Chapter 89
Coupling Model Analysis of the Psychological Dynamic in Sport

Qing Wang and Niankun Zhang

Abstract In this modern society, competition is very fierce, and there will inevitably be subject to pressure from all sides. The increased psychological pressure is gradually becoming a serious social problem. The current sports' cutting into perspective also lack of relevant research results of the psychological dynamic. This paper is mainly combined with sports characteristics and those influencing factors of the psychological dynamic to apply the coupling concept, establishing the sport psychological dynamic coupling models. It also research on sports mechanics, psychology and other knowledge for the psychological dynamic changes and impacts, mitigation of pressure to study the coupling model based on the unique perspective of innovation, giving people some guidance on their psychological dynamics.

Keywords Sports • Psychological dynamics • Psychological pressure • Coupling model

89.1 Introduction

Psychological pressure has become a topic of concern to the community in the period of rapid development and rapid social transformation of modern society, and the psychological problems are faced by the public have evolved a very real problem of the social, but rarely to combine sports to analyze the psychological dynamic of change. The sports team is a special social group. It is the combination of certain social relations collective joint activities is the basic unit of social competitive sports organizations. To complete the training and competition task entrusted by the sports

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organizations, to meet the members of a variety of social needs, such as security, ownership, communication, self-esteem and achievement needs [1]. In addition, sports team also has a social function cannot be ignored. Sports team members are young children, they are at learning, interaction and personality the best period of their long-term living, learning, training in teams, in addition to master specific sport, their world view, outlook on life the formation of value sand aesthetics, ideals, ethics, basic life skills and social norms of behavior, learning, etc., are closely linked within the team environment by the coaches, team culture, the psychological atmosphere of group pension and other aspects of impact. With the acceleration of social integration and economic globalization, what kind of coupling is in the psychological dynamic of the sport? From the unique and innovative perspective, we make cross-integration and comparison tests on coupling the concept of multi-disciplinary sports and psychology, and build a psychological dynamic coupling model to carry out effectively guide people in sport, health, psychological changes, and actively release negative emotions and psychological dynamics, and ease the psychological pressure [2].

89.2 The Conceptual Model

In sports, the body's heart beat and blood flow is cyclical and between the existence of the gap. When the body is in motion, the person's blood goes through external resistance vessels to provide energy to the body peripheral tissue activities. When the normal state, blood flow in the psychological dynamics, human movement and heart beat have the coupling relationship.

Sports science and psychology, sports psychology is the system of interaction and impact of research on people's movement in the psychological dynamic coupling phenomenon has very important practical significance. The physiological mechanism of sports psychology use sport and the psychological dynamic simulation, clear mutual coupling between the standard and criteria, to predict the dynamics and volatility of the psychological pressure. We built this through psychological factors through the heart and blood vessels of the sports related data analysis, and the establishment of the coupling model [3]:

$$q_{in}(t) = a(1 + m\tau)e^{mt} + b(1 - m\tau)e^{-mt} - \frac{\lambda}{R + Z_c} \tag{89.1}$$

Factors affect the athletes' psychological dynamic, athletic ability in sport conceptual model of the following aspects: First is the psychological momentum model. From changes in the cause and effect analysis of motivation, control, optimism, energy and synchronized view of the power of cognitive psychology toward a moving target [4]. Cause or effect of the difference between these models, the psychological momentum to admit defeats, the performance changes. The nature of the task is also an important consideration. Namely the psychological dynamic is likely to lead to a high level of awakening, which may contribute to the awakening of performance at a high level task [5].

The model of an incident or series of events, leading to the performance of athletes are different, subjective norm, athletes began to generate power, trigger change in cognitive, emotional and physical changes, which in turn affect the behavior of the players, the performance and the final result of an event. The change in momentum led to corresponding changes in cognition, but not persistent.

