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The Practical Dilemma and Optimization Path of Smart Home-Based Care in Hengshui City, China

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Abstract

Smart home-based care for elderly is the product of the "Internet+" era, along with the information technology and the growing needs for a better elderly life. In order to understand the influencing factors of smart home care in Hengshui city, this paper selected 183 elderly people through a questionnaire survey. The conclusion of the study showed that education level, economic status, sleep quality and residence conditions are the influencing factors affecting the needs of smart home care of the elderly ($p < 0.05$). Smart home care products for the elderly have a high willingness to use them, especially in terms of life care, medical services and emotional talk, but the compliance still needs to be improved. Development countermeasures suitable for Hengshui city can be put forward through the publicity of smart elderly care services, promoting the construction of demand-oriented big data, and promoting the participation of various forces.

Keywords

Aging, Smart Home Care, Smart Products, Demand-Oriented

1. Introduction

China's aging population is large in scale, deep in degree and fast in speed. By 2020, the number of elderly people over 65 will reach 191 million, accounting for 13.5% of the total population, with one Chinese in every four elderly people in the world. In 2020, it will have 36.6 million people aged 80 and above, and the elderly may face more serious health problems. The growth of empty nesters and the elderly people living alone will weaken the function of family caring [1]. Ac-

cording to the estimates of the National Health Commission of China, around 2035, the population of elderly people aged 60 and above will exceed 400 million, accounting for more than 30% of the total population, and entering the stage of severe aging. Home-based elderly care is the mainstream way of elderly care for the elderly in China, but with the growth of age and the decline of physical function, the demand for life, health, emotion and other services is increasing and complex [2]. In addition, it is in the state of COVID-19 epidemic prevention and control at the present stage, and the elderly who do not leave their homes cannot enjoy the institutions in time, and the services and convenience brought by the community and even hospitals. The traditional elderly care service has exposed many shortcomings and makes it difficult to adapt to the pension needs at the present stage [3].

For this problem, the rapidly developing Internet technology provides a good solution. The combination of the traditional care for elderly and information technology can greatly make up for the lack of "bridge" in the traditional caring model. The Chinese government strongly supports and cultivates the development of the elderly care service industry combining Internet technology. Governments have organized related activities such as learning skills for the elderly to participate in the learning of digital skills, and help them to accept and "embrace" the smart society faster and better [4]. Smart home care services have been piloted in various parts of China.

However, the study of smart home care is late in China, and the promotion and popularization of related smart elderly care services is still lacking. In addition, the elderly's ability to accept new things is poor, so the effect is not very significant. The smart home care model is still in the early stage of exploration and regional demonstration sites construction, and there are still many defects and deficiencies in all aspects. Many regions are faced with a lack of understanding of the needs of smart home care and health services for the elderly, but they are more serious in the areas with less developed economy and less perfect medical facilities [5] [6]. Therefore, it should thoroughly investigate and analyze the current needs of intelligent home health management for the elderly, and analyze its influencing factors, so as to develop a health management plan for the aging elderly population. Based on the above thinking, the research group investigated the demand for smart home for the elderly in Hengshui city, Hebei Province, in order to provide valuable reference for promoting and improving the smart home service system in Hengshui city.

2. Literature Review

The realization of smart elderly care depends on the integrated construction of smart products and professional services. Scholars' research on smart home care services focuses on service content and service effect.

Stefanov *et al.* (2004) studied the change of smart home, emergency help, remote monitoring, health monitoring and other intelligent products for the lives

of the elderly [7]. Demiris (2008) proposed to promote the relationship between the elderly and smart devices through the construction of the elderly care service platform, so as to fully grasp the real needs of the elderly [8]. Yangzi Qing *et al.* (2021) pointed out that the elderly have a high willingness to use smart pension products such as non-contact vital sign monitors [9]. Gaoyue *et al.* (2022) analyzed the current situation of the home health management needs of the disabled rural elderly, and proposed to build a remote health management platform [10].

