



# Psychological factors of sports injury caused by wireless communication of embedded microprocessor in social sports teaching and training

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## Abstract

In the process of physical education and training, students' sports injuries are found, and the laws of injury and psychological factors of injury are discovered from them, to propose targeted preventive measures to reduce the incidence of sports injuries. Based on embedded communication technology, it provides a material means for the sharing of information resources. And the application of the microprocessor makes it very useful in physical education. It is hoped that the incidence of track and field sports injuries of physical education students can be reduced, their potential can be tapped, and their sports life span can be prolonged. This paper establishes the evaluation model of sports injury psychology and emotion, and analyzes the influence of sports injury emotion change on injury rehabilitation and psychological state maintenance cycle in Google data analysis platform. 36 undergraduates from 211 universities were recruited as subjects to show them the introduction information of various sports and ask them to complete the questionnaire. This paper adopts the group design method with psychological quality (high / low) as the independent variable and the choice intention of sports (simple sports / complex sports) as the dependent variable. To select suitable sports for young people to carry out psychological experiments and realize the effective control of scene information. According to the score of psychological quality, the group with high score is regarded as young people with high psychological quality, and the group with low score is regarded as young people with low psychological quality. According to the experimental data, the median score of experiment 1 was 5.00. Those who score higher than 5.0 have high psychological quality, while those who score lower than 5.0 have low learning ability. Taking "psychological quality (high / low)" as the independent variable and "sports project (simple sports / complex sports) choice intention" as the dependent variable, this paper carries out one-way ANOVA with the help of spss22.0. The results show that psychological quality has a significant impact on young people's sports injury.

**Keywords** Physical education · Sports injury · Mental state · Comprehensive development of body and mind · Embedded microprocessor · Wireless communication

## 1 Introduction

The thorough advancement of body and brain in school actual instruction is as yet lingering behind. The fundamental explanation is that the association between schools and market economy is not sufficiently close. Albeit a few super advanced implies have been utilized in school sports and wellness, the way is moderately single, the gear is maturing, and the level of insight is not high. Indeed, most of the games adopted the normal display mode and confrontation mode, and the study of the psychological nature of sports injuries in the classroom and in the preparation was lacking.

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In recent years, the application of embedded technology has penetrated into all aspects of people's lives, from mobile phones and handheld computers to smart home appliances such as smart refrigerators and microwave ovens. There are also large-scale CNC machines such as CNC machine tools and CNC centers in the industry. Embedded controller on the device. The development of embedded technology brings great convenience to human production and life, which greatly promotes production and improves people's quality of life. The embedded wireless communication system can use the wireless method to release information and is equipped with a set of software interfaces for product display. The system has a built-in operating system, so that the system functions can be expanded with the increase of application software functions, and it has a wide range of market applications. Of course, you can observe the psychological changes of students in the training process in real time.

Khan S talked about the way of behaving of African-American understudies remaining in school and decided the impact of various social, mental, and different variables. Non-parametric investigation shows that higher feelings of anxiety, youth destitution, absence of parental association or backing, absence of help from mentors, and absence of self-inspiration improve the probability of exiting. The discoveries of this study have significant ramifications for the school standard for the dependability of African American understudies [1]. A large number of studies believe that psychological quality cognitive strategy plays an important role in sports learning. Jin Wook C's research found that for learning behavior, individuals with high interpretation level are more confident in their own learning effects [2]. What is more, letafatkar A's research also shows that individuals have higher expectations of long-distance performance than recent tasks. This means that with the increase of time distance, the task goal of individual choice will become higher [3]. In addition, Richmond's study also found that: the farther the time distance, the more attention individuals pay to the desirability of behavior results; the closer the time distance, the more attention individuals pay to the feasibility of behavior results [4]. Soltyk believes that in a general sense, people with higher self-efficacy have higher psychological quality, and they are more likely to choose more difficult task goals. However, because this experience can not be formed in a short time, the time factor is particularly important for the formation of self-efficacy that is competent for a certain learning task [5].

