

Research Article

Health Promotion System for the Elderly's Daily Body Functions Based on Nanoprotective Technology

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Received 28 February 2022; Accepted 8 July 2022; Published 20 July 2022

Academic Editor: Pandiyarasan Veluswamy

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With the acceleration of China's aging trend, the physical health of the elderly needs more attention and research from us. In particular, many elderly people are prone to accidental injuries during exercise, so how to protect the health of the elderly through high-tech is worthy of more in-depth research. This measure can promote the establishment of a health system for the elderly. This article is mainly based on the research on the health promotion system of the elderly's daily body functions based on nanoprotective gear technology. It uses the literature method to read a lot of literature to understand the current research status of the elderly's daily body function and health and the application status of nanotechnology, through the questionnaire and survey method for testing the blood pressure, heart rate, pulse wave velocity, bone density, and other physical indicators of the surveyed elderly population, and organize and analyze the relevant data. In this survey, 28.8% of the elderly who regularly participate in physical exercise have high systolic blood pressure, 33.3% of the elderly who do not participate in exercise regularly have high systolic blood pressure, and most of them are in the low bone density stage. Therefore, nanocare technology can effectively protect the health of the elderly and provide protection during exercise. The research in this article is aimed at illustrating the establishment and improvement of the physical function and health promotion system of the elderly through the impact data on physical indicators and providing a factual basis for the elderly to better participate in physical exercise and improve the health quality of the elderly.

1. Introduction

The number of elderly people is increasing year by year, and the aging trend of the world population is becoming increasingly obvious. With the increase of age, the physical function of the elderly declines, the aging rate and incidence of internal organs also increase, and psychological problems gradually occur. The health problem of the elderly population is the most obvious problem in an aging society, so finding effective ways to improve the health of the elderly is the key. The World Health Organization's survey results also confirm the importance of improving healthy behaviors on the quality of life of the elderly, and it is essential to conduct surveys on improving the health of the elderly.

Universities and research institutions in various countries have increased their investment and research on nanotechnology. The development of nanotechnology has a certain socioeconomic and political background. The development of nanotechnology is inseparable from people's area of life. From physics to chemistry, from power to aviation, nanotechnology that integrates the strengths of multiple disciplines has been rapidly developed. Among them, nanoprotective technology is also under continuous research and development.

The intake of protein in the Isanejad M diet may be beneficial to the physical function (PF) of the elderly. They examined the cross-sectional and prospective associations of g/kg body weight (BW), fat mass (FM), and lean body mass (LM) with PF in 554 women aged 65.3–71.6 years

old. Research on osteoporosis risk factors and fracture prevention was carried out. Participants filled out questionnaires about lifestyle factors and 3 d food records in 2002. Body composition was measured by dual-energy X-ray absorption method, and PF was measured at baseline and 3-year follow-up. The definition of sarcopenia is based on the standards of the European Working Group on Elderly Sarcopenia. At baseline, women with higher protein intake (≥ 1.2 g/kg body weight) had grip strength/weight (GS/BM) ($P = 0.001$), knee extension/BM ($P = 0.003$), and single-leg posture ($P = 0.047$), when the chair rises ($P = 0.043$), squats ($P = 0.019$), squats on the ground ($P = 0.001$), and walks faster at 10 m ($P = 0.005$), the short-term physical performance battery score is better ($P = 0.004$). However, while recording the factors related to osteoporosis, this experiment does not account for the controllable variables [1]. Grimm B wearable sensors, especially the inertial measurement unit (IMU), can perform objective, effective, differentiated, and responsive physical function assessment during functional tests such as gait, climbing stairs, or sitting and standing. The most suitable method is to apply to each body part to accurately capture task completion time, spatiotemporal gait, and harshly testing or kinematic parameters specific to the affected limb. In activity monitoring (AM), the accelerometer is mainly used to derive energy consumption or parameters related to overall health (such as total steps). In older adults, it is most effective by studying specific events, such as stairs or high-intensity activities. By looking at qualitative parameters at the “micro” level of activity, such as rhythm or standing time, low cost and ease of use allow routine clinical applications, but there are many options for sensors, algorithms, tests, and parameter definitions. Selection and comparability are still difficult and require consensus or standardization [2]. Lin and Lin’s existing health promotion system (HPS) has some shortcomings, such as lack of the ability to automatically plan exercise prescriptions (EP) for individuals, difficulty in obtaining physiological signals of users who are exercising, and lack of effective mechanisms for medical notification emergency situations for personnel users. To solve these shortcomings, in this research, they use wireless sensor network (WSN), mobile communication, and cloud computing technology to develop cloud-based HPS. HPS includes a health promotion cloud service platform that can build a user’s physical health model and then generate appropriate EPs for users to perform various exercises. On the user side, in this study, they designed a motion-sensing device that can obtain the physiological signals and global positioning system (GPS) positioning information of users who exercise through WSN in time. Some sensors are designed in motion-sensing devices, such as GPS sensors. However, this technology can only provide location services and cannot provide more types of services related to healthy life [3].

The innovations of this article are as follows: (1) the combination of qualitative analysis and quantitative analysis is fully based on the analysis of data; (2) the combination of theoretical research and empirical research, and the in-depth study of nanotechnology and other theoretical foundations on the above, is carried out in combination with the spe-

cific conditions of physical function and health of the elderly.

