1 Length	C1Upper extremity length (cm)
		C2 Calf length (cm)
		C3 Arm span(cm)
		C4 Lower limb length (cm)
	B2 width	C5 Shoulder width (cm)
		C6 Hip width (cm)
	B3 Girth	C7 Upper arm tension (cm)
		C8 Calf circumference (cm)
		C9 Waist circumference (cm)
		C10 Thigh circumference (cm)
		C11 Chest circumference(cm)
	B4 Body principal component	C12Height (cm)
		C13 Body fat percentage
		C14 The Ketole index
A2 Physical Function	B5 Cardio-pulmonary function	C15 Quiet heart rate(Time)
		C16 Heart Function Index (Time)
	B6 Energy supply system	C17 Maximal oxygen uptake (VVO2ma)
		C18 Maximum anaerobic power(W)
A3 Sport Quality	B7 Strength	C19 Vertical jump touch height
		C20 Core ventral bridge level 8
		C21 1RM pull-out (kg)
		C22 Back muscle endurance
		C23 1RM bench press
		C24 Standing long jump

First Level indicators (3)	Second Level indicators (11)	Third Level indicators（36）
		C25 1RM Squat (kg)
		C26 1min pull-ups
	B8 Endurance	C27 3000m run
		C28 800m run
	B9 Flexibility	C29 Seated forward bend (cm)
		C30 Cross fork(cm)
		C31Shoulder rotation
	B10 Speed	C32 400m run(s)
		C33 30 m Sprint (s)
	B11 Sensitive	C34 1min jump rope
		C35 cross-shaped change direction run
		C36 30s burpees

APPENDIX L

Expert Questionnaire of Physical Fitness Evaluation Index of Chinese Female Dragon Boat Athletes (Third round)

Dear experts:

Hello! First of all, thank you for taking time out of your busy schedule to assist this research! I would like to express my sincere thanks for your attention and support. I am Ms. Li Bing Chen. Ph.D. student, Department of Health and Sport Science, MahaSarakham University is now doing on research name Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China. In this study, the Delphi method, which is commonly used in the society, was adopted in the process of constructing the physical fitness index . Therefore, you need to rely on your solid theoretical knowledge and rich scientific research experience.

At present, the second round of expert evaluation has been completed in this study, and the evaluation indicators have been modified and adjusted according to the evaluation opinions of experts, and the third round of expert evaluation table has been determined. Experts are invited to assess the indicators according to the specific filling requirements with their own professional knowledge. This investigation is divided into two parts: first, the basic information of the experts investigation (confidential); Second, the importance and feasibility of the evaluation indicator of female dragon-boat athletes; This survey will be divided into two rounds, please follow your real ideas.

Thank you for your support and help!

Advisor：Watthanapong Khongsuebsor

Ph.D. student：Li bing Chen

一、Expert basic information investigation

Name		Sex	
Age		Work unit	
Professional		Education	
Years of professional experience		Duties	

二、Opinions on the importance and feasibility of the physical fitness evaluation

Filling explanation:

At present, the second round of expert evaluation has been completed in this study, and the evaluation indicators have been modified and adjusted according to the evaluation opinions of experts, and the third round of expert evaluation table has been determined. 3 first-level indicators, 11 second-level indicators and 36 third-level indicators are proposed. Please evaluate the second-level and third-level indicators. If you agree with the indicator, type "✓" in "agree"; At the same time, please rate the importance of the indicator, which is divided into five measures: Very important = 5; Important = 4; More important = 3; General importance = 2; Not important = 1.

Third Level indicators questionnaire

First Level indicators (3)	Second Level indicators (11)	Third Level indicators (36)	Degree of importance				
			5	4	3	2	1
A1 Body Shape	B1 Length	C1Upper extremity length (cm)					
		C2 Calf length (cm)					
		C3 Arm span(cm)					
		C4 Lower limb length (cm)					
	B2 width	C5 Shoulder width (cm)					
		C6 Hip width (cm)					
	B3 Girth	C7 Upper arm tension (cm)					
		C8 Calf circumference (cm)					
		C9 Waist circumference (cm)					
		C10 Thigh circumference (cm)					
		C11 Chest circumference (cm)					

First Level indicators (3)	Second Level indicators (11)	Third Level indicators (36)	Degree of importance				
			5	4	3	2	1
	B4 Body principal component	C12Height (cm)					
		C13 Body fat percentage					
		C14 The Ketole index					
A2 Physical Function	B5 Cardio-pulmonary function	C15 Quiet heart rate (Time)					
		C16 Heart Function Index (Time)					
	B6 Energy supply system	C17 Maximal oxygen uptake (VVO2ma)					
		C18 Maximum anaerobic power (W)					
A3 Sport Quality	B7 Strength	C19 Vertical jump touch height					
		C20 Core ventral bridge level 8					
		C21 1RM pull-out (kg)					
		C22 Back muscle endurance					
		C23 1RM bench press					
		C24 Standing long jump					
		C25 1RM Squat (kg)					
		C26 1min pull-ups					
	B8 Endurance	C27 3000m run					
		C28 800m run					
	B9 Flexibility	C29 Seated forward bend (cm)					
		C30 Cross fork(cm)					
		C31Shoulder rotation					
	B10 Speed	C32 400m run (s)					
		C33 30 m Sprint (s)					
	B11 Sensitive	C34 1min jump rope					
		C35 cross-shaped change direction run					
		C36 30s burpees					

APPENDIX M

Expert Survey results of Physical Fitness Evaluation of Chinese Female Dragon Boat Athletes (Third round)

Number	First Level indicators (3)	Second Level indicators (11)	Third Level indicators (36)	Mean	Standard deviation	Variable coefficient	Result
1	A1 Body Shape	B1 Length	C1Upper extremity length (cm)	4.77	0.60	0.13	pass
2			C2 Calf length (cm)	4.62	0.51	0.11	pass
3			C3 Arm span(cm)	4.54	0.52	0.11	pass
4			C4 Lower limb length (cm)	4.31	0.48	0.11	pass
5		B2 width	C5 Shoulder width (cm)	4.62	0.51	0.11	pass
6			C6 Hip width (cm)	4.39	0.65	0.15	pass
7		B3 Girth	C7 Upper arm tension (cm)	4.46	0.52	0.12	pass
8			C8 Calf circumference (cm)	4.23	0.73	0.17	pass
9			C9 Waist circumference (cm)	4.31	0.75	0.17	pass
10			C10 Thigh circumference (cm)	4.39	0.65	0.15	pass
11			C11 Chest circumference(cm)	4.62	0.51	0.11	pass
12		B4 Body principal component	C12 Height (cm)	4.46	0.66	0.15	pass
13			C13 Body fat percentage	4.62	0.51	0.11	pass
14			C14 The Ketole index	4.54	0.52	0.11	pass
15	A2 Physical Function	B5 Cardio-pulmonary function	C15 Quiet heart rate (Time)	4.54	0.52	0.11	pass
16			C16 Heart Function Index (Time)	4.54	0.52	0.11	pass
17		B6 Energy supply system	C17 Maximal oxygen uptake (VVO2ma)	4.46	0.52	0.12	pass
18			C18 Maximum anaerobic power(W)	4.62	0.51	0.11	pass

Number	First Level indicators (3)	Second Level indicators (11)	Third Level indicators (36)	Mean	Standard deviation	Variable coefficient	Result
19	A3 Sport Quality	B7 Strength	C19 Vertical jump touch height	4.46	0.52	0.12	pass
20			C20 Core ventral bridge level 8	4.62	0.51	0.11	pass
21			C21 1RM pull-out (kg)	4.69	0.48	0.10	pass
22			C22 Back muscle endurance	4.62	0.65	0.14	pass
23			C23 1RM bench press	4.69	0.48	0.10	pass
24			C24 Standing long jump	4.85	0.38	0.08	pass
25			C25 1RM Squat (kg)	4.62	0.51	0.11	pass
26			C26 1min pull-ups	4.54	0.52	0.11	pass
27		B8 Endurance	C27 3000m run	4.77	0.44	0.09	pass
28			C28 800m run	4.69	0.48	0.10	pass
29		B9 Flexibility	C29 Seated forward bend (cm)	4.62	0.51	0.11	pass
30			C30 Cross fork(cm)	4.77	0.44	0.09	pass
31			C31Shoulder rotation	4.54	0.52	0.11	pass
32		B10 Speed	C32 400m run(s)	4.92	0.28	0.06	pass
33			C33 30 m Sprint (s)	4.69	0.48	0.10	pass
34		B11 Sensitive	C34 1min jump rope	4.54	0.52	0.11	pass
35			C35 cross-shaped change direction run	4.69	0.48	0.10	pass
36			C36 30s burpees	4.92	0.28	0.06	pass

APPENDIX N

Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China

Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China		
First Level indicators (3)	Second Level indicators (11)	Third Level indicators (36)
A1 Body Shape	B1 Length	C1 Upper extremity length (cm)
		C2 Calf length (cm)
		C3 Arm span(cm)
		C4 Lower limb length (cm)
	B2 width	C5 Shoulder width (cm)
		C6 Hip width (cm)
	B3 Girth	C7 Upper arm tension (cm)
		C8 Calf circumference (cm)
		C9 Waist circumference (cm)
		C10 Thigh circumference (cm)
		C11 Chest circumference(cm)
	B4 Body principal component	C12 Height (cm)
		C13 Body fat percentage
		C14 The Ketole index
A2 Physical Function	B5 Cardio-pulmonary function	C15 Quiet heart rate(Time)
		C16 Heart Function Index (Time)
	B6 Energy supply system	C17 Maximal oxygen uptake (VVO2ma)
		C18 Maximum anaerobic power(W)
A3 Sport Quality	B7 Strength	C19 Vertical jump touch height
		C20 Core ventral bridge level 8
		C21 1RM pull-out (kg)
		C22 Back muscle endurance
		C23 1RM bench press
		C24 Standing long jump
		C25 1RM Squat (kg)
		C26 1min pull-ups
	B8 Endurance	C27 3000m run
		C28 800m run

Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China		
First Level indicators (3)	Second Level indicators (11)	Third Level indicators (36)
	B9 Flexibility	C29 Seated forward bend (cm)
		C30 Cross fork(cm)
		C31Shoulder rotation
	B10 Speed	C32 400m run(s)
		C33 30 m Sprint (s)
	B11 Sensitive	C34 1min jump rope
		C35 cross-shaped change direction run
		C36 30s burpees

APPENDIX O

Weight table of Chinese female dragon boat athletes physical evaluation indicator

Dear experts:

Hello! In the process of developing the physical evaluation indicators of Chinese female dragon boat athletes, the weight coefficient of the indicators needs to be assigned. According to the pairwise comparison of different dimensions, the Weight Table of Physical Evaluation indicators of Chinese Female Dragon boat Athletes is made. We hope to evaluate the selected indicators in this study based on your experience and understanding.

Thank you for your support and help.

Advisor: Watthanapong Khongsuebsor

PHD student: Li bing Chen

Explain: The analytic Hierarchy process (AHP) is used to evaluate the relative importance of each element. The evaluation scale of AHP is divided into nine levels, and the specific judgment scale, definition and meaning are shown in the following table

Judging scale	Definition	Meaning
1	Equally important	Indicates that two elements are of equal importance
3	Slightly important	Indicates that the former is slightly more important than the latter
5	Obviously important	Indicates that the former is significantly more important than the latter
7	Strongly important	Indicates that the former is more important than the latter
9	Extremely important	Indicates that the former is more important than the latter
2,4,6,8		Represents the scale when there is a compromise between adjacent scales
The inverse of 1 to 9		The latter is more important than the former

Example: When you think "A" is significantly more important than "B",Near the "obviously important" of "A"tick“√”

Indicators	Extremely important	Strongly important	Obviously important	Slightly important	Equally important	Slightly important	Obviously important	Strongly important	Extremely important	Indicators
A			√							B

When you think "B" is significantly more important than "A",Near the "obviously important" of "B"tick“√”。

Indicators	Extremely important	Strongly important	Obviously important	Slightly important	Equally important	Slightly important	Obviously important	Strongly important	Extremely important	Indicators
A							√			B

First Level indicators

Indicators	Extremely important	Strongly important	Obviously important	Slightly important	Equally important	Slightly important	Obviously important	Strongly important	Extremely important	Indicators
A1 Body Shape										A2 Physical Function
A1 Body Shape										A3 Sport Quality
A2 Physical Function										A3 Sport Quality

Second Level indicators

Indicators	Extremely important	Strongly important	Obviously important	Slightly important	Equally important	Slightly important	Obviously important	Strongly important	Extremely important	Indicators
B1 Length										B2 width
B1 Length										B3 Girth
B1 Length										B4Body principal component
B2 width										B3 Girth
B2 width										B4Body principal component
B3 Girth										B4Body principal component
B5 Cardio-pulmonary function										B6Energy supply system
B7 Strength										B8 Endurance
B7 Strength										B9 Flexibility
B7 Strength										B10 Speed
B7 Strength										B11 Sensitive
B8 Endurance										B9 Flexibility
B8 Endurance										B10 Speed
B8 Endurance										B11 Sensitive
B9 Flexibility										B10 Speed
B10 Speed										B11 Sensitive

Third Level indicators

Indicators	Extremely important	Strongly important	Obviously important	Slightly important	Equally important	Slightly important	Obviously important	Strongly important	Extremely important	Indicators
C1 Upper extremity length (cm)										C2 Calf length (cm)
C1 Upper extremity length (cm)										C3 Arm span (cm)
C1 Upper extremity length (cm)										C4 Lower limb length (cm)
C2 Calf length (cm)										C3 Arm span (cm)
C2 Calf length (cm)										C4 Lower limb length (cm)
C3 Arm span (cm)										C4 Lower limb length (cm)
C5 Shoulder width (cm)										C6 Hip width (cm)
C7 Upper arm tension (cm)										C8Calf circumference (cm)
C7 Upper arm tension (cm)										C9Waist circumference (cm)
C7 Upper arm tension (cm)										C10Thigh circumference (cm)
C7 Upper arm tension (cm)										C11Chest circumference(cm)
C8Calf circumference (cm)										C9Waist circumference (cm)
C8Calf circumference (cm)										C10Thigh circumference (cm)
C8Calf circumference (cm)										C11Chest circumference (cm)
C9Waist circumference (cm)										C10Thigh circumference (cm)

Indicators	Extremely important	Strongly important	Obviously important	Slightly important	Equally important	Slightly important	Obviously important	Strongly important	Extremely important	Indicators
C9Waist circumference (cm)										C11Chest circumference (cm)
C10Thigh circumference (cm)										C11Chest circumference (cm)
C12Height (cm)										C13 Body fat percentage
C12Height (cm)										C14 The Ketole index
C13 Body fat percentage										C14 The Ketole index
C15Quiet heart rate (Time)										C16Heart Function Index (Time)
C17Maximal oxygen uptake (VVO2ma)										C18Maximum anaerobic power (W)
C19Vertical jump touch height										C20 Core ventral bridge level 8
C19Vertical jump touch height										C21 1RM pull-out (kg)
C19Vertical jump touch height										C22 Back muscle endurance
C19Vertical jump touch height										C23 Free bar bench press
C19Vertical jump touch height										C24 Standing long jump
C19Vertical jump touch height										C25 1RM Squat (kg)

Indicators	Extremely important	Strongly important	Obviously important	Slightly important	Equally important	Slightly important	Obviously important	Strongly important	Extremely important	Indicators
C19Vertical jump touch height										C26 1min pull-ups
C20Core ventral bridge level 8										C21 1RM pull-out (kg)
C20Core ventral bridge level 8										C22 Back muscle endurance
C20Core ventral bridge level 8										C23 Free bar bench press
C20Core ventral bridge level 8										C24 Standing long jump
C20Core ventral bridge level 8										C25 1RM Squat (kg)
C20Core ventral bridge level 8										C26 1min pull-ups
C211RM pull-out (kg)										C22 Back muscle endurance
C211RM pull-out (kg)										C23 Free bar bench press
C211RM pull-out (kg)										C24 Standing long jump
C211RM pull-out (kg)										C25 1RM Squat (kg)
C211RM pull-out (kg)										C26 1min pull-ups
C22Back muscle endurance										C23 Free bar bench press
C22Back muscle endurance										C24 Standing long jump
C22Back muscle endurance										C25 1RM Squat (kg)

Indicators	Extremely important	Strongly important	Obviously important	Slightly important	Equally important	Slightly important	Obviously important	Strongly important	Extremely important	Indicators
C22Back muscle endurance										C26 1min pull-ups
C23 Free bar bench press										C24 Standing long jump
C23 Free bar bench press										C25 1RM Squat (kg)
C23 Free bar bench press										C26 1min pull-ups
C24 Standing long jump										C25 1RM Squat (kg)
C24 Standing long jump										C26 1min pull-ups
C251RM Squat (kg)										C26 1min pull-ups
C27 3000m run										C28 800m run
C29Seated forward bend (cm)										C30Cross fork(cm)
C29Seated forward bend (cm)										C31Shoulder flexibility test
C30Cross fork(cm)										C31 Shoulder flexibility test
C32400m run(s)										C33 30 m Sprint (s)
C341min jump rope										C35 Cross change direction run
C341min jump rope										C36 30s burpees
C35Cross change direction run										C36 30s burpees

APPENDIX P

Chinese female dragon boat athletes physical function evaluation standard table

Score	C15	C16	C17	C18
0	65	12.5	46.8	392.7
1	64.55	12.3405	47.14	403.545
2	64.1	12.181	47.48	414.39
3	63.65	12.0215	47.82	425.235
4	63.2	11.862	48.16	436.08
5	62.75	11.7025	48.5	446.925
6	62.3	11.543	48.84	457.77
7	61.85	11.3835	49.18	468.615
8	61.4	11.224	49.52	479.46
9	60.95	11.0645	49.86	490.305
10	60.5	10.905	50.2	501.15
11	60.05	10.7455	50.54	511.995
12	59.6	10.586	50.88	522.84
13	59.15	10.4265	51.22	533.685
14	58.7	10.267	51.56	544.53
15	58.25	10.1075	51.9	555.375
16	57.8	9.948	52.24	566.22
17	57.35	9.7885	52.58	577.065
18	56.9	9.629	52.92	587.91
19	56.45	9.4695	53.26	598.755
20	56	9.31	53.6	609.6

Note: C15-C18 represents, respectively: C15 Quiet heart rate (Time), C16 Heart Function Index (Time), C17 Maximal oxygen uptake (VVO2ma), C18 Maximum anaerobic power (W)