Vlad R pointed out that at the macro level, we must give play to the regulatory functions of the government and society, strengthen social, cultural, and economic construction, to enhance the awareness of sports participation of the whole society [6]. In recent years, increasingly

people begin to classify sports according to the complexity of sports skills. For example, when Beijsterveldt AMV discussed the universality of operational memory ability in sports, he divided motor skills into simple motor skills and complex motor skills and used the index of "ability" to represent the difficulty of motor skill learning, and classified them accordingly [7]. Labella believes that it is necessary to cultivate young people's interest in sports at the micro level, strengthen physical education, and use mass media to enhance young people's interest in participation. However, it is a pity that the above suggestions ignore the important role of young people's own psychological qualities [8]. Ham pointed out that the difficulty of different sports is not the same, so the required psychological quality is also different. It is inferred that young people's choice of sports may be affected by their own psychological qualities [9]. Moreover, the time distance theory proposed by Lee Y S also confirms that people will present different decision-making characteristics when they are faced with making choices immediately or making plans for the future [10]. The above research on the macro analysis of the psychological factors of sports injury, but for people with different psychological quality sports injury with psychological change feedback and lack of data proof, this paper analyzes the psychological changes in specific sports.

This paper establishes the evaluation model of sports injury psychology and emotion, and analyzes the influence of sports injury emotion change on injury rehabilitation and psychological state maintenance cycle in Google data analysis platform. 36 undergraduates from 211 universities were recruited as subjects to show them the introduction information of various sports and ask them to complete the questionnaire. This paper adopts the group design method with psychological quality (high / low) as the independent variable and the choice intention of sports (simple sports / complex sports) as the dependent variable. To select suitable sports for young people to carry out psychological experiments and realize the effective control of scene information. The innovation of this paper is that it adopts a group design method with psychological quality as the independent variable and exercise selection intention as the dependent variable. The rest of the paper is categorized as the following content.

## 2 Related theory introduction

### 2.1 Sports metacognition teaching

Physical fitness is an eternal topic. Today, with the rapid development of science and technology, people's attention and demand for health has risen to a new height. Fitness is

an important way to promote health and improve national physique [11, 12]. The traditional fitness is greatly affected by the venue, way, coach, economy, and time [13, 14]. The classified guidance and personalized guidance for different physical groups are vague, and the tracking evaluation is not in place. Sports training and teaching is a branch industry of training and teaching, which has the function of competition, performance and entertainment and leisure [15, 16]. At present, increasingly trainers are attracted to participate in it. To advance the change and advancement of sports industry, we ought to work on the nature of occasion broadcasting and setting offices, enrich and optimize the service content, to promote the continuous improvement of industrial training [17, 18]. Novel coronavirus pneumonia has been greatly affected by the new crown pneumonia epidemic situation, which has been unable to meet the training needs of trainers. Thusly, how to advance the supported and solid improvement of sports preparing industry under extreme scourge circumstances has turned into a critical issue. In this situation, due to the obstacles of offline training, we can use the Internet platform to implement online training according to the needs of trainers, and promote the smooth progress of training [19, 20]. At the same time, we should strictly supervise, evaluate, and timely the feedback online to ensure the training effect. In terms of fitness and leisure industry, sports, town, and city marathons are in full swing. People keep on partaking in the sports and the travel industry, which animates the development of sports preparing. Under the change of sports training demand, the fitness and leisure industry should actively seek transformation and reshape the business model [21, 22]. Specifically, we can attract trainers to participate in sports training by holding sports training festival activities and issuing sports training coupons, to promote the growth of sports service training. Under the support of policy and science and technology, and guided by the needs of trainers, we focus on the implementation of online and offline integrated development modes [23].

