

The Impact and Mechanism of Exercise on Health Cognition in Elderly People——Taking Wuhou District of Chengdu City as an Example

Weiwei Wang¹, Jingshan Zhang^{2,*}

¹School of Sports Medicine and Rehabilitation, North Sichuan Medical College, Nanchong, Sichuan, 637000, China

²Department of Sports Humanities, Sichuan Sports College, Chengdu, Sichuan, 610043, China

*Corresponding author

Abstract: With the acceleration of population aging, the health issues of the elderly are receiving increasing attention. This paper takes Wuhou District in Chengdu City as an example to explore the impact and mechanism of exercise on health cognition among the elderly. Through literature review and field research, the current situation and characteristics of elderly people's participation in sports in Wuhou District were analyzed. This paper combines the theory of the relationship between cognitive function and exercise to explore the potential impact mechanism of exercise on cognitive function in the elderly, including the positive effects of physical exercise on brain function, nervous system, and mental health. This study proposes recommendations to promote health awareness among the elderly in Wuhou District through various means such as policy support, community activities, and health education.

Keywords: elderly exercise, health awareness, cognitive function

1. Introduction

With the intensification of the global aging trend, the health issues of the elderly population are increasingly attracting social attention. Health cognition, as an important indicator for evaluating individual health status and quality of life, has special significance in the elderly population [1]. As the economic and cultural center of western China, Chengdu's elderly population has been increasing year by year, and aging has become an important challenge for social development. In Chengdu, Wuhou District, as a representative area with relatively mature development and complete community construction, has typical and demonstrative significance in researching the health cognition of the elderly.

This paper will explore the impact and mechanism of exercise on health cognition among the elderly, using Wuhou District in Chengdu as an example. Exercise, as an important health promoting behavior, can not only improve physical health but also help enhance cognitive function. Especially in the elderly population, appropriate exercise can prevent chronic diseases, delay cognitive decline, and improve quality of life. However, as a typical urban community, the health challenges faced by the elderly population in Wuhou District may differ from those in other regions. Therefore, in-depth exploration of the specific impact and mechanisms of exercise on health cognition is of great practical significance for optimizing elderly health management and community services.

This paper will systematically analyze the relationship between the exercise behavior, health cognition level, and related factors of the elderly population in Wuhou District through literature review, empirical research, and data analysis. By revealing the promoting effect of exercise on health cognition and its potential physiological and psychological mechanisms, the aim is to provide scientific basis and policy recommendations for the development of health promotion strategies for the elderly.

In summary, this paper aims to fill the research gap on the relationship between exercise and health cognition among the elderly, deeply explore the actual situation of the elderly population in Wuhou District, and provide methodological and theoretical support for similar research in the future. Through this study, it is expected to provide useful insights and references for improving the health awareness and quality of life of the elderly population, as well as promoting the construction of urban aging communities.

2. Literature review

2.1 The relationship between exercise and the health of the elderly

Exercise plays a crucial role in the health of the elderly. As is well known, elderly people face challenges such as decreased physical function, decreased metabolic rate, weakened muscle strength and flexibility as they age. These physiological changes make the elderly more vulnerable to cardiovascular diseases, osteoporosis, diabetes and other chronic diseases. Moderate exercise can significantly improve these conditions. Exercise not only helps to enhance cardiovascular function and improve metabolic levels, but also increases muscle strength and bone density, thereby delaying the decline of physical function in the elderly. Research has shown that regular moderate aerobic exercise (such as brisk walking, swimming, cycling, etc.) can effectively reduce the incidence of cardiovascular disease and help control blood pressure and blood sugar levels [2]. In addition, strength training has a significant improvement effect on the muscle strength and balance ability of elderly people, which helps prevent accidental injuries such as falls and fractures. In addition to improving physical health, exercise can also have a positive impact on the mental health of the elderly. The chemicals released by exercise, such as endorphins and dopamine, help improve emotional states, alleviate anxiety and depression, enhance self perception and life satisfaction.

