



Research on the Development and Optimization of a Lifelong Health Promotion System Integrating Physical Education and Medicine

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Abstract. Aligning with the Healthy China strategy and the “lifecycle health management” requirements proposed at the Third Plenary Session of the 20th CPC Central Committee, this study reinforces the guiding principle of proactive health. It proposes the conceptual logic and mechanism design for constructing an integrated “sports-medical” health promotion system, identifies its development challenges, and suggests optimization pathways. Through literature analysis and policy interpretation, this study clarifies the theoretical foundation of “sports-medical integration” research within the proactive health framework and the significance of establishing a whole-life-cycle health promotion system. It achieves the mechanism design of such a system, analyzes development challenges including health literacy, institutional coordination, and resource allocation, and proposes a four-dimensional optimization pathway: “conceptual elevation, institutional innovation, service iteration, and resource integration.”

Keywords: proactive health; integration of physical activity and medical care; full life cycle; health promotion

1 Introduction

Traditional healthcare systems, centered on disease treatment, struggle to effectively address the rising prevalence of chronic diseases—primarily lifestyle-related conditions—exposing structural weaknesses in prioritizing treatment over prevention. Against this backdrop, the Party and the state have systematically deployed the “National Fitness” strategy and the “Healthy China 2030” plan, focusing on key populations such as the elderly and children while advancing institutional innovation and policy coordination. The deep integration of sports and medicine is not only a key pathway to address current health challenges but also a core driver for transforming health governance from a “disease-centered” to a “health-centered” model. By combining the exercise intervention strengths of sports with the scientific assessment tools of medicine, a health promotion system covering the entire life cycle can be established. This approach effectively compensates for the shortcomings of traditional healthcare in disease prevention, health management, and functional maintenance. The integrated

sports-medicine health promotion system holds promise for achieving precision, intelligence, and continuity in health services, providing critical support for strengthening the population health foundation of Chinese modernization.

2 Theoretical Framework for the Lifespan Health Promotion System of Integrated Sports and Medicine

2.1 Theoretical Basis of This Study

Guided by the core concept of proactive health, the methodology of systems theory, and the framework of the lifespan theory, this study constructs a three-dimensional theoretical model for the integrated sports-medicine health promotion system [1].

Proactive health theory drives the transformation of health management paradigms from disease treatment to proactive prevention, establishing dual safeguards of individual health responsibility awareness and behavioral intervention [2]. Systems theory provides a methodological approach to address the “fragmentation” of subsystems such as sports, healthcare, and education within traditional governance models [3]. It emphasizes treating the integrated physical and medical system as a complex, open megasystem, guiding subsystems to form a dynamically coordinated network through “data sharing-resource allocation-service integration.” Its core lies in pursuing the emergent effect where “the whole is greater than the sum of its parts,” achieving seamless service chains and the overall optimal allocation of system resources.

The full life cycle theory provides a consistent temporal dimension and structural framework for the aforementioned collaborative network. Drawing upon Erikson's psychosocial development model, it divides the human life course into continuous stages characterized by distinct health profiles and needs. Comprehensive health records serve as the conduit for information flow within this system, while dynamic health assessments function as nodes for feedback and regulation. Together, they ensure the continuity of health services throughout an individual's life journey, ultimately achieving a structural leap in health governance effectiveness.

2.2 Practical Significance of Establishing a Lifecycle Health Promotion System

On one hand, it facilitates the collection of diverse personalized public needs, identifies issues across service segments, enables timely service improvements, enhances efficiency and quality, and fulfills the public's aspirations for “integrated physical and medical services” [4]. On the other hand, leveraging digital big data platforms allows for monitoring resource allocation and utilization status, significantly improving the efficiency of both sports and medical service resources. This ensures residents have access to nearby services when needed, thereby strengthening grassroots governance capabilities.

3 Mechanism Design for a Lifecycle Health Promotion System Integrating Sports and Medical Care

The “Healthy China 2030” Planning Outline emphasizes that universal health is the fundamental goal of building a healthy nation. This requires covering the entire lifecycle, identifying priority areas based on major health issues and influencing factors at different life stages, and strengthening interventions. The aim is to achieve comprehensive health services and safeguards from fetal development to the end of life, thereby fully protecting public health. Based on individual physiological and psychological development characteristics and varying health needs, combined with policy guidance and academic research consensus, the full life cycle can be broadly divided into four main stages (see Table 1).

Table 1. Stages of the Lifespan and Characteristic Needs

Stage	Age Range	Health Characteristics	Health Needs
Childhood and Adolescence	0–22 years	Critical period for growth and development; emergence of mental health issues	Nutritional balance, physical skill development, mental health education
Middle and Young Adulthood	23–64 years	Decline in physical function; accumulation of chronic disease risks	Sub-health intervention, chronic disease prevention, stress management
Old age stage	65 years old and above	Physical decline, high incidence of chronic diseases.	Chronic disease management, maintenance of cognitive function and maintenance of living ability.
Perinatal and perinatal period	Women of childbearing age	Maternal and infant health is closely related, and postpartum recovery is a critical period.	Pre-pregnancy examination, pregnancy management, postpartum rehabilitation

The stage of children and adolescents: focusing on the development of sports ability and the cultivation of health literacy. Relying on the goal of improving the qualified rate of National Physical Fitness Test Standard (reaching 92.2% in 2030), the physical health monitoring was jointly carried out by the school physical fitness test room and the sports clinic of medical institutions, and the exercise prescription was designed to enhance the bone density and cardiopulmonary function, combined with the special needs of prevention and control of myopia, scoliosis screening and weight management for adolescents.