2. Promoting Research Methodology Based on Daily Physical Function in Healthy Elderly Nanotechnology Protective Gear

2.1. Nanoprotective Gear Technology. In the late 1980s, a new high-tech science and technology emerged in human society, which is nanotechnology [4]. The emergence of nanotechnology has played a leading role in the development of today’s science and technology. This effect has changed the process of technological development to a certain extent and at the same time has changed the scope of research on the philosophy of technology [5]. The emergence of nanotechnology has opened up a brand-new research field, and the scope of its research and discussion is basically between nonmacro and nonmicro, which is what people have rarely paid attention to before [6]. In short, the development of nanotechnology has changed the traditional concept of human understanding and use of technology. It has not only changed the real life of human beings but also profoundly affected the ethics and morals of traditional human society. “Double-edged sword” is the proposition of the philosophy of technology [7, 8].

Through this understanding, we can feel that it is not easy to accurately define nanotechnology. On this basis, the foreign academic circles define nanotechnology as follows: “First, the research on the microcosm of 1-100 nm and the microcosm of molecules [9] can be used to conduct technical analysis and research on the molecules and atoms of materials. Second, research has the possibility of changing a certain characteristic of nanometers. [10]. Third, the ability to control and use the substance is within a personal range [11].”

Nanoprotective technology is a tool made of nanomaterials designed to provide protection for the elderly. By changing the size of nanobuilding units to design the properties and functions of materials [12], the internal and surface chemical properties and their combinations can be controlled. Nanotechnology is known as one of the three pillar industries in the 21st century [13]. Artificial nanomaterials are the foundation and core of nanotechnology [14, 15]. Due to the small size of the structure of artificial nanomaterials, it has special physical and chemical properties, such as small effects and complex structures, with large surface effects, very high reactivity, quantum results, etc. These characteristics bring unique characteristics to nanotechnology. Nanoresearch is highly unique, comprehensive, and social [16]. The disciplines it involves are a multidisciplinary synthesis, involving a number of research areas of emerging disciplines, and countries have also invested large funds in nanotechnology [17, 18].

The success of nanoprotective technology is a brand-new experience for the elderly, which not only provides comprehensive protection measures for the elderly but also reduces the burden on adult children. The development of the field of nanotechnology, on the one hand, can promote

the innovation of production methods. Nanotechnology can change the traditional production methods, guide human beings to produce necessary direct products on a personal level, and use existing materials to fully produce products needed for life [19]. The products produced in this way have improved performance, but the price has not increased much, so they have greater competitiveness. On the other hand, it can promote the improvement of cognitive style. Its appearance indicates that the level of human understanding of nature has reached a new level and has risen to a new height, allowing humans to understand the world from a new perspective, thereby improving human cognitive methods [20, 21]. The biggest problem with the development and application of nanoprotective gear technology at present is how protective its application is and the high cost, whether the elderly and their children can afford this price, and whether nanoprotective gear can be used.

2.2. Methods to Promote the Health of the Elderly's Daily Body Functions. With the development of economy, the progress of science and technology, the improvement of living standards, and the improvement of medical and health conditions, the proportion of aging of the population in our country is increasing year by year [22]. We also found that while the overall level of public fitness exercise in my country is on the rise, the elderly's fitness exercise is still in the initial stage, and the overall poor health of the elderly is a general trend in the development of human life [23]. Regular exercise can resist the age effect of dysfunction and health disorders and can also reduce mortality and morbidity [24]. With the increase in the incidence of the elderly, through research and analysis, older people have the potential to improve both structure and function [25]. Moderate exercise, appropriate load, exercise time, exercise methods, etc. can promote blood circulation throughout the body, increase metabolism, improve bone, and improve adaptability to various organs and system functional loads. The elderly can also enrich their spare time through the above methods, satisfy people's spiritual needs, increase their sense of joy, establish good interpersonal relationships, improve people's body and mind, achieve their goals [26], delay aging, and improve health. The research results further confirmed that physical exercise has a good impact on the health of the elderly, and increasingly, people have clearly realized that physical exercise has a good effect on improving health and antiaging. The elderly are increasingly participating in physical exercise and at the same time enhance the national health. It provides a factual basis for people to better participate in physical exercise, to further promote the national fitness program and promote the active participation of the elderly in sports, and it provides a scientific and useful foundation. Improve people's and society's interest in older people's participation in sports and encourage them to actively participate in sports.

2.2.1. Physical Exercise. Taking exercise as a means, using fitness, entertainment, health care, rehabilitation, and mental

and intellectual training activities, according to the formation of growth and development and human skills, consciously and orderly promotes people's overall development, improves people's physical condition, improves physical strength, improves athletic ability, improves physical function, improves and maintains physical and mental health, improves lifestyle, and improves quality of life. Sport is not only a physical exercise but also a spiritual activity. Therefore, exercise not only affects physical health but also has a positive effect on mental health.

2.3. Health Promotion Model

2.3.1. Origin of Health Promotion Model. In 1987, Pan De proposed a health promotion model, an action to improve health to achieve self-fulfillment and personal achievement. Everyone must maintain action to maintain and enhance peace and happiness. He believes that actions to improve health are for self-realization and personal achievement, and everyone will use actions to maintain and improve peace and happiness. This is a positive attitude. Through this healthy behavior, the individual can achieve the greatest potential to achieve the best state of health. The determinants of health promotion actions are divided into specific personal characteristics and experiences (the above actions, personal factors), specific action knowledge and feelings (action feelings, action disorders, self-efficacy, and action-related), and influences on actions (many have future action plans and urgent competition needs and preferences), three categories. The determinants of health promotion actions in the health promotion model can be used to evaluate patients' health awareness and enthusiasm for participating in health promotion activities. In action to improve health to achieve self-fulfillment and personal achievement, everyone must maintain action to maintain and enhance peace and happiness.