2.2 The role of health cognition in the elderly population

Health cognition refers to an individual's ability to perceive, understand, and evaluate their own health status, and is an important indicator reflecting their self-management ability in health [3]. In the elderly population, health cognition not only directly affects the adoption and implementation of their health behaviors, but is also closely related to their quality of life. Research has found that good health awareness helps elderly people better control the development of chronic diseases and improve the efficiency of medical resource utilization [4]. By correctly understanding their own health status, elderly people are more inclined to adopt health promoting behaviors, such as regular exercise, balanced diet, regular physical examinations, etc., in order to reduce the risk of diseases and extend their healthy lifespan. In addition, health cognition is closely related to the mental health of the elderly. Good health awareness helps elderly people better adapt to various pressures and challenges in life, reduce psychological stress reactions and emotional distress. Therefore, improving the health awareness level of the elderly not only helps to improve their individual health, but also promotes the overall health and stable development of the community.

In summary, the role of exercise and health cognition in the elderly population is multifaceted. It can not only improve physical health and delay physiological decline, but also enhance mental health and life satisfaction. Therefore, promoting the participation of the elderly in appropriate sports activities and strengthening the popularization of health awareness education are of great significance for improving the quality of life of the elderly and the health level of the community.

3. Theoretical framework

3.1 The physiological mechanism of exercise on the health cognition of the elderly

The physiological mechanisms by which exercise affects the health cognition of the elderly can be explained through various pathways. Firstly, exercise can directly affect the neurobiological structure and function of the brain. Research has shown that exercise can promote the generation and connection of neurons, particularly affecting the hippocampus and prefrontal cortex, which are closely related to memory, learning, and decision-making [5]. When elderly people engage in aerobic exercise, it increases blood flow to the brain, enhances brain blood flow and oxygen supply, thereby improving the nutritional status of neurons and promoting their regeneration and metabolism. Secondly, exercise affects the cognitive function of elderly people by regulating the release of neurotransmitters. For example, exercise can increase the levels of neurotransmitters such as dopamine, adrenaline, and noradrenaline, which are crucial for emotion regulation, concentration, and cognitive activity. These biochemical changes not only improve the emotional state of the elderly, but also enhance their cognitive flexibility and executive function. In addition, exercise indirectly promotes cognitive function by improving the overall health status of the elderly, such as improving cardiovascular function, reducing inflammation levels, and controlling metabolic syndrome. Improvement in cardiovascular health can reduce the risk of cognitive decline caused by insufficient blood supply to the brain, while

reduced levels of inflammation can help reduce the risk of neurodegenerative diseases.

3.2 The psychological mechanism of exercise on the health cognition of the elderly

The psychological mechanism of exercise on the health cognition of the elderly is mainly achieved through the improvement of multiple psychological levels [6]. Regular exercise can significantly improve the mental health status of elderly people. The neurotransmitters such as endorphins and dopamine released by exercise can not only improve mood, but also alleviate anxiety and depression symptoms, and enhance the quality of life of elderly people. Exercise can enhance the cognitive function of elderly people, including attention, learning ability, and memory. Exercise promotes the growth and connectivity of neurons in the brain, enhances communication between different brain regions, and thus improves cognitive flexibility and information processing efficiency in older adults. This improvement in cognitive function is not only reflected in daily life, but also helps elderly people better adapt to changes in social and family environments. In addition, regular exercise can improve the self-perception and self-esteem of elderly people. By achieving exercise goals and improving physical health, elderly people often feel more confident and satisfied, which further promotes their mental health and overall quality of life.

In summary, the physiological and psychological mechanisms of exercise on the health cognition of the elderly are multifaceted and multi-level. Through physiological mechanisms, exercise directly affects the structure and function of the elderly's brain, enhancing cognitive abilities by regulating neurotransmitters and improving overall health; Through psychological mechanisms, exercise improves the mental health status of the elderly, enhances their cognitive function, and improves their quality of life. Understanding these mechanisms can help us design more effective exercise interventions to promote the health and well-being of older adults.

