

# SYSTEMATIC SPORTS MEDICINE BASED ON THE CONCEPT OF REALIZING PHYSICAL FITNESS



ORIGINAL ARTICLE  
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MEDICINA DO ESPORTE SISTEMÁTICA BASEADA NO CONCEITO DE ATINGIR O PREPARO FÍSICO

MEDICINA DEL DEPORTE SISTEMÁTICA BASADA EN EL CONCEPTO DE ATINGIR LA PREPARACIÓN FÍSICA

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## ABSTRACT

**Introduction:** The idea of sports as a way of strengthening the body has been around for a long time. It has also been confirmed from the perspective of modern medicine. The development of sports has been accepted by people under the effect of medical proof. **Objective:** This article explores the behavioral characteristics and shortcomings of physical exercise for the elderly who aim to strengthen their health. **Methods:** The article statistically analyzes the influencing factors of urban Chinese elderly people participating in sports. At the same time, it uses questionnaire surveys and mathematical statistics to find out the common main obstacles hindering the participation of the elderly in sports in Chinese cities. **Results:** Keeping fit is the primary purpose of older urban people participating in sports. Walking, Tai Chi, square dancing, etc., are the primary sports for the elderly. **Conclusion:** Most older adults still participate in physical exercises in independent forms or self-organized small groups. Under the concept of physical fitness, the elderly are more active in physical exercise.

**Level of evidence II; Therapeutic studies - investigation of treatment results.**

**Keywords:** Physical exercise; Exercise test; Sports medicine; Factor analysis, statistical.

## RESUMO

**Introdução:** A ideia do esporte como forma de fortalecer o corpo já circula há muito tempo. Também foi confirmada na perspectiva da medicina moderna. O desenvolvimento do esporte tem sido aceito pelas pessoas ao observar o efeito obtido em provas médicas. **Objetivo:** Este artigo explora as características e deficiências comportamentais do exercício físico para os idosos cujo objetivo é fortalecer a saúde. **Métodos:** O estudo analisou estatisticamente os fatores que influenciam idosos chineses urbanos a participarem em esportes. Ao mesmo tempo, questionários de sondagem e estatísticas matemáticas foram utilizados para descobrir os principais obstáculos que em geral impedem a participação dos idosos em esportes em cidades chinesas. **Resultados:** Manter-se em forma é o principal propósito para a participação de idosos urbanos em esportes. Caminhadas, Tai Chi, dança de quadrilhas etc. são os principais esportes dos idosos. **Conclusão:** A maioria dos adultos mais velhos ainda participam de exercícios físicos de forma independente, ou em pequenos grupos que eles mesmos organizam. Sob o conceito de preparo físico, os idosos praticam exercícios mais ativamente. **Nível de evidência II; Estudos terapêuticos - investigação de resultados de tratamento.**

**Descritores:** Exercício físico; Teste de esforço; Medicina esportiva; Análise fatorial.

## RESUMEN

**Introducción:** La idea del deporte como forma de fortalecer el cuerpo ya circula hace mucho tiempo. También se la confirmó en la perspectiva de la medicina moderna. El desarrollo del deporte ha sido aceptado por las personas al observar el efecto obtenido en pruebas médicas. **Objetivo:** Este artículo explora las características y deficiencias comportamentales del ejercicio físico para ancianos cuyo objetivo es fortalecer la salud. **Métodos:** El estudio analizó estadísticamente los factores que influyen a ancianos chinos urbanos a participar en deportes. Al mismo tiempo, encuestas de sondeo y estadísticas matemáticas se utilizaron para descubrir los principales obstáculos que en general impiden la participación de los ancianos en deportes en ciudades chinas. **Resultados:** Mantenerse en forma es el principal propósito para la participación de ancianos urbanos en deportes. Caminatas, Tai Chi, square dance, son los principales deportes de los ancianos. **Conclusión:** La mayoría de los adultos mayores aún participan de ejercicios físicos de forma independiente, o en pequeños grupos que organizan ellos mismos. Bajo el concepto de preparación física, los ancianos practican ejercicios más activamente. **Nivel de evidencia II; Estudios terapéuticos - investigación de resultados de tratamiento.**

**Descritores:** Ejercicio físico; Pruebas de esfuerzo; Medicina deportiva; Análisis factorial.



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## INTRODUCTION

In the context of rapid population aging development, strengthening the awareness of physical exercise among the elderly is an important issue facing society. This study aims to understand the

behavioral characteristics and existing problems of elderly physical exercise by investigating and analyzing the status quo and influencing factors of elderly physical exercise.<sup>1</sup> This provides a theoretical

reference for further promoting the implementation of the national fitness program and realizing effective management and guidance of physical exercise for the elderly.

## METHOD

### Research object

The subjects of this study are older adults aged 60 to 69 who participate in physical exercise in a particular city.<sup>2</sup> Their average age is 64.09±2.64 years old. The survey sample is based on the stratified sampling method. A total of 500 older adults were included in the study. The sample size of valid data is 473 people. This accounts for 94.6% of the total sample size.

