A Study on the Impact of Campus Table Tennis Courses on Students' Physical and Mental Health

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Abstract: *As one of the ways to promote all-round development of students, the design of campus physical education curricula should consider how to integrate the features of sports with the developmental needs of adolescents. Table tennis has certain biomechanical characteristics and is an intermittent high-intensity exercise; therefore, it can exercise the heart and lungs, muscles, etc., in all parts of the body. At the same time, the circumstances require rapid decision-making and self-control, so they are excellent training grounds for cognitive ability and psychosocial development. This paper will systematically present the theoretical basis and practical effects of campus table tennis classes on the health of students. First, based on biomechanics, developmental systems theory and curriculum studies, present the theoretical basis and basic reasons for how table tennis promotes the physical and mental health of children and adolescents. Second, it studies the physiological changes caused by learning skills, psychological regulation under the influence of the sports environment, and how much health benefits can be achieved through exercise to reveal the internal mechanism of impact. Finally, a construction plan for a curriculum system that promotes the harmony of body and mind has been put forward, and it will be gradually rolled out with adjustments according to dynamic assessment and feedback. The goal of the above is to promote the all-around development of the physical and mental health of adolescents through an organised and scientific curriculum.*

Keywords: *Table Tennis Curriculum; Physical and Mental Health; Influence Mechanism; Curriculum System Construction; Adolescent Development*

Introduction

Good physical and mental health in adolescence is the foundation for a good life later on, so the physical education curriculum at school aims to achieve this end. With a deeper understanding of the educational philosophy of all-round development, the aims of physical education have shifted from teaching skills and improving physical fitness to cultivating all kinds of healthy development in body and mind, intelligence, emotions, social skills, etc. Table tennis is a popular sport that is also good exercise; therefore, it has some advantages for health in school physical education due to all sorts of complex movements, short periods of high-intensity activity and mental concentration, etc. However, how to move beyond experiential teaching and systematically explore and achieve the synergistic effect of body and mind has not been well investigated at the level of theoretical mechanisms and curriculum design. Therefore, we need to clarify the basic logic of how table tennis courses affect students' physical and mental health, and based on this understanding, establish a scientific and practical curriculum system; otherwise, we will not be able to promote all-round development of students effectively in the course of school physical education reform and improve the quality of the curriculum. The aim of this paper is to provide theoretical support and a comprehensive system for improving and innovating table tennis teaching in schools in light of the problems mentioned above.

1. Theoretical Foundation for the Promotion of Physical and Mental Health in the Table Tennis Curriculum

1.1 Biomechanical and Physiological Load Characteristics of Table Tennis

Table tennis has many kinds of motion patterns, and they are all biomechanically different. Athletes need to make a stroke at high speed. First, push off the ground with your lower body to start moving; then, transmit this force through the rotational kinetic chain of your torso, and finally whip the racket

with your upper body; together they form a whole system for force generation and transmission. The whole-body movement needs to be coordinated in a particular way at a certain time; therefore, it can improve one's sense of coordination, speed, flexibility and dynamic stability. All kinds of non-cyclical movements will not put too much stress on any one joint or muscle group, reduce the risk of sports injuries, and promote the all-round development of muscles in the body[1].

In terms of physiological load, the energy metabolism pattern of table tennis is that of intermittent high-intensity exercise followed by periods of moderate-intensity continuous exercise. Prolonged exercise and frequent alternation between exertion and rest are very demanding on the phosphagen and glycolytic energy systems, and given the continuous nature of such activities, an aerobic metabolic system must be employed. All types of energy sources can be used to promote all kinds of adjustments in the cardiovascular system of students, thus increasing their maximum oxygen utilisation and heart function. The heart rate during play is not constant, and changes in demand can help strengthen the regulation ability of the autonomic nervous system and increase cardiovascular functional reserve.