In summary, this paper, the psychological dynamic model for the dynamic characteristics of athletes' psychological analysis that athletes can be effective and comprehensive analysis to consider from the perspective of qualitative and quantitative binding assay, fully teamwork used in which, to common analysis of the performance of athletes in the game, better analysis of the psychological dynamics, psychological momentum and momentum, and cognitive, emotional, etc.

When people are in sports, the power output by the heart mainly the dynamic power and potential power, usually the state, the potential power is much larger than the dynamic power, while the energy supply during exercise, blood flow rate provided by the organization fluctuations in the whole psychology of the people have quite the impact of sports, we have to the optimization of the psychological dynamic coupling analysis.

89.3 The Coupling Analysis

Under the motion study of people's psychological dynamic coupling relations, we need a prerequisite which is a separate but associated with heart and blood vessels, arterial model fitting, while during the fitting to the actual situation of the people fit body input impedance curve, which is the most critical step for the model fitting. Blood flow and the input impedance is not only the arterial bed of its own characteristics and volatility feedback. In coupling model analysis, we need to carry out the analysis of dispersion and concentration of the two parameter model fitting, so as to more comprehensive comparative analysis.

The psychological dynamic coupling data in Table 89.1 and Fig. 89.1 show that ^aj coupling data was much larger than ^bj and rj value in addition to the second

Table 89.1 Psychological dynamic coupling data table

j	^a j	^b j	r j
1	3.37	1.097	0.639
2	0.32	0.879	0.836
3	3.02	0.777	0.921
4	3.99	0.83	0.843
5	2.43	0.836	0.793
6	3.39	0.913	0.897
7	3.58	0.849	0.533
8	2.27	0.739	0.938
9	4.13	0.593	0.873
10	2.27	0.893	0.756

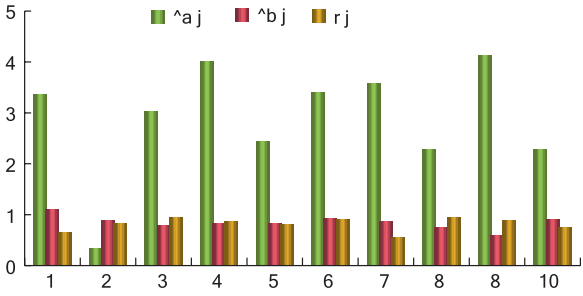

Fig. 89.1 Psychological dynamic coupling model parameter proportion

set of data ^aj is significantly less than ^bj and rj, while ^aj is the minimum value of all data. Relatively speaking, the value of ^bj and rj are relatively flat and they are in the relationship between fluctuations. Sport, the energy provided by the blood flow is mainly used for aortic other in the main artery of the contraction and expansion of consumption needs, but the blood during exercise after peripheral vascular resistance, the external body tissues is essentially no direct impact. This can show the psychological dynamic changes in the sport main concern in ^aj numerical changes, ^bj and rj can be used as two auxiliary parameters to control.

Through the coupling model analysis, combined with the kinematics and the psychology literature, we get the model of the triangular flow wave of sports and athletes with physical and psychological, and its coupling to the formula as follows, as time increases, the movement of athletes' psychological dynamic changes are shown in the figure below [6, 7].

$$q_{in}(t) = \begin{cases} \dfrac{2SV}{T_S T_P} t (0 \le t < T_P) \\ \dfrac{2SV}{T_S (T_P - T_s)} (t - T_s)(T_P \le t < T_s) \\ 0 (T_s \le t < T) \end{cases} \tag{89.2}$$

From our comparison of chart by the coupling curve in Fig. 89.2, we know that five data presented curve there is a difference in basis points is the same, but first the pressure of the first curve, but when up to a certain stage, the corresponding pressure value on the horizontal line data in ascending order according to the order of 1–5. And 1–4 increase is relatively flat; 5 at the beginning is slow, but after a sharp increase it has the formation of a maximum point.