Young and middle-aged stage: focus on sub-health intervention and occupational health maintenance. Based on the clinical research results of peak bone mineral density, it can be seen that the bone mineral density decreases year by year after reaching the peak at the age of 23, and it is necessary to maintain bone health with targeted exercise intervention, taking this physiological age as the starting point of young and mid-

dle-aged stage. For the occupational population, the incidence of chronic diseases and the mortality rate of sudden diseases can be effectively reduced, the workplace health management resources can be integrated, the pressure from work and life in this age stage can be relieved, and the sub-health evaluation intervention of \integration of sports and medicine\ can be promoted.

Elderly stage: focus on exercise therapy and functional maintenance of chronic diseases. According to the prevention and control objectives of major chronic diseases proposed in the \Healthy China 2030\ Planning Outline, and relying on county medical communities and community rehabilitation centers, we will carry out sports intervention on chronic diseases such as hypertension and diabetes. Combine Tai Ji Chuan, Baduanjin and other traditional exercise therapies to improve the balance ability and life function of the elderly. At the same time, with the help of wearable devices, the intensity of exercise is monitored in real time, and medical institutions are linked to realize risk early warning and dynamic adjustment, helping the trinity of \body, medical care and maintenance\ under the background of aging society.

Perinatal and perinatal period: pay attention to pre-pregnancy health intervention, risk prevention and control during pregnancy and postpartum functional recovery. Focusing on the whole-cycle management goal of maternal and infant health, a service system of \pre-pregnancy intervention-prevention and control during pregnancy-postpartum rehabilitation\ was constructed.

4 Integration of Physical Education and Medicine\ in the whole life cycle health promotion system construction dilemma

4.1 Gradient differentiation of health literacy and behavioral transformation fault

According to the 2024 monitoring data from the National Health Commission, China's health literacy rate among residents has reached 31.87%, an increase of 2.17 percentage points compared to 2023. The urban-rural gap has narrowed from 5.83 percentage points to 5.63 percentage points (urban: 34.74%, rural: 29.11%), regional disparities also narrowed significantly (34.98% in eastern regions, 31.48% in central regions, 27.27% in western regions) [5]. However, structural imbalances in health literacy remain prominent: at the competency level, basic knowledge and concept literacy (44.46%) significantly outpaced health lifestyle/behavior and basic skills literacy, revealing a "knowledge-to-behavior" conversion barrier; In health issue domains, safety and emergency literacy (61.29%) and scientific health perspectives (56.27%) remained high, while chronic disease prevention literacy (32.77%), basic medical literacy (30.16%), and infectious disease prevention literacy (29.26%) remained low, reflecting a deep mismatch between the health service system and residents' actual needs [6].

4.2 Systemic Barriers to Institutional Coordination and Incentive Failure

China's institutional development for integrating sports and healthcare exhibits structural contradictions between top-level design and specialized systems, manifesting as three-dimensional institutional barriers. First, cross-departmental coordination mechanisms are inefficient: integration spans multiple administrative sectors including sports and healthcare, yet the absence of cross-domain governance entities leads to high policy duplication. Second, fragmented policy and regulatory supply: Among the 127 existing policies on sports-health integration issued between 2016 and 2024, only 18 (14.2%) specified relatively independent implementation rules. Third, misaligned incentive mechanisms: The previous evaluation of pilot cities revealed that exercise intervention metrics accounted for only 12.3% of assessment weighting, far below the 45.6% allocated to medical treatment indicators [7]. In contrast, Germany's "Movement is Medicine" initiative significantly increased grassroots healthcare participation in exercise interventions by fully integrating exercise prescriptions into statutory health insurance coverage. Its community exercise prescription implementation rate exceeds 70%, offering a mature reference for China in establishing incentive-compatible mechanisms.

4.3 Structural Imbalance in Factor Allocation and Sluggish Transformation

First, there is a significant imbalance between supply and demand, with a shortage of 874,000 professionals in the field of sports medicine. Second, funding for sports-medicine integration exhibits characteristics of "strong reliance on public finances, weak social participation, and narrow medical insurance coverage." The funding structure is monolithic, market vitality remains underutilized, and medical insurance reimbursement prioritizes disease treatment over preventive services like exercise prescriptions and physical fitness assessments, resulting in low reimbursement rates and limited service accessibility. In the practice of Zhejiang Health Cloud Platform, despite connecting over 50% of community physical fitness monitoring sites, cross-institutional dynamic interventions struggle to operate in a closed-loop due to a mere 22.8% medical data sharing coverage. This highlights service gaps caused by insufficient system integration. Additionally, technological transformation in sports-medicine integration exhibits systemic delays. The integration rate of wearable device exercise monitoring data with medical systems remains low, health records share only 22.8% cross-institutional coverage, and the conversion rate of competitive sports technology achievements into the sports-medicine integration field is insufficient (see Table 2).

