

# RESEARCH ON THE HEALTH SYSTEM OF COMMUNITY SPORTS FRAMEWORK BASED ON FUNCTION ORIENTATION



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PESQUISA SOBRE A ESTRUTURA DO SISTEMA DE SAÚDE ESPORTIVA COMUNITÁRIA COM BASE NA ORIENTAÇÃO FUNCIONAL

INVESTIGACIÓN SOBRE EL MARCO DEL SISTEMA DE SALUD DEL DEPORTE COMUNITARIO BASADO EN LA ORIENTACIÓN FUNCIONAL

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## ABSTRACT

**Introduction:** Community sports activities are performed by people in the community environment, using beneficial factors such as sports equipment, facilities, and natural resources in the community to improve their body structure and functions, and their activity participation levels. **Objective:** The thesis studies how to use the framework and theory of "International Classification of Functions, Disability and Health" and World Health Organization "Community Rehabilitation Guidelines" to construct a sports service system to promote community health. **Methods:** The thesis uses the theory and methods related to function, disability, and health of the International Classification of Functions, Disability, and Health, and the matrix of the World Health Organization's Community Rehabilitation Guidelines as the framework for community sports activities and integrated development. **Results:** The development of community sports activity services can improve the physical function and athletic ability of different participants, promote healthy behaviors, improve mental health, and improve happiness. Community sports activities can promote the community's health, rehabilitation, education, career development, and empowerment. The integrated development of community sports activities and community health and rehabilitation activities will build a modern health service system. **Conclusions:** Use "International Classification of Function, Disability, and Health" to construct a community sports activity framework based on function orientation and overall health. Use the matrix and methods of the World Health Organization's "Community Rehabilitation Guidelines" to promote the integration of sports activities with activities such as health, rehabilitation, education, professional development, and empowerment to achieve inclusive community development and overall community health. **Level of evidence II; Therapeutic studies - investigation of treatment results.**

**Keywords:** Community sports; Sports activities; Exercise; Community participation.

## RESUMO

**Introdução:** As atividades esportivas comunitárias são realizadas por pessoas do meio comunitário, utilizando fatores benéficos como equipes esportivas, instalações e recursos naturais da comunidade para melhorar sua estrutura e funções corporais e seus níveis de participação na atividade. **Objetivo:** A tese estuda como usar a estrutura e a teoria da "Classificação Internacional de Funções, Incapacidade e Saúde" e as "Diretrizes de Reabilitação Comunitária" da Organização Mundial de Saúde para construir um sistema de serviços esportivos para promover a saúde da comunidade. **Métodos:** A tese usa a teoria e métodos relacionados à função, deficiência e saúde da Classificação Internacional de Funções, Incapacidade e Saúde, e a matriz das Diretrizes de Reabilitação Comunitária da Organização Mundial de Saúde como uma estrutura para atividades esportivas comunitárias e desenvolvimento integrado. **Resultados:** O desenvolvimento de serviços de atividades esportivas comunitárias pode melhorar a função física e a capacidade atlética dos diferentes participantes, promover comportamentos saudáveis, melhorar a saúde mental e melhorar a felicidade. As atividades esportivas da comunidade podem promover saúde, reabilitação, educação, desenvolvimento profissional e empoderamento da comunidade. O desenvolvimento integrado de atividades esportivas comunitárias e atividades de saúde e reabilitação comunitárias criará um sistema moderno de serviços de saúde. **Conclusões:** Use a "Classificação Internacional de Função, Incapacidade e Saúde" para construir uma estrutura de atividade esportiva comunitária baseada na orientação funcional e saúde geral. Use a matriz e os métodos das "Diretrizes de Reabilitação da Comunidade" da Organização Mundial da Saúde para promover a integração das atividades esportivas com atividades como saúde, reabilitação, educação, desenvolvimento profissional e capacitação para alcançar o desenvolvimento comunitário inclusivo e saúde da comunidade em geral. **Nível de evidência II; Estudos terapêuticos: investigação dos resultados do tratamento.**