In 1987, American nursing expert Pan De first proposed the Health Promotion Lifestyle Scale, which was revised by Walker in 1996 and formulated HPLP-II. The scale contains six dimensions. Promoting a healthy lifestyle refers to all actions taken by individuals, families, communities, and society to improve peace, happiness, and the possibility of health. Based on the health promotion model, various forms have been developed to measure health status. Iran is using the scale of health-improving lifestyles to measure the health actions of Iranian elderly. It has good reliability and validity and good applicability.

2.3.2. Application of the Health Promotion Model in Nursing Practice. Research on health promotion models has been applied to nursing practice in many countries. The health promotion model was first used in nursing practice abroad. The health promotion model can improve the dietary behavior of diabetic patients. In addition, it can also improve the loneliness symptoms of the elderly. Health education based on the health promotion model has a positive impact on improving social and mental health, delaying the aging process, improving the quality of life and physical health,

improving daily activities, and reducing the risk of disability. In this way, it can activate the essential motivation and beliefs of personal health, turn it into a healthy action, and promote the development of a healthy lifestyle at any level. To achieve a full recovery, reduce the recurrence rate and readmission rate. With the improvement of living standards, unhealthy behaviors, lifestyles, and living environments are more likely to increase the burden of disease.

3. Promote Research Experimental System Based on Daily Body Functions of Healthy Elderly Nanotechnology Protective Gear

3.1. The Establishment of a Model of Influencing Factors of the Physical Function and Health Promotion System of the Elderly

3.1.1. *Build the Model Equation.* The structural equation model consists of a measurement model and a structural model. In this study, the model equation can be represented by three matrix equations:

$$M = \Gamma_x \xi + \vartheta, \quad (1)$$

$$N = \Gamma_y \eta + \psi, \quad (2)$$

$$\eta = R\eta + \tau\xi + \omega. \quad (3)$$

Table 1 shows the meaning of the letters in the above formula. Equations (1) and (2) are the formulas of the measurement model, which, respectively, determine the position of the relationship between the external observation variable X and the external latent variable and the internal observation variable Y and the internal latent variable. Equation (3) is a structural model equation that determines the relationship between external latent variables and inherent latent variables.

3.1.2. *Parameter Estimation Method.* Establish an initial structural equation model, and verify the suitability of the model through data analysis. In the SEM analysis, 7 parameter estimation methods are provided, including ML, IV, TSLS, ULS, GLS, GWLS, and DWLS. In this paper, the maximum likelihood method (ML method) is used for parameter estimation.

3.1.3. *Construction of the Theoretical Model of the Factors Affecting the Health of the Elderly.* The theoretical construction of the structural equation model needs to be based on a certain theoretical foundation and practical experience. Previous literature studies have found that socioeconomic status affects the elderly's social support, family relationships, health status, and health-promoting lifestyle. For example, according to the research, high age, low education, and low income are important risk factors affecting the elderly. The main sources of living expenses, the existence of children, gender, and average monthly income are important factors that affect the level of social support for the empty-nest elderly. Family support also affects the elderly's social support, health status, and health-promoting lifestyle. Having

TABLE 1: The meaning of the letters in the above formula.

Letter	Meaning
M	Observed variables of exogenous latent variables
N	Observed variables of endogenous latent variables
η	Endogenous latent variables
Γ_x	X path coefficient of exogenous latent variables
Γ_y	Y path coefficient of endogenous latent variables
ξ	Exogenous latent variables
ϑ	Error of exogenous latent variable
ψ	Error of endogenous latent variable
ω	Staggered term

a spouse, children's filial piety, and living with children contributes to the mental health of the elderly, and the lack of timely care for spouses and children is easier for the elderly. Perceive loneliness and so on. The main factors affecting social support for the elderly in nursing facilities for the elderly are age, family status, number of visits, and the presence or absence of children.

Health status will also affect the social support of the elderly. In China, participation in social activities is causally related to the health of the elderly. If you are in good health, your chances of participating in cultural group activities and personal family activities will increase. At the same time, combined with the results of single factor analysis, on the basis of theoretical foundation and repeated verification, this study constructed a theoretical model of factors affecting the health and lifestyle of the elderly.

Construct a structural equation model based on the latent variables and observed variables extracted by exploratory factor analysis, and use the Amos22.0 software to fit the constructed model.

3.2. *Monitoring System Model of Basic Health Parameters of the Elderly.* The health parameter sensor is used to extract human physiological information. It is the basis of the monitoring system. The detection accuracy of the sensor is related to the effectiveness of the monitoring system, and its power consumption and wearing comfort are related to the actual application value of the monitoring system. This chapter considers the characteristics of the dynamic monitoring device, from the perspective of low power consumption, designing the detection circuit and signal processing algorithm of health parameters.

3.2.1. *Design of ECG Signal Processing Algorithm.* For systems used for long-term signal monitoring, due to limited resources and sensitive to power consumption, signal processing algorithms should have the characteristics of low computational complexity and high real-time performance. Smoothing filtering is a simple and practical filtering algorithm, which is widely used in medical monitoring systems and has a good filtering effect on power frequency interference.