### Research methods

#### Questionnaire survey method

The investigation time is from April to May 2019. The survey content mainly includes: (1) Motivation to participate in physical exercise. (2) The amount of exercise involved in physical exercise. (3) Participate in the main items of physical exercise. (4) Selection of physical exercise venues. (5) The main factors affecting participation in physical exercise.

#### Interview method

To obtain detailed information that is difficult to understand in the questionnaire, we randomly selected a total of 50 older adults from the 500 older adults surveyed for individual interviews.<sup>3</sup> The interview content mainly included the needs of the elderly for the form and content of physical exercise and the reasons that hindered them from participating in physical exercise.

### Mathematical Statistics

The original data was processed by SPSS17.0 statistical software. We use frequency statistics to calculate and analyze the survey results of the current situation and influencing factors of the motives, amount of exercise, events, places, etc., of physical exercise for the elderly.

The dissertation uses the multi-dimensional wavelet scale decomposition method to decompose the image at the pixel level.<sup>4</sup> The contour length of the wrong action image reconstruction in sports is:

$$E = \theta E^{LBF} + (1 - \theta) E^{LGF} + \nu L(\varphi) + \mu P(\varphi) \quad (1)$$

$\theta$  is the gray-scale weight coefficient of the neighborhood of each sports wrong action pixel.  $L(\varphi)$  is the constraint item of the edge contour length of the sports wrong action. The global affine invariant domain model of the bad action image we get in sports is defined as follows:

$$L(\varphi) = \int_{\Omega} \delta(\varphi) |\nabla \varphi| dx \quad (2)$$

$P(\varphi)$  is the sparse regular term. We use  $f_1(x)$  and  $f_2(x)$  to represent the gray value of the reconstruction of the bad action image in sports.  $f_1(x)$  and  $f_2(x)$  are related in the horizontal concentration of the pixel distribution in the background area. The description of template matching based on the detection results of image 3D modeling is as follows:

$$H_{\varepsilon}(z) = \frac{1}{2} \left[ 1 + \frac{2}{\pi} \arctan \left( \frac{z}{\varepsilon} \right) \right] \quad (3)$$

$$\delta_{\varepsilon}(z) = \frac{1}{\pi} \frac{\varepsilon}{\varepsilon^2 + z^2}, z \in R \quad (4)$$

We mark the corner points of the wrong action image sequence in sports in the moving state to obtain the Gaussian distribution of the wrong action in the affine invariant domain of the entire image distribution as follows:

$$P(\varphi) = \int \frac{1}{2} (|\nabla \varphi| - 1)^2 dx \quad (5)$$

$E^{LBF}$  is the local gray information of wrong actions in sports.  $E^{LGF}$  is the local gradient energy term of the wrong action in sports.<sup>5</sup> According to the regularity of the gray-scale contour model of the wrong action in sports, we carry out the 3D modeling and detection of the wrong action.

## RESULTS

### The status quo of older adults participating in physical exercise

#### Motivation to participate in physical exercise

Physical exercise motivation refers to the psychological motivation or internal motivation that promotes individuals to participate in physical exercise activities. It is the direct cause that affects physical exercise behavior. It can be seen from Table 1 that the primary purpose of older adults participating in physical exercise is to improve their health.<sup>6</sup> This proportion is as high as 79.3%. This reflects that the elderly has a strong sense of health. The second is personal interest. 40.6% of the elderly regard physical exercise as their hobby. Many older adults participate in physical exercises to cure diseases. The elderly has realized that participating in physical exercise plays an essential role in improving health, reducing diseases, and prolonging life.

#### Participate in physical exercise amount of exercise

The amount of exercise is composed of multiple elements such as exercise intensity, exercise duration, and movement accuracy. From the survey results in Table 2, the proportion of older adults who participate in physical exercise every day is the highest. The time of physical exercise is mostly 60 minutes or more, which accounts for 37.8%. This may be related to their main exercise program is walking (Table 3).

**Table 1.** Survey statistics of older people's motivation to participate in physical exercise.

Purpose	Number/person	Proportion/%
Improve health	375	79.3
personal interest	192	40.6
Curing disease	116	24.5
Social interaction	77	16.3
Recreation	63	13.3
Body sculpting	41	8.7
Participate in performances / competitions	40	8.6

**Table 2.** Statistical table of the survey on the amount of physical exercise of the elderly.

Amount of exercise	Options	Number of people / n	Ratio /%
Frequency (times/week)	1~2	87	18.4
	3~4	156	33
	5~6	51	10.8
	Exercise every day	179	37.8
Time (min/time)	<15	13	2.7
	15~30	92	19.5
	30~45	74	15.6
	45~60	115	24.3
	>60	179	37.8
Strength	Low intensity	208	44
	Medium intensity	246	52
	high strength	19	4

According to relevant studies, the elderly should exercise every day or every other day. The number of exercises per week should not be less than 2 to 3 times.