Chinese female dragon boat athletes Sport Quality evaluation standard table

Score	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36
0	265	6	71	152	47	246	71	17	11	2.25	25.5	15.3	60	1.25	4.7	170	13.9	14
1	265.3	6.1	72.2	153.65	48.65	246.95	71.95	17.3	10.919	2.2435	25.765	15.095	59.855	1.3875	4.6805	170.75	13.855	14.35
2	265.6	6.2	73.4	155.3	50.3	247.9	72.9	17.6	10.838	2.237	26.03	14.89	59.71	1.525	4.661	171.5	13.81	14.7
3	265.9	6.3	74.6	156.95	51.95	248.85	73.85	17.9	10.757	2.2305	26.295	14.685	59.565	1.6625	4.6415	172.25	13.765	15.05
4	266.2	6.4	75.8	158.6	53.6	249.8	74.8	18.2	10.676	2.224	26.56	14.48	59.42	1.8	4.622	173	13.72	15.4
5	266.5	6.5	77	160.25	55.25	250.75	75.75	18.5	10.595	2.2175	26.825	14.275	59.275	1.9375	4.6025	173.75	13.675	15.75
6	266.8	6.6	78.2	161.9	56.9	251.7	76.7	18.8	10.514	2.211	27.09	14.07	59.13	2.075	4.583	174.5	13.63	16.1
7	267.1	6.7	79.4	163.55	58.55	252.65	77.65	19.1	10.433	2.2045	27.355	13.865	58.985	2.2125	4.5635	175.25	13.585	16.45
8	267.4	6.8	80.6	165.2	60.2	253.6	78.6	19.4	10.352	2.198	27.62	13.66	58.84	2.35	4.544	176	13.54	16.8
9	267.7	6.9	81.8	166.85	61.85	254.55	79.55	19.7	10.271	2.1915	27.885	13.455	58.695	2.4875	4.5245	176.75	13.495	17.15
10	268	7	83	168.5	63.5	255.5	80.5	20	10.19	2.185	28.15	13.25	58.55	2.625	4.505	177.5	13.45	17.5
11	268.3	7.1	84.2	170.15	65.15	256.45	81.45	20.3	10.109	2.1785	28.415	13.045	58.405	2.7625	4.4855	178.25	13.405	17.85
12	268.6	7.2	85.4	171.8	66.8	257.4	82.4	20.6	10.028	2.172	28.68	12.84	58.26	2.9	4.466	179	13.36	18.2
13	268.9	7.3	86.6	173.45	68.45	258.35	83.35	20.9	9.947	2.1655	28.945	12.635	58.115	3.0375	4.4465	179.75	13.315	18.55
14	269.2	7.4	87.8	175.1	70.1	259.3	84.3	21.2	9.866	2.159	29.21	12.43	57.97	3.175	4.427	180.5	13.27	18.9
15	269.5	7.5	89	176.75	71.75	260.25	85.25	21.5	9.785	2.1525	29.475	12.225	57.825	3.3125	4.4075	181.25	13.225	19.25
16	269.8	7.6	90.2	178.4	73.4	261.2	86.2	21.8	9.704	2.146	29.74	12.02	57.68	3.45	4.388	182	13.18	19.6
17	270.1	7.7	91.4	180.05	75.05	262.15	87.15	22.1	9.623	2.1395	30.005	11.815	57.535	3.5875	4.3685	182.75	13.135	19.95
18	270.4	7.8	92.6	181.7	76.7	263.1	88.1	22.4	9.542	2.133	30.27	11.61	57.39	3.725	4.349	183.5	13.09	20.3
19	270.7	7.9	93.8	183.35	78.35	264.05	89.05	22.7	9.461	2.1265	30.535	11.405	57.245	3.8625	4.3295	184.25	13.045	20.65
20	271	8	95	185	80	265	90	23	9.38	2.12	30.8	11.2	57.1	4	4.31	185	13	21

Note: C19-C36 represents, respectively : C19 Vertical jump touch height, C20 Core ventral bridge level 8, C21 1RM pull-out (kg), C22 Back muscle endurance, C23 1RM bench press, C24 Standing long jump, C25 1RM Squat (kg), C26 1min pull-ups, C27 3000m run, C28 800m run, C29 Seated forward bend (cm), C30 Cross fork (cm), C31 Shoulder rotation, C32 400m run (s), C33 30 m Sprint (s), C34 1min jump rope, C35 cross-shaped change direction run, C36 30s burpees.

APPENDIX Q

Results of individual scores of physical function indicators of Chinese female dragon boat athletes(unweighted)

Athletes	C15	C16	C17	C18
X1	9	12	11	9
X2	9	13	10	8
X3	9	13	10	8
X4	0	4	18	15
X5	20	20	3	1
X6	18	18	4	4
X7	3	9	15	12
X8	7	11	12	9
X9	14	14	7	6
X10	0	0	20	20
X11	7	11	13	9
X12	9	13	11	8
X13	3	9	16	13
X14	9	13	10	8
X15	12	14	9	7
X16	9	12	11	9

Athletes	C15	C16	C17	C18
X17	18	18	4	4
X18	12	14	8	6
X19	12	14	9	7
X20	12	14	8	7
X21	9	13	10	8
X22	7	11	13	10
X23	5	10	14	11
X24	14	14	8	6
X25	3	9	15	12
X26	0	6	17	15
X27	5	11	13	10
X28	9	12	11	8
X29	9	13	9	7
X30	7	11	13	9
X31	14	16	6	5
X32	9	12	11	8
X33	18	19	3	1
X34	0	7	16	14
X35	9	13	11	8

Athletes	C15	C16	C17	C18
X36	16	16	6	5
X37	0	7	16	14
X38	5	10	13	11
X39	12	14	9	7
X40	0	6	17	14
X41	5	10	14	12
X42	16	16	6	5
X43	3	9	14	12
X44	18	17	4	5
X45	0	3	18	16
X46	14	15	7	6
X47	20	20	3	1
X48	5	10	14	12
X49	18	17	5	5
X50	7	11	12	9
X51	18	18	3	4
X52	20	19	3	1
X53	18	16	5	5
X54	7	11	12	0

Athletes	C15	C16	C17	C18
X55	16	16	6	5
X56	0	8	16	13
X57	9	12	11	9
X58	14	16	7	6
X59	12	14	9	7
X60	18	16	5	5
X61	3	9	15	13
X62	14	14	8	6
X63	7	11	13	10
X64	16		6	5
X65	20	20	0	9
X66	3	9	15	13

Note: C15-C18 respectively represent:C15 Quiet heart rate (Time), C16 Heart Function Index (Time), C17 Maximal oxygen uptake (VVO2ma), C18 Maximum anaerobic power (W)

Results of individual scores of Sport Quality indicators of Chinese female dragon boat athletes (unweighted)

Athletes	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36
X1	11	11	9	5	4	6	9	11	10	8	12	7	12	10	11	11	9	12
X2	11	11	12	10	11	11	12	11	11	10	11	9	12	10	12	10	9	12
X3	11	11	5	1	1	2	6	11	12	11	10	9	8	16	8	17	12	20
X4	20	20	17	19	17	19	17	20	1	2	19	1	12	10	12	10	0	9
X5	0	0	12	10	10	11	12	14	20	19	1	6	13	9	12	9	7	9
X6	0	0	7	4	4	5	9	17	18	17	2	5	12	10	11	11	5	12
X7	17	20	17	19	17	18	17	7	6	4	16	11	18	3	17	2	14	0
X8	14	20	14	16	13	14	14	17	6	5	16	5	13	8	13	7	3	9
X9	7	0	6	4	2	3	8	7	18	17	2	10	13	9	12	9	12	9
X10	20	20	18	20	20	19	20	4	1	2	19	13	13	8	13	7	16	9
X11	14	0	9	5	5	7	9	14	15	14	5	6	12	9	12	10	7	9
X12	11	0	2	0	0	0	4	4	20	20	0	12	10	13	10	14	14	15
X13	17	20	14	16	14	14	14	0	6	5	15	13	15	6	14	5	16	6
X14	11	0	6	4	2	3	8	20	17	17	2	2	20	0	20	0	0	0
X15	7	20	16	19	16	18	17	11	3	2	17	7	8	15	8	17	9	18
X16	11	11	12	11	12	12	13	4	9	8	12	12	11	11	11	11	14	12
X17	0	0	9	5	5	6	9	17	15	14	5	4	14	7	14	6	0	6

Athletes	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36
X18	7	11	11	7	8	9	11	7	13	13	8	11	13	9	13	9	14	9
X19	7	0	6	4	4	4	8	20	17	16	2	1	16	5	15	3	0	3
X20	7	20	16	19	16	17	15	14	5	4	16	6	8	16	8	17	5	18
X21	11	11	10	6	7	7	10	11	15	13	7	7	14	8	13	7	9	9
X22	14	20	13	14	13	14	14	11	7	7	14	10	10	13	10	14	12	15
X23	14	20	14	16	14	14	14	0	6	5	15	18	9	14	9	15	18	15
X24	7	0	10	6	7	7	10	0	15	14	6	15	14	8	13	6	16	9
X25	17	20	15	17	14	15	15	17	6	5	16	5	9	14	9	15	3	18
X26	20	20	17	20	18	19	19	17	1	2	19	5	5	17	4	19	3	20
X27	14	20	14	16	13	14	14	0	7	5	14	14	10	13	9	14	16	15
X28	11	11	12	10	11	12	13	20	11	10	12	1	12	10	11	11	0	12
X29	11	11	11	8	9	9	11	7	12	11	10	12	13	9	12	9	14	9
X30	14	11	13	12	13	13	14	0	8	7	13	18	10	12	10	13	20	12
X31	7	11	12	10	11	12	13	17	15	14	4	5	14	6	14	6	5	6
X32	11	11	11	9	10	11	12	11	11	10	11	8	12	10	12	10	9	12
X33	0	11	11	9	9	10	12	0	19	17	1	16	18	3	18	2	18	0
X34	20	20	18	20	19	19	19	20	2	2	17	2	7	17	7	18	0	20
X35	11	0	3	1	0	0	5	11	11	10	11	8	12	10	12	10	9	12
X36	4	0	6	2	2	3	7	4	16	16	3	13	15	5	15	3	14	6

Athletes	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36
X37	20	20	15	18	15	15	15	20	2	2	17	2	8	17	7	17	0	20
X38	14	20	14	17	14	15	14	14	6	5	15	6	10	13	9	14	5	15
X39	7	0	11	7	8	9	11	7	13	13	7	10	13	8	13	9	12	9
X40	20	20	17	20	18	19	17	20	1	2	17	1	7	17	5	18	0	20
X41	17	0	14	16	14	15	14	17	6	5	16	5	9	14	9	15	3	18
X42	4	0	7	4	4	5	9	4	17	16	3	13	16	5	15	3	16	3
X43	17	11	13	12	13	13	13	14	8	7	13	6	11	12	11	13	7	12
X44	0	0	10	6	6	7	9	7	15	14	6	12	14	8	13	6	14	6
X45	20	20	20	20	20	20	20	20	0	0	20	0	0	20	0	20	0	20
X46	7	0	4	1	0	0	6	0	20	19	1	17	18	3	18	0	18	0
X47	0	0	6	4	3	4	8	0	17	16	2	13	16	5	16	2	16	3
X48	17	11	12	12	13	13	13	14	8	8	13	6	11	11	11	13	7	12
X49	0	0	9	5	4	5	9	4	15	16	4	12	14	6	14	5	14	6
X50	11	11	12	11	0	13	13	14	9	8	13	7	11	11	11	13	7	12
X51	0	0	5	1	1	2	6	0	19	17	1	16	18	3	18	2	18	0
X52	0	11	13	14	13	0	14	14	7	7	13	6	10	12	10	13	7	12
X53	4	11	11	0	10	11	12	11	11	10	11	8	12	9	12	10	9	9
X54	14	20	16	19	16	17	17	20	3	2	17	3	12	9	12	9	0	9
X55	4	11	11	9	10	11	12	11	11	10	11	9	4	18	4	19	9	20

Athletes	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36
X56	17	11	11	8	8	9	11	7	13	13	8	10	18	1	19	0	12	0
X57	11	11	12	10	11	12	0	11	10	8	12	7	17	3	16	2	9	0
X58	7	0	6	2	1	2	7	0	19	17	1	16	8	14	9	17	16	18
X59	7	11	10	6	7	8	10	7	14	13	7	11	9	14	9	15	12	18
X60	0	11	11	8	8	9	11	7	12	13	9	10	17	4	16	2	12	3
X61	17	11	10	7	7	8	11	7	14	13	7	11	3	19	3	19	12	20
X62	7	20	11	9	10	10	12	11	12	11	10	9	14	7	14	6	9	6
X63	14	11	14	15	13	14	14	14	7	7	14	6	20	0	20	0	7	0
X64	4	11	8	5	4	5	9	4	16	16	4	12	9	14	9	15	14	15
X65	0	11	0	10	12	13	13	0	20	20	0	20	16	4	16	2	20	3
X66	17	0	16	18	16	17	15	17	5	4	16	4	8	17	8	17	3	20

Note: C19-C36 respectively represent :C19 Vertical jump touch height, C20 Core ventral bridge level 8, C21 1RM pull-out (kg), C22 Back muscle endurance, C23 1RM bench press, C24 Standing long jump, C25 1RM Squat (kg), C26 1min pull-ups, C27 3000m run, C28 800m run, C29 Seated forward bend (cm), C30 Cross fork (cm), C31Shoulder rotation, C32 400m run (s), C33 30 m Sprint (s), C34 1min jump rope, C35 cross-shaped change direction run, C36 30s burpees

APPENDIX R

Results of individual scores of physical function indicators of Chinese female dragon boat athletes (weighted)

Athletes	C15	C16	C17	C18
X1	0.0604	0.7251	1.2308	0.2014
X2	0.0604	0.7855	1.1190	0.1790
X3	0.0604	0.7855	1.1190	0.1790
X4	0.0000	0.2417	2.0141	0.3357
X5	0.1343	1.2085	0.3357	0.0224
X6	0.1208	1.0876	0.4476	0.0895
X7	0.0201	0.5438	1.6784	0.2685
X8	0.0470	0.6647	1.3427	0.2014
X9	0.0940	0.8459	0.7833	0.1343
X10	0.0000	0.0000	2.2379	0.4476
X11	0.0470	0.6647	1.4546	0.2014
X12	0.0604	0.7855	1.2308	0.1790
X13	0.0201	0.5438	1.7903	0.2909
X14	0.0604	0.7855	1.1190	0.1790
X15	0.0806	0.8459	1.0071	0.1567

Athletes	C15	C16	C17	C18
X16	0.0604	0.7251	1.2308	0.2014
X17	0.1208	1.0876	0.4476	0.0895
X18	0.0806	0.8459	0.8952	0.1343
X19	0.0806	0.8459	1.0071	0.1567
X20	0.0806	0.8459	0.8952	0.1567
X21	0.0604	0.7855	1.1190	0.1790
X22	0.0470	0.6647	1.4546	0.2238
X23	0.0336	0.6042	1.5665	0.2462
X24	0.0940	0.8459	0.8952	0.1343
X25	0.0201	0.5438	1.6784	0.2685
X26	0.0000	0.3625	1.9022	0.3357
X27	0.0336	0.6647	1.4546	0.2238
X28	0.0604	0.7251	1.2308	0.1790
X29	0.0604	0.7855	1.0071	0.1567
X30	0.0470	0.6647	1.4546	0.2014
X31	0.0940	0.9668	0.6714	0.1119
X32	0.0604	0.7251	1.2308	0.1790
X33	0.1208	1.1480	0.3357	0.0224

Athletes	C15	C16	C17	C18
X34	0.0000	0.4230	1.7903	0.3133
X35	0.0604	0.7855	1.2308	0.1790
X36	0.1074	0.9668	0.6714	0.1119
X37	0.0000	0.4230	1.7903	0.3133
X38	0.0336	0.6042	1.4546	0.2462
X39	0.0806	0.8459	1.0071	0.1567
X40	0.0000	0.3625	1.9022	0.3133
X41	0.0336	0.6042	1.5665	0.2685
X42	0.1074	0.9668	0.6714	0.1119
X43	0.0201	0.5438	1.5665	0.2685
X44	0.1208	1.0272	0.4476	0.1119
X45	0.0000	0.1813	2.0141	0.3581
X46	0.0940	0.9063	0.7833	0.1343
X47	0.1343	1.2085	0.3357	0.0224
X48	0.0336	0.6042	1.5665	0.2685
X49	0.1208	1.0272	0.5595	0.1119
X50	0.0470	0.6647	1.3427	0.2014
X51	0.1208	1.0876	0.3357	0.0895

Athletes	C15	C16	C17	C18
X52	0.1343	1.1480	0.3357	0.0224
X53	0.1208	0.9668	0.5595	0.1119
X54	0.0470	0.6647	1.3427	0.0000
X55	0.1074	0.9668	0.6714	0.1119
X56	0.0000	0.4834	1.7903	0.2909
X57	0.0604	0.7251	1.2308	0.2014
X58	0.0940	0.9668	0.7833	0.1343
X59	0.0806	0.8459	1.0071	0.1567
X60	0.1208	0.9668	0.5595	0.1119
X61	0.0201	0.5438	1.6784	0.2909
X62	0.0940	0.8459	0.8952	0.1343
X63	0.0470	0.6647	1.4546	0.2238
X64	0.1074	0.9668	0.6714	0.1119
X65	0.1343	1.2085	0.0000	0.2014
X66	0.0201	0.5438	1.6784	0.2909

Note: C15-C18 respectively represent:C15 Quiet heart rate (Time), C16 Heart Function Index (Time), C17 Maximal oxygen uptake (VVO2ma), C18 Maximum anaerobic power (W)

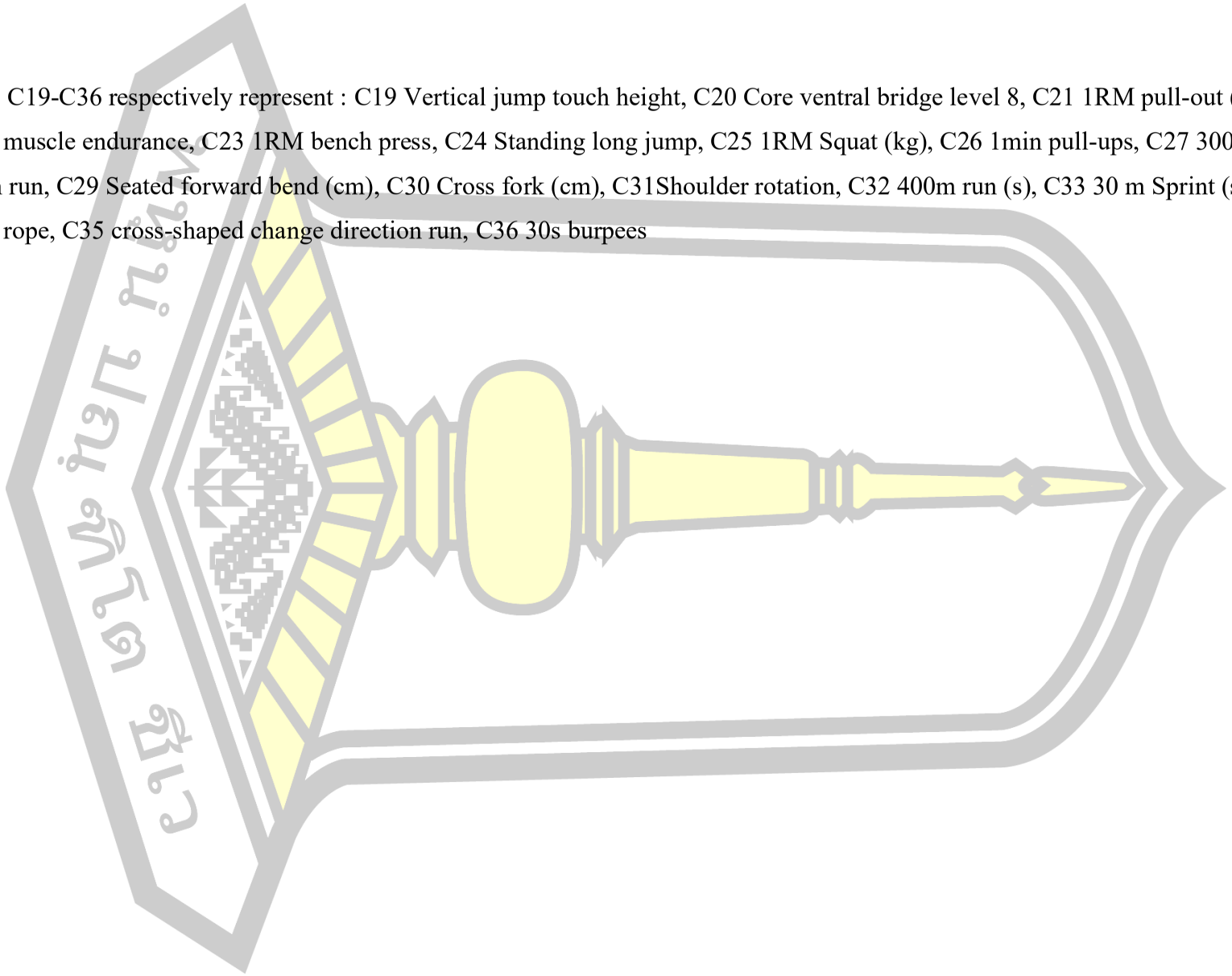
Results of individual scores of Sport Quality indicators of Chinese female dragon boat athletes (weighted)

