

Construction and Optimization of Youth Physical Health Promotion Model in Anhui Province from the Perspective of Social Ecosystem

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Abstract: Adolescent physical health is related to the overall development of individuals and the future and destiny of the country. The academic circles have accumulated fruitful results from different perspectives such as education, sports and technology, but the implementation effect is not good. The reason may be that the existing research focuses more on a single level and ignores the interaction between levels. Based on the social ecological model of health promotion, this paper examines the practical dilemma of adolescent physical health promotion from five aspects: individual, interpersonal, organization, community and policy. It is found that the root of the problem lies not only in the lack of ability at all levels, but also in the coordinated fracture of resource transmission and demand feedback between levels. Based on this, this paper puts forward that we should take the construction of inter-level collaborative linkage mechanism as the core, promote the transformation of physical health promotion from phased intervention to normalized collaborative governance, and put forward the specific optimization path of adolescent physical health promotion in Anhui Province from five levels.

Keyword: Adolescent Physical Health; Health Promotion Social Ecological Model; Collaborative Linkage Mechanism; Collaborative Governance

1. Introduction

The youth is strong, the youth is strong and China is strong. Teenagers are the future of the motherland and the hope of the nation. Good physical health is not only conducive to the healthy growth and all-round development of

young individuals, but also directly related to the improvement of the quality of the national population and the great rejuvenation of the Chinese nation. At present, although the overall physical health of adolescents has improved, they still face problems such as myopia, overweight and obesity, and insufficient physical activity.

In view of the outstanding problems in the field of adolescent physical health, the state has attached great importance to and continuously strengthened the top-level design in recent years, and has successively issued policy documents such as the "Healthy China 2030" Plan Outline, the Sports Power Construction Outline, the Education Power Construction Plan Outline (2024-2035), the Opinions on Implementing the Student Physical Fitness Program, and the "Five Health Promotion Action Plan for Children and Adolescents (2026-2030)," forming a multi-sectoral collaborative governance system covering education, sports, health, etc. Scholars at home and abroad have also actively discussed from multiple dimensions such as education, sports, technology, policy and society, and the theoretical research results are relatively rich. However, from the perspective of practical results, there is still room for further improvement in the physical health of adolescents in China. According to the data, the proportion of students with excellent national physical health standards for primary and secondary school students in 2023 is 56.6%, which is 1.5 percentage points higher than that in 2022, and there is still a distance from the goal of 60% and above in 2030 proposed in the 'Opinions on Implementing Healthy China Action'[1]. In 2022, the overall myopia rate of children and adolescents in China was 51.9%, including 36.7% in primary schools, 71.4 % in junior high schools, and

81.2% in senior high schools. So far, this data is still rising; compared with 2016, the overweight and obesity rates of primary and secondary school students in China continued to rise in 2020, reaching 26.7% and 11.6% respectively[2]. Taking the body test of a high school student in Anhui Province as an example, 25% of boys can only do 1-2 pull-ups. Physical health problems caused by myopia, overweight and obesity not only affect the physical function of young students, but also may lead to mental health problems such as anxiety and depression, which have a long-term impact on their physical and mental development[3,4].

It can be seen that despite the continuous accumulation of theoretical results and the emergence of intervention measures, there is still a certain gap between the level of physical health development of adolescents and the national policy objectives. The reason is that although previous literature studies have discussed the causes and optimization paths of adolescent physical health problems from different disciplines and levels, they generally focus on a single level and a single factor, lacking systematic investigation of the interaction between individuals and families, schools, communities and systems. For example, pedagogy mainly focuses on sports class hour guarantee, curriculum setting and teaching methods. Sports science pays more attention to sports skills and training load. Technology focuses on the intervention of big data, wearable devices and artificial intelligence. These studies provide an important basis for adolescent physical health promotion, but do not understand individual behavior in the 'human-environment' interaction. Once entering the real scene, it will be affected by other factors, and the implementation effect will be weakened, offset, and even play a reverse role.

Social Ecological Systems Theory (SET) was proposed by American scholar Bronfenbrenner in 1979. It is an interdisciplinary analytical theoretical framework based on sociology, ecology and system science. This theory breaks through the limitations of traditional research that mainly explains behavior from individual internal factors, and believes that individual behavior and growth are affected by multi-level environmental factors such as micro, meso and macro levels[5], which was

later improved by McLeroy. It is divided into five levels : individual, interpersonal, school, community and policy. It has been widely used in many fields such as health behavior, public health, sports and education.