**Descritores:** Esportes comunitários; Atividades desportivas; Exercício físico; Participação da comunidade.

## RESUMEN

**Introducción:** Las actividades deportivas comunitarias son realizadas por personas del entorno comunitario, utilizando factores beneficiosos como equipos deportivos, instalaciones y recursos naturales de la comunidad para mejorar su estructura y funciones corporales, y sus niveles de participación en la actividad. **Objetivo:** La tesis estudia cómo utilizar el marco y la



teoría de la "Clasificación internacional de funciones, discapacidad y salud" y las "Pautas de rehabilitación comunitaria" de la Organización Mundial de la Salud para construir un sistema de servicios deportivos para promover la salud comunitaria. Métodos: La tesis utiliza la teoría y los métodos relacionados con la función, la discapacidad y la salud de la Clasificación Internacional de Funciones, Discapacidad y Salud, y la matriz de las Pautas de rehabilitación comunitaria de la Organización Mundial de la Salud como marco para las actividades deportivas comunitarias y el desarrollo integrado. Resultados: El desarrollo de servicios comunitarios de actividades deportivas puede mejorar la función física y la capacidad atlética de los diferentes participantes, promover comportamientos saludables, mejorar la salud mental y mejorar la felicidad. Las actividades deportivas comunitarias pueden promover la salud, la rehabilitación, la educación, el desarrollo profesional y el empoderamiento de la comunidad. El desarrollo integrado de las actividades deportivas comunitarias y las actividades comunitarias de salud y rehabilitación construirá un moderno sistema de servicios de salud. Conclusiones: Utilice la "Clasificación internacional de función, discapacidad y salud" para construir un marco de actividad deportiva comunitaria basado en la orientación funcional y la salud en general. Utilice la matriz y los métodos de las "Pautas de rehabilitación comunitaria" de la Organización Mundial de la Salud para promover la integración de actividades deportivas con actividades como salud, rehabilitación, educación, desarrollo profesional y empoderamiento para lograr el desarrollo comunitario inclusivo y la salud comunitaria en general. **Nivel de evidencia II; Estudios terapéuticos: investigación de los resultados del tratamiento.**

**Descriptor:** Deportes comunitarios; Actividades deportivas; Ejercicio físico; Participación de la comunidad.

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## INTRODUCTION

The community is the most direct carrier of people's lifestyle and living environment and the environment in which people live and develop. Community sports activities are an essential part of community activities and play an irreplaceable role in enhancing community service functions and promoting residents' physical and mental health.<sup>1</sup> This research uses the theories and methods of the World Health Organization's International Classification of Functions, Disability and Health (ICF) and Community Rehabilitation Guidelines and combines the characteristics of community sports activities to construct a people-oriented, function-oriented community sports service system. Explore how to develop individualized community sports guidance for the disabled in the community.

## METHOD

### Functional architecture

ICF is a unified and standard language and framework system for describing health status and health-related conditions promulgated by the World Health Organization in 2001. In addition to physical function and structure, activities, and participation factors, ICF also incorporates environmental and personal factors, emphasizing the interaction between diseases, functions, the individual, and the environment, and describes health conditions from a positive perspective.

In terms of body function and structure, physical activity can improve the function of joints and bones, muscle function, and motor function, involving sports-related body structure; in terms of activity and participation, physical activity affects nine secondary categories, namely learning and Applied knowledge, general tasks and requirements, communication, activities, self-care, family life, interpersonal and interpersonal relationships, central areas of life, and community, social and civic life.<sup>2,3</sup> At the same time, community sports activities also impact the environment and personal factors and promote the improvement of the community sports environment and the development of personal sports behavior habits (Figure 1).

### 3D motion estimation of walking human body

In this article, the human body model includes a human body physiological structure model and a discrete joint diagram model. The human body physiological structure model can be represented by a 3D skeleton model of the human body. Simultaneously, to display the

tracking results, the 3D representation model of each part of the human body is represented by a tapered cylinder.<sup>4</sup> A cardboard model represents the corresponding 2D representation model of the human body. If  $\varphi^i$  is a conical cylinder parameter set, then  $\varphi^i$  it can be represented by the following formula:

$$\varphi^i = \{l^i, \omega^{i,p}, \omega^{i,d}, o^{i,p}, o^{i,d}\} \quad (1)$$

Among them,  $i$  is the limb number;  $l^i$  is the limb's length;  $\omega^{i,p}$ ,  $\omega^{i,d}$  is the radius of the circular plane where the limb's start and joint endpoints are located,  $o^{i,p}$ ,  $o^{i,d}$  is the offset of the 3D coordinates of the limb's start and end joint points. To reduce the amount of calculation,  $\varphi^i$  Defined as a constant vector. To simplify the calculation, we use the decomposition of the graph. The discrete joint diagram model can simplify the human body's overall tracking to local independent tracking according to the limbs. According to the discrete joint diagram model, the human body motion state parameter space can be defined as:

$$X = \{x^1, x^2, \dots, x^{10}\} \quad (2)$$

We let  $X$  represent the parameter space of the human motion state and  $Z$  the corresponding observation state. Then at any time  $t$ , the hybrid tracking model can be defined as follows:

$$P(X_t) = (1 - \lambda_t) \times \varphi(X_t) + \lambda_t \times \psi(X_t) \quad (3)$$

Among them, when  $\lambda_t$  is the occlusion factor  $\lambda_t = 1$ , the walking human body is in the self-occluded state and  $\lambda_t = 0$  is in the normal waking state. Refer to Section 3 for its calculation;  $\varphi(X_t)$  is the probability distribution in the unoccluded tracking mode;  $\psi(X_t)$  is the probability distribution in the self-occluded tracking mode.