Athletes	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36
X1	0.1003	0.7662	0.8527	0.1262	0.0556	0.0607	0.4440	0.1911	1.1881	0.4752	0.2373	0.0305	0.2220	0.0760	1.0175	0.1328	0.0491	0.6322
X2	0.1003	0.7662	1.1369	0.2524	0.1530	0.1114	0.5920	0.1911	1.3069	0.5940	0.2175	0.0392	0.2220	0.0760	1.1100	0.1207	0.0491	0.6322
X3	0.1003	0.7662	0.4737	0.0252	0.0139	0.0202	0.2960	0.1911	1.4257	0.6534	0.1977	0.0392	0.1480	0.1216	0.7400	0.2053	0.0655	1.0536
X4	0.1824	1.3930	1.6106	0.4796	0.2365	0.1923	0.8387	0.3474	0.1188	0.1188	0.3757	0.0044	0.2220	0.0760	1.1100	0.1207	0.0000	0.4741
X5	0.0000	0.0000	1.1369	0.2524	0.1391	0.1114	0.5920	0.2432	2.3762	1.1287	0.0198	0.0261	0.2405	0.0684	1.1100	0.1087	0.0382	0.4741
X6	0.0000	0.0000	0.6632	0.1010	0.0556	0.0506	0.4440	0.2953	2.1386	1.0099	0.0395	0.0218	0.2220	0.0760	1.0175	0.1328	0.0273	0.6322
X7	0.1550	1.3930	1.6106	0.4796	0.2365	0.1822	0.8387	0.1216	0.7129	0.2376	0.3164	0.0479	0.3330	0.0228	1.5725	0.0241	0.0764	0.0000
X8	0.1277	1.3930	1.3264	0.4039	0.1809	0.1417	0.6907	0.2953	0.7129	0.2970	0.3164	0.0218	0.2405	0.0608	1.2025	0.0845	0.0164	0.4741
X9	0.0638	0.0000	0.5684	0.1010	0.0278	0.0304	0.3947	0.1216	2.1386	1.0099	0.0395	0.0436	0.2405	0.0684	1.1100	0.1087	0.0655	0.4741
X10	0.1824	1.3930	1.7053	0.5048	0.2782	0.1923	0.9867	0.0695	0.1188	0.1188	0.3757	0.0566	0.2405	0.0608	1.2025	0.0845	0.0873	0.4741
X11	0.1277	0.0000	0.8527	0.1262	0.0696	0.0709	0.4440	0.2432	1.7821	0.8317	0.0989	0.0261	0.2220	0.0684	1.1100	0.1207	0.0382	0.4741
X12	0.1003	0.0000	0.1895	0.0000	0.0000	0.0000	0.1973	0.0695	2.3762	1.1881	0.0000	0.0523	0.1850	0.0988	0.9250	0.1690	0.0764	0.7902
X13	0.1550	1.3930	1.3264	0.4039	0.1948	0.1417	0.6907	0.0000	0.7129	0.2970	0.2966	0.0566	0.2775	0.0456	1.2950	0.0604	0.0873	0.3161
X14	0.1003	0.0000	0.5684	0.1010	0.0278	0.0304	0.3947	0.3474	2.0198	1.0099	0.0395	0.0087	0.3700	0.0000	1.8500	0.0000	0.0000	0.0000
X15	0.0638	1.3930	1.5158	0.4796	0.2226	0.1822	0.8387	0.1911	0.3564	0.1188	0.3361	0.0305	0.1480	0.1140	0.7400	0.2053	0.0491	0.9483
X16	0.1003	0.7662	1.1369	0.2776	0.1669	0.1215	0.6414	0.0695	1.0693	0.4752	0.2373	0.0523	0.2035	0.0836	1.0175	0.1328	0.0764	0.6322
X17	0.0000	0.0000	0.8527	0.1262	0.0696	0.0607	0.4440	0.2953	1.7821	0.8317	0.0989	0.0174	0.2590	0.0532	1.2950	0.0724	0.0000	0.3161
X18	0.0638	0.7662	1.0421	0.1767	0.1113	0.0911	0.5427	0.1216	1.5445	0.7723	0.1582	0.0479	0.2405	0.0684	1.2025	0.1087	0.0764	0.4741
X19	0.0638	0.0000	0.5684	0.1010	0.0556	0.0405	0.3947	0.3474	2.0198	0.9505	0.0395	0.0044	0.2960	0.0380	1.3875	0.0362	0.0000	0.1580
X20	0.0638	1.3930	1.5158	0.4796	0.2226	0.1721	0.7400	0.2432	0.5940	0.2376	0.3164	0.0261	0.1480	0.1216	0.7400	0.2053	0.0273	0.9483

Athletes	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36
X21	0.1003	0.7662	0.9474	0.1514	0.0974	0.0709	0.4934	0.1911	1.7821	0.7723	0.1384	0.0305	0.2590	0.0608	1.2025	0.0845	0.0491	0.4741
X22	0.1277	1.3930	1.2316	0.3534	0.1809	0.1417	0.6907	0.1911	0.8317	0.4158	0.2768	0.0436	0.1850	0.0988	0.9250	0.1690	0.0655	0.7902
X23	0.1277	1.3930	1.3264	0.4039	0.1948	0.1417	0.6907	0.0000	0.7129	0.2970	0.2966	0.0784	0.1665	0.1064	0.8325	0.1811	0.0982	0.7902
X24	0.0638	0.0000	0.9474	0.1514	0.0974	0.0709	0.4934	0.0000	1.7821	0.8317	0.1186	0.0653	0.2590	0.0608	1.2025	0.0724	0.0873	0.4741
X25	0.1550	1.3930	1.4211	0.4291	0.1948	0.1519	0.7400	0.2953	0.7129	0.2970	0.3164	0.0218	0.1665	0.1064	0.8325	0.1811	0.0164	0.9483
X26	0.1824	1.3930	1.6106	0.5048	0.2504	0.1923	0.9374	0.2953	0.1188	0.1188	0.3757	0.0218	0.0925	0.1292	0.3700	0.2294	0.0164	1.0536
X27	0.1277	1.3930	1.3264	0.4039	0.1809	0.1417	0.6907	0.0000	0.8317	0.2970	0.2768	0.0610	0.1850	0.0988	0.8325	0.1690	0.0873	0.7902
X28	0.1003	0.7662	1.1369	0.2524	0.1530	0.1215	0.6414	0.3474	1.3069	0.5940	0.2373	0.0044	0.2220	0.0760	1.0175	0.1328	0.0000	0.6322
X29	0.1003	0.7662	1.0421	0.2019	0.1252	0.0911	0.5427	0.1216	1.4257	0.6534	0.1977	0.0523	0.2405	0.0684	1.1100	0.1087	0.0764	0.4741
X30	0.1277	0.7662	1.2316	0.3029	0.1809	0.1316	0.6907	0.0000	0.9505	0.4158	0.2570	0.0784	0.1850	0.0912	0.9250	0.1570	0.1092	0.6322
X31	0.0638	0.7662	1.1369	0.2524	0.1530	0.1215	0.6414	0.2953	1.7821	0.8317	0.0791	0.0218	0.2590	0.0456	1.2950	0.0724	0.0273	0.3161
X32	0.1003	0.7662	1.0421	0.2272	0.1391	0.1114	0.5920	0.1911	1.3069	0.5940	0.2175	0.0348	0.2220	0.0760	1.1100	0.1207	0.0491	0.6322
X33	0.0000	0.7662	1.0421	0.2272	0.1252	0.1012	0.5920	0.0000	2.2574	1.0099	0.0198	0.0697	0.3330	0.0228	1.6650	0.0241	0.0982	0.0000
X34	0.1824	1.3930	1.7053	0.5048	0.2643	0.1923	0.9374	0.3474	0.2376	0.1188	0.3361	0.0087	0.1295	0.1292	0.6475	0.2173	0.0000	1.0536
X35	0.1003	0.0000	0.2842	0.0252	0.0000	0.0000	0.2467	0.1911	1.3069	0.5940	0.2175	0.0348	0.2220	0.0760	1.1100	0.1207	0.0491	0.6322
X36	0.0365	0.0000	0.5684	0.0505	0.0278	0.0304	0.3453	0.0695	1.9009	0.9505	0.0593	0.0566	0.2775	0.0380	1.3875	0.0362	0.0764	0.3161
X37	0.1824	1.3930	1.4211	0.4543	0.2087	0.1519	0.7400	0.3474	0.2376	0.1188	0.3361	0.0087	0.1480	0.1292	0.6475	0.2053	0.0000	1.0536
X38	0.1277	1.3930	1.3264	0.4291	0.1948	0.1519	0.6907	0.2432	0.7129	0.2970	0.2966	0.0261	0.1850	0.0988	0.8325	0.1690	0.0273	0.7902
X39	0.0638	0.0000	1.0421	0.1767	0.1113	0.0911	0.5427	0.1216	1.5445	0.7723	0.1384	0.0436	0.2405	0.0608	1.2025	0.1087	0.0655	0.4741
X40	0.1824	1.3930	1.6106	0.5048	0.2504	0.1923	0.8387	0.3474	0.1188	0.1188	0.3361	0.0044	0.1295	0.1292	0.4625	0.2173	0.0000	1.0536
X41	0.1550	0.0000	1.3264	0.4039	0.1948	0.1519	0.6907	0.2953	0.7129	0.2970	0.3164	0.0218	0.1665	0.1064	0.8325	0.1811	0.0164	0.9483
X42	0.0365	0.0000	0.6632	0.1010	0.0556	0.0506	0.4440	0.0695	2.0198	0.9505	0.0593	0.0566	0.2960	0.0380	1.3875	0.0362	0.0873	0.1580
X43	0.1550	0.7662	1.2316	0.3029	0.1809	0.1316	0.6414	0.2432	0.9505	0.4158	0.2570	0.0261	0.2035	0.0912	1.0175	0.1570	0.0382	0.6322

Athletes	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36
X44	0.0000	0.0000	0.9474	0.1514	0.0835	0.0709	0.4440	0.1216	1.7821	0.8317	0.1186	0.0523	0.2590	0.0608	1.2025	0.0724	0.0764	0.3161
X45	0.1824	1.3930	1.8948	0.5048	0.2782	0.2025	0.9867	0.3474	0.0000	0.0000	0.3954	0.0000	0.0000	0.1520	0.0000	0.2415	0.0000	1.0536
X46	0.0638	0.0000	0.3790	0.0252	0.0000	0.0000	0.2960	0.0000	2.3762	1.1287	0.0198	0.0740	0.3330	0.0228	1.6650	0.0000	0.0982	0.0000
X47	0.0000	0.0000	0.5684	0.1010	0.0417	0.0405	0.3947	0.0000	2.0198	0.9505	0.0395	0.0566	0.2960	0.0380	1.4800	0.0241	0.0873	0.1580
X48	0.1550	0.7662	1.1369	0.3029	0.1809	0.1316	0.6414	0.2432	0.9505	0.4752	0.2570	0.0261	0.2035	0.0836	1.0175	0.1570	0.0382	0.6322
X49	0.0000	0.0000	0.8527	0.1262	0.0556	0.0506	0.4440	0.0695	1.7821	0.9505	0.0791	0.0523	0.2590	0.0456	1.2950	0.0604	0.0764	0.3161
X50	0.1003	0.7662	1.1369	0.2776	0.0000	0.1316	0.6414	0.2432	1.0693	0.4752	0.2570	0.0305	0.2035	0.0836	1.0175	0.1570	0.0382	0.6322
X51	0.0000	0.0000	0.4737	0.0252	0.0139	0.0202	0.2960	0.0000	2.2574	1.0099	0.0198	0.0697	0.3330	0.0228	1.6650	0.0241	0.0982	0.0000
X52	0.0000	0.7662	1.2316	0.3534	0.1809	0.0000	0.6907	0.2432	0.8317	0.4158	0.2570	0.0261	0.1850	0.0912	0.9250	0.1570	0.0382	0.6322
X53	0.0365	0.7662	1.0421	0.0000	0.1391	0.1114	0.5920	0.1911	1.3069	0.5940	0.2175	0.0348	0.2220	0.0684	1.1100	0.1207	0.0491	0.4741
X54	0.1277	1.3930	1.5158	0.4796	0.2226	0.1721	0.8387	0.3474	0.3564	0.1188	0.3361	0.0131	0.2220	0.0684	1.1100	0.1087	0.0000	0.4741
X55	0.0365	0.7662	1.0421	0.2272	0.1391	0.1114	0.5920	0.1911	1.3069	0.5940	0.2175	0.0392	0.0740	0.1368	0.3700	0.2294	0.0491	1.0536
X56	0.1550	0.7662	1.0421	0.2019	0.1113	0.0911	0.5427	0.1216	1.5445	0.7723	0.1582	0.0436	0.3330	0.0076	1.7575	0.0000	0.0655	0.0000
X57	0.1003	0.7662	1.1369	0.2524	0.1530	0.1215	0.0000	0.1911	1.1881	0.4752	0.2373	0.0305	0.3145	0.0228	1.4800	0.0241	0.0491	0.0000
X58	0.0638	0.0000	0.5684	0.0505	0.0139	0.0202	0.3453	0.0000	2.2574	1.0099	0.0198	0.0697	0.1480	0.1064	0.8325	0.2053	0.0873	0.9483
X59	0.0638	0.7662	0.9474	0.1514	0.0974	0.0810	0.4934	0.1216	1.6633	0.7723	0.1384	0.0479	0.1665	0.1064	0.8325	0.1811	0.0655	0.9483
X60	0.0000	0.7662	1.0421	0.2019	0.1113	0.0911	0.5427	0.1216	1.4257	0.7723	0.1779	0.0436	0.3145	0.0304	1.4800	0.0241	0.0655	0.1580
X61	0.1550	0.7662	0.9474	0.1767	0.0974	0.0810	0.5427	0.1216	1.6633	0.7723	0.1384	0.0479	0.0555	0.1444	0.2775	0.2294	0.0655	1.0536
X62	0.0638	1.3930	1.0421	0.2272	0.1391	0.1012	0.5920	0.1911	1.4257	0.6534	0.1977	0.0392	0.2590	0.0532	1.2950	0.0724	0.0491	0.3161
X63	0.1277	0.7662	1.3264	0.3786	0.1809	0.1417	0.6907	0.2432	0.8317	0.4158	0.2768	0.0261	0.3700	0.0000	1.8500	0.0000	0.0382	0.0000
X64	0.0365	0.7662	0.7579	0.1262	0.0556	0.0506	0.4440	0.0695	1.9009	0.9505	0.0791	0.0523	0.1665	0.1064	0.8325	0.1811	0.0764	0.7902
X65	0.0000	0.7662	0.0000	0.2524	0.1669	0.1316	0.6414	0.0000	2.3762	1.1881	0.0000	0.0871	0.2960	0.0304	1.4800	0.0241	0.1092	0.1580
X66	0.1550	0.0000	1.5158	0.4543	0.2226	0.1721	0.7400	0.2953	0.5940	0.2376	0.3164	0.0174	0.1480	0.1292	0.7400	0.2053	0.0164	1.0536

Note: C19-C36 respectively represent : C19 Vertical jump touch height, C20 Core ventral bridge level 8, C21 1RM pull-out (kg), C22 Back muscle endurance, C23 1RM bench press, C24 Standing long jump, C25 1RM Squat (kg), C26 1min pull-ups, C27 3000m run, C28 800m run, C29 Seated forward bend (cm), C30 Cross fork (cm), C31Shoulder rotation, C32 400m run (s), C33 30 m Sprint (s), C34 1min jump rope, C35 cross-shaped change direction run, C36 30s burpees



APPENDIX S

Chinese female dragon boat athletes physical evaluation indicators test record

Name		Age	
Training years		Education	
From which dragon boat team		Occupation	

Body Shape indicators	**Grade**	Sport Quality indicators	**Grade**
C1Upper extremity length (cm)		C19 Vertical jump touch height (cm)	
C2 Calf length (cm)		C20 Core ventral bridge level 8 (level)	
C3 Arm span(cm)		C21 1RM pull-out (kg)	
C4 Lower limb length (cm)		C22 Back muscle endurance(s)	
C5 Shoulder width (cm)		C23 1RM bench press(kg)	
C6 Hip width (cm)		C24 Standing long jump(cm)	
C7 Upper arm tension (cm)		C25 1RM Squat (kg)	
C8 Calf circumference (cm)		C26 1min pull-ups(kg)	
C9 Waist circumference (cm)		C27 3000m run(min)	
C10 Thigh circumference (cm)		C28 800m run(min)	
C11 Chest circumference(cm)		C29 Seated forward bend (cm)	
C12Height (cm)		C30 Cross fork(cm)	
C13 Body fat percentage (%)		C31Shoulder rotation(cm)	
C14 The Ketole index(kg\cm)		C32 400m run(s)	
		C33 30 m Sprint (s)	
Physical Function indicators	**Grade**	C34 1min jump rope(time)	
C15 Quiet heart rate(min)		C35 cross-shaped change direction run (s)	
C16 Heart Function Index (L\min\m^2)		C36 30s burpees(time)	
C17 Maximal oxygen uptake ml\cm\kg)			
C18 Maximum anaerobic power (W)			

APPENDIX T

Monoidal score Results of Body shape indicators of Chinese female Dragon Boat athletes (weight)