Because Anhui Province has not issued a bulletin on adolescent physical health testing, this paper adopts the theory of social ecosystem, on the basis of revealing problems through national-level data, combined with relevant policy texts in Anhui Province and school physical health test data obtained on the spot, specifically examines the performance and causes of this problem in Anhui Province, and then analyzes the fracture links and structural causes of resource transmission and demand feedback between different levels, so as to propose a feasible health promotion strategy optimization path.

2. Theoretical Basis and Analytical Framework

In the study of adolescent physical health, the mainstream practice in the academic circle is to blame the problem on the individual itself, such as sports cognition, attitude and so on. However, McLeroy, in an abnormal state, puts the problem into the 'human-environment' relationship, and quotes the social ecological model to complete the paradigm shift from 'individual attribution' to 'ecological attribution'. The core idea is that individual health behavior and health outcomes are not only determined by individual factors, but also influenced by multi-level factors such as interpersonal relationship, organizational environment, community environment and public policy. McLeroy 's health promotion social ecological model is divided into five levels: First, individual factors, including physical exercise awareness, self-efficacy, sports interest, etc.; the second is interpersonal factors, including parental support, peer participation, teacher encouragement, etc.; third, organizational factors, physical education curriculum, extracurricular sports activities, sports facilities; fourth, community factors, community sports venues, public sports services, community sports atmosphere, etc.; fifth, public policy, 'Healthy China', youth sports policy, school sports policy and so on[6]. The five levels are nested and interact with each other. The poor effect of adolescent physical health promotion is not only due to

the existence of blocking factors at a certain level, but also due to the lack of effective coordination and linkage between the five levels, and poor resource transmission and demand feedback. Therefore, the real effective promotion path is not to increase the level of stratification, but to truly establish a collaborative linkage mechanism, effectively link policies, resources and services, and promote the implementation of adolescent physical health promotion measures. This paper will sort out the real dilemma layer by layer according to the five levels of McLeroy's health promotion social ecological model, and then analyze the fracture and causes of collaborative linkage between various levels, and finally put forward the path of collaborative promotion.

3. The Realistic Dilemma of Adolescent Physical Health from the Perspective of Social Ecosystem

The realistic dilemma of adolescent physical health promotion is the systematic result of the five levels of individual level, interpersonal level, organizational level, community level and policy level. Therefore, on the basis of fully analyzing the practical difficulties at all levels, we should further question the synergy between the levels.

3.1 Personal Layer

The individual level is the direct basis for the formation of adolescents' physical health behavior, and it is also the key transformation link of social ecological environment acting on physical health. That is to say, the individual level is the micro carrier to undertake the final implementation of physical health promotion policies and interventions. Whether young people participate in sports activities and whether they can adhere to sports must first be achieved through the individual's own health cognition, sports interest, motivation, self-efficacy and behavioral skills. In practice, the lack of sports cognition, self-efficacy and intrinsic motivation of adolescents is the main problem at the individual level[7]. If young people can correctly understand the positive effects of sports activities on physical health, such as enhancing physical fitness, improving cardiopulmonary function, relieving learning pressure, and improving emotions, they will be more likely to form positive sports value

judgments, and the willingness to participate in sports activities will be higher. A 12-week, two-stage longitudinal study of 1091 adolescents found that intrinsic motivation was one of the causal variables of subsequent exercise behavior[8]. Relevant empirical studies have shown that self-efficacy is positively correlated with the level of physical activity of school-age children[9]. However, even if some adolescents have certain sports cognition, their physical activity behavior is often limited due to lack of family companionship, school support and peer support[10].

3.2 Interpersonal Layer

Adolescence is an important stage from family dependence to peer interaction, and its health behavior is supported, demonstrated, encouraged and regulated by important others such as parents and peers. The support of parents, teachers and friends is the key to the sustainability of adolescent sports behavior[11]. When parents support their children to participate in sports activities through positive social influence, it helps to improve the level of physical activity of adolescents and form stable exercise habits. The same is true of the active peer sports support network, which can enhance adolescents' sports cognition, self-efficacy and motivation through companionship, encouragement and emotional support, behavioral demonstration and other ways, so as to enhance sports participation and promote physical health[12]. However, in practice, limited by 'family companionship, peer encouragement and joint participation are still insufficient', 'there are differences in the sports participation atmosphere of different peer groups' and other reasons, adolescents' willingness to participate in sports is still insufficient. At the same time, whether schools and communities can provide convenient and accessible sports resources will also limit the health behavior of adolescents.