## 2.2 Psychological index simulation model in physical training

At present, the management of College Students' Extracurricular fitness is insufficient. There is no professional guidance and supervision for students' extracurricular exercises, which can not avoid the negative impact of unscientific fitness. Students' fitness activities can not achieve the purpose of professional, safe, effective, and convenient, which hinders the formation of lifelong sports awareness and habits. At the same time, there are few full-time fitness coaches in colleges and universities, and most of them come from other sports. The results show that there

is a lack of guidance and pertinence for students' fitness, and there is no information management equipment due to backward fitness ways and equipment. This depends on the intervention and integration of intelligent means. Only by combining psychology with fitness can the fitness effect be implemented:

$$P = \frac{\sum_{j=1}^k \sum_{h=1}^k \sum_{i=1}^{n_j} \sum_{r=1}^{n_h} |y_{ij} - y_{hr}|}{2n^2u} \quad (1)$$

At present, the comprehensive development of physical and mental health in China's coastal provinces is relatively advanced. Rizhao and other cities have been building a comprehensive health club integrating intelligent medical treatment, intelligent fitness, and intelligent rehabilitation. It adopts the whole process information and intelligent means, takes foreign advanced equipment as the carrier, and integrates the body measurement, monitoring, tracking, treatment, and individual planning as one of the intelligent fitness system. However, most of these methods exist in commercial clubs, but they are rarely used in colleges and universities, and they do not meet the requirements of the National College fitness club reform. The purpose of club system reform in colleges and universities is to integrate sports into students' lives, so that students can achieve the purpose of physical fitness and cultivating students' interest in sports through extracurricular sports competition, extracurricular sports exercise, extracurricular sports training, sports performance, sports video watching and other ways:

$$I_A = E_w + E_{nb} + E_t - Ic \quad (2)$$

Use Internet, Internet of things, big data, and other high-tech to create a new fitness management mode. Reasonable optimization of fitness club, several areas, set up fitness test area, scientific fitness area, sports rehabilitation area, health care area, health management service area, college students can, according to their own physique monitoring report data and analysis, understand their body composition and need to strengthen the place, use big data, Internet of things, reasonable development of fitness plan and exercise model for their own physique type:

$$E_j = \frac{\frac{1}{2n_j} \sum_{i=1}^{n_j} \sum_{r=1}^{n_j} |y_{ji} - y_{jr}|}{n_j^2} \quad (3)$$

According to the students' level and fitness years, the students are divided into junior students, intermediate students, and senior students. A series of activities and competitions are regularly carried out in different levels of student groups, such as health knowledge, competition, fitness one-to-one assistance activities, free fitness, activity planning, strength and speed competition, etc., to enrich the content of fitness activities, increase the interest and

participation of fitness, and make the fitness more effective, to promote the development of fitness research system and arouse the enthusiasm of students to explore fitness knowledge, we should make the model more diversified and game oriented, increase the discussion part of audience groups, effectively combine theory with practice:

$$E_t = \sum_{j=2}^k \sum_{h=1}^{j-1} G_{jh}(p_j s_h + p_h s_j) D_{jh}(1 - D_{jh}) \quad (4)$$

Add a variety of free sports, combine traditional rhythmic gymnastics with intelligent fitness, such as yoga, Pilates, pedal exercise, aerobic combat, dance, etc. On the operational level, members can register and ask questions through the app and the official websites. After the competition, they can communicate, interact, and share online to improve the influence and sustainability of the activity and facilitate the collection and retention of activity files. All slave cores run the simulation model at the same time to calculate the objective function of psychological state

$$M = \frac{d_{jh} - P_{jh}}{d_{jh} + P_{jh}} \quad (5)$$

To consider the uncertainty related to activity duration, K replicates are used to calculate the total cost and duration of the project in each round:

$$d_{jh} = \int_0^\infty dF_h(y) \int_0^y (y-x) dF_j(x) \quad (6)$$

The last worth of the goal, is not entirely set in stone by the normal aftereffect of K reproduces, which is utilized as the result of the recreation model:

$$f(x) = \frac{1}{Nh} \sum_{i=1}^N k \left( \frac{X_i - x}{h} \right) \quad (7)$$

