

# COMPREHENSIVE PHYSICAL AND PSYCHOLOGICAL TRAINING OF MODERN PENTATHLON ATHLETES

TREINAMENTO FÍSICO E PSICOLÓGICO ABRANGENTE DE ATLETAS MODERNOS DO PENTATLO

ENTRENAMIENTO FÍSICO Y PSICOLÓGICO INTEGRAL DE LOS ATLETAS DEL PENTATLÓN MODERNO



ORIGINAL ARTICLE  
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## ABSTRACT

**Introduction:** The modern pentathlon requires athletes to participate in 5 individual sports (fencing, swimming, equestrian, running, and shooting combined) in one day. All of these belong to different categories, resulting in high demand for physical and mental control by the athlete. The importance of psychological factors in everyday physical activity has increased attention. **Objective:** This paper explores the role of comprehensive psychological training in modern pentathlon. **Methods:** Forty-seven modern pentathletes were selected by random sampling method. A questionnaire survey method was used to analyze the volunteers. Interviews on the psychological status of the athletes before the competition were also conducted. Finally, a statistical method was used to determine the participants' interview and questionnaire results. **Results:** The athletes in all five sports experienced high stress before the competitions. The second highest stress was during preparation, before the games. The incidence of anxiety, indifference, and disproportionate confidence before the competition was lower. **Conclusion:** The psychological state of modern pentathletes before competition is directly related to their competitive state and level. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

**Keywords:** Anticipation, Psychological; Athletes; Sports; Exercise Training.

## RESUMO

**Introdução:** O pentatlo moderno exige que os atletas participem de 5 esportes individuais (esgrima, natação, hipismo, corrida e tiro combinados) em um dia. Todos esses itens são pertencentes a diferentes categorias, resultando numa alta demanda de controle físico e mental pelo atleta. A importância dos fatores psicológicos na atividade física cotidiana tem aumentado a atenção. **Objetivo:** Este artigo explora o papel da formação psicológica abrangente no pentatlo moderno. **Métodos:** Foram selecionados 47 pentatletas modernos por método de amostragem aleatória. Utilizou-se um método de pesquisa de questionário para analisar os voluntários. Também foram realizadas entrevistas sobre o estado psicológico dos atletas antes da competição. Por fim, utilizou-se o método estatístico para trabalhar os resultados das entrevistas e questionários sobre os participantes. **Resultados:** Os atletas dos cinco esportes experimentaram um estresse elevado antes das competições. O segundo maior momento de tensão foi durante a preparação, antes dos jogos. A incidência de ansiedade, indiferença e confiança desproporcional antes da competição é menor. **Conclusão:** O estado psicológico dos pentatletas modernos antes da competição está diretamente relacionado ao estado competitivo e nível desses atletas. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

**Descritores:** Antecipação Psicológica; Atletas; Esportes; Treinamento físico.

## RESUMEN

**Introducción:** El pentatlón moderno requiere que los atletas participen en 5 deportes individuales (esgrima, natación, hípica, carrera y tiro combinados) en un día. Todos estos elementos pertenecen a diferentes categorías, lo que supone una gran exigencia de control físico y mental por parte del atleta. La importancia de los factores psicológicos en la actividad física diaria ha aumentado la atención. **Objetivo:** Este trabajo explora el papel del entrenamiento psicológico integral en el pentatlón moderno. **Métodos:** Se seleccionaron 47 pentatletas modernos por el método de muestreo aleatorio. Para analizar a los voluntarios se utilizó un método de encuesta por cuestionario. También se realizaron entrevistas sobre el estado psicológico de los atletas antes de la competición. Por último, se utilizó el método estadístico para elaborar los resultados de las entrevistas y los cuestionarios sobre los participantes. **Resultados:** Los atletas de los cinco deportes experimentaron un gran estrés antes de las competiciones. El segundo momento de mayor estrés fue durante la preparación, antes de los partidos. La incidencia de la ansiedad, la indiferencia y la confianza desproporcionada antes de la competición es menor. **Conclusión:** El estado psicológico de los pentatletas modernos antes de la competición está directamente relacionado con el estado y el nivel competitivo de estos atletas. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

**Descriptores:** Anticipación Psicológica; Atletas; Deportes; Entrenamiento Físico.



## INTRODUCTION

Modern pentathlon has higher and higher requirements for athletes' psychological quality. Modern pentathlon requires athletes to participate in 5 individual sports (fencing, swimming, equestrian, running, and shooting combined) in one day. These items all fall into different categories. It places a significant burden on the body of the athlete. Based on attaching importance to physical fitness and tactical training, coaches need to strengthen the psychological stability training of modern pentathlon players. The modern pentathlete wants to be in good competitive shape. It must have the technology, physical fitness, and robust psychological quality.<sup>1</sup> With the development of pentathlon, the mentality of athletes will be more and more prominent in the competition. This article conducts a pre-competition psychological test for modern pentathlon. This paper analyzes the athletes' psychological state before the modern pentathlon competition. This article finds out the reasons for its formation and takes corresponding preventive measures. This allows the athlete to perform at their best in the game.