Without considering the shape parameters of human limbs (using fixed values), at any time  $t$ ,  $x_i$  in equation (2) can be defined by the following equation:

$$x_t^i = \{\rho_t^i, \theta_t^i\}, i = 1, \dots, 10 \quad (4)$$

$\rho_t^i$  is the three-dimensional coordinate vector of the  $i$  limb end joint point;  $\theta_t^i$  is the angle vector of the  $i$  limb end joint point rotating

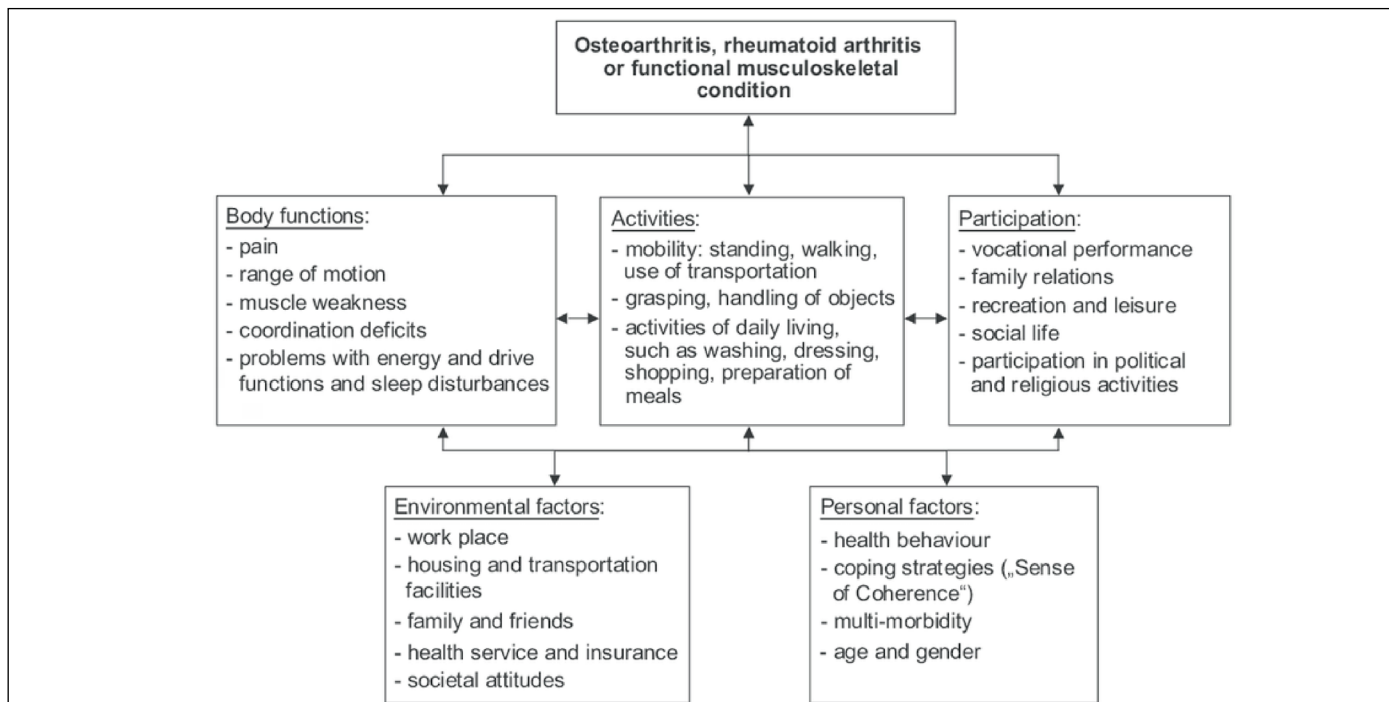


Figure 1. Based on the ICF community population's health status and community sports activities.

around the three-dimensional coordinate axis. Moreover, according to the human physiological structure model  $\rho_i^i$ , and  $\theta_i^i$  can be calculated by Convert each other.