The result of the reproduction (for example, the wellness upsides of all individuals from the sub-populace) is sent back to the expert hub to perform transformative activities (for example, determination, hybrid, and change) and lastly select the original Pareto front:

$$P = \sigma t = \frac{\sqrt{\frac{1}{n} \sum_{i=1}^n (FI_{it} - FI_{it})^2}}{FI_{it}} \quad (8)$$

## 2.3 Embedded microprocessor and wireless communication

### (1) Embedded Microprocessor

Embedded microprocessors evolved gradually from CPUs to general-purpose computers. Most microprocessors with 64 bits or more have higher processing performance. Unlike computer processors, embedded microprocessors retain only functional components closely related to embedded applications in actual embedded applications,

and remove other redundant functional parts. In terms of low power consumption and rich peripheral functions, A good balance has been found to meet the special requirements of embedded product applications. Compared with industrial control computers, embedded microprocessors have the advantages of low power consumption, low cost, light weight, small size, and high reliability. Figure 1 shows the overall layout of the embedded microprocessor core board.

It can be seen from Fig. 1 that the core board circuit layout is relatively concentrated and the area is small, which not only reduces the cost of the board, but also facilitates the integration of the entire system. The necessary core circuits are concentrated on a core board, which greatly facilitates the design, development, and debugging of the product. At the same time, in some application circuits with strong electromagnetic interference, you can increase the entire the design reliability of the circuit.

### (2) Wireless Communication.

When the fourth-generation (4G) wireless communication system commercial network is rapidly spreading worldwide, the fifth-generation (5G) wireless communication system “facing 2020 and the future” has become a

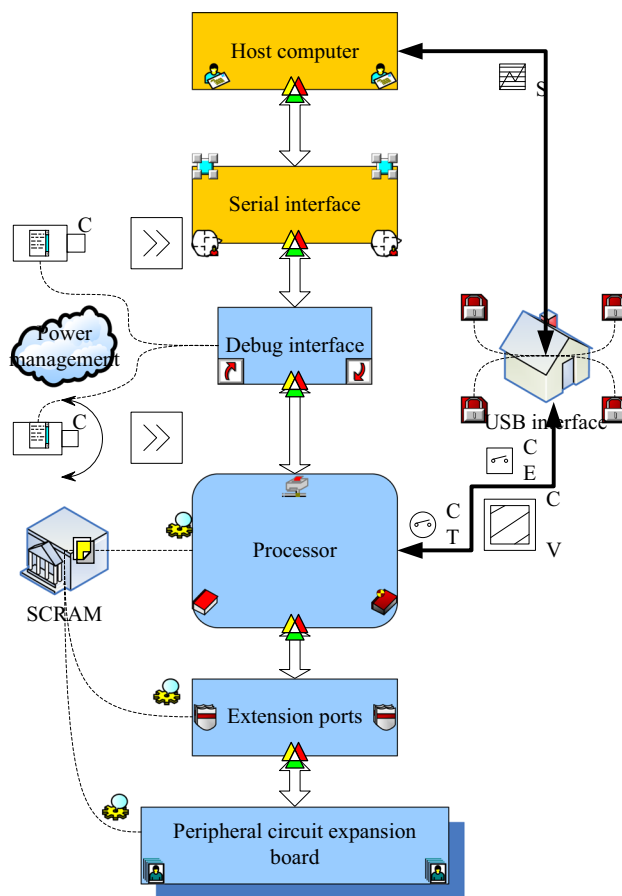


Fig. 1 Block diagram of the core board module

research hotspot in the global wireless communication field. 5G wireless communications will integrate multiple technologies, such as millimeter wave communications, large-scale antenna arrays, full-duplex and ultradense networking, etc., to support multiple business communications, such as virtual reality, augmented reality, Internet of Things, and multimedia applications. Upgrades and advancements to existing innovations to take care of the four fundamental issues of “ceaseless wide-region inclusion”, “areas of interest and high limits”, “low inertness and high dependability” and “low power utilization and enormous association”. All through the times of improvement of remote correspondence frameworks, the restoration of every age of remote correspondence frameworks has been joined by the development of notable various access advancements. To meet the large access and super high limit prerequisites of 5G remote correspondence framework, Non-Orthogonal Multiple Access (NOMA) technology has gradually become one of the candidate technologies for multiple access in 5G wireless communication systems. Figure 2 details the basic principles of the downlink and uplink NOMA technology.