1.2 Multidimensional Theoretical Models of Adolescent Physical and Mental Health Development

The development of physical and mental health in adolescence is not due to the maturation of the body at a certain time; rather, it is the result of prolonged interaction among all aspects of life and one's surrounding environment. Thus, the three parts of physiological function, cognitive-emotional state and social adaptation can all be regarded as closely related and dynamic in the biopsychosocial model. At this time, with changes in the body's systems and hormones during adolescence, there are also psychological changes such as the search for identity and the development of self-regulation, and these are also influenced by social circumstances and expectations. School-based physical education is a good place for the interaction mentioned above.

According to the theory of developmental systems, a person's development path is the result of continuous two-way interaction among genes, behaviour and all sorts of environments around them, such as the small-group classroom atmosphere and the school's sports culture. The foundation of the physical and mental health system for the people is this. Exercise in this system is a "motivation experience". Regular exercise helps young people achieve their goals in many ways and can improve all sorts of aspects of their lives, such as body image, self-confidence, stress control and relationships with others. There are both general and particular cases[2].

1.3 The Associative Mechanism of Curricularized Physical Education and the Promotion of Physical and Mental Health

Curricularised physical education is different from free play and exercise. The general direction is to organise the students' physical exercise and thinking in an orderly way according to the aims of the teaching activities. The formal organisation will ensure that the experience of sports is no longer random but a regular educational event, and we can reliably provide physical and mental benefits for all children through schools. The goals of learning, the progress of content, load control and feedback assessment in the curriculum work together to create a developmental environment with an educational aim and ensure the quality and continuity of students' physical education learning.

Curricularisation can help promote the good health of all people. At the level of cognition, the step-by-step development of skill learning (e.g., moving from hitting a ball from a fixed position to performing combined techniques in motion) is in line with the rules of motor skill development and can help students construct procedural knowledge and metacognition. A regular school schedule can help students form good exercise and study habits, thus increasing their interest in learning and self-discipline in daily life. In terms of the development of social and emotional skills, the planned social situations in the curriculum, such as cooperation, competition and learning to obey rules, provide children with chances to learn self-regulation, empathy and fairness. Therefore, the curriculum will be used to connect the specific sport of table tennis with the general aim of promoting good physical and mental health.

2. The Influence Mechanism of Table Tennis Curricula on Students' Physical and Mental Health

2.1 Physiological Adaptation and Functional Improvement in the Process of Learning Table Tennis Skills

The organised process of learning table tennis skills causes many changes in the physiology of different parts of the body. Modifications in the neuromuscular system are made to improve the efficiency of motor unit recruitment and optimise the pattern of neuromuscular coordination. Given that a ball is about to be played and an accurate return needs to be made, the central nervous system will change the amount and time of activation for agonists, antagonists and synergists selectively to achieve this purpose. It will help promote economic and movement development. At the same time, the sensitivity of proprioception and reaction speed also increase; therefore, there is an automatic response of the muscles and improved exercise performance[3].

The cardiovascular and metabolic systems will have made some good adjustments after a long period of participation in the curriculum. Irregular and vigorous, strenuous and prolonged rallies repeatedly stimulate the regulatory mechanism of cardiac stroke volume and heart rate, increase myocardial contractility, and thus cause an adaptive thickening of the ventricular wall. Regularly increasing the school workload can increase the number of mitochondria and oxidative enzyme activity in skeletal muscle to improve aerobic metabolism and energy utilisation efficiency. At the same time, due to changes in metabolism, there are also changes in body composition, such as a decrease in the proportion of fat and an increase in muscle. All of the above are changes in the body that help students maintain good health and good physical shape.

2.2 The Path of Strengthening Psychological Regulation Ability through Situational Cognition in Sport

The curriculum of table tennis can create a particular kind of sports environment with many cognitive demands, and it can also serve as a continuous, organised training ground for the psychological regulation abilities of the participants. For tasks that need to judge spin or predict the position of a ball, all kinds of high-level executive functions are used constantly by students, such as working memory, selective attention, cognitive flexibility, etc. Cognitive engagement does not only refer to sports performance; it can also improve one's speed of learning and ability to resist distraction in all other areas of life, providing a training ground for effective use of mental resources.