This also reflects in the process of sports, the body of motor function caused by the heart, blood flow to the arteries, resulting in a pulsating flow, and includes not only the steady flow oscillating flow [8]. Often mobile sucked the blood of energy delivery to the blood vessels of the external resistance, so that you can make the external surrounding body tissue, such as access to energy and nutrition; but it also needs to be the case of oscillating flow analysis, it is mainly used to the aorta and other organizations to release and storage, This makes the psychological dynamic

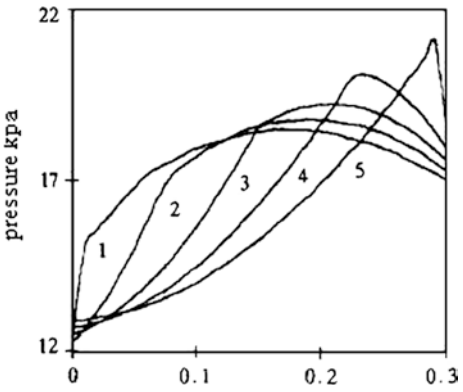

Fig. 89.2 Coupler curve comparison chart pressure

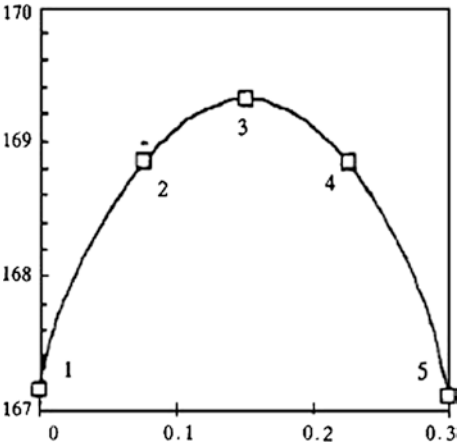

Fig. 89.3 Psychological dynamic curve

changes remained relatively stable, you can also maintain its continuity, so as to better carry out the analysis of sports under the psychological dynamic coupling relations.

Figure 89.3 shows that when people are in the process of doing sports, the psychological dynamic curve is first low and then increased to the highest point, and then under the bottoming out. Combined with Fig. 89.2, the first curve is the beginning of the high starting point, and then tends to smooth the development relative to the psychological dynamic changes in the lowest position; and 2, 3, 4 three curves in Fig. 89.2 is basically the rate of increase substantially the same, and therefore corresponds to Fig. 89.3, the third curve is the position value at the highest point, while the 2 and 4 in the position corresponding to the highest point of the left and right, 25 in Fig. 89.2 is an increase of the relative maximum in Fig. 89.3 is located in the lowest position, which shows the course of the campaign, the psychological dynamic changes also have a maximum value, corresponding to fluctuate within a certain range. Appropriate to decompression

in the sport, and often concerned about the psychological dynamics change, to maintain the psychological changes within certain reasonable limits, and anything cannot go too far. Therefore, in sport people should reasonably control psychological significantly change and in this way they can maintain a good and healthy mentality.

89.4 Conclusion

The aim of sports is to promote human health, and it is also a reasonable and effective way to promote a person's mental health. When people in sports they put great importance to accelerate the psychological dynamic and the emphasis is also increasingly concerned about. This paper discusses the construction of sport psychological dynamic coupling model, and verifies the actual reliability of the psychological changes in the coupled model fitting movement, so not only can be more perfect model, but also can strengthen people's the ability to predict and explain the application of psychological changes in the exercise.

For the coupling model sports, the human heart, blood flow and pulse affect the role of the psychological dynamic of the people, and they are the basis to establish the coupling relations and sense of optimizing the coupled model, which is in line with the reality of the body's physiological the actual situation. It allows people to have a better understanding of the sport, and to know how they affect the psychological dynamic, what kind of relationship, how to undertake more effective physical exercise in order to better maintain a more healthy and a good mental state, but also helps people effectively improve and promote their physical activity, and their physical and psychological qualities.

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