Research on the influencing factors and mechanisms of adolescent physical health from the perspective of collaborative theory

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Abstract: In the past thirty years, the physical health of young people in China has been continuously declining, which has become a key issue of national concern. The physical health of young people has become an urgent issue to be solved in China's physical fitness education under the new era background. Therefore, this study takes the synergy theory as the research perspective to analyze the interrelationships between various influencing factors of students' physical health system. The research results show that good family physical activity factors have a dynamic coordinating effect on the physical fitness of adolescents, and the physical health system plays a leading role. The main manifestation is that the physical activity ability of adolescents in the early stages directly affects the participation of their later motor and physical activity systems. The dynamic changes that occur between the two are the result of the interaction between other important variables in the physical health system, such as exercise ability, physical fitness, and body shape.

The United States, Japan, and other countries have been conducting research on students' physical fitness since the end of the 19th century. China has been conducting research on students' physical form, function, and quality since 1979. Up to now, China's research perspective on students' physical fitness mainly focuses on traditional physical condition research and evaluation. In the new era where China's health concept has undergone significant changes,The study of physical factors and improvement mechanisms closely related to adolescent health should become a new research focus.

Based on this, this article takes synergetics as the theoretical support for research, draws inspiration from the theoretical ideas of synergetics, analyzes the various systems that affect physical activity factors, and focuses on analyzing the dynamic collaborative relationship between the order parameter of family factors as the "servitude" effect in the organization and other influencing factors, thereby revealing the mechanism of the influencing factor system of adolescent physical fitness.

1. The Theoretical Connotation and Important Enlightenment of Synergetics

According to the perspective of synergetics, we consider the physical activities that affect physical fitness as a complete system, with various factors that affect physical health levels as its subsystems. So whether the physical health system can function normally depends on the operation of the subsystems that make up the physical activity system and the interaction between them. The various subsystems have an impact on the body activity system through collaboration and competition, which inevitably leads to the generation of order parameters. Once order parameters are generated, they will exert their dominant position and attract other factors that affect the physical health system to their own influence, enabling the coordinated development of various subsystems, promoting the continuous evolution of the body activity system, and achieving the ideal operating state of the system.

Therefore, we need to understand the operating mechanism of the physical health system, grasp the most important subsystem that affects the physical health system, which is the order parameter of the physical health system. By controlling and adjusting the order parameter, we can adjust the movement status of the physical health system, in order to improve the overall physical health level

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of young people.

2. Analysis of various influencing factors within the physical health system

2.1 Family physical activities - order parameters of physical health system

From the perspective of synergetics theory, as the control factor of subsystems in other self-organizing systems, the order parameter not only plays a role in controlling other subsystems but also affects and dominates them, serving as the "slave" effect of the entire motion of the system.

At present, scholars mainly divide the various subsystems that constitute the physical health system into three aspects: the family physical education subsystem, the school physical education subsystem, and the community physical education subsystem. These three subsystems cannot become the dominant players in the evolution and development of the entire system, as they compete and collaborate with each other, while providing necessary conditions for the physical health system. Kriemler's study shows that multiple holistic interventions such as schools and families are currently the most effective evidence-based approach for students' physical activity. However, current research on the analysis of physical health factors in China indicates that the governance function of schools on students' physical health has also been excessively amplified, obscuring the governance space of society and families. And this study believes that based on the theory of synergetics, family physical education factors have a dynamic coordinating effect on the physical health of adolescents and have a psychological and physical impact, which is the "slaving" effect in the physical health system.

The author believes that this is because, first of all, the order parameter of the physical health system is a macro parameter that originates from the individual itself and must have a dominant role over various influencing factors, which can internalize various external environmental factors into internal factors of the physical health system. Firstly, family physical education is the most controlling variable for individual early education, determining the formation of individual exercise willingness and habits. At the same time, family genetic factors are important variables affecting physical fitness. Secondly, individuals in their adolescence are more controlled by various factors of family physical education. Firstly, if individuals do not acquire basic motor skills, it will hinder the improvement of their physical health. The important indicators of physical fitness, such as body shape, physical fitness, and athletic ability, cannot be developed accordingly, leading to a relatively poor operating state of the physical health system. Secondly, under the influence of the Chinese style parental ideology of valuing culture over physical fitness, parents' emphasis on physical health and sports is very lacking. Research shows that 74% of parents in China have hardly ever taken their children to exercise, and nearly 70% of students spend a lot of time in extracurricular tutoring for cultural courses and are hardly allowed to exercise. This directly leads to school physical education becoming the main part of the current governance of students' physical health in China. However, from the perspective of synergetics, family education is the order parameter of the entire physical health system, and as the "slaving principle" of physical health, it directly affects the physical health system of teenagers.

2.2 School physical education - control parameters that affect the physical health system

The education of physical movement skills in schools has a significant impact on the improvement of individual physical health systems. The level of individual motor skills and the level of physical activity participation exhibited by individuals are highly positively correlated with their physical health. Therefore, the relationship between the level of basic motor skills mastered during adolescence and the level of physical activity is more closely related. Compared to individuals who have reached childhood through family physical education systems in childhood, they are more dependent on school physical education to improve their physical health.

The pyramid model of motor skill development studied by Seefeldt (1980) tells us that in childhood, the mastery of basic motor skills plays an important role in the ability to participate in physical activities that are beneficial to physical health in the future. Seefeldt believes that unless

individuals have basic development in various basic motor skills, their motor skill levels will be difficult to develop to advanced levels.

Therefore, in the physical health system, it is necessary to provide individuals with rich basic physical exercise skills and knowledge forms through the control parameter of school physical education, laying a good foundation for the acquisition and learning of subsequent skills and physical health.

Therefore, we can clearly recognize that school physical education, as an order parameter of the physical health system, plays a certain leading and dominant role in the operation of the system. According to the characteristics of order parameters in the theory of synergetics, in the process of order parameters playing a role in the system from scratch and from small to large, control will affect the effect of order parameters on the system through mutual cooperation and competition, or strengthen or weaken the influence of order parameters on the system. In the physical health system, there are still some other factors that affect physical health, such as individual motivation factors and cognitive factors, As well as health related physical factors and obesity factors, these factors have an undeniable impact on physical health. Unlike the external environmental factors of the system, these factors are inherent characteristics of individuals in the physical health system and can directly or indirectly affect the operation of the physical health system by influencing the relationship between physical quality and physical activity.

3. Conclusion

The physical health system of adolescents is influenced by multiple factors, both internal and external. This study focuses on analyzing the order parameters that affect individual physical health from the perspective of synergy theory. Family physical education is the order parameter that dominates the operation status of the physical health system, and important variables such as motor ability, physical fitness, and body shape formed during childhood largely determine whether adolescents can be proactive Effectively identify factors that affect individual physical health. From childhood to adolescence, the relationship between school physical education and the physical health system is in a dynamic state of change. As a control parameter for adolescent physical health, the connection between motor skills, awareness, and habits and the physical health system is gradually strengthened in the later stages of childhood and adolescence, and the relationship between the two is in a dynamic state of mutual promotion.

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