The problems and uncertainties that naturally occur in the world of sports provide students with an ideal place to learn self-regulation and stress management. Each point can be earned or lost, and the important moments of a game are generally under high pressure to different extents. At the same time, students should also be able to recognise their own state of emotional arousal and use coping strategies, such as deep breathing, positive self-talk, changing focus, etc., to regulate it. Through repeated exposure and adaptive learning in the curriculum, one can alter the physiological and psychological response pattern of stress to learn from it and develop emotional resilience. Therefore, they will be able to face difficulties in life better and handle problems.

2.3 Dose-response relationship of curriculum participation and physical and mental health benefits

Curriculum participation is an intervention dose, and its effect on the health of body and mind is not linear. Participation is a multi-faceted concept that refers to how often people are involved, how long an individual session lasts, the total length of the curriculum period, as well as the level of behavioural participation and the degree of cognitive concentration during participation. Research has shown that to achieve the desired physical and psychological effects, one must reach a certain lower bound; otherwise, it will not be very effective. On the other hand, after reaching a certain level, the increase in benefits will be relatively small, and if it is too heavy, people may lose interest in participating.

There are differences in all the dimensions of health benefits for the various elements of participation. Moderate-intensity exercise can strengthen the heart and lungs, and it is also known that it can improve mood immediately. At the same time, more serious changes, such as skill automation, substantial alterations in body composition, or considerable positive developments in cognitive and emotional functions (e.g., the development of resilience), generally require a longer period of participation and a high degree of concentrated effort. A person's original health, genes and mental traits are also reasons why different dosages of the same drug will affect people differently. Therefore,

the design of the curriculum should set different participation goals for all students to improve their health.

3. Building a Table Tennis Curriculum System to Promote the All-round Development of Students

3.1 Structured Design of Curriculum Content Based on the Synergistic Development of Body and Mind

The organisation of curriculum content should move away from the defect of teaching only individual skills and aim to integrate all levels of physiological, cognitive and affective-social development goals. The first is that the game of table tennis can be viewed as a small world with many kinds of problems and emotions. The basis of this Design is that we will take the internal characteristics of this ecosystem, such as the visuospatial processing required to predict the path of a ball, decision-making and execution at the time of contact, and emotional responses after scoring or losing a point, and organise them into sequenced and teachable modules. For example, in continuous backhand drive drills, not only is a stable motor pattern formed, but by changing the position and time of control for this drill, one can also exercise students' executive functions, such as attention distribution, response inhibition and adjustment of action plans. The structure of the content should be in line with the "whole-part-whole" principle of skill learning and the laws of development in psychology, so that technical studies and psychological growth are always in harmony in the curriculum. Thus, each teaching unit should be the carrier of several development goals[5].

The combination of the two will be to create a series of "integrated exercises" that combine physical exercise and mental training. For example, in a multi-player drill, a "tactical timeout" can be added to have students voluntarily stop at a certain score, briefly discuss the technical and strategic problems, share their feelings verbally, etc.; thus, one can discover their implicit thoughts and promote the development of metacognition and emotional intelligence. The Content Modules should have a logical order and work together. The foundation of physiological adaptation and the psychological skills learned in the previous modules will provide support for the more difficult comprehensive application modules below. Therefore, the curriculum content is an organised "sequence of developmental experiences", and how it is organised directly affects the appearance and effectiveness of the synergistic effects promoting the development of the body and mind.

3.2 Considerations for Physical and Mental Adaptability in Progressive and Tiered Teaching Arrangements

The first reason for using a gradual and tiered teaching method is that not all students are at the same stage of physical and mental development. To provide an appropriate sense of challenge for students of all ages in their studies and development. Tiering should be based on the initial skill assessment, but one should also consider general health, physical fitness (e.g., aerobic capacity, core strength), neurological factors (e.g., reaction speed, sensation-seeking), psychological conditions (e.g., goal orientation, social anxiety), etc. Dynamic grouping and personalised task allocation according to the above information can effectively match the difficulty of the learning material with the current physical and mental conditions of the students. Therefore, it is hoped that the children will have a good experience in learning and be motivated to study independently. The logic of tiered instruction should be applied to the entire curriculum and adjusted dynamically according to the progress of the students[6].