The power frequency signal is a sine wave with a frequency of 50 Hz. We divide a period of the signal into N equal parts, and the sum of the signal values corresponding to each equal point is 0, namely

$$\sum_{i=1}^n \sin\left(i \frac{2\pi}{n} + \theta\right) = 0. \quad (4)$$

To achieve power frequency filtering, you only need to set the ECG signal sampling frequency to an integer multiple of 50 Hz. We assume that the ECG signal sampling frequency is 500 Hz, which is 10 times the power frequency. In other words, there are exactly 10 sampling points in a power frequency cycle, that is, $n = 10$, which is equivalent to dividing a power frequency signal cycle into 10 equal parts, and averaging 10 samples can theoretically eliminate the power frequency interference. Then, the difference equation is

$$t(n) = [x(n) + x(n-1) + x(n-2) + \dots + x(n-9)]/10. \quad (5)$$

In the formula, $x(n), x(n-1) \dots x(n-9)$ is the sampled signal, and $t(n)$ is the filtered ECG signal.

Performing the Z transformation on the above formula, we get

$$T(z) = [(X(z) + X(z) \cdot z^{-1} + X(z) \cdot z^{-2} + \dots + X(z) \cdot z^{-9})/10]. \quad (6)$$

The transfer function is

$$Q(z) = (1 + z^{-1} + z^{-2} + \dots + z^{-9})/10. \quad (7)$$

3.2.2. Design of the Heart Rate Extraction Algorithm. Heart rate refers to the number of times the heart beats per minute, which is the reciprocal of the cardiac cycle. Every time the heart beats, a QRS complex is generated. Therefore, we can detect the heart rate by counting the number of times the R wave appears per unit time. The differential threshold method is the most widely used ECG signal R wave detection algorithm. It is a fast algorithm and is suitable for systems with high real-time requirements.

In the waveform electrocardiogram, the rise and fall of the edge of the R wave are the areas with the most dramatic changes in the trend. In this area, using the zero crossing point of the dominant number and the end point of the second derivative, the first or second derivative of the filtered ECC signal is performed to determine the position of the R wave that passes the threshold.

The first-order difference and the second-order difference of the electrocardiogram signal are obtained, and the total of the second-order differences is used as the detection standard of the R wave. The quadratic waveform uses the infinite order of the square of the center difference. Since the value of the center difference is an error, the first-order difference is as follows. The form is as follows.

$$h'(n) = \frac{(h(n+1) - h(n-1))}{2}. \quad (8)$$

The second-order difference form is

$$h''(n) = (2h(n+1) + h(n+2) - h(n-2) - 2h(n-1))/8. \quad (9)$$

In the formula, $h(n)$ is the filtered ECG signal sequence.

Then the first-order and second-order differences are squared and the square sum sequence $H(n)$ is obtained, which is equivalent to a nonlinear amplification of the signal, which significantly increases the proportion of high-frequency signals in the original signal. The calculation process is as follows:

$$H(n) = (h'(n))^2 + (h''(n))^2. \quad (10)$$

The square sum sequence $H(n)$ is combined with an appropriate threshold to detect the R wave and the signal difference calculation processing effect.

3.2.3. ECG Signal Detection Circuit. Only by improving the input impedance of the circuit and the common-mode interference suppression capability of the instrumentation amplifier itself, satisfactory results cannot be obtained. To further suppress the common-mode interference and improve the quality of ECG signal detection, a common-mode interference suppression circuit is designed on the basis of the above circuit. Its function is equivalent to inverting an amplifier, inverting and amplifying the detected common-mode signal before returning it to the human body to further eliminate common-mode signal interference.

We assume that the common-mode voltage of the human body is L_u , and the gain of the amplifiers U1A and U1B is 1, so the amplifier output voltage L_u can be regarded as equal to L_u . Among them are as follows:

$$L_u = i_{db} \times R6 + I_o, \quad (11)$$

$$L_u = i_{db} \times R6 - \frac{2R9}{R5} \times L_u'. \quad (12)$$

Thereby

$$L_u = \frac{i_{db} \times R6}{1 + 2R9/R5}. \quad (13)$$

If the right leg is directly grounded, then

$$L_u = i_{db} \times R6. \quad (14)$$

The gain of the circuit is

$$A_3 = R_{14}/(R_{12} + R_{13} + R_{14}). \quad (15)$$

TABLE 2: Elderly health promotion, lifestyle, and its score levels in various dimensions.

Dimension	Individual score	Total score	Behavior level	Sequence number
Self-actualization	2.65 ± 0.35	36.98 ± 0.28	Medium level	2
Health responsibility	2.22 ± 0.19	19.92 ± 0.12	Medium level	6
Movement	2.28 ± 0.06	6.83 ± 0.12	Medium level	5
Nutrition	2.86 ± 0.25	14.36 ± 0.05	Medium level	1
Interpersonal support	2.57 ± 0.29	12.89 ± 0.34	Medium level	3
Stress management	2.55 ± 0.37	15.35 ± 0.28	Medium level	4
Healthy lifestyle	2.53 ± 0.47	105.98 ± 19.61	Medium level	—