As shown in Fig. 2, the transmitter first divides the multiuser signal in the power domain according to user channel conditions, user quality of service (Quality of Service, QoS) requirements, interuser interference and other information, and then divides the multiuser signal in the power domain through superposition coding (SC). Its

sending; receiving end uses the serial interference cancellation (Successive Interference Cancellation, SIC) technology to eliminate the interference among the multiuser signals step by step according to the difference in the power of the multiuser signals, until the desired signal is decoded. It can be seen that in NOMA technology, the system transmits multiple user signals overlapping on the same wireless resource with different transmission powers, which can provide wireless transmission services for multiple users at the same time, and realizes the system's new dimension power domain. Multiple access.

### 3 Psychological factors of sports injury

#### 3.1 Data model

This paper establishes the evaluation model of sports injury psychology and emotion, and analyzes the influence of sports injury emotion change on injury rehabilitation and psychological state maintenance cycle in Google data analysis platform. 36 undergraduates from 211 universities were recruited as subjects to show them the introduction information of various sports and ask them to complete the questionnaire.

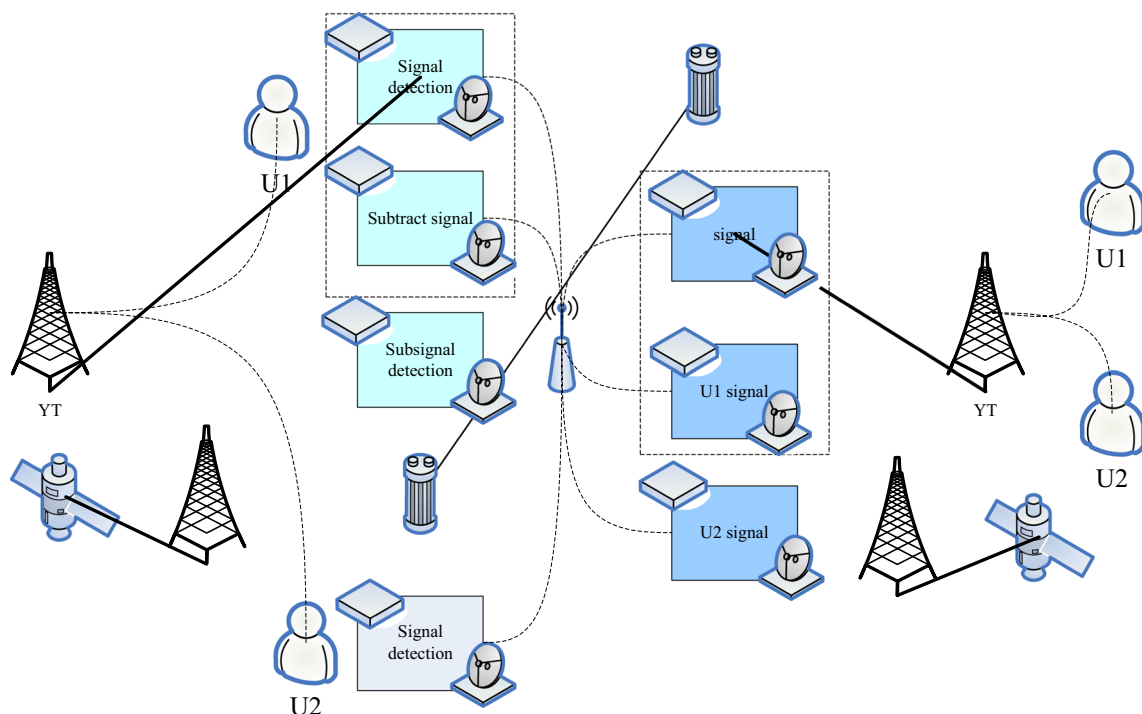


Fig. 2 Schematic diagram of the basic principle of NOMA technology

### 3.2 Steps

This paper adopts the group design method with “psychological quality (high / low)” as the independent variable and “sports project (simple sports / complex sports) choice” as the dependent variable. To select suitable sports for young people to carry out psychological experiments and realize the effective control of scene information.