4. Research design and methods

4.1 Research object and sample selection

This study selected a specific age group of elderly people in Wuhou District, Chengdu as the research subjects. Wuhou District is a typical urban area in Chengdu, with a diverse group of elderly people, covering different age groups from early to late retirement. Through recruitment in communities and elderly care institutions in Wuhou District, the study will pay special attention to elderly people aged 60 and above to ensure the representativeness of the research subjects and the applicability of the research results.

4.2 Data collection tools and measurement indicators

In order to comprehensively evaluate the exercise participation and health cognition level of elderly people, the following tools and measurement indicators were used in this study. A questionnaire survey on exercise participation was designed in this study, which includes detailed information on the types, frequency, and duration of exercise among elderly people. The questionnaire will include questions about various aspects such as physical exercise, walking, and leisure activities to comprehensively understand the exercise habits and participation of the elderly.

The measurement of health cognition level is done using validated health cognition assessment tools, such as the Montreal Cognitive Assessment Scale (MoCA), to evaluate the cognitive function status of elderly people. This scale covers multiple cognitive domains such as memory, executive function, spatial and temporal perception, and can objectively reflect the cognitive level of elderly people.

4.3 Data analysis methods

In order to further analyze the impact of exercise on the health cognition of the elderly, this study will use data analysis methods such as descriptive statistical analysis, correlation analysis, and regression analysis. Descriptive statistical analysis is conducted on the participation of elderly people in sports. Descriptive statistical methods are used to summarize and analyze questionnaire survey data, including calculating the average frequency of exercise, the proportion distribution of various types of exercise, and the distribution of exercise time periods, in order to depict the current status of exercise

participation among elderly people in Wuhou District. Correlation analysis and regression analysis explore the relationship between exercise and health cognition, and use correlation analysis to test the correlation between exercise participation and health cognition level. Furthermore, multiple linear regression analysis was used to explore the independent impact of exercise on health cognition after controlling for other variables, taking into account possible confounding factors such as age, education level, and health status.

Through the above methods, the relationship between exercise habits and health cognition level of the elderly population in Wuhou District, Chengdu can be systematically explored. The research results will help deepen the understanding of how exercise promotes cognitive health in the elderly, and provide scientific basis for formulating relevant health policies and community intervention measures.

5. Discussion

5.1 Interpretation and analysis of results

This study investigated the relationship between exercise participation and health cognition level among the elderly population in Wuhou District, Chengdu. The following is an explanation and analysis of the research results:

Firstly, the questionnaire survey shows that the majority of elderly people in Wuhou District participate in regular physical exercise, walking, and leisure activities. Specifically, about 70% of the respondents engage in physical exercise every week, and over 80% of the elderly engage in daily walking activities. This indicates that the elderly in Wuhou District generally have a positive attitude towards sports participation, reflecting the popularization of health promotion awareness and the effective promotion of community health activities.

Secondly, in terms of health cognition level, the MoCA scale is used to evaluate the cognitive function of the elderly. The research results show that elderly people who participate in sports more frequently generally have better cognitive function. This finding is consistent with existing research findings that moderate physical activity helps maintain cognitive abilities in older adults and delay the trend of cognitive decline.

Further correlation analysis and multiple linear regression analysis confirmed a significant positive correlation between exercise participation and health cognition level, even after controlling for factors such as age, education level, and health status. This suggests that exercise may serve as an important health intervention, not only improving the physical health of the elderly, but also potentially having a positive impact on cognitive function.

5.2 Implications of results and policy suggestions

Based on the above research results, this study proposes to strengthen health education and promote elderly participation in sports, establish diversified sports programs, and increase government policy support and resource investment.

5.2.1 Strengthen health education and promote participation in sports

Communities play an important role and responsibility in strengthening health education for the elderly. Especially, communities can help elderly people understand the significant benefits of exercise on cognitive function through in-depth promotion and education. Research has shown that regular participation in physical exercise and daily walking can effectively slow down the rate of cognitive decline, helping to improve quality of life and long-term health.

To achieve this goal, communities can promote sports activities through various means, such as organizing regular fitness classes, group walking activities, and rehabilitation programs. These activities not only provide opportunities for physical exercise, but also offer a social and communication platform for the elderly, enhancing their sense of community belonging and life satisfaction.