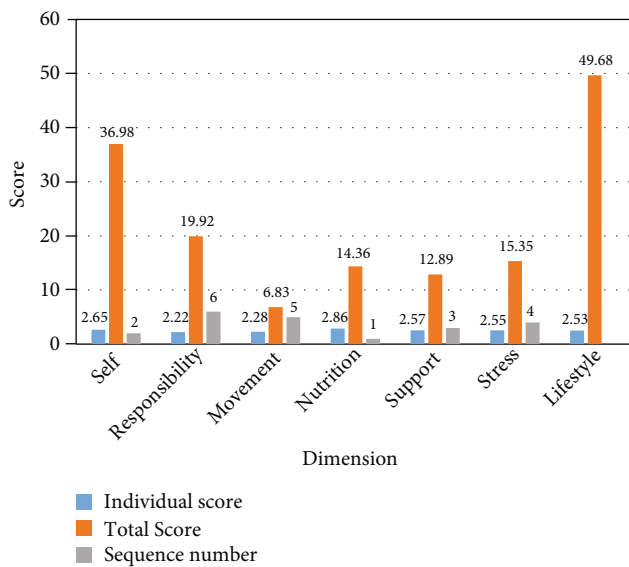


FIGURE 1: Elderly health promotion, lifestyle and its score levels in various dimensions.

4. A Health Promotion System for the Elderly's Daily Body Functions Based on Nanoprotective Technology

4.1. Elderly Health Promotion Lifestyle Physical Function and Its Analysis of the Scores. It can be seen from Table 2 and Figure 1 that the total score for the health promotion lifestyle of the elderly in Province A in this survey is 105.98 ± 19.61 points, and the average score for each item is 2.53 ± 0.47 points. According to the evaluation criteria of the health-improving lifestyle scale, a healthy lifestyle and all aspects related to the promotion of the elderly are at a medium level. According to the average score of each dimension, the nutrition score (2.86 points) is the highest, and the rest are self-actualization (2.65 points), interpersonal support (2.55 points), stress management (2.53 points) and exercise (2.28 points), and health responsibility (2.22 points), among which the scores of nutrition, self-realization, interpersonal support, and stress management are higher than the total average score of health promotion lifestyle. The results suggest that the elderly have poor health responsibilities and exercise behaviors, and nutritional behaviors are the best.

4.2. Various Indicators of Physical Function of the Elderly. BMI (body mass index) is an international standard used to measure body fat, weight, and health. It is mainly divided into the following: BMI < 18 is thin, 18.5-24.9 is normal (standard weight), 25-30.0 is overweight, 30.0-34.9 is grade I obesity, and 35.0-39.9 is grade II obesity.

According to the research data, as shown in Table 3 and Figure 2, the number of standard-weight elderly people who exercise regularly is 45, accounting for 50% of the total number, which is higher than the proportion of standard-weight elderly people who do not regularly participate in physical exercise. 41 obese elderly people regularly participate in sports, accounting for 45.5% of the total, far exceeding the proportion of obese people who do not regularly participate in sports. The proportion of elderly people who do not exercise regularly is higher than the proportion of elderly people who exercise regularly. Compared with men and women, the proportion of men who exercise regularly is higher than that of women, and the proportion of women who are too fat is 46.1% higher than that of women who hardly exercise. With the increase of age, body function gradually declines, and the elderly are prone to obesity. Through the body mass index test, people can judge their own health status, actively participate in sports, control and prevent weight, and reduce the appearance of related diseases.

The blood pressure level is not only closely related to heart function, vascular resistance, and blood volume but also affected by factors such as nerves and body fluids. Blood pressure changes according to age, time, and climate. A happy mood and proper exercise can lower blood pressure, and large mood swings, high exercise intensity, and high work pressure can cause blood pressure to rise.

As shown in Table 4 and Figure 3, the blood pressure of most elderly people is in the normal range. The systolic blood pressure of the elderly who regularly participate in physical exercise reaches the normal range in 71.1%, and the diastolic blood pressure reaches the normal range in 85.5%. The systolic blood pressure of the elderly who did not regularly participate in physical exercise reached the normal range in 66.6%, and the diastolic blood pressure reached the normal range in 77.7%. 28.8% of the elderly who regularly participate in physical exercise are beyond the normal range of systolic blood pressure, and 12.2% of the elderly are higher than the maximum diastolic blood pressure. Health requires active participation in physical exercise to prevent disease and promote health. Compared

TABLE 3: BMI ratio analysis table for the elderly.

BMI classification	Participate in physical exercise regularly		Total	Participate in physical exercise infrequently		Total
	Male	Female		Male	Female	
<18, thin	1	1	2	—	—	—
18.5-24.9, normal	26	19	45	3	4	7
>25, overweight	25	16	41	1	6	7
30.0-34.9, first-degree obesity	1	1	2	1	3	4
35.0-39.9, second-degree obesity	—	—	—	—	—	—

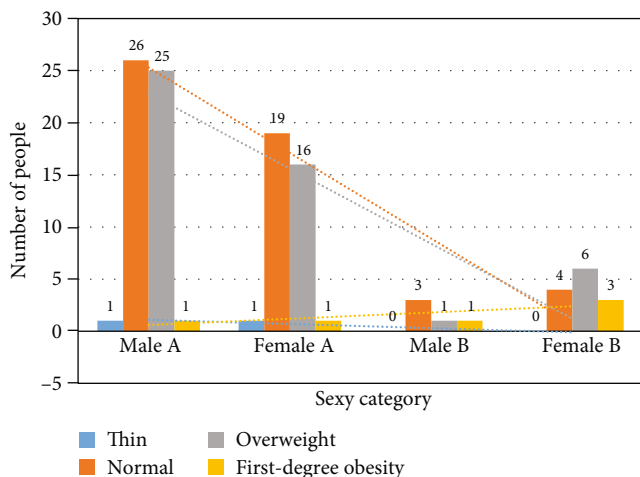


FIGURE 2: BMI ratio analysis for the elderly.

with the blood pressure of older men and women who regularly participate in physical exercise or infrequently participate in physical exercise, the proportion of men with high blood pressure is higher than that of women.