Athletes	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
X1	0.4331	0.0497	0.2009	0.1257	0.0255	0.0275	0.0451	0.0118	0.0360	0.0237	0.0086	0.0094	0.1446	0.0442
X2	0.4331	0.0398	0.1786	0.1257	0.0373	0.0314	0.0401	0.0118	0.0324	0.0218	0.0086	0.0169	0.1927	0.0221
X3	0.4331	0.0398	0.1563	0.1257	0.0236	0.0275	0.0401	0.0107	0.0324	0.0218	0.0086	0.0056	0.0482	0.0995
X4	0.7363	0.0994	0.4465	0.1741	0.0216	0.0314	0.0752	0.0201	0.0720	0.0346	0.0144	0.0375	0.1566	0.0387
X5	0.5197	0.0000	0.0000	0.0387	0.0255	0.0432	0.0150	0.0036	0.0000	0.0055	0.0108	0.0000	0.1084	0.0774
X6	0.5197	0.0099	0.0000	0.0774	0.0059	0.0196	0.0251	0.0071	0.0072	0.0109	0.0108	0.0000	0.0964	0.0829
X7	0.3465	0.0795	0.3572	0.1547	0.0353	0.0000	0.0551	0.0154	0.0540	0.0309	0.0065	0.0319	0.1566	0.0387
X8	0.5630	0.0994	0.2456	0.1451	0.0334	0.0510	0.0551	0.0154	0.0540	0.0291	0.0130	0.0281	0.0843	0.0829
X9	0.3898	0.0646	0.0893	0.0774	0.0079	0.0196	0.0251	0.0083	0.0072	0.0109	0.0065	0.0056	0.2048	0.0166
X10	0.2599	0.0497	0.4465	0.1741	0.0393	0.0746	0.0852	0.0213	0.0720	0.0364	0.0043	0.0375	0.0120	0.1106
X11	0.4764	0.0447	0.0000	0.1064	0.0157	0.0236	0.0351	0.0095	0.0180	0.0182	0.0108	0.0094	0.1686	0.0332
X12	0.3032	0.0199	0.0446	0.0290	0.0020	0.0079	0.0050	0.0036	0.0000	0.0036	0.0065	0.0000	0.2409	0.0055
X13	0.2599	0.0895	0.2456	0.1451	0.0314	0.0510	0.0551	0.0154	0.0504	0.0291	0.0043	0.0281	0.0964	0.0829
X14	0.6063	0.0646	0.0670	0.0870	0.0079	0.0196	0.0251	0.0083	0.0072	0.0127	0.0130	0.0056	0.1927	0.0166
X15	0.4764	0.0199	0.2456	0.1644	0.0373	0.0510	0.0601	0.0166	0.0612	0.0328	0.0086	0.0356	0.0482	0.0995
X16	0.3465	0.0547	0.3125	0.1354	0.0275	0.0353	0.0451	0.0118	0.0360	0.0237	0.0065	0.0244	0.1205	0.0719

Athletes	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
X17	0.5630	0.0348	0.2009	0.0967	0.0157	0.0236	0.0351	0.0095	0.0180	0.0164	0.0130	0.0206	0.1807	0.0332
X18	0.3465	0.0646	0.1563	0.1161	0.0216	0.0275	0.0351	0.0107	0.0252	0.0200	0.0065	0.0169	0.1325	0.0663
X19	0.6929	0.0348	0.0446	0.0870	0.0079	0.0196	0.0251	0.0083	0.0108	0.0146	0.0144	0.0169	0.1446	0.0553
X20	0.5197	0.0795	0.3795	0.1547	0.0353	0.0510	0.0601	0.0166	0.0612	0.0309	0.0108	0.0319	0.1446	0.0498
X21	0.4331	0.0348	0.1339	0.1161	0.0177	0.0275	0.0351	0.0095	0.0252	0.0182	0.0086	0.0131	0.1205	0.0719
X22	0.4331	0.0596	0.2902	0.1354	0.0294	0.0432	0.0501	0.0130	0.0468	0.0273	0.0086	0.0281	0.1807	0.0332
X23	0.1732	0.0000	0.3125	0.1451	0.0314	0.0471	0.0551	0.0142	0.0504	0.0291	0.0022	0.0281	0.1325	0.0663
X24	0.2599	0.0696	0.0893	0.1161	0.0157	0.0275	0.0351	0.0095	0.0216	0.0182	0.0022	0.0131	0.0602	0.0885
X25	0.5630	0.0149	0.3572	0.1547	0.0334	0.0510	0.0551	0.0154	0.0540	0.0309	0.0130	0.0319	0.0602	0.0829
X26	0.5630	0.0845	0.4241	0.1741	0.0393	0.0589	0.0752	0.0201	0.0720	0.0346	0.0130	0.0375	0.0241	0.1106
X27	0.2599	0.0497	0.3572	0.1451	0.0314	0.0432	0.0501	0.0142	0.0468	0.0273	0.0022	0.0281	0.1084	0.0774
X28	0.8229	0.0149	0.0000	0.1257	0.0255	0.0353	0.0451	0.0118	0.0360	0.0237	0.0144	0.0206	0.1325	0.0663
X29	0.3465	0.0398	0.4465	0.1161	0.0236	0.0314	0.0401	0.0107	0.0324	0.0218	0.0065	0.0169	0.1446	0.0498
X30	0.1299	0.0547	0.2679	0.1354	0.0294	0.0393	0.0451	0.0130	0.0396	0.0273	0.0022	0.0244	0.0241	0.1106
X31	0.5197	0.0248	0.0893	0.0967	0.0157	0.0236	0.0351	0.0095	0.0108	0.0164	0.0108	0.0094	0.2409	0.0055
X32	0.4331	0.0447	0.2009	0.1257	0.0255	0.0314	0.0451	0.0118	0.0360	0.0237	0.0086	0.0206	0.2048	0.0166
X33	0.1732	0.0050	0.0000	0.0677	0.0039	0.0157	0.0150	0.0059	0.0000	0.0073	0.0022	0.0000	0.2289	0.0111
X34	0.6496	0.0895	0.0000	0.1741	0.0373	0.0550	0.0652	0.0178	0.0648	0.0328	0.0144	0.0356	0.0361	0.1050
X35	0.4331	0.0298	0.2679	0.1257	0.0255	0.0314	0.0451	0.0118	0.0324	0.0218	0.0086	0.0206	0.1325	0.0608

Athletes	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
X36	0.3032	0.0298	0.1786	0.0870	0.0098	0.0196	0.0301	0.0083	0.0108	0.0146	0.0043	0.0094	0.1927	0.0276
X37	0.6063	0.0348	0.4018	0.1644	0.0373	0.0550	0.0601	0.0178	0.0648	0.0328	0.0130	0.0356	0.0361	0.1050
X38	0.5197	0.0795	0.3125	0.1451	0.0314	0.0471	0.0551	0.0142	0.0504	0.0273	0.0108	0.0281	0.1084	0.0774
X39	0.3898	0.0348	0.1339	0.1161	0.0216	0.0275	0.0351	0.0107	0.0252	0.0200	0.0065	0.0169	0.1446	0.0442
X40	0.6496	0.0895	0.4241	0.1741	0.0393	0.0589	0.0702	0.0189	0.0684	0.0346	0.0144	0.0375	0.0241	0.1106
X41	0.5197	0.0696	0.3125	0.1451	0.0334	0.0510	0.0551	0.0154	0.0504	0.0291	0.0108	0.0281	0.0843	0.0829
X42	0.2599	0.0745	0.0446	0.0870	0.0079	0.0196	0.0301	0.0083	0.0108	0.0146	0.0043	0.0094	0.1927	0.0276
X43	0.4764	0.0099	0.3125	0.1354	0.0275	0.0393	0.0451	0.0130	0.0396	0.0255	0.0108	0.0244	0.1205	0.0719
X44	0.3465	0.0994	0.0446	0.1064	0.0157	0.0275	0.0351	0.0095	0.0216	0.0182	0.0065	0.0131	0.1686	0.0332
X45	0.8662	0.0994	0.4018	0.1934	0.0393	0.0785	0.1002	0.0237	0.0720	0.0364	0.0144	0.0169	0.0000	0.1106
X46	0.1732	0.0050	0.2456	0.0677	0.0039	0.0118	0.0150	0.0047	0.0000	0.0073	0.0022	0.0169	0.2289	0.0055
X47	0.2599	0.0149	0.0893	0.0870	0.0079	0.0196	0.0251	0.0083	0.0108	0.0127	0.0043	0.0169	0.1927	0.0166
X48	0.4764	0.0547	0.1339	0.1354	0.0275	0.0393	0.0451	0.0130	0.0396	0.0255	0.0086	0.0094	0.1205	0.0719
X49	0.3032	0.0248	0.0893	0.0967	0.0118	0.0236	0.0301	0.0095	0.0108	0.0164	0.0065	0.0244	0.1807	0.0332
X50	0.4764	0.0547	0.0000	0.1354	0.0275	0.0393	0.0451	0.0130	0.0360	0.0255	0.0086	0.0244	0.1205	0.0719
X51	0.2599	0.0050	0.4018	0.0677	0.0059	0.0510	0.0200	0.0071	0.0000	0.0091	0.0022	0.0000	0.2048	0.0111
X52	0.5197	0.0547	0.2009	0.1354	0.0294	0.0432	0.0501	0.0130	0.0396	0.0273	0.0000	0.0244	0.1205	0.0774
X53	0.4331	0.0398	0.0670	0.1257	0.0255	0.0314	0.0401	0.0118	0.0000	0.0218	0.0086	0.0206	0.1325	0.0608
X54	0.5630	0.0000	0.4018	0.1547	0.0236	0.0510	0.0601	0.0166	0.0612	0.0328	0.0130	0.0319	0.0482	0.0995

Athletes	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
X55	0.4331	0.0398	0.1786	0.1257	0.0236	0.0314	0.0401	0.0118	0.0324	0.0218	0.0086	0.0169	0.1446	0.0608
X56	0.3898	0.0348	0.1563	0.1161	0.0393	0.0275	0.0000	0.0000	0.0252	0.0200	0.0065	0.0169	0.1446	0.0498
X57	0.4764	0.0497	0.2009	0.0000	0.0039	0.0353	0.0451	0.0118	0.0360	0.0237	0.0086	0.0244	0.1325	0.0719
X58	0.0000	0.0099	0.0000	0.0774	0.0059	0.0157	0.0251	0.0071	0.0072	0.0109	0.0022	0.0000	0.2048	0.0111
X59	0.3465	0.0348	0.1339	0.1161	0.0177	0.0353	0.0351	0.0095	0.0252	0.0182	0.0065	0.0375	0.1566	0.0387
X60	0.4331	0.0398	0.1563	0.1161	0.0216	0.0314	0.0401	0.0107	0.0324	0.0200	0.0065	0.0000	0.1446	0.0498
X61	0.3898	0.0348	0.1339	0.1161	0.0177	0.0314	0.0351	0.0107	0.0252	0.0200	0.0065	0.0056	0.1446	0.0442
X62	0.4331	0.0398	0.1563	0.1257	0.0236	0.0628	0.0401	0.0107	0.0324	0.0218	0.0086	0.0169	0.1446	0.0553
X63	0.5197	0.0596	0.2902	0.1354	0.0314	0.0118	0.0501	0.0130	0.0468	0.0273	0.0108	0.0281	0.1084	0.0774
X64	0.3032	0.0248	0.0670	0.0967	0.0118	0.0157	0.0301	0.0095	0.0108	0.0146	0.0043	0.0094	0.1807	0.0276
X65	0.2599	0.0845	0.0000	0.1257	0.0000	0.0157	0.0401	0.0107	0.0324	0.0000	0.0108	0.0000	0.2409	0.0000
X66	0.5630	0.0795	0.3572	0.1547	0.0353	0.0510	0.0551	0.0154	0.0612	0.0309	0.0130	0.0319	0.0602	0.0885

Note: C1-C14 respectively represent respectively:C1Height (cm), C2 Calf length (cm), C3 Arm span(cm), C4 Lower limb length (cm), C5 Shoulder width (cm), C6 Hip width (cm), C7 Upper arm tension (cm), C8 Calf circumference (cm), C9 Waist circumference (cm), C10 Thigh circumference (cm), C11 Chest circumference (cm), C12Height (cm), C13 Body fat percentage (%), C14 The Ketole indicators.

APPENDIX U

Test rules and methods of physical evaluation indicators for Chinese female dragon boat athletes

(Sports measurement and evaluation，Sun qingzhu,sun Jinhai chen peiyou, 2022)

一、Body shape test

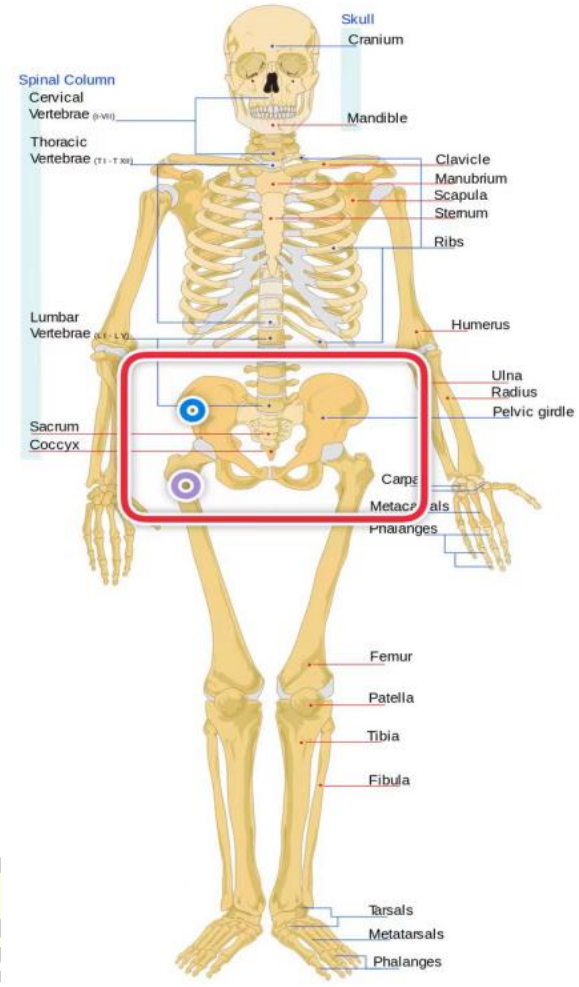


Diagram of human bone structure

1. Upper extremity length (cm)

Test instruments ：Straight steel rule, corrected with standard steel rule before use, error per meter can not exceed 0.2 cm.

Test venue：Indoor or outdoor testing

Measuring method：The subject stands naturally with feet shoulder-width apart, arms straight and down, fingers together. The tester stands behind the right side of the subject, and the fixed end of the ruler is aligned with the middle point of the outer edge of the acromion, and then moves the vernier so that it colliding with the middle fingertip to measure the linear distance from the acromion point to the middle fingertip point. It is recorded in centimeters, accurate to one decimal place, and the test error must not exceed 0.5 cm (Nguyen Van Duc, 2008).As shown in Figure 1:

Figure 1 Upper extremity length

2. Calf length（cm）

Test instruments ：Straight steel rule, corrected with standard steel rule before use, error per meter can not exceed 0.2 cm.

Test venue：Indoor or outdoor testing

Measuring method: the vertical distance between the winning point and the inner spot at 90 degrees (Jin Zongqiang, 2004; He Qiang, 2010). Distance from point A， as shown in Figure 2 ：

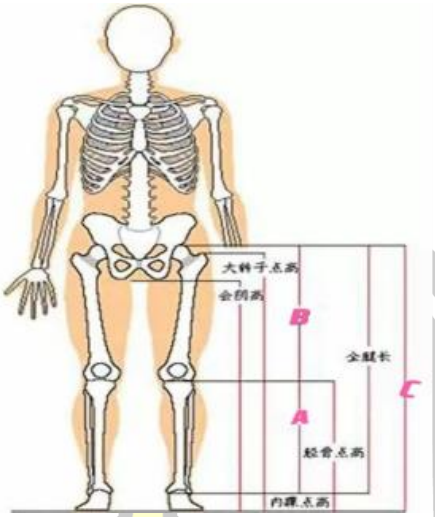


Figure 2 calf length

3. Arm span(cm)

Test instruments ：Straight steel rule, corrected with standard steel rule before use, error per meter can not exceed 0.2 cm.

Test venue：Indoor or outdoor testing

Measuring method: Arm span, also known as finger distance, The linear distance between the fingertips of the two middle fingers when the two arms are extended horizontally to the maximum (Xi Huanjiu, Chen Zhao, 2010; National Standard, 1984). First of all, the measuring ruler should be fixed on a platform that can move up and down. Then, the client's feet should be separated naturally, should-width apart, the left arm should be raised horizontally to the left side, perpendicular to the body, and the body should be close to the measuring platform. The client should fix the zero position of the measuring ruler with the middle finger of the left hand, and extend the right hand to the other side as far as possible to ensure that the two arms are in a straight line and parallel to the ground. Finally, the tester and the client face to face, and record the distance between the tips of the two middle fingers of the client (Luo Xinghua, Lai Rongxing, 1989). As shown in Figure 3:

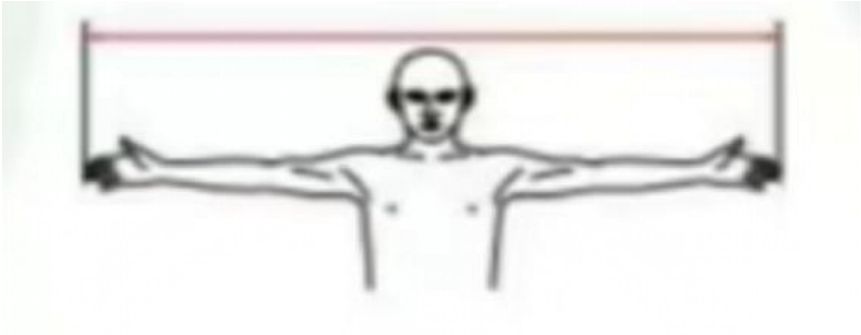


Figure 3 Arm span

4. Lower limb length (cm)

Test instruments ：Straight steel rule, corrected with standard steel rule before use, error per meter can not exceed 0.2 cm.