## METHOD

### Subjects

This paper takes 47 contemporary pentathletes who participated in various national sports events as the research object.<sup>2</sup> The players are between 16-35 years old.

### Investigation method

This paper investigates the psychological status of athletes in five sports before the competition. In this paper, 47 questionnaires were distributed and recovered on-site.<sup>3</sup> The effective recovery rate is 100%.

Cluster analysis of training load of five different types of modern five athletes

The Euclidean distance of the sum of these two  $n$  dimensional vectors  $\vec{F}(f_1, f_2, \dots, f_n)$  and  $\vec{E}(e_1, e_2, \dots, e_n)$  is as follows:

$$D(\vec{F}, \vec{E}) = \sqrt{\sum_{i=1}^n (f_i - e_i)(f_i + e_i)} \quad (1)$$

Data class  $D = \langle \text{count} \overline{MN}, Q \rangle$  is a triple. *count* is the number of member profiles contained in this profile category and  $\overline{MN}$  is the average vector of profile categories.  $Q$  is a set with  $D$  of one member in it. Since each data class can only be generated by one data element, no more data classes than  $i$  are produced when processing the first training data.<sup>4</sup> Therefore, no more than this number of data types can be used each time. Then the worst initial clustering time is:

$$\sum_{i=1}^n i - 1 = \frac{n + (n-1) + (n-2) + \dots + 2 + 1}{n \times (n-1) \times (n-2) \times \dots \times 2} O(n^2) \quad (2)$$

This can happen if an incorrectly chosen parameter causes each data unit to be its data type.<sup>4</sup> Because the number of data categories generated by clustering should be constant, the computational complexity of the entire initial clustering algorithm should be  $O(Cn) = O(n)$ .

### Mathematical and statistical methods

This paper uses Excel 2016 software for statistical analysis of the survey results.

There is no need for a code of ethics for this type of study.

## RESULTS

### The mentality of athletes in the game

The 42 athletes are always in a state of tension before the competition.<sup>5</sup> (Table 1) The proportion accounted for 89.36%. The proportion of athletes who are occasionally nervous is 10.64%. Pre-race nervousness is one of the most common emotions among pentathletes. Both young and old players can feel a sense of nervousness before a match begins.

In the game, ten athletes were in extreme excitement during the game, and the proportion was 21.28%. Twenty athletes will have noticeable hyperactivity. The proportion accounted for 42.55%. Seventeen athletes did not experience excessive hyperactivity.<sup>6</sup> The proportion accounted for 36.17%. Most pentathletes don't have much excitement.

The percentage of athletes who showed "indifference" during the game was 1. The ratio is about 2.13%. Occasionally three athletes appeared indifferent during the game. The proportion accounted for 6.38%. The 43 athletes did not show indifference during the competition. The ratio accounts for 91.49%, which shows that few people will behave so indifferently in the game.<sup>7</sup> Pre-competition apathy manifests negative emotions such as low mood, depression, lack of concentration, lack of confidence, and reluctance to compete.

One athlete showed "blind confidence" in the game. This ratio is 2.13%. Three athletes have blind confidence. This ratio is 6.38%. Forty-three athletes did not have blind confidence. This ratio is 91.49%. While few people have blind faith in the pentathlon, some show it inadvertently.<sup>8</sup> In the case of blind confidence, athletes often underestimate the complexity and difficulty of the game. It overestimates its abilities, is complacent, despises opponents, and lacks concentration.

Twenty-eight athletes in the five competitions surveyed were in preparation before the competition. This proportion is 58.3%. Fifteen players were in a state of preparation during the competition, and the proportion was 31.3%. More than half of the pentathlon players are in the state of preparation, but a small number of players will not enter the state of preparation before the competition.