Blood pressure is an important indicator that reflects the state of cardiovascular function. With the increase of age, the physical function of the elderly decreases, the elasticity of the blood vessels decreases, and the blood pressure rises, which is prone to hypertension. Exercise can reduce high blood pressure, increase cholesterol levels, reduce harmful cholesterol levels, reduce weight, and prevent thrombosis. The elderly should choose appropriate exercise methods according to their health conditions, actively participate in exercise, maintain normal blood pressure, and effectively prevent the occurrence of cardiovascular diseases.

The size of the heart rate can reflect the functional state of the body and the changes of the cardiovascular system function to a certain extent, and it is a reference index for evaluating the cardiovascular function state and exercise effect. The heart rate of a normal person is 60-100 beats per minute. Less than 60 times is called slow heartbeat, and more than 100 times is called fast heartbeat (less than 160 times). The heart rate of women will be faster than the heart rate of men. The heart rate of the elderly increases between physical activity and mental excitement, and the heart rate decreases. Most patients with heart disease have a heartbeat rate of more than 160 beats per minute, or less than 40 beats per minute, and they have heartbeats, chest

pressure, and initial discomfort. People who regularly participate in sports and physical labor have a very low heart rate, less than 60 beats per minute. As long as there is no discomfort, this is normal.

As shown in Table 5 and Figure 4, 87.8% of the elderly who regularly participate in physical exercise maintain the normal heart rate range, 77.8% of the elderly who do not participate in physical exercise regularly reach the normal heart rate range, and 12.2% of the elderly who regularly participate in physical exercise are in the normal heart rate range. 50-60 times/min, which is also in the normal range, indicating that the health status of the elderly who regularly participate in physical exercise is higher than that of the elderly who do not regularly participate in physical exercise. Appropriate physical exercise can keep the heart rate stable. A small number of elderly people with low or high heart rates can improve their heart rate and promote their health by participating regularly. Elderly men and women who regularly take part in physical exercise have relatively good effects on participating in exercise, and there is not much difference in heart rate changes between the two. Appropriate exercise, maintaining a normal weight, and reasonable eating habits are all effective ways to improve heart rate.

As shown in Table 6 and Figure 5, nearly 70% of elderly men and women who regularly participate in physical exercise are in a normal state. Most elderly men and women who take part in physical exercise infrequently have abnormal phenomena, and the abnormality rate of men is much higher than that of women, which may be affected by daily life habits and eating habits.

Under normal circumstances, all blood vessels change with age, the elasticity of the large arteries decreases, the rigidity increases, the inner diameter of the blood vessels increases, the thickness of the internal medium increases, the blood vessels narrow, and the brain and physical strength decline. Arteriosclerosis refers to arterial wall hypertrophy, texture hardening, rough inner wall, and passage of grooves. The pathology is based on deep steatosis and cholesterol deposition in the arterial intestine to form a nonepithelial plate. These plaques stand out and cause blockage. Atherosclerosis is the general form of arteriosclerosis. That is the main cause of myocardial infarction and cerebral infarction. Arterial vascular disease will increase the damage to the heart, brain, kidney, and other organs, causing high mortality and high obstacles. Experts suggest that atherosclerosis-tonic thrombosis is a persistent overall disease and a systemic disease that needs to be prevented

TABLE 4: Analysis table of the influence of physical exercise on the blood pressure of the elderly.

Blood pressure test	Pressure classification, mmHg	Participate in physical exercise regularly		Participate in physical exercise infrequently	
		Male	Female	Male	Female
Systolic blood pressure	90-140	69.8	72.9	60.0	69.2
	>140	30.1	27.2	40.1	30.8
	<60	5.4	2.2	—	7.6
Diastolic blood pressure	60-90	84.9	86.5	60.2	84.7
	>90	15.2	8.3	40.3	7.7

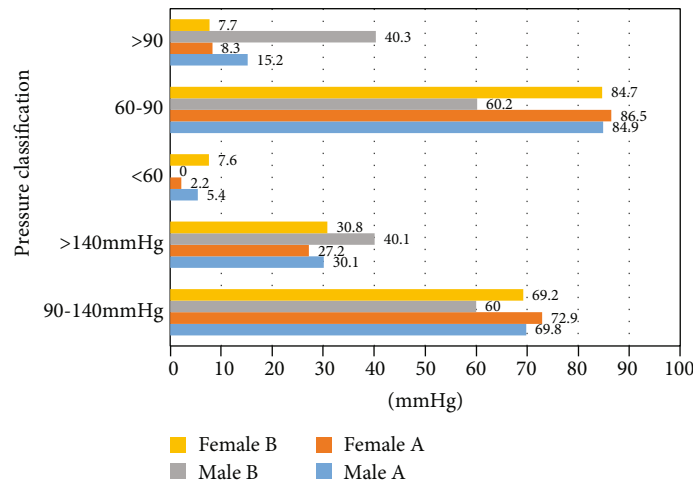


FIGURE 3: The influence of physical exercise on the blood pressure of the elderly.

TABLE 5: Analysis of the influence of physical exercise on the heart rate of the elderly.