3.3 Organizational Layer

The organizational level is an important condition for the transformation of adolescents' physical health promotion from individual participation willingness to stable exercise behavior. Young people have the willingness to participate in sports. Parents and peer support are the basis for the formation of sports

behavior. Organizational factors such as physical education curriculum, venue facilities, teachers, and sports activity systems are the hubs for transforming resources into sustainable sports participation opportunities. In the promotion of adolescent physical health, the organizational layer mainly covers the school management, physical education teachers, physical health testers and educational administrative departments, mainly from the three sections of physical education curriculum, physical activity organization and security. At present, the demand for youth sports does not match the supply of the organization, which is manifested in the insufficient supply of the organization, the low effectiveness and the lack of continuity, which leads to the lack of physical activity of young people and limits the effect of physical health promotion. Insufficient adequacy includes insufficient physical education curriculum, activities, venues, and teachers. 72% of Chinese teenagers believe that the school environment does not meet the benchmark standards[13]. The effectiveness of supply mainly examines the intensity of physical activity in physical education and the use of sports facilities. A study of 284 physical education classes in Shanghai in 2025 found that MVPA accounted for only about 40% of students' physical education classes[14]. Through interviews with sports facilities management personnel, it is also found that many sports facilities in China also have problems of insufficient opening and utilization[15]. The lack of continuity means that the supply of school physical education curriculum and activities has not yet extended to extracurricular and daily life, and has not fully formed a continuous sports participation mechanism throughout the classroom and daily life. The study found that 31.6% of children and adolescents did not participate in high-intensity physical activity outside school within a week[16].

3.4 Community Layer

Community public sports resources and activity space are the extension and supplement of family and school sports resources. The community gives full play to its functions through the four dimensions of resources, accessibility, service and coordination, and provides a public sports environment that can

support the continuous movement of young people. However, there is a mismatch between community sports public services and the needs of young people's continuous sports, which is manifested in the uneven distribution of venues, facilities and resources in different regions and communities[17]. The accessibility of resources is insufficient, and there is still room for improvement in the availability and accessibility of spatial layout; lack of public welfare sports services[18]; Poor communication with families and schools, lack of collaborative education[19]. This leads to the lack of a stable, convenient and continuous sports support environment for young people after leaving school.

3.5 Policy Level

The policy level mainly refers to the relevant laws, policies and systems issued by the state and local governments to promote the physical health of adolescents, which is the institutional guarantee for the first four levels to obtain resource support and action basis. In 2016, the "Healthy China 2030" plan outline raised the physical activity of young people to the national strategic level. In 2020, the "Opinions on Comprehensively Strengthening and Improving School Physical Education in the New Era" "Opinions on Deepening the Integration of Sports and Education to Promote the Healthy Development of Young People" and the "Opinions on Implementing the Students' Physical Fitness Plan" of the Ministry of Education and other five departments in 2025 have been continuously introduced, and policy measures are also deepening, which means that China has formed a relatively rich youth sports health policy system. However, although the youth physical health policy is constantly increasing, there are still some deficiencies in the implementation, guarantee and evaluation of the policy. In terms of policy implementation, from the national formulation and introduction of the document system, to the local introduction of documents and school development plans, there are several links in the middle, and it is finally difficult to implement[20]. In terms of policy guarantee, although the national policy objectives are constantly refined and strengthened, and higher requirements are put forward for the guarantee conditions of human, financial and material needed for policy implementation, there is a

certain gap between the existing guarantee conditions and the policy objectives. In terms of policy evaluation, evaluation is emphasized and feedback is ignored[21], lack of dynamic evaluation feedback mechanism[22]. The imperfect evaluation mechanism makes it difficult to identify the real problems in policy implementation in time, thus making the policy feedback and adjustment lack of accurate basis, and the resource allocation and governance measures are difficult to be further optimized, which leads to the decline of policy implementation efficiency, and ultimately affects the improvement of youth sports behavior and the realization of physical health policy objectives.

The limitations of the above five levels do not exist in isolation, and together reflect a deep-seated problem, that is, the resource transmission and demand feedback links between the various levels are broken. For example, due to the lack of family companionship, school support and peer support, the individual level of sports cognition can not effectively transform sports behavior ; family and peer support at the interpersonal level is limited by whether schools and communities can provide convenient and accessible resources. Therefore, it is necessary to break the inertial thinking of a single level and a single subject in the past, based on the theory of social ecosystem, to rethink the physical health of adolescents from a holistic perspective, to incorporate the five different levels of influencing factors of individual, interpersonal, school, community and policy into a unified analytical framework to investigate, and to propose a multi-level coordination, multi-subject participation, multi-factor linkage of adolescent physical health promotion path.