### Selection of physical exercise venues

From the survey results in Table 4, it can be found that the places where the elderly take part in physical exercise are mainly outdoor and accessible places. Among them, there are most communities, followed by parks. (1) For the elderly, charging stadiums will cause a more significant economic burden on them. Therefore, the choice of venues for physical exercise activities for the elderly is almost always free of charge. (2) The green coverage rate in the park is relatively high, which is more suitable for the elderly to perform outdoor sports such as walking, jogging, and Tai Chi. In recent years, square dancing and ballroom dancing have become popular sports exercises among older women.<sup>7</sup> Therefore, the square has also become one of the main places for the elderly to perform physical exercises.

### The main influencing factors of physical exercise for the elderly

Table 5 is the survey and statistical results of the factors affecting the participation of the elderly in physical exercise.

#### Weather factors

According to the survey results of this study, the weather factor has become the primary factor affecting the elderly to participate in physical

**Table 3.** Survey statistics on the items of the elderly participating in physical exercise.

Project	Number of people	Ratio /%
Walk	252	53.3
Ballroom dancing	96	20.3
Square dance	93	19.7
Fitness gymnastics	86	18.2
Tai Chi / Sword	70	14.8
jogging	59	12.5
National dance	55	11.6
Ball	41	8.7
Fitness equipment	22	4.7
Yoga	16	3.4
Martial arts	9	1.9
Swim	7	1.5
Other	31	6.6

**Table 4.** Survey statistics of places where the elderly participate in physical exercise.

Place	n	Ratio /%
Community	214	45.2
Park	136	28.8
Square	58	12.3
School	36	7.6
Gym	33	7
At home	27	5.7
Other	49	10.4

**Table 5.** A survey of factors affecting the elderly to participate in physical exercise.

Influencing factors	n	Ratio /%
Weather factor	362	76.5
Family Factors	63	13.3
Lack of exercise content	57	12.1
Lack of organization	45	9.5
Lack of guidance	33	7
Facility environmental factors	29	6.1
High cost of fitness	15	3.2
Other	21	4.4

exercise. Nearly 60% of the elderly will affect their participation in physical exercise due to weather. This may be because the elderly mainly participates in physical exercise places outdoors. This often affects the normal conduct of sports activities due to weather conditions such as rain, haze, and cold.<sup>8</sup> This also indirectly exposed the current shortage of indoor venues. Studies have pointed out that the number of indoor stadiums is limited. If it is free and open, it will lead to flocking, so it can still meet everyone's exercise needs.

#### Family factors

Family factors also constitute one of the important influencing factors for the elderly to participate in the exercise. After retirement, his social role has changed. Although they deserve more leisure time, they tend to spend more energy and time on the family. Many older adults who have retired begin to take care of their children and grandchildren. The time they spend on housework has dramatically increased and is even busier than before retirement.

#### Lack of exercise content and guidance

Lack of exercise content and lack of guidance are also important reasons that hinder the elderly from participating in group fitness activities. Most older adults in the community have a strong willingness to participate in the exercise. But apart from walking, jogging, and simple joint activities, they don't know what to practice or how to practice. Physical exercises are often done in a hurry by "moving casually" and "blindly training," and interest and enthusiasm have not been fully mobilized. Also, because the subjects of this survey participate in physical exercises, many older adults who have not participated in physical exercises may give up participating in physical exercises because they do not know what they are practicing. Some older adults also expressed their hope that the community can organize and carry out collective fitness programs suitable for elderly exercises.

#### Lack of organization

Lack of organization is also one of the factors that affect the elderly to participate in physical exercise. According to interviews and investigations, many older adults choose to exercise alone or with friends. Only about 1 to 20% of the elderly participate in physical exercise through corresponding organizations. Most older adults still participate in physical exercise in independent exercise or spontaneously organized small groups.

## DISCUSSION

### Strengthen the publicity of scientific fitness exercise methods

We need to give full play to the publicity and guidance role of the mass media and the Senior Sports Association. While actively promoting the benefits of physical exercise to the elderly, we can add some scientific, safe, and effective fitness methods and other content introductions. This can improve the awareness of scientific exercise of the elderly but also improve the effectiveness of their exercise.

### Strengthen the construction of stadiums and public sports facilities

The free opening range and intensity of public sports venues can be expanded to the masses through national policy support and encouragement and government compensation. We make full use of the resources of school sports venues, increase opening hours, and expand opening projects. This helps to meet the physical exercise needs of the elderly and effectively avoids forcing the elderly to stop physical exercise due to weather.

### Strengthen the team-building of social sports instructors

Relevant departments should increase investment in the training of social sports instructors. At the same time, we need to teach the elderly sports skills and scientific exercise knowledge to adapt to the elderly.

This provides scientific guidance and a safety guarantee for the elderly to participate in physical exercise.

## CONCLUSION

Walking, Taijiquan/Jianhai City elderly physical exercise is more appropriate. Walking, Tai Chi/sword, fitness gymnastics, square dance,

etc., are their main exercise items. The physical exercise of the elderly is affected by many factors. The weather factor is the primary factor.

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