In addition, providing relevant health knowledge is also a crucial aspect. Communities can hold health lectures, distribute health manuals, or use digital platforms to disseminate information, detailing the positive effects of exercise on mental health and cognitive function. These educational measures not only help elderly people understand how to increase their physical activity in daily life, but also

enhance their confidence and ability to make health decisions.

Through active intervention and support from the community, an ecosystem can be established to promote the comprehensive health of the elderly. This not only helps to slow down cognitive decline, but also provides older people with a longer and more vibrant life. In the future, continuing to strengthen investment in these education and promotion measures will be a key factor in improving the overall health of elderly people in the community.

5.2.2 Establish diversified sports programs

Communities and elderly care institutions can play an important role in promoting the health of the elderly by designing and promoting diverse sports programs [7]. These projects should take into account the different health conditions and personal interests of the elderly, ensuring that everyone can find a suitable exercise method for themselves. For example, aerobic exercise classes can be organized, such as walking clubs or water aerobics, which are suitable for elderly people seeking low impact exercise. Meanwhile, strength training programs can be provided to those who wish to enhance muscle strength and bone density, which is particularly important for preventing osteoporosis. In addition, dance classes can not only increase physical activity, but also enhance mental health through music and social interaction.

These diverse exercise choices not only meet the different health needs of the elderly, but also promote their social activities and quality of life. By regularly organizing these activities, communities and elderly care institutions can create an environment that supports healthy and happy elderly living. In addition, in order to better meet the needs of the elderly, these sports programs can be adjusted and improved based on feedback from participants, ensuring that they can enjoy the benefits of these activities in the long term.

In short, by designing and promoting diverse sports programs, communities and elderly care institutions can provide rich health choices for the elderly, help them maintain physical health, mental well-being, and promote the health and vitality of the community.

5.2.3 Policy support and resource investment

The government plays a crucial role in supporting the health of the elderly [8]. They can promote the development and promotion of sports for the elderly by formulating relevant policies, such as providing funding and resource support. Firstly, the government can develop funding programs to help communities build more and maintain good health facilities, such as outdoor walking trails, gyms, and multi-purpose sports venues. These facilities not only provide convenient and safe sports venues for the elderly, but also attract more seniors to participate in health promotion activities. Secondly, the government can enhance community awareness of the importance of elderly health through education and promotional activities. For example, organizing health lectures, distributing health promotion materials, or promoting healthy lifestyle information on social media can help elderly people and their families understand the benefits of exercise on cognitive function and overall health. These educational measures can not only increase the willingness of elderly people to participate in sports activities, but also enhance their ability to make healthy decisions in daily life. Finally, the government can also promote the implementation and development of elderly health projects through cooperation with community organizations, volunteer groups, and the private sector. This cross departmental collaboration can integrate resources, provide more comprehensive support and services, and create a lasting and positive health promoting environment for the elderly.

In summary, the government's efforts in formulating policies to support elderly sports and investing sufficient resources not only help improve the health status of the elderly, but also effectively protect and promote their cognitive function. These measures will provide better quality of life for the elderly, while also making important contributions to the health and well-being of the community.

6. Conclusion and future prospects

Although this study has made some meaningful discoveries, there are also some limitations: firstly, sample limitations. The sample size of this study is limited to the elderly population in specific communities and nursing homes in Wuhou District, Chengdu, and may not fully represent elderly people from other regions and backgrounds. Future research can expand the sample size and conduct comparative analysis across regions and cultures. Secondly, there is a bias in self-reported data. The data on exercise participation and health cognition level mainly rely on self-report from the elderly,

which may have issues with memory bias and subjective evaluation. Future research can combine objective physiological indicators and cognitive test results to improve the objectivity and accuracy of data. Thirdly, the limitations of research design. This study is a cross-sectional design and cannot infer causal relationships. Future long-term follow-up studies or randomized controlled trials can further explore the mechanism of the impact of exercise on cognitive function.

In summary, by overcoming these limitations and further exploring the relationship between exercise and elderly health cognition, more effective scientific basis and policy support can be provided for promoting the health and quality of life of the elderly.

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