Test venue：Indoor or outdoor testing

Measuring method: The subject stands on a horizontal floor with bare feet, feet naturally shoulder-width apart. The tester stands on the left side of the subject, the measuring stick is perpendicular to the ground, and the vertical distance from the left greater trochanter point to the ground is measured. Recorded in centimeters, accurate to one decimal place. The test error shall not exceed 0.5 cm. Note: The ground should be flat, the muscles of the standing lower limbs should be relaxed, and the weight should fall evenly on the two feet. The greater trochanter point should be touched accurately, and do not move after setting the point (Ruan Van Duc, 2008; He Qiang, 2010). As shown in Figure 4, point C:

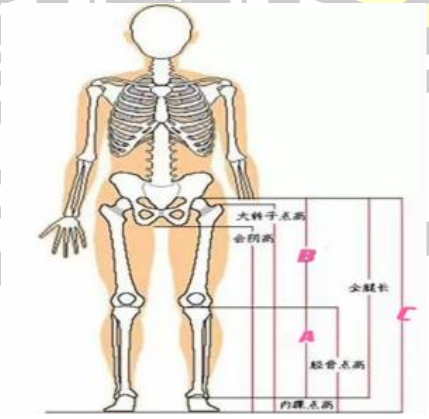


Figure 4 Lower limb length

5. Shoulder breadth (cm)

Test instrument: diometer; corner gauge; soft tape gauge

Test venue: indoor or outdoor tests

Measuring method: The tester is located behind the subject, finds the left and right shoulder points, leans the feet of the corner gauge on the shoulder point, and measures the straight line distance between the two points (Xia Han, 2020). Point A, as shown in Figure 5:

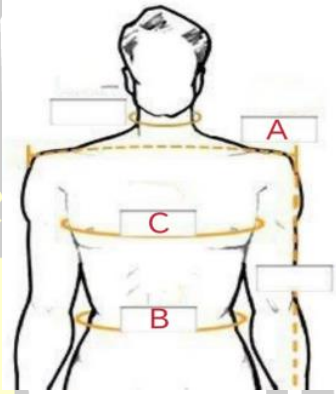


Figure 5 Shoulder breadth

6. Hip width (cm)

Test instrument: use diameter; corner gauge

Test venue: indoor or outdoor tests

Measuring method: The tester is located in front of the subject, find the left and right iliac ridge point, lean the two feet of the Angle gauge lightly on the iliac ridge point, and measure the linear distance between the two points. As shown in Figure 5:

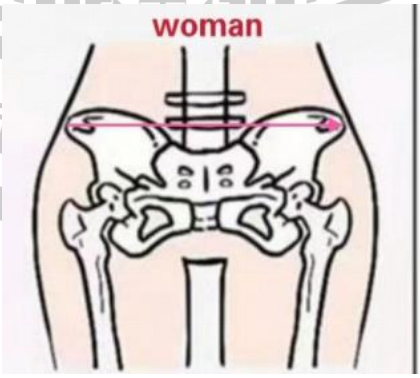


Figure 6 Hip width

7. Upper arm tension (cm)

Test instrument: nylon tape ruler

Test venue: indoor or outdoor test

Measuring method: The subject stood naturally, raised the left arm oblique and flat (about 45°), made a fist with the palm up and bent the elbow vigorously. Facing the subject, the tester measured the tension circumference of the upper arm with a ruler around the thickest part of the bicep muscle (He Qiang, 2010). As shown in Figure 7:

Figure 7 upper arm circumference

8. Calf circumference (cm)

Test instrument: nylon tape tape

Test venue: indoor or outdoor tests

Measuring method: The circumference of a horizontal bypass at the thickest part of the bowel muscle (He Qiang, 2010). As shown in Figure 8:

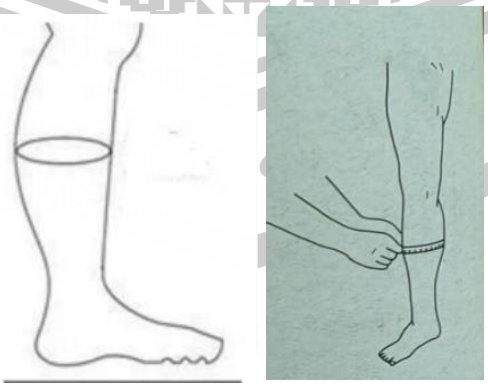


Figure 8 Calf circumference

9. Waist circumference (cm)

Test instrument: nylon tape tape

Test venue: indoor or outdoor tests

Measuring method: The athlete stands naturally, his shoulders relaxed and his arms crossed over his chest. Facing the test athletes, the tester will surround the ruler horizontally at 0.5 to 1 cm above the umbilicus. The tightness of the tape tape around the waist should be appropriate (so that the skin does not produce obvious depression) (as shown). The value on the tape tape that intersects with "0" is the measured value. Test record: record in centimeters to 1 decimal place (He Qiang, 2010). Point B, as shown in Figure 9:

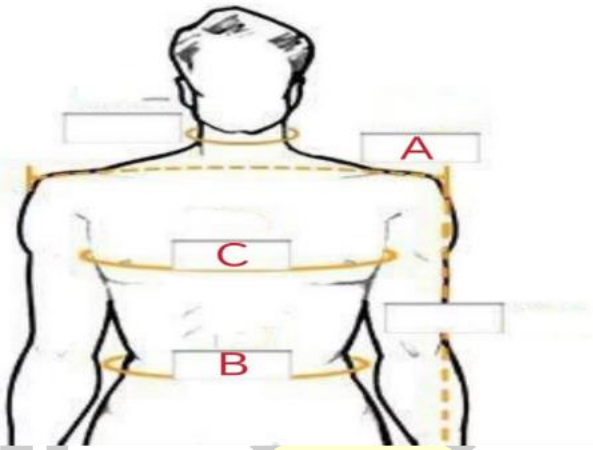


Figure 9 Waist circumference

10. Thigh circumference (cm)

Test instrument: nylon tape tape

Test venue: indoor or outdoor tests

Measuring method: The subject's legs are naturally separated from the shoulder width, the body weight is evenly supported by both legs, straight, and the lowest point of the hip line. The test error is no more than 0.2 cm (He Qiang, 2010). As shown in Figure 10:

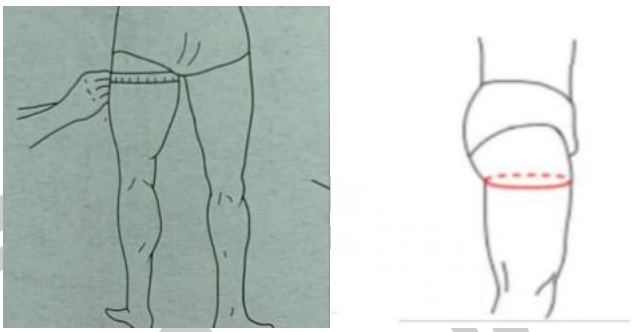


Figure 10, Thigh circumference

11. Chest circumference (cm)

Test instrument: nylon tape tape

Test venue: indoor or outdoor tests

Measuring method: The tester is positioned in front of the subject, with both hands placing the upper edge of the tape on the back under the scapula corner, wrapping it horizontally across the armpit to the chest, placing the lower edge of the tape on the upper edge of the nipple, and circling it for reading. Subjects breathe calmly. (1) When measuring, pay attention to whether the subject's posture is correct. If there are bowed head, hunched shoulders, chest out, hunchback and other conditions, it should be corrected in time. (2) The tester should strictly control the tightness of the tape. (3) If the subscapular Angle is not touched, the subject can be asked to enlarge the chest. After the touch is clear, the subject should return to the correct measurement posture. (4) If the height of both subscapular angles is inconsistent, the lower side shall prevail (He Qiang, 2010). As shown in Figure 11, point C:

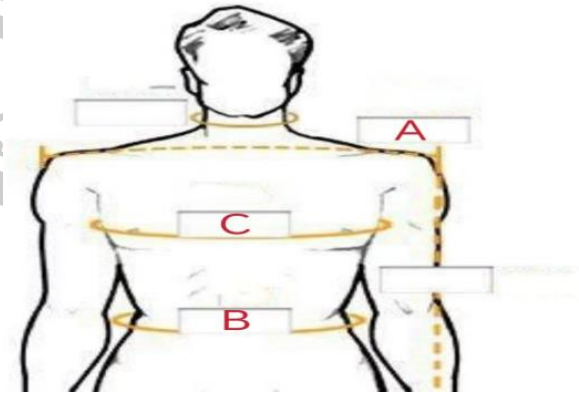


Figure 11 Chest circumference

12. Height (cm)

Test instrument: Height sit altimeter

Test venue: indoor or outdoor test

Measuring method: During the test, the athlete was barefoot, standing at attention on the bottom plate of the height meter (trunk straight, upper limbs naturally droops, heels together, toes about 60° apart), the heel, sacrum and the two scapulae were in contact with the height meter column, the head was upright, the eyes were straight ahead, and the upper edge of the tragus was level with the lowest point of the lower edge of the orbit. Stand with your feet on the height measuring device, heels together, toes 30 cm apart, hands and arms attached to the sides of the body, palms facing inward, keep the body upright, head straight, and eyes looking ahead (He Qiang, 2010).As shown in Figure 12:

Figure 12 Height sit altimeter

13. Body fat percentage (%)

Test instrument: Korea BIOSPACE body composition tester

Test venue: indoor or outdoor test

Measuring method: Input the basic information on the tester, and then complete the measurement and print the data according to the instrument voice prompt (He Qiang, 2010). As shown in Figure 13:

Figure 13. Body composition tester

14. The Ketole index (kg\cm）

Test instrument: weight electronic scale; Height-sitting altimeter (as shown in Figure 12)

Test venue: indoor or outdoor test

Measuring method: Weight: try to remove heavy clothing and accessories on the body, stand on the measuring scale to maintain stability, and then read. Height: The subject is barefoot, in a natural attention position, the heel, sacrum, between the shoulders and the height gauge post, keeping the ear and eye level, and then reading. Ketole index = weight x1000 / height (He Qiang, 2010).

二、Physical function test

1. Quiet heart rate (The min\times）

Test instrument: Sports stopwatch: YS-860

Measuring method: The measurement site is radial artery, so that the subject sit on the right side of the tester, right arm palm up flat on the table. The tester touched the radial artery of the subject's wrist with the finger abdomen of the index finger, middle finger and ring finger, and officially counted after the radial artery

pulsation was obviously felt. The pulse of the artery was measured for 10s and converted into a 1min pulse record. As shown in Figure 14:

Figure 14. Quiet heart rate

2. Heart Function Index (L\min\m^2)

Test instrument: Sports stopwatch: YS-860

Measuring method: 30 squatting test meter algorithm for 30 seconds was adopted. ① Sit for 5 minutes, measure the pulse number of 15 seconds, and then multiply by 4, to get the pulse number of 1 minute when quiet, labeled P1. ② The subjects were asked to complete 30 squats within 30 seconds (1 time per second). When you stand up for the last time, measure your pulse in 15 seconds immediately and multiply by 4 to get your pulse in 1 minute of exercise, labeled P2. ③ After 1 minute of rest, measure the pulse number of 15 seconds, and then multiply by 4 to obtain the pulse number of 1 minute after exercise, labeled P3. ④ The cardiac function index was calculated according to the following formula: P=(P1+P2+P3-200)/10.

3. Maximal oxygen uptake (ml\cm\kg)

Test instrument: sound, sign plate

Measuring method: In the test, the player must intermittently run back and forth between two markers at an increasing speed for a distance of 20 meters (5 meters as a buffer zone). The increase in operating speed is controlled by sound signals pre-recorded on tape. If the player fails to follow the set speed the first time, he will be warned once, and if he fails to follow the set speed the second time, the test will be terminated. Players who run out before the start signal must return to the starting line to start running again, or they will lose their eligibility to participate in the test. During the test, the athlete starts from the starting line and must step on the line or cross the line with one foot to reach the 20-meter mark line and return. Those who do not step on the line or walk the line must return to step on the line or they will be disqualified from the test. On the final return journey, team members must comply with the speed requirement, regardless of whether they were previously warned, and return to the starting point at the time of the signal or before the test is deemed to have failed. At the end of the race, the distance calculation table is combined with the formula (VO2maxax(mL/min/kg)=distance(m)x0.0136+45.33) to calculate the maximal oxygen uptake of the test subjects (He Qiang, 2010; Summer Cold, 2020). Precautions: (1) Before the test, athletes should prepare for activities to prevent injury; (2) Pay attention to protection during the test to prevent accidents. As shown in Figure 15:

Figure 15 YOYO test

4. Maximum anaerobic power (W)

Test instrument: Sweden produces MONARK837 power bicycles

Measuring method: and steps:

(1) The subjects wear sports clothes and sneakers, adjust the height of the bicycle according to their own conditions, and repeatedly pedal for 1-3 minutes without resistance to get familiar with the use of the equipment. The tester will explain the test process and requirements to the subjects.

(2) The subject shall prepare for 2-3 minutes and perform 1-2 full sprint exercises so that the subject can reach the degree of full mobilization of nerves and muscles, and the load value shall be adjusted according to the weight * 0.075.

(3) Rest for 2-3 minutes, the subject is ready to pedal, the tester issues the start command, the subject will pedal with full strength under no load, when the subject quickly accelerates to more than 180 RPM, the tester will pull down the weight load and start timing. The subject pedaled the bicycle with full force for 30 seconds, during which the tester gave continuous encouragement with words until the subject finished pedaling for 30 seconds. Significance of test: Evaluation of athletes' ability to supply energy by phosphatic and glycolysis (He Qiang, 2010). Precautions: (1) Before the test, athletes should prepare for activities to prevent injury; (2) Pay attention to protection during the test to prevent accidents. As shown in Figure 16:

Figure 16 The MONARK837 power bicycle

三、Sport Quality test

1. Vertical jump touch height（cm）

Test instrument: Electronic touch izer

Measuring method: In preparation for the test stage, the subject's feet are naturally separated and in a standing position. After receiving the instruction, the subject should bend his legs and squat half, swing his arms backward as much as possible, and then quickly swing his arms forward and upward, exert force on both legs at the same time, and try to jump vertically upward, while lifting and touching with one hand to measure his height. Read the distance from the ground to the top of the board.In the dragon boat project, the competition requires the strength of the legs and lower limbs, and jumping high can practice the explosive force of the lower limbs. Precautions: (1) Before the test, athletes should prepare for activities to prevent injury; (2) Pay attention to protection during the test to prevent accidents. As shown in Figure 17:

Figure 17 Vertical jump touch height

2. Core ventral bridge level 8

Test instrument: flat, yoga mat, stopwatch

Measuring method: Lie prone on the yoga mat, with the elbow joint and the tip of the foot as the fulcrum, prop up the body, the pelvis is in a neutral position, the head, shoulder, hip, knee and ankle joints are kept on the same plane, the Angle of the elbow joint is maintained at 90 degrees, and the forearm is parallel to the ground with the shoulder width. Each level of the eight-level abdominal bridge test has clear

action and time requirements, and the subject must complete the test in accordance with the regulations, the specific actions are as follows: The first level uses the elbow and the tip of the foot as the fulcrum, the body is propped up, and the body is required to maintain a neutral position for 30 seconds. The second level raises the right arm and raises it straight behind the ear and holds it for 15 seconds. The third stage brings the right arm back, raises the left arm and raises it straight behind the ear, and holds it for 15 seconds. The fourth stage brings back the left arm, raises the right leg and straight leg up, hooks the toe position, and holds for 15 seconds. Level 5: Pull in the right leg, lift the left leg and straight leg up, hook the toe position, hold for 15 seconds. Sixth, lift the right arm and left leg, and raise the right arm straight behind the ear; Left leg straight leg up, hook toe position, hold for 15 seconds. The seventh step is to bring in the right arm and left leg, lift the left arm and right leg and raise the left arm straight behind the ear; Right leg straight leg up, hook toe position, hold for 15 seconds. Level 8 Return to Level 1 position and hold for 1 minute. As shown in Figure 18:

Figure 18 Core ventral bridge level 8

3. 1RM pull-out (kg)

Test instrument: standard lying frame, barbell piece

Measuring method: Lying prone on the training board, feet naturally straight on the training board, hands are holding, closed hold, wide hold the barbell placed under the training board, arms naturally straight, can not overextend, upward force can not extend the hip and ridge to borrow, can only rely on the back and arm strength to pull the barbell. At the beginning of the test, you can choose the appropriate weight according to your own situation, and gradually increase the

weight. The test process can rest and adjust the weight until the maximum weight is measured and recorded, pay attention to protection and help. As shown in Figure 19:

Figure 19 1RM pull-out

4. Back muscle endurance (S)

Test instrument: lying rack, stopwatch

Measuring method: Lying on the sleeper, legs together, the helper to help press the calf, arms folded in front of the chest or placed on the ear side, with the strength of the lumbar muscle to slowly lift the torso from the cushion surface, the abdominal muscle as far as possible not to land, repeat for one minute, record the number of times. Precautions: (1) Before the test, athletes should prepare for activities to prevent injury; (2) Pay attention to protection during the test to prevent accidents. Figure 20 shows:

Figure 20 Back muscle endurance

5. 1RM Bench press

Test instrument: standard bench press training stool and barbell and barbell pieces, special bench press rack

Measuring method: The subject lies on the bench, feet on the ground, hands are holding the barbell bar, hands are about shoulder width apart. When the subject brings the barbell to the chest, push the barbell up with both arms until the arms are straight, and then hold for 2 seconds. Start from 20-25 kg below your personal best, increase by 5 kg each time, each weight can be lifted up to two times, until the maximum weight, take the maximum (He Qiang, 2010). As shown in Figure 21: Precautions: (1) Before the test, athletes should prepare for activities to prevent injury; (2) Pay attention to protection during the test to prevent accidents.

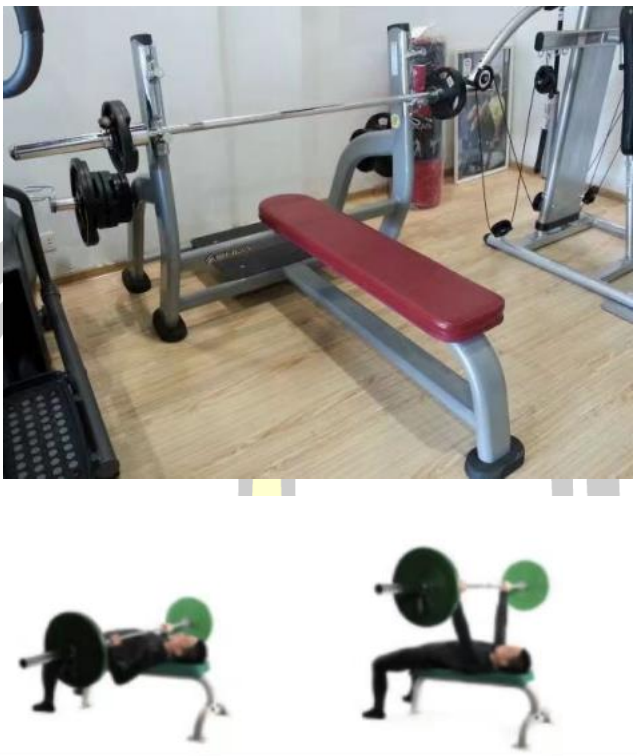


Figure 21 1RM Bench press

6. Standing long jump (cm)

Test instrument: standing long jump tester

Measuring method: Preparation position: Feet open, slightly wider than shoulder. Stand behind the jump line, toes close to the jump line. Look ahead with your eyes and take a few deep breaths. Take-off stage: The take-off stage includes two parts: pre-swing and jump. The upper arms are placed naturally during the pre-swing, raising the body's center of gravity as much as possible. When jumping, push hard on the balls of your feet and bring your arms forward. Air stage: After jumping, the belly is raised, and the legs are pulled into the air to make the body fly farthest. Landing stage: The moment before landing, hit the arm downward, and raise the body as a whole again, so that the feet to their own body premise. Tips: Keep your body stable after landing, do not fall back. Test three times and take the average value. As shown in Figure 22:

Figure 22. Standing long jump

7. 1RM Squat (kg)

Test instrument: barbell stand and barbell and barbell plate

Measuring method: Feet shoulder-width, solid ground, toes forward, knee joint direction is consistent with the toes, center of gravity is placed between the feet, the body upright, hands are holding, closed hold, wide hold the barbell, placed on the trapezius muscle, chest, stomach, jaw slightly closed, eyes level. The shoulder blades are slightly retracted and lowered, the core is tightened, the pelvis remains neutral, and the spine maintains normal physiological curvature. To cause the body to stand upright when contracted inward; To restore, place the thighs parallel to the floor. At the beginning of the test, you can choose the appropriate weight according to your own situation, and gradually increase the weight. The test process can rest and adjust the weight until the maximum weight of the weight-bearing squat is measured and recorded, paying attention to protection and help (Summer Cold, 2020). As shown in Figure 23:

Figure 23 1 The RM squat

8. 1min pull-ups (individual)

Test instrument: Sports stopwatch: YS-860; Horizontal bar, magnesium powder

Measuring method: Facing the railing, jump up and hold the railing with both hands slightly wider than shoulder width. When the foot is off the ground, the arm naturally drops and extends after grabbing the bar. Use the contraction of the latissimus muscles of the body to pull the body up. Pause for a moment when the bar is above the bar, then slowly lower your body back to the beginning of the pendant motion. Repeat for one minute, record the number of times, and measure once (He Qiang, 2010). As shown in Figure 24:

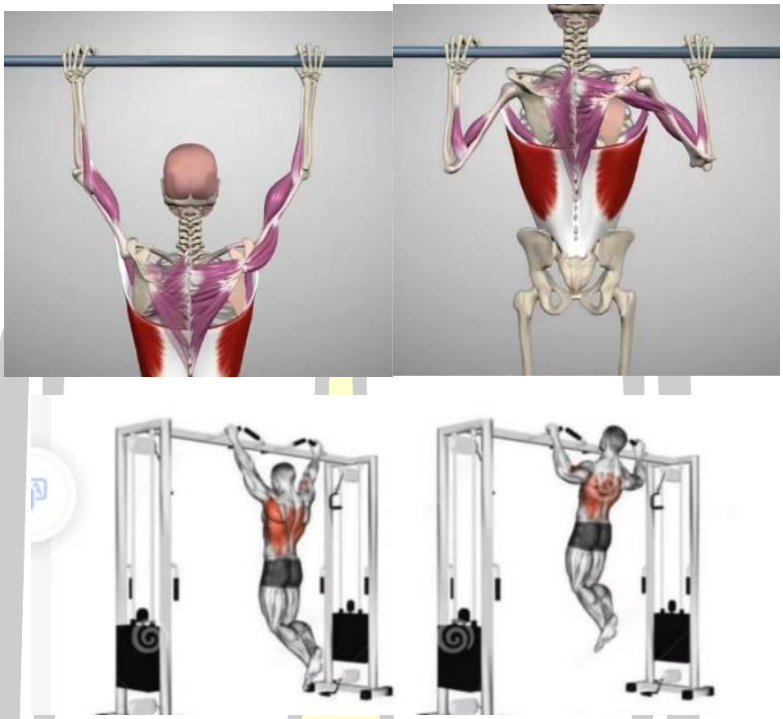


Figure 24 1min pull-ups (individual)

9. 3000m run (min）

Test instruments: Electronic Tester, 1 tape measure, 10 marker barrels, a starting flag, 400 meters track and field.