Li Cheng (2021) pointed out that although many communities have established a smart home elderly care service system, they still face the problem of a mismatch between supply and demand [11]. Jichun Yan (2022) pointed out that there are problems such as low social recognition in China [12], such as low degree of marketization, diversified services and limited professional level. Some Scholars proposed that professional strength in social work services should be used to actively promote elderly care services [13] [14]. Jiayu Jiao (2020) proposed that the problems and causes of the intelligent home care service system should be examined by the pension demand, and the intelligent home care service system should be improved on this basis [15].

At present, scholars' research on smart home care services mostly focuses on service content and service effect, and rarely reports on service utilization. The purpose of this study is to investigate the current situation of smart home care services in Hengshui city, deeply analyze the influencing factors of the use of smart services for the elderly, explore the measures to improve the smart elderly care services, and provide a scientific basis for the improvement and optimization of smart home care services in Hengshui City.

3. Research Method

3.1. Research Subject

This paper uses the random sampling method. The investigation team selected the elderly in Hengshui from July 2022 to August 2022. The inclusion criteria for the study objects: 1) age ≥ 60 years old; 2) Hengshui City household registration and living in Hengshui City for 10 years or more; 3) all at home retirement.

3.2. Instrument

3.2.1. General Data Questionnaire
This part was used to investigate the demographic characteristics of the study subjects, including gender, age, education level, number of children, living conditions, and economic status, sleep quality, physical status etc.

3.2.2. The Elderly Smart Home Care Demand Survey
This part of the survey was compiled by the members of the research group themselves. On the basis of full reference to the domestic and foreign literature, the final draft of the questionnaire was formed through expert consultation and credit validity test, which was mainly used to measure the smart home health management needs of the elderly in Hengshui city. It consists of 8 items in the ques-

tionnaire, which are life care, medical service, emotional talk, culture and entertainment, health guidance, purchasing agent, door-to-door service and meal helping service. The questionnaire used the Liket 5 grade score, from 1 (very unnecessary) to 5 (very needed), with the score range of 8 to 40 points. The higher the score, the greater the need for smart home health management. The degree of demand is divided into three grades, <20 low demand, 20 - 30 moderate demand, and >30 high demand.

3.2.3. Investigation Method

The investigators collected the data by issuing the paper questionnaire on site. The day before the survey, the consent of the elderly and their families was obtained by telephone, and the community went to accompany the survey. The research purpose and matters for attention were introduced to the elderly in the unified guidance. All questionnaires were investigated anonymously. After filling in, the filling situation was checked on the spot, and the mistakes and omissions were corrected and supplemented in time. A total of 200 questionnaires were distributed, and 183 valid questionnaires were collected, with an effective recovery rate of 91.5%.

3.2.4. Statistical Method

In this paper, SPSS 25.0 was used for data analysis, count data were expressed by frequency and percentage, mean ± standard deviation for measurement data, t-test, analysis of variance, non-parametric test, and multiple linear regression for influencing factors. The test level α is 0. 05.

4. Results

4.1. Descriptive Analysis

This total included 183 elderly people, mean age (68.044 ± 1.157) years, male 94 (51.37%) and female 89 (40.85%); others are shown in Table 1.

4.2. Score of Smart Home Care Needs for the Elderly in Hengshui City

The total score of smart home care demand for the elderly in Hengshui city is (29.28 ± 0.35), which is at a high level. See Table 2 for details.

4.3. Analysis of the Factors Affecting the Smart Home Needs of the Elderly

The results showed that the elderly people with different education levels, economic status, sleep quality, and residence conditions differ in their smart home needs (P < 0.05), as shown in Table 3.

5. Conclusion

Hengshui city elderly smart home demand level is high. The survey results show that the elderly smart home needs score for (29.28 ± 0.35) points, at a higher

Table 1. Basic information of the respondents.