### Analysis of the influencing factors of pentathlon athletes on the psychological status of pentathlon athletes

It can be seen from Table 2 that 87.23% of the athletes had a poor mentality before the game. This is because of their ultimate purpose. Their mindset will change if they have too much hope for victory but too much fear of failure. This will affect the outcome of the game.<sup>9</sup> Only

**Table 1.** Survey of pre-competition mental state performance.

Mental state performance before the game	Often	Sometimes	Not
Tension	42(0.8936)	5(0.1064)	0(0)
Hyperexcited state	10(0.2128)	20(0.4255)	17(0.3617)
Apathy	1(0.0213)	3(0.0638)	43(0.9149)
State of blind confidence	1(0.0213)	3(0.0638)	43(0.9149)
Combat readiness	33(0.7021)	4(0.0851)	6(0.1277)

**Table 2.** Analysis of the psychological factors of athletes before the competition.

Influencing factors	n	%
Want to win, afraid to lose	41	87.23
lack of confidence	19	40.43
Importance of the game	22	46.81
Injured game	9	19.15
poor self-regulation	7	14.89
The game environment is not suitable	5	10.64
Poor diet and sleep	5	10.64
Uncomfortable travel before the race	4	8.51

moderate competition motivation can make athletes fully adjust their mentality before the competition. This will allow them to perform at the level they deserve in the game.

Athletes' lack of confidence during competition is also a big part. The proportion reached 40.43%. Athletes who don't compete as much will lose confidence in the game. That's why they didn't do well in the game.

The mentality of the players during the game will also be significantly affected. The more important the event, the more it can reflect their competitive strength. Everyone wants to shine in this game and get a good place.<sup>10</sup> Because the competition results will also be linked to the athletes' performance, bonuses, and wages, the athletes, the attitude of the athletes in this kind of competition will also become very nervous.

Injury competition, poor self-regulation ability, unsuitable competition environment, poor diet and sleep, and travel discomfort before competition are the main reasons for the change of mentality of modern pentathlon players before the competition. Although the above factors account for a small proportion, they can also worry modern pentathletes and affect the following events. These factors can lead to an athlete's poor mentality before the game.

## DISCUSSION

### Mental exercise for running and shooting

The new regulations of "running and shooting combined items" have changed the traditional shooting methods drastically. The game changed from a slow shot to a quick shot after a sprint.<sup>11</sup> The athlete must stop abruptly during the run to fire the pistol. The athlete accelerates by another kilometer. Repeat this three times. Athletes need to reach their best shooting condition quickly after the game. Athletes can also use simulation training to help players self-regulate before entering the shooting range. Expressive practice is the ability to enhance motor skills and emotions by creating or reconstructing specific movements or scenarios in the brain, guided by mental cues. Because concentration is a process, athletes must concentrate and develop good behavior in the last ten minutes of the game. The coach should instruct the players to adjust their attention in advance. Athletes can preview the whole process of apparent shooting in their minds to increase the hit rate of the first bullet after running.

### Psychological exercise during swimming

Field adaptation can enable athletes to recover their senses in a short period quickly. Athletes get better body feel through surface training. Athletes need to think about the benefits of being in a pool where they have performed better. This has a positive effect on the self. Finally, athletes can also show their more successful swimming events through visual rehearsal to enhance self-confidence. At the same time,

athletes recall how they felt at the time to adjust themselves. In this way, gradually find the feeling of improving swimming performance.

### Cultivation of psychological quality in fencing

In addition, athletes can also simulate actual combat exercises in regular training. This allows players to master the game's rhythm and take the initiative at the right time. Dynamic presentation training before competition can enhance the athlete's confidence and thus enhance decision-making during competition. Athletes can boost their confidence by showing off their most successful blows.<sup>12</sup> This motivates you to succeed. Athletes can also quickly adjust the opponent's tactics to find a breakthrough by observing the opponent's moves and tactical characteristics. This improves your self-confidence and decision-making. Athletes need to put their energy in the right place during rest. In this way, the players' mental state can be fully released to relieve physical and mental exhaustion. Athletes have active rest methods. For example, the right hand should have time to relax before the game. Athletes can use the left hand to maintain the right-hand position for warm-up exercises.

### Mental training in horse riding

Daily and pre-competition simulation exercises can enhance a player's rhythm regulation. This allows the runners to align with the horse's center of gravity during the race. In daily training, athletes set different positions and heights and set different obstacles to developing the long jump skills of racing horses. This will also exercise their speed and adaptability, allowing them to develop a perfect feeling more quickly. In this way, a corresponding response plan can be formulated according to various emergencies in the game to achieve the purpose of being prepared. This reduces the psychological impact of accidents on athletes.<sup>13</sup>

## CONCLUSION

The fear of winning or losing in the five events is the main factor that affects the mentality of athletes before the competition. The second is a lack of confidence and low attention to the game in the regular training to strengthen the athlete's psychological quality. Coaches need to inspire them with the right motivation to compete and develop their winning beliefs. Coaches also need to continuously improve their commanding skills to ensure that they can maintain a good mentality during the game. In this way, athletes can achieve good results in the competition.

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