Athletes wear sports clothes with electronic chips, stand ready at the starting line, use a standing start, hear the signal, immediately start running.

Finish: Sprint through the finish line, infrared speed measurement timing, check results. Figure 25 shows:

Figure 25 3000-m run (min)

10. 800-m run (min)

Test instruments: Electronic Tester, 1 tape measure, 10 marker barrels, a starting flag, 400 meters track and field.

Athletes wear sports clothes with electronic chips, stand ready at the starting line, use a standing start, hear the signal, immediately start running.

Finish: Sprint through the finish line, infrared speed measurement timing, check results. Figure 25 shows.

11. Seated forward bend (cm)

Test instrument: Shengyue 0126 seat forward bending tester

Measuring method: The tested athlete faces the test meter, sits on the soft cushion, legs straight forward, heels together, pedal on the test meter's backstop, toes naturally separate. The tester adjusts the high end of the guide rail so that the subject's toe is level with the lower edge of the cursor. During the test, the subject should put his hands together, extend his palms flat downwards, straighten his knees, bend his upper body forward, and push the cursor smoothly forward with the fingertips of the middle fingers of both hands until it cannot be pushed forward (as shown in Figure 26).

Notes: (1) Before the test, the tested athletes should prepare for the activities. (2) During the test, the subject should not suddenly move his arms forward, push the cursor forward with one hand, and bend the knee joint. (3) Before each test, the tester should push the cursor to the near end of the guide rail. (4) The tester shall correctly fill in the "+" and "-" signs of the test value of the subject.

Test record: The value displayed by the test meter is the test value. Test twice, record the maximum value, in centimeters, one decimal place.

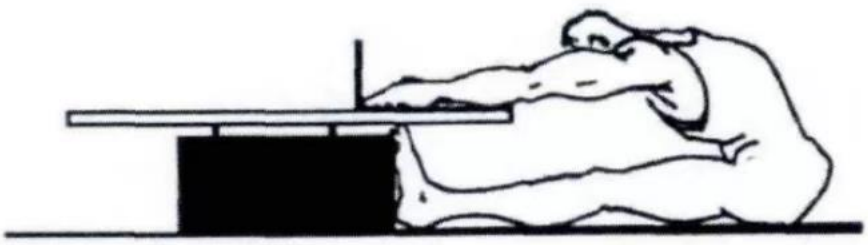


Figure 26 Seated forward bend

12. Cross fork (cm)

Test instruments: meter rule, bench, smooth board

Measuring method: The tester stood on a smooth board after slippers, supported the bench with both hands, and gradually spread his feet outward along the coronal surface. During the process of spreading, he should always pay attention to keeping his torso upright. When it can no longer unfold outwards, measure the distance between the two heels with a meter stick, and the measurement unit is 0.5 cm.

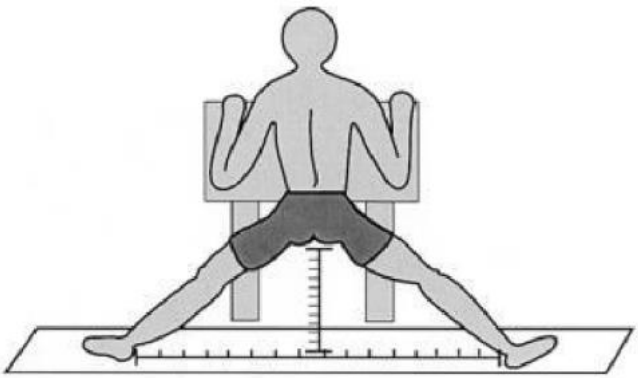


Figure 27 Cross fork

13. Shoulder mobility (cm)

Test instrument: **Tape measure or stick**

Operation process: the subject stands upright. After measuring the shoulder width, the subject is holding the tape measure or stick with both hands (the tiger mouth of the left hand is aligned with the "0" position of the tape measure or stick), and the two arms are lifted at the same time. Keep the arms in the same plane, and the spacing between the hands should be just enough to bring the arms around the back of the body, and then hold the tape measure or stick in the hands and wrap them around the back of the body to the front of the body. Record the distance between the two tiger mouths with "cm" as the unit, measure 3 times, and obtain the best result. As shown in Figure 28 :

Evaluation: Shoulder turn result = holding distance - shoulder width. The smaller the result of shoulder mobility, the better the flexibility of the subject's shoulder joint.

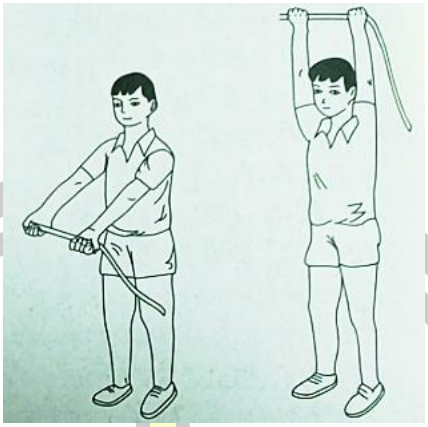


Figure 28 Shoulder mobility

14. 400-m Run (S)

Test instruments: Electronic Tester, 1 tape measure, 10 marker barrels, a starting flag, 400 meters track and field.

Athletes wear sports clothes with electronic chips, stand ready at the starting line, use a standing start, hear the signal, immediately start running.

Finish: Sprint through the finish line, infrared speed measurement timing, check results. Figure 25 shows.

15. 30 m Sprint (s)

Test instruments: Electronic Tester, 1 tape measure, 10 marker barrels, a starting flag, 400 meters track and field.

Athletes wear sports clothes with electronic chips, stand ready at the starting line, use a standing start, hear the signal, immediately start running.

Finish: Sprint through the finish line, infrared speed measurement timing, check results. Figure 25 shows.

16. 1min rope skipping (a)

Test instrument: skipping rope instrument; Number of skipping rope with handle;

Measuring method: First of all, the subject needs to hold both ends of the rope with both hands and get ready to jump rope. When the subject hears the signal "ready to jump" from the instrument, he should jump immediately, and automatically

record the number of successful jumps once (both hands shake the rope for a week, and the feet jump once), so as to measure the number of successful jumps that the subject can jump in 1 minute. During the test, if you miss the jump rope, immediately continue to jump until the end of the test. Each person was tested twice and the best result was recorded (Jin Zongqiang, 2004; Nguyen Van Duc, 2008). As shown in Figure 29:

Note: In the single shake rope test, the client can choose to jump on one foot or alternate feet.

Figure 29 1min rope skipping

17. cross-shaped change direction run (S)

Test instruments: stopwatch, tape measure, marking rod, recording table, etc

Measuring method: In the football field, the subjects stand behind the starting line, after hearing the starting signal, run quickly to the E pole, pass the E pole, and then bypass the B, C and D poles successively. Each round of the bar must pass through the central E bar, which is changed to the right side in a clockwise direction. After passing the E pole for the last time, sprint to the finish line. Test twice and get the best result (Summer Cold, 2020).

Measurement requirements: Subjects can only wear sports shoes during the test, not spikes, leather shoes. The starting position is standing, and the pole cannot be touched when running (as shown in Figure 30).

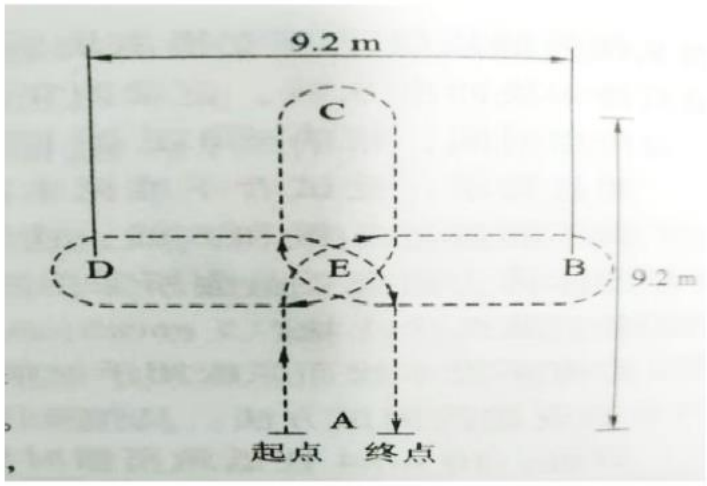


Figure 30 cross-shaped change direction run

18. 30s burpees (a)

Test instrument: Sports stopwatch: YS-860; Test equipment: flat, yoga mat

Measuring method: Test method: Stand naturally with your body, then squat with your feet shoulder-width apart. Then extend your legs straight back into a prone support position. Then fold your calves into a semi-squat position and return to your natural standing starting position. Repeat the number of 30s records and test once, and each subject is observed by one tester during the test (He Qiang, 2010). As shown in Figure 31:

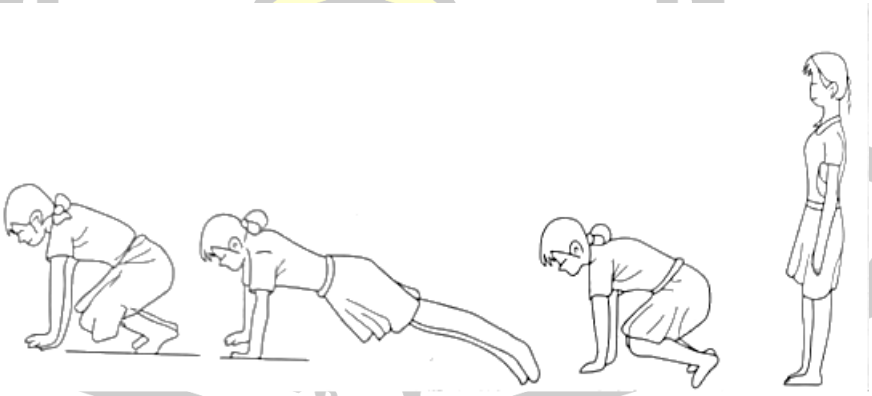


Figure 31 30s burpees

APPENDIX V

Ethic Certificate

MAHASARAKHAM UNIVERSITY ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS

Certificate of Approval

Approval number: 446-498/2023

Title : Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China.

Principal Investigator : Li Bing Chen
Responsible Department : Faculty of Education
Research site : Xi An City, Shan Xi Province, China

Review Method : Expedited Review

Date of Manufacture : 31 October 2023 **expire :** 30 October 2024

This research application has been reviewed and approved by the Ethics Committee for Research Involving Human Subjects, Mahasarakham University, Thailand. Approval is dependent on local ethical approval having been received. Any subsequent changes to the consent form must be re-submitted to the Committee.

Ratree S.

(Asst. Prof. Ratree Sawangjit)
Chairman

Approval is granted subject to the following conditions: (see back of this Certificate)

APPENDIX W

Research tool quality evaluating (IOC) of five experts

FACULTY OF EDUCATION
MAHASARAKHAM UNIVERSITY

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44000, THAILAND
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Center for International Affairs

MHERSI No. 0605.5 (2) /CL5294 Date: November 21, 2023

To:
Prof. Jian Gong Tan
Guang zhou Sport University,China

Subject:
Thesis Reviewer Invitation

Our student, **Li Bing Chen**, student ID **64010564003** majoring in the **Ph.D. Exercise and Sports Science** program is currently undertaking a research project titled **"Development of Physical Fitness Evaluation Indicator of Female Dragon Boat Athletes in China"** under the guidance of **Dr.Watthanapong Khongsuebsor.**

To ensure the successful execution and the highest quality of this research project, we are seeking your valuable expertise and experience. Therefore, I am delighted to extend a formal invitation to you to serve as a reviewer for the research instrument designed for this thesis project.

Your participation in this academic endeavor is highly valued and appreciated. Should you require any further information or have questions regarding this invitation, please do not hesitate to contact us be email.

Yours sincerely,

Assoc. Prof. Chowwalit Chookhampaeng
Dean, Faculty of Education,
Mahasarakham University

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MHERSI No. 0605.5 (2) /CL5294 Date: November 21, 2023

To:
Assoc. Prof. Jian Wu, Huang
Wuzhou University, China

Subject:
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Date: November 21, 2023

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Xi'an City, Shanxi Province, China

Subject:
Thesis Reviewer Invitation

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Guang zhou Sport University,China

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Date: November 21, 2023

To:
Prof. Zhao yuan Li
Wuzhou University, China

Subject:
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Dean, Faculty of Education,
Mahasarakham University

APPENDIX X

The expert's detailed answers to the interview

Q1: Introduce the number of athletes on your female dragon boat team？

The first Interviewee coach Wu said: There are 70 female dragon boat athletes in our school： The second Interviewee: Coach Feng said: the club female's dragon boat team has 55 people; The three Interviewee coach Lv said: the school female's dragon boat team has 57 people; The four Interviewee Zhu said: the club has female dragon boat athletes 60;The fifth Interviewee Yu leader said: the city's female dragon boat team has 120 people;

Q2: What do you think are the current physical characteristics of female dragon boat athletes？

The first interviewee Wu coach believes that physical fitness includes three elements: body shape, physical function and sport quality. The second Interviewee coach Feng believes that physical fitness is composed of body shape, physical function, physical health and sport quality, among which sport quality is the most important physical exercise ability, and body shape, physical function and physical health are the basic ability to form good sport quality. The third Interviewee coach Lv said: physical fitness includes body shape, physical function, sports quality and health level of four aspects. The fourth Interviewee team leader Zhu put forward: physical fitness is mainly composed of five elements, namely, the basic quality, the ability to develop physical quality, motor organ function, motor technology and psychological elements; The fifth Interviewee Yu coach believes that physical fitness is composed of three dimensions: body shape, physical function and sport quality. The most important means to develop and improve physical fitness is through exercise training.

Q3: What do you think are the factors that affect the construction of the physical fitness evaluation indicators of female dragon boat athletes?

The first Interviewee coach Wu said: the body shape is divided into nervous system function, muscle system function and energy metabolism system function,

sports quality is divided into strength quality, speed quality, endurance quality, flexibility quality and sensitive quality. The second Interviewee coach Feng thinks: the body shape reflects the human growth and development of the height, girth, length and width of the external morphological characteristics, as well as the diameter of the heart, the cross section of muscles and other internal morphological characteristics; Physical function reflects the working ability of the human cardiovascular system and various organs; Sports quality is the basic exercise ability of athletes, controlled by the central nervous system, including strength, speed, endurance, flexibility and sensitivity; the health level includes the injuries of athletes. The third coach Interviewee Lu believes that the body shape reflects the height, girth, length, width and main body components; Physical function refers to the functional state of the internal organs of the human body, such as cardiopulmonary function, aerobic metabolism ability, anaerobic metabolism ability, hormone level; Sports quality through the muscle activity of the various basic motor ability, in the exercise performance of strength, speed, endurance, flexibility and sensitive coordination ability; The fourth Interviewee leader Zhu said: according to the morphology analysis, the length, width, height, girth, measurement, derivative indicators are the influencing factors; The cardiopulmonary function of the physical function, anaerobic capacity, aerobic capacity, recovery level, hormone level indicators are the influencing factors; The strength quality, endurance quality, flexibility quality, speed quality and sensitivity quality indicators of sports quality are the influencing factors. The fifth Interviewee Yu leader believes that the factors affecting the physical fitness evaluation indicators of female dragon boat athletes involve the knowledge of human morphology, according to the characteristics of dragon boat sports, proposed length, girth, height, width and other factors; From the perspective of physical function, cardiopulmonary function, aerobic anaerobic metabolism and load recovery ability of athletes; sports quality includes strength, endurance, flexibility, speed, coordination and sensitivity.

Q4: What do you think of the relationship between the factors influencing the physical fitness evaluation indicators of Chinese female dragon boat athletes?