Grouping	Participate in physical exercise regularly (%)		Participate in physical exercise infrequently (%)	
	50-60 (times/min)	60-100 (times/min)	50-60 (times/min)	60-100 (times/min)
Male	11.4	88.7	20.1	80.3
Female	13.6	86.5	23.6	75.8
Total	12.3	87.6	22.4	77.5

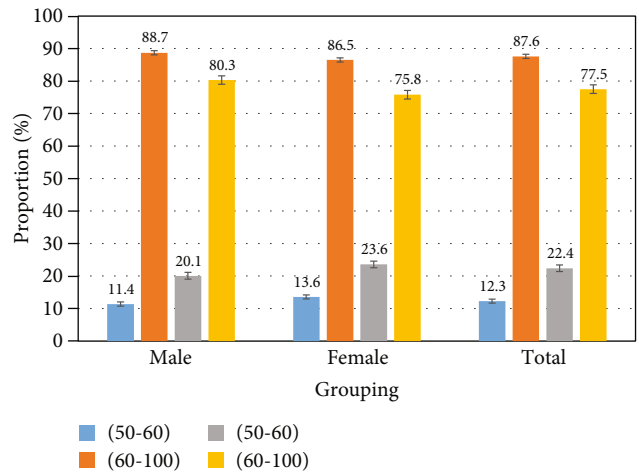


FIGURE 4: Analysis of the influence of physical exercise on the heart rate of the elderly.

in advance. At present, pulse wave velocity (PWV) (which refers to the speed at which the blood pumped from the heart reaches the hands and feet through the blood vessels) is used internationally. It is an index to predict the degree of atherosclerosis and the risk of coronary artery disease. The PWV of the aorta can also be used to predict the heart and an effective indicator of vascular disease to reflect the degree of arteriosclerosis. When blood vessel elasticity decreases, the blood vessel becomes hard, the speed of pulse conduction becomes faster, and PWV increases.

As shown in Table 7 and Figure 6, the average value of the pulse conduction velocity of men and women on the left and right sides of the elderly who regularly participate in physical exercise is less than 1700 m/s. Above 1800 m/s, the health status of the elderly who regularly participate in phys-

ical exercise is significantly better than that of the elderly who do not regularly participate in physical exercise. Through the *T* of the relevant data, there is a significant difference in pulse conduction velocity between male elderly who regularly participate in physical exercise and male elderly who do not regularly participate in physical exercise and female elderly who regularly participate in physical exercise and those who do not regularly participate in

TABLE 6: PWV statistical table of pulse wave velocity in the elderly.

Grouping	Category	Participate in physical exercise regularly		Participate in physical exercise infrequently	
		Abnormal	Normal	Abnormal	Normal
Male	Number of people	16	38	4	1
	Proportion	30.7	69.8	80.2	19.8
Female	Number of people	8	26	8	5
	Proportion	29.7	70.3	61.5	38.4

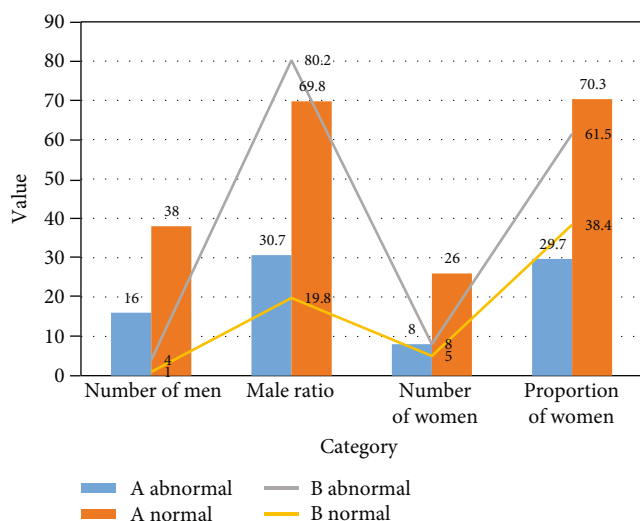


FIGURE 5: PWV statistical table of pulse wave velocity in the elderly.

TABLE 7: Analysis of the influence of physical exercise on the pulse conduction velocity PWV of the elderly.

Gender	Group	Number of samples	Left	Right
Male	Test group B	55	1692.8	1649.3
	Control group B	6	1893.1	1932.9
Female	Test group G	47	1661.5	1668.7
	Control group G	15	1843.2	1854.5

physical exercise There is a significant difference in pulse conduction velocity among elderly women. Through regular physical exercise, blood supply to tissues and organs (heart, kidney, other important organs, etc.) is increased, tissue hypoxia is reduced, lipid metabolism is improve, plasma activity is increased, body weight is reduced, and blood coagulation is reduce, which helps increase the activity of the anticoagulant system in the blood and reduce the possibility of myocardial infarction. It helps to improve mood, divert patients' attention to the disease, mobilize patients' positive causes, and eliminate negative fears.