4. Coordinated Promotion Path of Adolescent Physical Health Promotion

Based on the McLeroy social ecological model, combined with the reality of our government's overall planning and the main position of school education, a collaborative promotion path for adolescent physical health in line with China's reality is constructed.

4.1 Strengthen Policy Coordination and Improve the Collaborative Governance Mechanism of Physical Health

In view of the problems of policy implementation fracture, guarantee mismatch and insufficient evaluation feedback, it is necessary to give full play to the advantages of our government in quickly forming administrative mobilization and resource allocation, and transform macro policies into grassroots actions that can be implemented, supervised and fed back. First, establish a task list, led by the city or county government, integrate relevant policies for adolescent physical health, form an annual task list, and clarify specific tasks around various departments and subjects. Secondly, the implementation plan of "one school, one policy" should be established. Because the actual situation of each school is different, the school should formulate a sports activity plan in line with its own actual situation according to the number of students, site conditions, teachers' situation and students' physical fitness data. For example, Bozhou No.4 Primary School carries out a series of activities of traditional sports Wuqinxi into the campus, and invites the inheritors of Wuqinxi to come to the school to carry out the guidance of campus Wuqinxi exercises. Schools with insufficient venues can arrange sports activities in staggered peaks, sub-regions or by using surrounding public sports facilities. Schools with insufficient teachers can apply to the local education department for coordination, realize the sharing of regional physical education teachers, or introduce local excellent social sports instructors to teach in schools. Thirdly, establish an annual list of physical health problems. According to the data of students' physical health test and sports participation reported by schools, the local education department identifies schools with declining students' physical health and insufficient sports time, as well as groups with low sports participation rate, and requires relevant school principals to take targeted measures according to specific problems. In the next year, the effectiveness of the inspection work will be carried out by comparing data and random inspections.

4.2 Give Full Play to the Role of School Hubs and Optimize the Sports Service Supply System

Give full play to the key role of the main position of school education in the cooperative

linkage of home, school and community, and establish a continuous movement mechanism of physical education, after-school service, family and community. First, to ensure the intensity of physical education exercise, schools should establish a course checking system, not only to pay attention to whether the physical education curriculum is carried out normally, but also to record the actual exercise time, medium and high intensity activity time and exercise participation rate in students' physical education classes through random sampling and follow-up lectures. If it is found that the actual physical activity time of middle school students in physical education classes is low for a long time, the physical education teaching and research group should be required to adjust the teaching design. Second, the after-school service sets a fixed sports period. The school arranges at least 2-3 fixed sports activities per week, and establishes a three-level system of class sports activities, sports associations, and campus competitions. Daily sports activities, weekly fixed sports associations, monthly class or age sports competitions, and campus sports leagues each semester form a rich campus sports activity scene with "daily activities, weekly events, and monthly competitions." Third, the school sports venues implement staggered peak opening, through the WeChat small program real-name registration appointment, working day service students, after school priority to the school students open, weekends to the community youth open, and carry out time management to ensure safety.

4.3 Integration of Home School Community Resources, Improve the Sports Support Network

Coordinated by the community and the education department, each school connects several surrounding communities and gathers high-quality resources from both sides. The school provides resources such as sports venues, physical education teachers, and sports associations. The community provides public sports venues, social sports instructors, public welfare sports training, and community sports events, and implements open sharing. For example, social sports instructors and school physical education teachers jointly organize and plan to carry out various sports activities at different times on weekends, carry out

community public welfare basketball training on Saturday morning, carry out badminton and table tennis competitions on Saturday afternoon, and carry out parent-child sports activities on Sunday morning, so that the community can truly become an extension space of school sports.

4.4 Highlight Individual Demand Orientation and Improve the Accuracy of Exercise Intervention

Create a digital collaborative platform for youth physical health, collect index data such as student body measurement, sports interest, and physical activity, and classify students. Arrange competitions, associations, and challenge tasks for students who are active in sports, and assign fixed sports partners and interest projects to students who are interested but lack participation. Physical education teachers develop personalized exercise plans for students with weak physical fitness, and jointly intervene in the family community for students with high risk of obesity and sedentary.

5. Conclusion

Based on the theory of health promotion social ecosystem, this paper focuses on the problem of adolescent physical health promotion in Anhui Province, and systematically examines the practical difficulties and causes from the five levels of individual, interpersonal, organization, community and policy. It is found that the reason for the poor promotion effect lies in the lack of resource transmission and demand feedback mechanism between the organizational level and the community level. Based on this, this paper proposes a youth physical health promotion model with the core of constructing a collaborative linkage mechanism between levels, and promotes the transformation of the promotion method from decentralized, phased intervention to normalized collaborative governance.

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