The first Interviewee Wu Coach said: as the length indicators factor, it reflects the sitting arm length, kneeling arm length, lower arm length; the width factor reflects hip width, shoulder width, circumference reflect the upper arm tension, thigh circumference, waist circumference; height reflects sitting height, knee height; the derivative indicators reflects Vervik indicators and BMI; The second Interviewee Feng coach said: in the evaluation of physical fitness indicators, heart rate, heart function indicators, blood pressure, and vital capacity indicators are closely related to cardiopulmonary function; anaerobic valve, the relative maximum power indicators are closely related to anaerobic metabolic capacity; the maximum oxygen uptake and hemoglobin can reflect the aerobic metabolic capacity; The third Interviewee, Zhu leader said: the sports quality of strength quality, endurance quality, flexibility quality, speed quality, sensitivity quality indicators are the influencing factors. The strength factors are closely related to standing long jump, maximum weight, pull-up and maximum strength; endurance is 2000 meter, meter 1000 meter and one-minute sit-ups; flexibility reflects the indicators of prone back extension, shoulder rotation and sitting position; the speed is associated to the meter 250 meter and 500 m meter; the sensitivity is associated to repeated crossing and 66 m round-trip running; The fourth Interviewee lu coach think affect the construction of female's dragon boat athletes physical evaluation indicators factors and kneeling arm length, shoulder width, upper arm tension circumference, height, weight, vervik indicators, Laurel indicators, standing long jump, dynamometer 2000 meters, sitting body forward flexion, dynamometer 500 meters, 3000 meters, 10 seconds lying, heart rate, blood pressure, oxygen valve, maximum oxygen consumption indicators correlation; The fifth Interviewee told the leader that the factors of sports quality are correlated to pull-up, bench press, lie-down, 1000 m and forward flexion; the factors of body form are related to the length of kneeling arm, arm length, pelvis width, hand width, upper arm tension circumference, thigh circumference, sitting height and vervik indicators; the factors of body function and heart rate, cardiac function indicators, vital capacity and maximum oxygen consumption.

Q5: What do you think are the most important factors affecting the physical fitness evaluation indicators of female dragon boat athletes?

The first Interviewee Wu coach said: The dragoner with long arms has a long catch distance, that is, the front arc is far away from the dragon boat technology. The front arc technology is very important, if there is no good sitting arm length, it is difficult to achieve a good front arc distance. Shoulder width, hip width, can provide enough power for rowing, give full play to the strength of the large muscle group, provide guarantee for the fast operation of the boat. Thigh circumference can be used as a measurement feature of body muscle indicators. In dragon boat events, thigh circumference is generally used to monitor the dimensional growth of muscles, especially for dragon boat athletes.

The second Interviewee Feng coach thinks: good vervik indicators, Laurel indicators, weight, BMI, these appearance characteristics are very beneficial to increase the frequency and length. The increase, and the heart rate is the result of good heart function. Lung capacity is the maximum ability of primary lung ventilation and an important indicator of the level of respiratory system. The anaerobic threshold is one of the important indicators to assess the aerobic metabolic capacity in athletes. The third Interviewee leader Zhu indicated that the maximum oxygen uptake (VO2max) and anaerobic threshold (AT) are important indicators to evaluate the aerobic capacity of dragon boat athletes, and the training with anaerobic threshold intensity is an important means for the dragon boat athletes to improve the aerobic capacity; the maximum oxygen uptake is a method to measure a person's aerobic capacity or cardiopulmonary endurance; in the dragon boat race, the speed of the paddle, the speed, the higher, the higher, the speed of the paddle, the usual training should increase the 100m training. The fourth Interviewee Lv coach said: although dragon boat sports is an aerobic metabolic energy supply sports, but anaerobic energy supply capacity is still very important, especially glycolysis energy supply capacity plays an important role in the sail and sprint stage; dragon boat race requires athletes with strong physical strength, including upper limbs, core and lower limb strength. Dragon boat sports require the range of movement of the trunk, waist, hip and other joints. In the dragon boat sports training, the main means are: shoulder rotation, sitting forward flexion practice; dragon boat athletes need good sensitivity and coordination ability, in order to quickly learn and master various sports skills, and enhance the mastery of new technology and new practice, can run through the training way. The

fifth Interviewee leader team: the upper body strength is very important for dragon boat athletes, usually each dragon boat athletes will have a strong upper body strength, usually using 1min pull-up, longitudinal jump higher training method; the boat athletes each stroke need abdominal force, training often use weight abdominal core strength training; lower limb strength, greater force, more effective, more effective training method has 1 RM squat, longitudinal jump higher. The endurance level of dragon boat athletes must first develop aerobic capacity, using the dynamometer 1000 meters (s), dynamometer meter 2000 meters (S), lying pull can improve the aerobic capacity of athletes (Liu Xiao, 2020), the endurance required by dragon boat sports is realized through several training stages.

Q6: What methods do you think are adopted for the selection of test indicators in this study?

The first Interviewee Wu coach pointed out that the measuring tools involved in body shape included body composition analyzer (Korean Biospace InBody : 720), soft ruler, straight ruler, tape measure, centimeter ruler, etc.

The second Interviewee Feng coach proposed: the sports quality indicators involved in the measurement tools are speed tester (Time Brower infrared), TRX suspension rope (NSCA production), longitudinal jump tester (Tongfang CSTF-ZT), sitting stereo forward flexion tester (TZCS-3), stopwatch, marking rod, etc. The third Interviewee Lv coach proposed that the measuring tools involved in the physical function indicators include stethoscope, electronic sphygmomanometer, second change, metronome, monomial buoy spirometer (0-7000 ml), dynamometer meter, heart rate monitor, 80-2 centrifuge, YO-YO tester (BP TEST test software), etc.

The fourth interviewee Zhu leader proposed: most of the measuring tools involved in morphology are soft ruler, tape measure and ruler; the measuring tools involved in body function are complicated, it is recommended to have professional assistance; the measuring tools of sports quality indicators involve dragon boat dynamometer;

The fifth interviewee team leader proposed: about the dragon boat athletes physical indicators measurement tools involved in the weight scale, body composition

analyzer, sitting body forward flexion tester, dragon boat power meter, blood pressure meter, soft ruler, ruler, bar bell, dumbbell, bench bench, long jump board.

Q7: In your opinion, how to select test subjects for this study and what is the appropriate sample size?

The first interviewee wu coach said: this study is to build the Chinese female's dragon boat athletes physical evaluation indicators , female's dragon boat athletes as a test object, according to the purpose of the research, should select domestic representative dragon boat team and won the top eight China dragon boat open athletes, each team 22 people, the top eight a total of 176.The second interviewee Feng coach said: the national dragon boat championship, China dragon boat competition finals, Asian Games dragon boat national trials, China dragon boat open the top six female dragon boat sports team members as the test object, such as: 100 meters, 200 meters, 500 meters race, each team 22 people, take the top six, 396 athletes. These dragon boat events are high-level dragon boat events in China, which can reflect the physical strength of Chinese female dragon boat athletes. The third interviewee lu coach proposed: according to the research purpose, should be selected in the domestic high level of dragon boat events, won the top three female's dragon boat players, and the level of the athletes above secondary athletes, because these athletes in skills, physical above has certain advantages, can be represented by Chinese female's dragon boat athletes. The third interviewee yu coach proposed, said that many studies of the sample size of a interviewee completely relied on past experience, and there was no uniform criterion of sample size. Some use 30 as the criterion, some use 50 as the criterion, and even use 100 or 300 as the criterion. Therefore, this method lacks theoretical basis and scientificity to some extent. The sample size required for questionnaire investigation is obtained by calculating the formula. Where: n: indicates the required sample size; Z: The Z statistic at the confidence level, for example, the Z statistic at the 95% confidence level is 1.96, and the Z statistic at 99% is 2.58; p: possibility of options, generally 0.5; e: Sampling error, generally 5%, the smaller the sampling error, the higher the reliability of the conclusion; The result calculated by the formula is 384, so it is generally recommended to collect at least 384 valid questionnaires based on the questions

answered in the survey, which is the minimum sample size required to ensure the credibility of the survey results. The leader of the fifth Interviewee Zhu said: according to the highest dragon-boat races in China in recent years, if the female dragon-boat athletes were in the top three of the country in each individual performance, it was best to have the experience of the national team or athletes above the first level to qualify for inclusion. 50% of the female dragon-boat athletes were selected as the test subjects.

Q8: What problems do you think should be paid attention to in selecting test indicators in this study?

The first interviewee Wu coach said that before carrying out the test, the staff should carefully check all the instruments, and inform the interviewee of the detailed test content, and also make a good record of the relevant information. The subject should have appropriate protection measures to prevent injury during the test. The second interviewee Feng coach said: the subjects need to be fully prepared to exercise before the test, so that the muscles are fully mobilized to avoid causing damage to the muscle tissue and ligaments during the test. The third Interviewee Lu coach said: before the test, we need to detail the value of the study, the purpose of the study, the whole study process, and the measures to ensure the health and safety of the athletes. The most important explanation of the need between researchers and coaches, sharing the study results to meet the need of physical training, getting the female dragon boat team supported by the head coach, the head coach is asked to recommend the best candidate to take the fitness indicator test. The fourth Interviewee Zhu team leader said: after determining the athletes who meet the requirements, discuss with the athletes, publicize the value of research, clarify the content of the physical fitness indicators test, and reach a preliminary cooperation intention according to their own training and competition arrangement. The fifth interviewee proposed to the team leader: to train the athletes who voluntarily participate in the cooperation, put forward specific indicators test requirements, and inform the safety guarantee of the whole test process, and issue the written document of the volunteers.

Q9: How do you think the weights of test indicators are determined in this study?

The first interviewee Wu coach put forward: there are many methods to determine the weight of indicators, the most widely used mean method, hierarchical analysis method, principal component analysis method, matrix algorithm and so on.

The second Interviewee Feng coach proposed: T.L sta hierarchical analysis method (Analytic Hierarchy Process AHP method) to determine the indicators weight. American operations radiologists proposed a hierarchical analysis in the early 1970s. The so-called hierarchical analysis refers to the decomposition of elements related to decision into multiple levels, including target level, criterion level, scheme level, etc., after the decomposition into multiple levels for qualitative and quantitative analysis. The advantages of this method include: system, flexibility and simplicity. The third Interviewee Lv coach said: the evaluation of all levels of indicators weight, can use the principal component analysis method. Principal component analysis is a multivariate statistical analysis method that transforms multiple measured variables into a few unrelated comprehensive indicators. The advantage is that the number of principal components obtained by PCA is much smaller than the number of original variables, but the information loss is very small. In recent years, with the popularization of computer, this method has been widely applied in the field of sports science research to solve the problem of multivariable large sample encountered in the research.

The fourth interviewee zhu leader put forward: the weight of the calculation indicators, can take principal component analysis, mathematical analysis of the measured indicators, extract the principal components and named according to the rotation after load results, KMO value are above 0.7, shows that all kinds of indicators for main component analysis, the cumulative contribution rate above 75%, shows that the analysis effect is good. The fifth interviewee Yu leader said: in the process of assigning the weight of second-level indicators and three-level indicators, it is necessary to use the contribution of each indicators in the principal component analysis to calculate the weight data. The main operational calculation steps of PCA analysis are as follows:1. Calculate the correlation coefficient matrix between the measured indicators, and observe the correlation indicators between the data.2. Whether the KMO value of the observed data and the Butterlett sphericity test value meet the analysis criteria.3. After orthogonal rotation by the variance maximal method

on the basis that the factor can be expressed, the indicators of the maximum load factor is extracted.4. According to the indicators factor, the load degree and the contribution degree shall serve as the basis of the weight determination.

Q10: How do you think the evaluation criteria for this study are established?

The first interviewee Wu said: the evaluation criterion consists of three parts: frequency, intensity and scale. The most common is the rating criteria. Grade evaluation criterion is to classify the evaluation objectives into different criterions and make quantitative and qualitative division. In the process of measurement and evaluation, it is generally divided into 5 classes, which are excellent, good, medium, middle and lower, and poor respectively. The second Interviewee Feng coach proposed: the use of criterion percentage method to score each indicators, the use of deviation method to determine the range of grade division, combined with the weight, to establish the physical fitness evaluation grade criterion. Points above 76 were excellent, 61 to 75 good, 36 to 60 moderate, 21 to 35 inferior, and 20 inferior. The third Interviewee Lv coach proposed that: a reasonable evaluation criterion can make an accurate measurement of the development level of things. Through the test of indicators, the percentile method can be adopted to formulate the evaluation criteria suitable for the physical fitness indicators of female dragon boat athletes. The specific method and operation process is as follows: 1. First, the test data were collected and sorted out, and the maximum value, minimum value, mean value and criterion deviation of each relevant indicators were processed by SPSS software.2. Data were processed according to the percentile method by using the percentile function in SPSS software, the score interval was set to 10%, and the corresponding percentile indicators value was found respectively.3. Set the minimum score to 0 points, set the maximum score to 10 points, and score according to the set score interval.

The fourth interviewee team leader Zhu put forward: through the "percentile method" to develop the scoring criterions of the physical indicators of female dragon boat athletes, The specific steps are below: (1) by analyzing and processing the physical fitness test results of the female dragon boat athletes, we can find out the minimum value, maximum value, average value and criterion deviation of each

indicators.(2) To calculate the value of the 5th to 95th percentile respectively.(3) The maximum value is set as 20 points, and the minimum value is 0 points, and the value corresponding to the 5th to 95th percentage is calculated respectively as 1~19 points. The fifth Interviewee Yu leader of the proposed: T score method can be used to establish the scoring criterion, the specific method is: set the percentage system to 10 grades, every 10 points, the average of the indicators is 50 points, if the higher the indicators, it is the excellent indicators, the mean plus 3 criterion deviation is 100 points, minus 3 criterion deviation to 0 points; on the contrary, the low optimal indicators is opposite, the difference between each grade is T, the calculation formula is as follows: High-quality indicators: T=[X-(X-3s)]/5=0.6s ; Low-excellent indicators: T=[(X+3s)-X]/5=0.6s.

Q11: What are your suggestions for this study?

The first interviewee wu coach pointed out: flexible training is indispensable in the dragon boat project, it can make the dragon boat athletes in physical training quickly, accurate, coordinated to complete all kinds of technical action, make more smooth, and flexibility can promote muscle coordination, improve proprioception stimulation, improve the pulp amplitude, should pay more attention to the flexibility of practice. The second Interviewee feng coach thinks: endurance is the body long resistance to fatigue, endurance quality as one of the basic components of physical, in the vast majority of sports plays a direct or indirect role, for dragon boat sports this kind of periodic endurance project, endurance level is the main factor of decision performance, in the dragon boat sports training, should put the endurance training as the focus. The third Interviewee lu coach put forward: the dragon boat movement has a higher requirement for physical quality, upper limb strength, lower limb strength, waist abdomen strength, three be short of one cannot, in the dragon boat sports, athletes lack of strength, center of gravity instability, can lead to rowing technology action is not stable, inadequate, a force, affect the normal play of the game, therefore, to attach importance to strength training. The fourth Interviewee in the leader pointed out that the dragon boat athletes coordination and the nervous system of muscle ability, and determines whether they can strength, flexible, sensitive, psychological quality, in the dragon boat sports training and competition, need to mobilize the whole

body to power, cultivate the coordination of athletes, has a great role in promoting sports quality development. Sensitivity can have a greater impact on the technical level of athletes. Athletes with good sensitivity will have a stronger understanding ability of sports technology, and the special technology will be easier to operate. Therefore, these factors cannot be ignored. The fifth Interviewee Zhu leader proposed that heart rate, blood pressure and lung capacity reflect the development level of body function, cardiovascular system and respiratory system of female dragon boat athletes. Good cardiopulmonary function is the basic condition to ensure high-load training and high-intensity competition, so cardiopulmonary function can become an important indicator to evaluate the results of dragon boat training.

Q12: Introduce the current development trend of female's dragon boat sports in China?

The first interviewee Sun pointed out that after the reform and opening up, the dragon boat project has developed rapidly and spread widely around the world. Under the influence of the Olympic spirit, the dragon boat race has gradually changed from a traditional folk sport to a competitive sport. The level of female's dragon boat sports is also constantly moving forward to the international level. The second Interviewee Huang said: The competitive ability of athletes is composed of physical ability, skills, tactical ability, sports intelligence and psychological ability with different forms of expression and different functions. And physical ability, as one of the important components of athletes' competitive ability, is the key factor to determine the victory of the dragon boat race. Third Interviewee zhu thinks: dragon boat is a fitness for athletes, skills, tactical ability, sports intelligence, psychological ability demanding high sports, the development trend of modern dragon boat sports training competition is physical, technical and tactical height closely the trend of combining, physical fitness is the basis of all technical and tactical ability, is the key to decide the game. The fourth interviewee once said: competitive dragon boat is a collective project, rowers rely on a monomial paddle paddle to push the boat forward, need to lower limbs, waist coordination movement. Although the dragon boat is a still water movement in natural waters, but influenced by the wind speed, the water direction, the water flow rate and the players' own factors, the rowers will shake from

the vertical and horizontal direction, especially the shaking of the upper body is the most obvious. Useless shaking will affect the incomplete force of the rowers, resulting in different depth and range of the OARS, it is difficult to form a resultant force, and ultimately affect the sports performance.

The fifth interviewee department said: for a long time, the whole sports circle for physical training attention, lack of practical experience, resulting in many athletes basic physical weak, special outstanding, sports career is short, and some sports can not maintain excellent results for a long time, this is an objective phenomenon in China. The General Administration of Sport of China faced up to this deficiency and tried to implement some effective measures to solve the problem. The physical level of the team seems to be an elusive disease, so there is still a long way to go to solve this problem completely.

Q13: Talk about the current status of physical training of outstanding female dragon boat athletes in China?

The first interviewee Sun said: from the current research situation of China's competitive dragon boat, the research direction is mostly focused on the dragon boat rowing technology, the athletes' physical fitness research is less, the content is only the indicators of the characteristics of physical institutions, the lack of systematic physical training research, ignoring the huge role of physical fitness in the competition. The second interviewee Huang, with years of training experience, pointed out that according to the theory of energy supply, dragon boat is a physical leading race, without physical fitness as the leading, it is impossible to play out in the perfect technical movements. Physical ability and technology, as two important factors of dragon boat race, complement each other, ignore one side to pay attention to the training of the other party, and deviate from the law of sports. It is unscientific and must be corrected.

The third interviewee Zhu said: the dragon boat competition requires athletes to have a good physical foundation, so as to have a higher competitive ability and achieve excellent results in the competition. At present, there is a lack of a unique scientific and systematic training system and a complete set of systematic training mode.

The fourth interviewee once based on his personal leadership experience: the training thought of competitive dragon boat is to emphasize technology rather than physical ability, which reflects the general view of the dragon boat industry that technology is the only factor that determines the outcome of the race. In addition, I found that every time in the dragon boat competition, we could see the special camera dragon boat researchers, comparing the video, only repeatedly study the technical characteristics, ignoring the great role of physical fitness in the competition.

The fifth interviewee department put forward: dragon boat sports as a physical leading endurance race events, physical fitness is an important performance of athletes' competitive ability. With the continuous development of science and technology, the traditional dragon boat physical training has not meet the requirements of modern competitive dragon boat competition, if you want to play the best competitive state in the game, win the game, must rely on a long time big intensity of physical and technical training, make the body gradually adapt to the intense complex competition needs, realize the best of sports competition.

Q14: A Brief discussion on the factors affecting the physical fitness level of China's outstanding female dragon boat athletes?