Table 2. Core Indicators for Sports-Medicine Integration Resource Supply

Dimension	Key Indicator	Data Value	International Reference Value	Gap Rate
Human Capital	Density of Sports-Medicine Composite Talent	0.7 persons/10,000 people	3.2 persons/10,000 people	78.1%
	Proportion of Social Capital Investment	9.3%	35% (OECD)	73.4%
Technology Transfer	Standardization Rate of Exercise Prescriptions	38.9%	85% (United States)	54.2%

5 Optimization Pathways for a Lifecycle Health Promotion System in “Sports-Medicine Integration”

5.1 Conceptual Elevation: Lifecycle Reconstruction of Proactive Health Value

At the cognitive enhancement level, this system reconstructs an integrated service model encompassing “prevention-treatment-rehabilitation-health promotion,” strengthening the public’s scientific exercise literacy. Institutional innovation involves establishing a three-tiered framework—“National Sports-Medicine Integration Management Committee-Provincial Coordination Centers-Grassroots Implementation Units”—to promote data sharing and resource integration among health, sports, civil affairs, and other relevant departments. At the practical level, implementing an integrated strategy of “universal coverage-lifecycle management-holistic coordination” fosters a synergistic flywheel effect in multi-stakeholder governance.

5.2 Institutional innovation: the systematic construction of cross-domain collaborative governance mechanism

Based on the synergetic logic of health promotion in the whole life cycle, it is necessary to build a linkage mechanism in the construction of sports and medical integration system in China. First, cross-domain collaboration mechanism: We can refer to the pilot experience of \Sports for Health Center\ in Shenzhen, and jointly issue the \List of Rights and Duties of Integration of Sports and Medicine Services\ by the health, sports and medical insurance departments, so as to clarify the responsibilities of all parties and the path of data sharing, so that the community coverage rate of integration services of physical fitness assessment and chronic disease follow-up will increase from 18% to 57% within two years. Secondly, incentive compatibility mechanism: learn from the mature international experience such as Germany’s \Exercise is a good doctor\ plan, incorporate exercise prescription into the scope of medical insurance reimbursement, and incorporate the integration of sports and medicine into the assessment of healthy cities. Third, the benefit symbiosis mechanism: focus on solving the goal conflict

between the cost control of medical system and the service expansion of sports system, and finally form an institutional guarantee network covering the whole life cycle.

5.3 Service iteration: dynamic optimization of full-cycle supply-demand coupling

It is necessary to build a dynamic optimization system of \demand-driven, accurate supply-quality closed loop\ for the integration of sports and medical services in China. Establish a quality evaluation system including indicators such as service accessibility (30-minute accessibility rate) and effective intervention rate (chronic disease control rate), form a full-cycle closed loop of \demand perception → accurate supply → effect evaluation → service iteration\, and realize the paradigm transformation from \disease treatment\ to \life-cycle health promotion\ [8].

5.4 Factor integration: systematic promotion of resource supply-side reform

In the dimension of talent construction, a full chain talent training system covering pre-service education, double-degree training and continuing education is constructed to realize the ability integration of medical and sports science professionals. At the level of capital guarantee, it not only relies on special financial investment and the extension of medical insurance policy to build basic guarantee, but also activates the efficiency of social capital through market-oriented tools such as industrial guidance fund and commercial health insurance. Jiangsu Province has set up the \Double Degree Program for Talents Integrating Physical Education and Medicine\ and jointly carried out on-the-job training with medical institutions, and trained nearly 3,000 compound health managers in three years, which significantly eased the shortage of grassroots talents. In terms of technological innovation, we rely on interdisciplinary research platform to promote the transformation of competitive scientific and technological achievements, and realize accurate portrait and dynamic intervention of health services through wearable device research and development and big data platform construction.

6 Conclusion

Facing the triple reality of cognitive fragmentation, institutional bottlenecks, and resource misallocation, this study proposes four core optimization pathways for a “sports-medicine integration” health promotion system spanning the entire life cycle: conceptual elevation, institutional innovation, service iteration, and factor integration. These pathways systematically address critical issues from value reshaping and mechanism construction to service implementation and resource safeguarding, offering an integrated solution to overcome fragmented health services and advance modern health governance.

Looking ahead, future research in this field may deepen exploration in the following directions: First, pathways for digital and intelligent technologies to empower precision health services, with a focus on algorithmic models and clinical applications of artificial intelligence and wearable devices in generating dynamic exercise prescriptions and risk alerts; Second, research on the adaptability of sports-medicine integration policy tools and regional practices, exploring differentiated implementation models for areas with varying socioeconomic development levels; Third, establishing long-term evaluation mechanisms for sports-medicine integration services, developing comprehensive evaluation indicators covering health benefits, cost-effectiveness, and service satisfaction. Only through continuous deepening of research in these areas can the institutional dividends of sports-medicine integration be fully unleashed, laying a solid health foundation for China's modernization.

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