Bone density is an important indicator of bone quality, reflects the degree of osteoporosis, and is an important basis for predicting fracture risk. The bone content of minerals is closely related to the resistance of bone and the stability of the internal environment. This is not only an important indicator for evaluating human health but also an important indicator for evaluating and studying bone physiology,

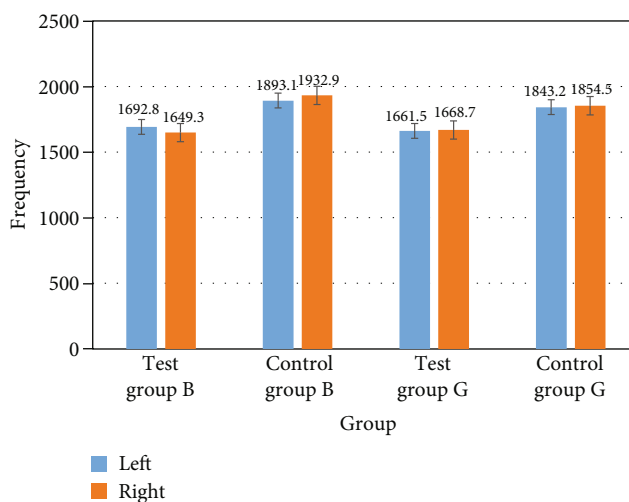


FIGURE 6: Analysis of the influence of physical exercise on the pulse conduction velocity PWV of the elderly.

human pathology and aging, and the diagnosis of various diseases of the body. The bone mineral density, in BND and normal youth and standard deviation (SD) high (+) or low (-) comparison *T* value, is the most important value in the diagnosis of osteoporosis.

As shown in Table 8 and Figure 7, the bone density of the elderly who regularly participate in physical exercise is 28.8% in the normal range, which is higher than that of the elderly who participate in physical exercise infrequently; -2.5 to -1 belong to the low bone density stage. And osteoporosis, the proportion of elderly people who regularly participate in physical exercise, is 48.9%, and the proportion of elderly people who hardly participate in sports is 55.6%. Compared with the proportion of elderly people who regularly participate in sports, the proportion of elderly people who hardly participate in sports is even higher. 16.7% of the elderly who exercise regularly suffer from osteoporosis, and 22.2% of the elderly who do not exercise suffer from osteoporosis. Combined with the above analysis, it can be seen that regular participation in physical exercise can strengthen bone. Muscles and bone are inseparable. Continuous, regular, and appropriate exercise can alleviate the degree of osteoporosis. In the elderly, muscle strength is weakened, mechanical stimulation is relatively reduced, and bone turnover tends to be negatively balanced, which will accelerate the development of osteoporosis. According to these data, the ratio of osteoporosis among elderly women

TABLE 8: Analysis table of the influence of physical exercise on bone mineral density of the elderly.

Grouping	Category	$T < -2.5$	$-2.5 < T < -1$	$-1 < T < 1$	$T > 1$
Test group	Male	3.8	56.7	32.1	7.3
	Female	35.2	37.8	24.4	2.9
	Total	16.8	48.9	28.9	5.6
Control group	Male	—	80.0	20.0	—
	Female	30.8	46.3	15.5	7.6
	Total	22.4	55.8	16.8	6.6

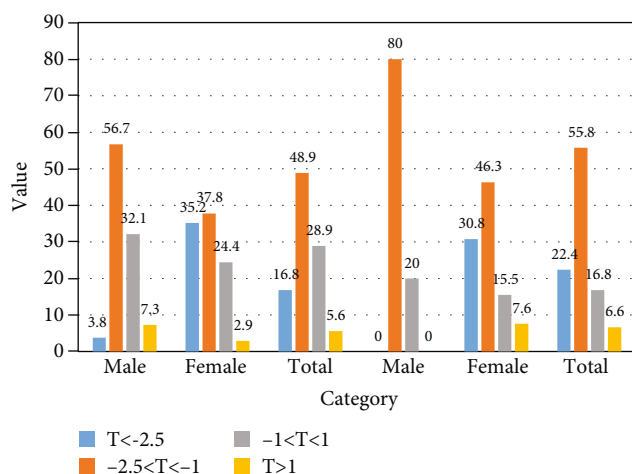


FIGURE 7: The influence of physical exercise on bone mineral density of the elderly.

who regularly participate in physical exercise and those who do not participate in physical exercise is much higher than that of men. The bone mineral content of normal people is closely related to gender and age, and there are differences between different genders in the same age group. Females are lower than males. The elderly women who often take part in physical exercise are also lower than men, which is related to the body structure of men and women.

Especially for the elderly with osteoporosis, the use of nanoprotective gear can better protect the bone health of the elderly. It can also avoid accidents while exercising and provide good protection for the elderly. The research of nanoprotective gear technology is exclusively customized for the elderly. Of course, it can also be applied to the sports of many young people. The purpose is to bring a better healthy lifestyle and improve the quality of healthy life.

5. Conclusion

This article is mainly based on the research of the elderly's daily body function and health promotion system based on nanoprotective technology. Using a variety of research methods, the model of the influence factors of the elderly body function and health promotion system was established, and the elderly body function and health status from the influencing factors was analyzed. And the role and effect of nanoprotective technology in the daily exercise of the elderly were highlighted.

The innovations of this article are as follows. First, qualitative analysis is combined with quantitative analysis, and qualitative analysis is fully based on the analysis of data; second, theoretical research is combined with empirical research and in-depth study of nanotechnology, etc. On the basis of the theory, empirical research is carried out in combination with the specific conditions of the physical function and health of the elderly.

There are still shortcomings in this article. Firstly, the amount of data in the questionnaire survey is not enough, the number of interviewers is not large enough, and the representativeness of the data is not strong enough; secondly, the nanoprotective technology is still immature, and more in-depth research and more extensive research are needed. In application experiment, in the future, the development of nanotechnology will bring increasingly convenient life to people, and at the same time, it will also bring better protection to the health of the elderly.

Data Availability

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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