Combined with the literature review and according to the difficulty of sports, 15 sports events are selected as the pretest objects. The subjects were asked to evaluate the difficulty of each sport by Likert 5 scale. Among them, 1–5 represent five grades of “very easy to learn to very difficult to learn”. To verify the interaction between psychological quality and time distance in influencing the willingness to choose sports events, this paper takes “sports choice” as the dependent variable and “psychological quality and time distance” as the independent variable, and uses (Sports difficulty: high vs low)  $\times$  (time distance: far) The experimental process is similar to the first step. According to the characteristics of time distance, this study adopts direct manipulation, and the time distance of event occurrence is manipulated to two levels: far and near. On the one hand, according to the actual life situation, such as the length of the swimming training course, the “time distance” is set to 3 days.

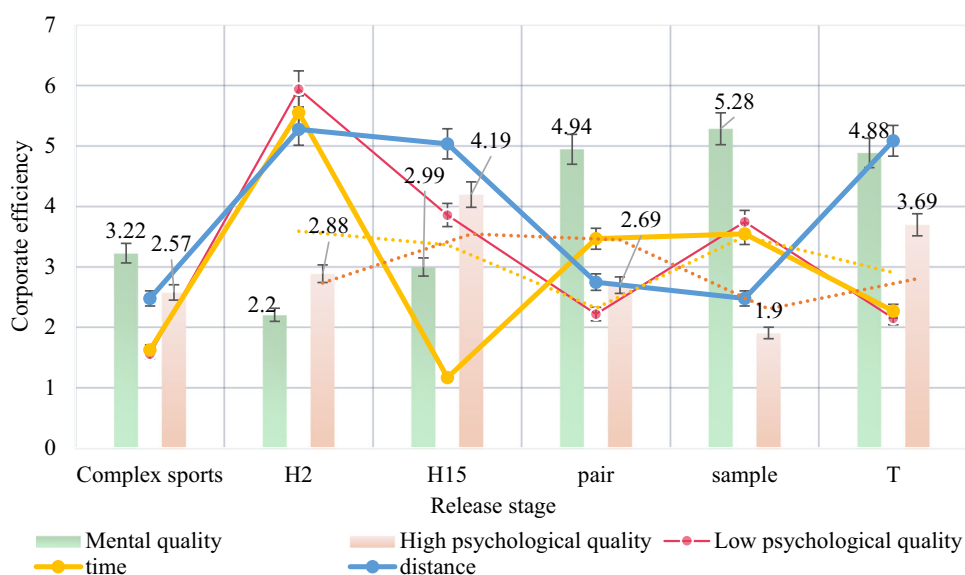
## 4 Psychological factors of sports injury in physical education teaching and training

As shown in Fig. 3, due to the lack of experience and competence, people with low psychological quality tend to choose simple sports within their ability and avoid complex sports in the face of recent choices. However, if they are given enough time, the evaluation expectation and confidence of people with low psychological quality to participate in complex sports may be improved. At this time, they pay more attention to the desire to participate in complex sports.

As shown in Table 1, the extension of time distance has a greater impact on the willingness of people with low psychological quality to participate in complex sports. In addition, for people with high psychological quality, in the case of sufficient time, because they have a lot of experience, they are more willing to choose complex sports. However, if the time given is limited, their self-confidence may decrease with the decrease of the level of explanation, and eventually they tend to consider the feasibility of the behavior results, and then choose simple sports, not complex sports.