At any time,  $t$ , define the motion state of the  $i$  limb of the human body as  $x_t^i$ , and its observation state as  $z_t^i$ ; therefore, using the derivation of the Gibbs distribution sum,  $\varphi(X_t)$  in equation (3) can be defined by the following equation:

$$\varphi(X_t) = P(X_t) = \prod_{i=1}^C \dot{p}(x_t^i | z_t^i) \quad (5)$$

Among them,  $C$  is the number of limbs, and  $C = 10$  let us  $N(i)$  denote the set of neighboring limbs of the  $i$ -th limb of the human body. According to the derivation, the posterior probability  $\dot{p}(x_t^i | z_t^i)$  of each limb in equation (5) can be calculated by equation (6).

$$p(x_t^i | z_t^i) = p(x_t^i | z_t^i, z_{t-1}^{N(i)}) \propto p(x_t^i | z_t^i) p(x_t^i | x_{t-1}^i) \times \prod_{j \in N(i)} \int p(z_t^j | x_t^j) p(x_t^j | x_t^i) dx_t^j \quad (6)$$

In formula (6),  $p(z_t^i | x_t^i)$  is the local likelihood probability of the current limb  $i$ ;  $p(x_t^i | x_{t-1}^i)$  is the current limb motion state transition model;  $p(x_{t-1}^i | z_{t-1}^i, z_{t-1}^{N(i)})$  is the posterior probability of the current limb  $i$  at the  $t-1$  time;  $p(z_t^j | x_t^j)$  in the integral represents the current limb  $j$  The local likelihood model of the neighboring limb  $j$ ;  $p(x_t^j | x_t^i)$  is the connected limb relationship model, which can be defined by the following formula:

$$p(x_t^j | x_t^i) = p(\rho_i^j | \rho_i^i) p(\theta_i^j | \theta_i^i) \quad (7)$$

Among them,  $p(\theta_i^j | \theta_i^i)$  is the posture angle model of two connected limbs. This model can be constructed from the prior knowledge of human physiological structure. According to different body parts, this paper uses the prior knowledge to establish corresponding uniform distributions for different connected limbs;  $p(\rho_i^j | \rho_i^i)$  is two the position information model of a connected limb; the model is defined as follows:

$$p(\rho_i^j | \rho_i^i) = \frac{\exp\left\{-\frac{(\rho_i^j - \rho_i^i) \Sigma_\rho^{-1} (\rho_i^j - \rho_i^i)}{2}\right\}}{2\pi |\Sigma_\rho|^{1/2}} \quad (8)$$

Among them  $\rho_i^j$  and  $\rho_i^i$  are the characteristic points of the two connected limbs, which can be calculated from the limb shape parameters and the end joint point coordinate  $\rho_i^i$ ;  $\Sigma_\rho$  is the covariance matrix of the multivariate Gaussian distribution. To simplify the calculation,  $\Sigma_\rho$  is set as a diagonal matrix.

## RESULTS

### The function and health of the population participating in community sports activities

According to the ICF "body-individual-society" structure, it is necessary to analyze the functional characteristics and demand characteristics of the participants in the process of community sports activities. The "Healthy China 2030" Plan puts forward the promotion of sports activities for critical groups. It emphasizes the need to solve critical groups' health problems, such as young people, women, the elderly, professional groups, and the disabled. This requires that they should be fully considered in community sports activities.<sup>5</sup> Factors such as physical health, disease status, mental health, leading lifestyle, athletic ability, physical fitness, and athletic skills.

### Core goals and strategies of community sports activities

Based on the theoretical framework and knowledge system of ICF, different key groups need to understand the physical and personal factors of the participants before participating in community sports activities, including attitudes, sports knowledge and skills, diseases, functional status, mental health status, and personal participation<sup>6</sup>; At the environmental level, it is necessary to understand the community sports activities environment, attitudes, and community guidance, as well as the corresponding facilities and equipment.

### Critical areas of community sports activities

The critical areas of community sports activities based on ICF include three levels: physical activities, rehabilitation sports, and community

development. Each level has core content that needs to be considered. At the level of physical activity, the core content of community sports activity services is to improve the athletic ability of sports participants, improve physical fitness, and improve sports skills; at the level of rehabilitation sports, the core content of community sports activity services is to improve the participants' ability to prevent diseases. See Table 1.