The three directions of progressivity are the learning goals, the difficulty of the environment and the psychological pressure. Gradual increases in the exercise load for physiological adaptation should be in line with the principle of physiological supercompensation and the principle of training specificity. Help to maintain good health in the long term of the cardiovascular, metabolic and neuromuscular systems; gradually increase the intensity of technical drills in closed-skill environments and move to high-intensity competition in open-ended situations that require quick decision-making under uncertainty. Psychologically speaking, progressivity is associated with an increase in the amount of information and problems that need to be addressed. Curriculum Design can reduce many of these distractions, decrease the need for students to respond quickly, change the form of social interaction (e.g., from group activities to individual work), and create a supportive but still challenging ladder for students' emotional development. Gradually increase the amount of intentional exposure to help

students accumulate more experiences of successfully managing stress in a healthy way and boost their self-confidence and mental health.

3.3 Multi-dimensional Assessment and Dynamic Optimisation Mechanism of Curriculum Effectiveness

Build an organised and all-encompassing assessment system to learn how well the new curriculum can improve the all-round development of students and promote learning. The problem with the traditional physical education curriculum is that it mainly conducts summative assessments of skills, so all-round indicators for both the process and the results need to be established by combining objective data and subjective reports. In addition to the general physical fitness tests, some specific indicators of table tennis ability should also be added to the list of physiological fitness, such as choice reaction time, dynamic balance, eye-hand coordination, etc. The measurement tools for psychosocial factors should have good reliability and validity, be able to measure all aspects of students' sports motivation (e.g., Intrinsic Motivation Inventory), psychological abilities (e.g., Attention Control Scale), use of emotion-regulation strategies, and sense of social support in physical education. Behavioural Participation refers to students' behaviour in the classroom, how often they join in extracurricular activities, and so on. Collect the above data from all the places mentioned to build a complete chain of evidence on the impact of the curriculum.

The first way to ensure that the curriculum system is scientific, targeted and dynamic is to adjust it according to assessment data. The cycle of improvement is "design-implementation-assessment-feedback-redesign"; at this time, all kinds of periodic assessment data are collected and analysed to determine how well the curriculum has achieved its original goal of promoting the all-round physical and mental health of students, and also to find differences in their responses among different groups of students (e.g., those with different abilities, genders, interests, etc.). Based on the above evidence, some revisions will be made to the curriculum content, teaching methods and organisation. For example, if the assessment data show that the general level of stability in students' technical performance under the pressure of games has been declining, a special "stress inoculation training" module can be added to the next lesson. Gradually increase the work intensity of the technical staff by having them participate in mock games. Based on the above data, the problems will be solved online, and the fixed teaching plan for the table tennis curriculum system will be transformed into an intelligent educational intervention system with self-monitoring, diagnosis and correction capabilities.

Conclusion

Organise the logical basis of how campus table tennis courses affect the physical and mental health of students systematically, and put forward a system construction plan in this paper. Based on the above research, the health-promoting effect of the table tennis curriculum is due to the special biomechanical and physiological load characteristics of the sport, and this effect is achieved through the curricularised organisational form of this system. Paths of Influence refer to all the physiological changes in the body during the learning stage of a skill, the organised training of cognitive and emotional regulation abilities provided by the sports environment, and the non-linear dose-response relationship between participation in sports and health. Based on the above, the effective curriculum system should aim to achieve the physical and mental goals jointly, use progressive and tiered teaching plans to meet the different needs of all students, and establish a dynamic improvement mechanism based on all-round assessment data. The curriculum will no longer be a fixed teaching plan but will be an intelligent educational intervention system that responds to feedback. In the future, many more studies will be carried out to investigate how all sorts of factors in the design of the curriculum (such as the proportion of content modules and different modes of teaching feedback) affect specific indicators of physical and mental health, as well as the long-term impact of participating in the curriculum on the all-round development of students. Continue to improve the theoretical model and increase the accuracy and effectiveness of curriculum intervention.

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