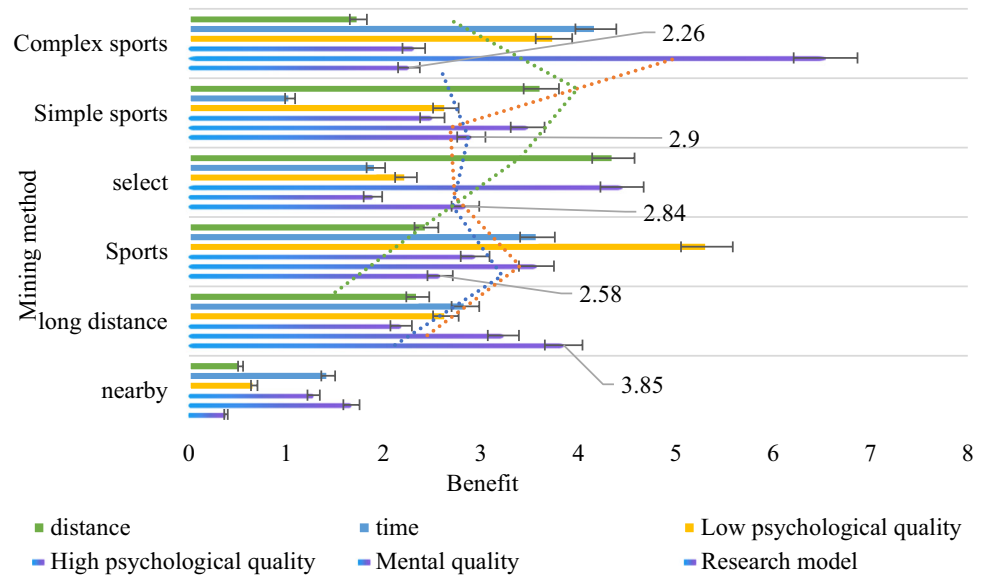
As shown in Fig. 4, compared with students with low self-efficacy, students with high self-efficacy prefer mastery goals. Learners with high self-efficacy are more likely to work hard and choose difficult tasks. From this point of view, self-efficacy, as a psychological control factor of psychological quality, has an impact on learners' choice of different difficulty sports. Among them, compared with learners with low psychological quality, learners with high psychological quality are more willing to choose or face complex tasks. To sum up, self-efficacy will not only affect

**Fig. 3** People with low psychological quality lack experience and competence



**Table 1** The effect of the extension of time distance on the willingness of people

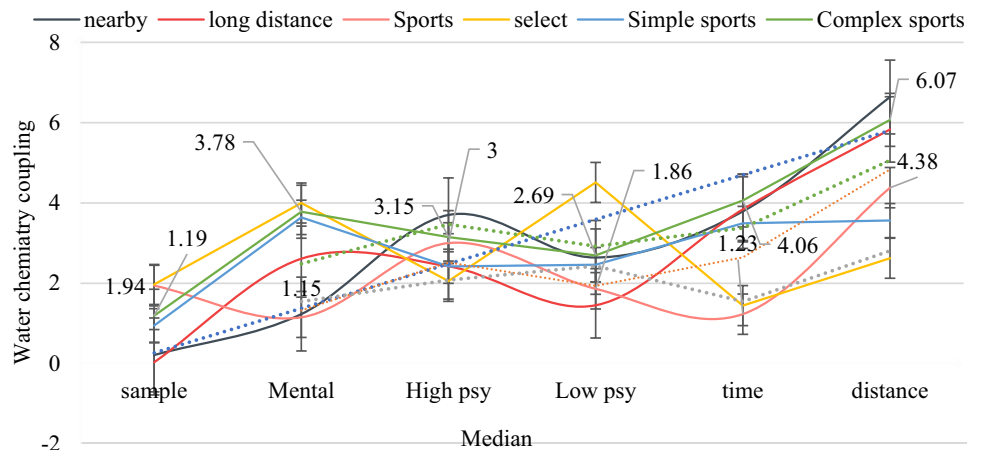
Item	Mental quality	High psychological	Low psychological	Time	Distance
Complex sports	3.22	2.57	1.55	1.62	2.47
H2	2.2	2.88	5.94	5.55	5.27
H15	2.99	4.19	3.85	1.16	5.03
Pair	4.94	2.69	2.21	3.46	2.74
Sample	5.28	1.9	3.74	3.54	2.47

**Fig. 4** High self-efficacy and preferred mastery goals

learners' confidence in accepting learning tasks, but also enable learners to choose tasks of different difficulties according to their self-efficacy.