### Integrate community sports into the community health service system

The health service system includes four links: disease prevention, treatment, rehabilitation, and health promotion. In the prevention link, community sports activities can be used as an essential means of disease prevention in the community. The incidence of diseases can be reduced through sports activities. In the treatment link, community sports activities are used as a method of sports rehabilitation, and suitable sports activities are designed to promote participation in sports activities through family supervision and support and the impact of the community environment to improve physical health, delay the progression of the disease, and promote the recovery of existing diseases purpose. In the rehabilitation process, as a method of rehabilitation sports, community sports activities can improve the community's health, prevent secondary diseases, and promote rehabilitation. In the link of health promotion, as a method of community health promotion, community sports activities can be designed according to the needs of participants to design targeted and personalized sports activities to promote the acquisition of related sports skills and exercise habits to prevent loss of function, Slow down the rate of loss of function, improve or restore function, compensate for the loss of function and promote health, and the purpose of establishing healthy behaviors through physical activities. (Table 2)

## DISCUSSION

### Specific forms of home rehabilitation sports activities for the disabled

Disabled persons have problems such as lack of physical structure and dysfunction, limited activities, and limited participation. They are

**Table 1.** Key areas and core content of community sports activities based on ICF.

Sports activities	Rehabilitation sports	Community development
Athletic ability	prevent disease	Promote community sports participation
Physical fitness	Maximum function (rehabilitation)	And establish healthy behaviors
Motor skills	Mental health and social adjustment	Promote inclusive community development

**Table 2.** Demand-oriented community sports activities methods and goals.

Health Service Continuum	Method	The goal
Prevention	Community disease prevention	Reduce disease incidence
Treatment	Sports rehabilitation	Disease treatment
Recovery	Rehabilitation sports	Functional rehabilitation
Health promotion	Community health promotion	Establish healthy behavior

the people who need to focus on community sports activities. Carry out community sports activities for the disabled, with specific education, health, function, and rehabilitation functions. Home rehabilitation sports activities for the disabled are a form of community-family-individual sports activities that focus on the health and functional status of the disabled, improve the dysfunction of the disabled, improve the health of the disabled, and promote the functional recovery of the disabled. Home rehabilitation sports activities for the disabled are also the most direct and targeted way to develop community sports activities for the disabled.

### Instruction of home rehabilitation sports activities is an essential part of community sports activities services

In the guidance of home rehabilitation sports activities, special consideration should be given to the physical structure and functional level of the disabled, pay attention to their limitations and obstacles in activities and participation, set appropriate home rehabilitation sports activities, and meet the needs of the disabled in sports activities. In combination with the favorable factors in the family environment, to maintain, improve or improve the functional level of the disabled to the greatest extent, promote the improvement of the physical activity ability of the disabled, cultivate the sports skills of the disabled, improve the daily life activities of the disabled, and promote the participation of the disabled in community sports Activities, enter the community, integrate into the society, further empower the disabled, promote their health, education, and livelihood ability, and promote their career development.

## CONCLUSION

Community sports activities are an essential part of promoting social sports development and national fitness. Community sports activities services can improve the physical function and athletic ability of different participants and promote mental health and happiness and cultivate healthy behaviors and lifestyles. This research combines the policy background of health and sustainable development at home and abroad, uses ICF theories and methods related to function, disability, and health, and the framework and theory of the "Community Rehabilitation Guidelines" to study the structure and guidance methods of contemporary community sports activities. Integrate community sports activities into the health service system of prevention, treatment, rehabilitation, and health promotion; strengthen the role of community sports in community health, rehabilitation, education, etc., and integrate with community health services to promote a community's formation health service system. ICF can be used as a related theoretical framework and method of community sports activity services. Using ICF can build community sports activity programs based on needs, function orientation, and individualization. The development of community sports activities further promotes sports, rehabilitation, and health and promotes community development.

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## REFERENCES

- Schulenkorf N, Siefken K. Managing sport-for-development and healthy lifestyles: The sport-for-health model. *Sport Management Review*. 2019;22(1):96-107.
- Diaz R, Miller EK, Kraus E, Fredericson M. Impact of adaptive sports participation on quality of life. *Sports Med Arthrosc Rev*. 2019;27(2):73-82.
- Henriksen K, Schinke R, Moesch K, McCann S, Parham WD, Larsen CH, et al. Consensus statement on improving the mental health of high performance athletes. *International Journal of Sport and Exercise Psychology*. 2020;18(5):553-60.
- Ives BA, Gale LA, Potrac PA, Nelson LJ. Uncertainty, shame and consumption: Negotiating occupational and non-work identities in community sports coaching. *Sport, Education and Society*. 2021;26(1):87-103.
- Schinke RJ, Stambulova NB, Si G, Moore Z. International society of sport psychology position stand: Athletes' mental health, performance, and development. *International Journal of Sport and Exercise Psychology*. 2018;16(6): 622-39.
- Rice SM, Parker AG, Rosenbaum S, Bailey A, Mawren D, Purcell R. Sport-Related Concussion and Mental Health Outcomes in Elite Athletes: A Systematic Review. *Sports Med*. 2018;48(2):447-65.