First interviewee sun: according to the characteristics of dragon boat sports and athletes energy metabolism, think the dragon boat sports is a moderate strength to large strength of explosive force, is aerobic ability as fundamental key, anaerobic capacity as the main body, aerobic energy ratio between 75%~80%, no oxygen energy ratio between 20%~25% of a special sports. In the process of the dragon boat sports training, paying attention to the strength training helps to improve the aerobic and anaerobic ability of the dragon boat athletes, and improve the performance of the competition level. In the process of the dragon boat race, the athletes rely on the strength of the limbs and the trunk muscles to complete a series of related movements such as lifting the oar into the water, pulling the paddle, pressing the oar and pushing the paddle, and make the dragon boat move forward through the paddle stroke. The excellent dragon boat athletes have the ability to increase the oar frequency from the static state to 150 paddle / min in 0~6 paddle, and the athletes can reach the force of each oar to 736~1054 Newton. It can be seen that dragon boat is a physical leading

sport that provides aerobic energy and emphasizes the strength and quality. The second interviewee Huang put forward: the physical evaluation of dragon boat athletes is mainly carried out from three aspects: body shape, physical function and sports quality. Body shape is the external shape and characteristics of the body, which is an intuitive reflection of a human body, including height, weight, length of upper limbs, lower limbs length, finger distance, shoulder width, chest circumference, waist circumference, hip circumference, thigh circumference, to role indicators, body fat rate, etc. Sports quality mainly includes strength quality, endurance quality, speed quality, sensitive and coordinated quality, etc. For dragon boat athletes, good sports quality is the basis of achieving excellent competition results on the field. The third interviewee Zhu said: from the perspective of sports quality, the antagonism and intensity of the dragon boat movement determines that the female dragon boat athletes must have good strength quality, speed quality and sensitive coordination quality. Strength quality is the dragon boat athletes is the most basic and the most important sports quality, athletes in the game, if you don't have good upper limbs and lower limbs and waist abdomen strength, cannot play in the fierce technology, more unlikely to complete the team tactics, so, in daily training, athletes special emphasis on strength quality training. The fourth interviewee once said: speed quality is the dragon boat athletes competition weapon, dragon boat sports not only requires strength confrontation, but also must have a good speed quality. In the process of the dragon boat race, the situation on the field is changing rapidly, and the fierce competition requires a faster speed. At the same time, sensitivity and coordination are the display of the ability to control themselves. In all sports, the best athletes show the sensitivity and coordination of the body to the extreme.

The fifth interviewee department said: from the perspective of physiological function characteristics, the dragon boat race rhythm is very fast, the exercise time is short, the exercise intensity is high, the athletes heart and lung machine and anaerobic energy supply system has high requirements. The fast competition rhythm and strong physical confrontation make the athletes easy to produce lactic acid accumulation and affect the performance of the competition. Therefore, the good cardiopulmonary function can help the dragon boat athletes to maintain high oxygen intake in the high intensity and intense exercise, and prevent the lactic acid accumulation to produce

exercise fatigue. Therefore, female dragon boat athletes generally have better cardiopulmonary function, reaction to lower heart rate, greater lung capacity, maximum oxygen uptake and higher lactic acid valve.

Q15: How do you think to improve the physical training level of China's elite female dragon boat athletes?

The first interviewee Sun thinks: the function level and state of the body affect the performance of physical fitness, is the most basic link in the physical structure, and physical concentration in physical fitness, is an important indicator of the physical level. Body shape, physical function and sport quality are not simple combinations and splicing between systems, but an organic interactive whole. The three components promote and restrict each other, and jointly form the complete physical fitness system of athletes. For example, the body shape is the most intuitive physical image of athletes, including height, weight, length of upper limbs, lower limbs, circumference, etc. It seems to be just an external image, but it is another expression of athletes' sports quality. Sports quality is a direct embodiment of athletes' athletic ability, and these sports quality are generally affected by the body shape. Therefore, in the training of Female dragon boat sports, we should pay attention to the development of these indicators factors and the targeted exercise. The second Interviewee Huang put forward: dragon boat belongs to a very technical physical cycle action race project, is a high demand on physical and muscle strength sports. Dragon boat sports have the characteristics of high exercise intensity and high energy consumption per unit time. Dragon boat rowing technology includes the paddle, paddle, paddle, paddle, paddle action need upper arm and waist muscles have good explosive force, endurance, speed, etc., in the process of rowing, to control the paddle posture, and to control the weight of ups and downs and the coordination of body, which requires the dragon boat athletes not only need a good endurance and fitness, also have strong control, maintain the strength of stable posture, these qualities to athletes technical level fully play a decisive role.

The third interviewee zhu said: according to the definition of physical characteristics, the physical characteristics of dragon boat athletes can be divided into

the following three main aspects, respectively, the athlete's body shape, physical function and sports quality, the dragon boat athletes on the body shape quality showed shape symmetry, shoulder width, upper arm muscle dimension, wingspan is a good enrichment physical characteristics. Strength, flexibility, speed, endurance and sensitivity are the five major influencing factors of exercise quality. Good explosive power, endurance, speed and other sports quality, to the dragon boat athletes play an important role in the competition.

The fourth interviewee once said: dragon boat as a physical leading strength endurance project, the competition is very intense, physical consumption is huge. Dragon boat athletes need to quickly complete a series of technical movements such as slurry insertion, pulling, slurry outlet, slurry, flexion and trunk rotation under the control of stable body posture. In the process of dragon boat athletes rowing, the balance of the body is largely maintained by the strength provided by the core muscles of the waist and abdomen. It can be seen that the strength quality plays an important role in the skill of the dragon boat athletes. Fifth interviewee division said: paddle length, strength and muscle strength indicators on the difference determines the level of the dragon boat athletes, outstanding dragon boat athletes usually shape, muscle dimension is the shape characteristics of excellent dragon boat athletes, the distinctive appearance characteristics to the athletes in the game fast, lasting, powerful paddle. The combination of exercise with high intensity, high energy, short-term consumption, anaerobic metabolism exercise and aerobic metabolism exercise are the body function characteristics of dragon boat exercise.

Q16: What aspects do you think should be used to evaluate the physical fitness of China's excellent female dragon boat athletes?

The first interviewee Sun said: in the dragon boat project, most of the energy supply is sweet triphosphate (ATP) and sugar element. To understand its main characteristics of energy supply, in the training method, we should choose to vigorously develop the training method of its energy supply system, and increase its energy reserves. For example, if we want to develop the ATP system for dragon boat athletes, we can use the maximum exercise time and the maximum force exhaustion

time to control the exercise intensity of the athletes' training, so as to promote the synthesis and decomposition rate of ATP.

The second interviewee Huang said: according to the principle of mechanics, during the physical training of dragon boat athletes, the strength training of the main muscle groups was targeted and the training methods and means were selected scientifically and rationally, which made the goal of physical training more clear and the effect more significant. The dragon boat movement relies on people rowing the boat to move forward in the water, so the driving force of the boat forward is the force of people acting on the paddle to overcome the resistance of the water to obtain, the size of its force depends on the size of the force of people on the paddle. Therefore, in order to increase the boat speed, the most important thing is to increase the muscle contraction speed and strength, so as to increase the paddling force and get a larger reaction force, so that the state of the dragon boat changes. The third interviewee Zhu said: in the short distance dragon boat race, the fast muscle fibers were mainly responsible for providing energy for the body, while in the long distance race, the slow muscle fibers were mainly responsible for providing energy. In the daily physical training, training methods and means should be selected according to the energy characteristics of the special technical requirements of the dragon boat to conduct targeted strength training. In the process of the dragon boat race, the starting technology requires the athletes to have a strong speed explosive force, which requires fast muscle fibers to contract rapidly, providing huge energy for the muscle to do fast work, so the daily physical training should be based on the actual needs of the race, do more key development of fast muscle fiber physical training. The fourth interviewee Zeng said: to improve the competitive ability of female dragon boat athletes, improving their physical training is the key. In the training, the explosive power of each muscle group is improved through effective methods, the forward movement amplitude and speed of the pulling arm and the supporting arm are increased, the pulling force is strengthened, and the water reaction force against the dragon boat is increased, and the speed of the dragon boat is accelerated. This is the fundamental of the dragon boat athletes physical training. Dragon boat is a typical physical race speed project, which must rely on the rapid contraction of muscles to produce strong muscle strength to meet the needs of movement.

The fifth interviewee Si said: dragon boat athletes rowing exercise, the athletes upper body movement mode and amplitude than the trunk and lower limb movement is significantly too much, mainly the shoulder belt muscle and upper arm muscles to do work. From the technical analysis of the completion of dragon boat sports, the working mode of athletes' upper limb muscles is mainly distal fixed centripetal contraction. According to the characteristics of muscle movement, the usual training method should use distal fixed training method, which has important guiding significance for physical training.

Q17: What are your suggestions for this study?

The first interviewee Sun said: in the daily physical training process of dragon boat sports, more attention should be paid to the fatigue and recovery of muscles, and different means of fatigue recovery for different types of muscle fibers to ensure that the muscles can adapt to the needs of competition and training. The second interviewee Huang said: the current dragon boat competition level is getting higher and higher, the intensity of training is getting bigger and bigger, how to adapt to the high level of training, make the body as soon as possible to recover fatigue, this is in the dragon boat sports physical training should cause attention and attention. The third interviewee Zhu said: through his years of research on the dragon boat sports, in the dragon boat training, improve the level of myocardial strength and endurance, speed, can ensure the heavy load training and competition, at the same time, the cardiopulmonary function of the dragon boat athletes can be regarded as an aspect of the selection of athletes in the future. The fourth interviewee Zeng suggested that dragon boat athletes need good sensitivity and coordination ability in order to quickly learn and master various sports skills, and enhance the mastery of new technologies and adaptability to new exercises. The fifth interviewee Si said: in the dragon boat race, in the rowing stage, the faster the rowing speed, the paddle to overcome the water resistance to do more work, the faster the boat speed, which requires the athletes to have a strong rowing ability. Therefore, in the daily physical training, should be according to the technical requirements of the dragon boat characteristics, do some special physical training.

APPENDIX Y

The physical fitness indicators and comprehensive grade scoring standard of Chinese female dragon boat athletes

Standard\ indicators	Poor Under 20%	Lower 20%-40%	Middle 40%-60%	Good 60%-80%	Excellence More than 80%
Body shape score	≦0.7122	0.7122-1.0474	1.0474-1.3825	1.3825-1.7176	≧1.7176
Physical function score	≦1.7724	1.7724-2.0001	2.0001-2.2289	2.2289-2.4572	≧2.4572
Sports quality score	≦5.8497	5.8497-6.4886	6.4886-7.1276	7.1276-7.7665	≧7.7665
Comprehensive score	≦9.4612	9.4612-10.2085	10.2585-10.9560	10.9560-11.7033	≧11.7033

APPENDIX Z

Results of comprehensive evaluation of physical fitness of Chinese female dragon boat athletes

Athletes	Body shape	Physical function	Sports quality	Comprehensive score
X1	Middle	Middle	Middle	Lower
X2	Middle	Middle	Good	Good
X3	Middle	Middle	Middle	Lower
X4	Excellent	Excellent	Excellent	Excellent
X5	Lower	Poor	Excellent	Middle
X6	Lower	Poor	Middle	Lower
X7	Middle	Excellent	Excellent	Excellent
X8	Good	Good	Excellent	Excellent
X9	Lower	Lower	Middle	Poor
X10	Good	Excellent	Excellent	Excellent
X11	Lower	Good	Middle	Lower
X12	Poor	Good	Lower	Poor
X13	Middle	Excellent	Good	Good
X14	Middle	Middle	Middle	Lower
X15	Middle	Middle	Excellent	Good
X16	Middle	Middle	Good	Middle
X17	Middle	Poor	Middle	Lower
X18	Lower	Lower	Good	Middle
X19	Middle	Middle	Middle	Lower
X20	Good	Lower	Excellent	Excellent
X21	Middle	Middle	Good	Middle
X22	Middle	Good	Excellent	Excellent
X23	Middle	Good	Excellent	Good
X24	Lower	Lower	Middle	Lower

Athletes	Body shape	Physical function	Sports quality	Comprehensive score
X25	Good	Excellent	Excellent	Excellent
X26	Excellent	Excellent	Excellent	Excellent
X27	Middle	Good	Excellent	Good
X28	Middle	Middle	Good	Good
X29	Middle	Middle	Good	Middle
X30	Lower	Good	Good	Middle
X31	Middle	Lower	Excellent	Good
X32	Middle	Middle	Good	Good
X33	Poor	Poor	Excellent	Middle
X34	Middle	Excellent	Excellent	Excellent
X35	Middle	Good	Poor	Poor
X36	Lower	Lower	Lower	Poor
X37	Good	Excellent	Excellent	Excellent
X38	Good	Good	Excellent	Excellent
X39	Lower	Middle	Middle	Lower
X40	Excellent	Excellent	Excellent	Excellent
X41	Good	Excellent	Middle	Middle
X42	Lower	Lower	Middle	Poor
X43	Middle	Good	Good	Good
X44	Lower	Poor	Middle	Poor
X45	Excellent	Excellent	Good	Excellent
X46	Lower	Lower	Lower	Poor
X47	Lower	Poor	Lower	Poor
X48	Middle	Excellent	Good	Good
X49	Lower	Lower	Middle	Poor
X50	Middle	Good	Good	Middle
X51	Lower	Poor	Lower	Poor
X52	Middle	Poor	Middle	Lower

Athletes	Body shape	Physical function	Sports quality	Comprehensive score
X53	Lower	Poor	Middle	Lower
X54	Good	Middle	Excellent	Good
X55	Middle	Lower	Good	Lower
X56	Lower	Excellent	Good	Good
X57	Middle	Middle	Middle	Lower
X58	Poor	Lower	Middle	Poor
X59	Lower	Middle	Good	Middle
X60	Middle	Poor	Good	Middle
X61	Lower	Excellent	Good	Middle
X62	Middle	Lower	Excellent	Good
X63	Good	Good	Good	Good
X64	Lower	Lower	Good	Lower
X65	Lower	Poor	Good	Lower
X66	Good	Excellent	Middle	Good

APPENDIX AA

Monoidal score Results of Body shape indicators of Chinese female Dragon Boat athletes (unweight)

Athletes	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
X1	10	10	9	13	13	7	9	10	10	13	12	5	12	8
X2	10	8	8	13	19	8	8	10	9	12	12	9	16	4
X3	10	8	7	13	12	7	8	9	9	12	12	3	4	18
X4	17	20	20	18	11	8	15	17	20	19	20	20	13	7
X5	12	0	0	4	13	11	3	3	0	3	15	0	9	14
X6	12	2	0	8	3	5	5	6	2	6	15	0	8	15
X7	8	16	16	16	18	0	11	13	15	17	9	17	13	7
X8	13	20	11	15	17	13	11	13	15	16	18	15	7	15
X9	9	13	4	8	4	5	5	7	2	6	9	3	17	3
X10	6	10	20	18	20	19	17	18	20	20	6	20	1	20
X11	11	9	0	11	8	6	7	8	5	10	15	5	14	6
X12	7	4	2	3	1	2	1	3	0	2	9	0	20	1
X13	6	18	11	15	16	13	11	13	14	16	6	15	8	15
X14	14	13	3	9	4	5	5	7	2	7	18	3	16	3
X15	11	4	11	17	19	13	12	14	17	18	12	19	4	18
X16	8	11	14	14	14	9	9	10	10	13	9	13	10	13
X17	13	7	9	10	8	6	7	8	5	9	18	11	15	6
X18	8	13	7	12	11	7	7	9	7	11	9	9	11	12
X19	16	7	2	9	4	5	5	7	3	8	20	9	12	10
X20	12	16	17	16	18	13	12	14	17	17	15	17	12	9
X21	10	7	6	12	9	7	7	8	7	10	12	7	10	13
X22	10	12	13	14	15	11	10	11	13	15	12	15	15	6
X23	4	0	14	15	16	12	11	12	14	16	3	15	11	12
X24	6	14	4	12	8	7	7	8	6	10	3	7	5	16
X25	13	3	16	16	17	13	11	13	15	17	18	17	5	15
X26	13	17	19	18	20	15	15	17	20	19	18	20	2	20
X27	6	10	16	15	16	11	10	12	13	15	3	15	9	14

Athletes	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
X28	19	3	0	13	13	9	9	10	10	13	20	11	11	12
X29	8	8	20	12	12	8	8	9	9	12	9	9	12	9
X30	3	11	12	14	15	10	9	11	11	15	3	13	2	20
X31	12	5	4	10	8	6	7	8	3	9	15	5	20	1
X32	10	9	9	13	13	8	9	10	10	13	12	11	17	3
X33	4	1	0	7	2	4	3	5	0	4	3	0	19	2
X34	15	18	0	18	19	14	13	15	18	18	20	19	3	19
X35	10	6	12	13	13	8	9	10	9	12	12	11	11	11
X36	7	6	8	9	5	5	6	7	3	8	6	5	16	5
X37	14	7	18	17	19	14	12	15	18	18	18	19	3	19
X38	12	16	14	15	16	12	11	12	14	15	15	15	9	14
X39	9	7	6	12	11	7	7	9	7	11	9	9	12	8
X40	15	18	19	18	20	15	14	16	19	19	20	20	2	20
X41	12	14	14	15	17	13	11	13	14	16	15	15	7	15
X42	6	15	2	9	4	5	6	7	3	8	6	5	16	5
X43	11	2	14	14	14	10	9	11	11	14	15	13	10	13
X44	8	20	2	11	8	7	7	8	6	10	9	7	14	6
X45	20	20	18	20	20	20	20	20	20	20	20	9	0	20
X46	4	1	11	7	2	3	3	4	0	4	3	9	19	1
X47	6	3	4	9	4	5	5	7	3	7	6	9	16	3
X48	11	11	6	14	14	10	9	11	11	14	12	5	10	13
X49	7	5	4	10	6	6	6	8	3	9	9	13	15	6
X50	11	11	0	14	14	10	9	11	10	14	12	13	10	13
X51	6	1	18	7	3	13	4	6	0	5	3	0	17	2
X52	12	11	9	14	15	11	10	11	11	15	0	13	10	14
X53	10	8	3	13	13	8	8	10	0	12	12	11	11	11
X54	13	0	18	16	12	13	12	14	17	18	18	17	4	18
X55	10	8	8	13	12	8	8	10	9	12	12	9	12	11
X56	9	7	7	12	20	7	0	0	7	11	9	9	12	9
X57	11	10	9	0	2	9	9	10	10	13	12	13	11	13
X58	0	2	0	8	3	4	5	6	2	6	3	0	17	2

Athletes	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
X59	8	7	6	12	9	9	7	8	7	10	9	20	13	7
X60	10	8	7	12	11	8	8	9	9	11	9	0	12	9
X61	9	7	6	12	9	8	7	9	7	11	9	3	12	8
X62	10	8	7	13	12	16	8	9	9	12	12	9	12	10
X63	12	12	13	14	16	3	10	11	13	15	15	15	9	14
X64	7	5	3	10	6	4	6	8	3	8	6	5	15	5
X65	6	17	0	13	0	4	8	9	9	0	15	0	20	0
X66	13	16	16	16	18	13	11	13	17	17	18	17	5	16

Note: C1-C14 respectively represent respectively:C1 Height (cm), C2 Calf length (cm), C3 Arm span (cm), C4 Lower limb length (cm), C5 Shoulder width (cm), C6 Hip width (cm), C7 Upper arm tension (cm), C8 Calf circumference (cm), C9 Waist circumference (cm), C10 Thigh circumference (cm), C11 Chest circumference (cm), C12 Height (cm), C13 Body fat percentage (%), C14 The Ketole indicators.

BIOGRAPHY

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