Single sample t-test was conducted with the mean value of swimming sports injury ( $M = 3.36$ ,  $SD = 1.073$ ), running sports injury ( $M = 1.56$ ,  $SD = 0.909$ ) and the median score (median = 3). As shown in Fig. 5 the mean value of swimming sports injury was significantly greater than the median ( $P = 0.051 < 0.1$ ); the mean value of running

sports injury was significantly less than the median ( $P = 0.000$ ). The results show that there is a significant difference between swimming injury and running injury ( $t = 7.680$ ,  $P = 0.000$ ,  $SD = 1.411$ ). In conclusion, this study decided to choose swimming sports injury (corresponding to complex sports) and running sports injury (corresponding to simple sports) as psychological experimental test items.

**Fig. 5** The mean and median of swimming injuries

**Table 2** There are significant differences in choosing sports of different difficulty

Item	Sample	Mental quality	High psychological quality	Low psychological quality
Sports	2.58	3.57	2.94	5.32
Select	2.84	1.89	4.45	2.23
Simple sports	2.9	3.48	2.5	2.64
Complex sports	2.26	6.54	2.31	3.75

As shown in Table 2, young people with different psychological qualities have significant differences in choosing sports with different difficulties, which proves the conclusion of this paper. Among them, people with high psychological quality are more willing to participate in complex sports than those with low psychological quality, while people with low psychological quality are more willing to choose simple sports than those with high psychological quality. The above results show that young people will unconsciously consider their own psychological qualities when they choose sports. However, it should also be noted that both knowledge and sports learning not only include a series of cognitive activities, but also need the support of time. Therefore, the influence of psychological quality on sports choice intention may also be regulated by time distance.

## 5 Conclusion

The growth of science and technology is changing day by day and the development of information technology is even faster. Embedded technology is the new darling of the development of information technology. The combination of embedded system and wireless communication is the general trend and has high practical value. The system's microprocessing uses a cost-effective and high-performance microcontroller developed by Samsung. Its most prominent feature is that its CPU core uses a 64-bit structure. In the process of developing processor-based embedded systems, how to make the system start up normally and quickly is a key link, including the following contents: setting the interrupt vector table, initializing the memory system, initializing the stack, and calling the program. The system can be used in the analysis of the psychological factors of sports injuries to students in physical education teaching.

Sports preparing is the major main thrust for the advancement of sports administration industry, and preparing updating gives an inward source to the change and improvement of the sports administration industry. In view of the issue of “how to advance the improvement of sports administration industry under the foundation of preparing overhauling”, this paper examines the cooperation, coordination and imaginative activity of sports

administration industry and related businesses from three parts of dynamic instrument, activity component and way component, through the examination of sports preparing strategy plan and execution, sports preparing market advancement and development, sports preparing request change and updating dynamic elements, it further investigates the advancement way of “incorporating sports administration industry assets under approach direction, further developing games administration industry framework under specialized help, and enhancing sports administration industry content under request excitement”.

Under the realistic background of training upgrading, it is of extraordinary functional importance to investigate the advanced improvement instrument of sports administration industry for the reason of extending the hypothesis. Therefore, this study has achieved an effective breakthrough in both theoretical and practical aspects, which provides an important reference for the development of industrial training and development research. Furthermore, we can dissect the components and meaning of the unique system, activity instrument, and way components of sports administration industry, and recover the vital substance of the improvement of sports administration industry, to really advance the examination progress in the field of sports administration industry. Young people have always been important players in sports. As an important force of economic development, the health of young people is the cornerstone of promoting social development.

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