Variable name	Classification	Ratio (%)
Gender	Male	51.37
	Female	40.89
Age	60 - 65	42.62
	66 - 70	28.42
	71 - 75	14.75
	76 - 80	10.38
	>80	3.83
Education	Junior high school and below	29.51
	High School	38.80
	College	27.32
	Master or above	4.37
Number of children	None	10.93
	One	55.19
	Two and more	43.72
Physical status	Very bad, totally need to be cared for	4.37
	Poor, it needs someone to take care of it	12.57
	OK, sometimes need to be cared for	37.7
	Better, hardly need any care	30.05
	Very good, do not need others to take care of, can also take care of others	15.3
Economic status	Retirement salary	46.45
	Children's subsidies	16.94
	Government funding	38.79
	Other	5.46
Sleep quality	Very bad	6.01
	Sometimes good, sometimes bad	69.95
	Fine	24.04
Residence condition	Living alone	7.1
	Living with a spouse or children	78.69
	Other	14.21

level. Among them, the demand for life care was the first, followed by the demand for medical service and emotional talk, and the meal service scored the lowest.

Being affected by their education level, economic status, sleep quality and residence conditions, the elderly have different needs for smart home care.

Elderly people with higher education level have a higher demand for smart

Table 2. Smart home care needs score for the elderly in Hengshui city.

Item	Score ($\overline{X} \pm S$)	Sort
Total demand for smart home care	29.28 ± 0.35	
Life care	4.69 ± 0.54	1
Medical service	4.26 ± 0.30	2
Emotional talk	3.99 ± 0.52	3
Cultural entertainment	3.81 ± 0.68	4
Health guidance	3.77 ± 0.45	5
Buy on behalf of the purchase	3.12 ± 0.43	6
Door-to-door service	2.97 ± 0.32	7
Catering service	2.67 ± 0.54	8

Table 3. Analysis affecting the smart home needs of the elderly (N = 183).

Variable name	Correlation coefficient	p
Gender	0.046	0.534
Age	−0.025	0.738
Education	−0.031	0.008
Number of children	1.384	0.253
Physical status	0.025	0.738
Economic status	0.197	0.007
Sleep quality	0.54	0.001
Residence condition	0.158	0.033

home care. The elderly with higher education level have a strong ability to accept new things, because they have a comprehensive understanding of smart home products, so they actively promote the use of smart products, and then drive more elderly people to participate in them and enjoy the beauty of smart pension.

Older people with better economic conditions have a higher demand for smart care home. The realization of smart care depends on the integrated construction of smart products and professional services. The purchase of smart products and professional services has certain requirements for the economic level, because the elderly people with poor economic level show a low demand in order to avoid excessive living expenses. Therefore, it should give full play to the leading role of the government and provide more subsidies.

The results showed that the elderly living alone had a higher need for smart home than those with children or spouse care. Elderly people living alone lack the care of a partner or children and may face more risks in life. At the same time, the elderly living alone lack companionship, get less emotional support, and feel more lonely. Therefore, it has a large demand for medical services, emo-

tional talk and other services. This suggests that we should pay high attention to the special group of the elderly living alone, and provide regular door-to-door health examination, emergency assistance, psychological counseling and other services. In addition, for these elderly people, intelligent home devices or home monitoring system can be installed in the home to increase the home safety factor of the elderly and meet their diversified health management needs.

Elderly people with poor sleep quality have a higher demand for smart home care. The reason may be related to the fact that the elderly are more likely to perceive the threat of disease, so they have a relatively strong sense of self-health care, and then the increased demand for health examination, medical environment, physical assessment and other services. Therefore, it is very important to timely understand the sleep quality of the elderly to better meet the needs of the elderly for home health management.

6. Suggestions

With the deepening of the aging population and the rise of the silver hair economy, and under the background of the government's strong support for the aging industry, the intelligent home-based industry has ushered in a good period of development. The development of smart home care in Hengshui adheres to the principle of people-centered and pays attention to the actual needs of urban and rural elderly. We take the growing needs of the elderly as the starting point and foothold. In order to promote the development of the aging service industry in Hengshui city, we should give full play to the supporting role of science and technology in improving the quality and efficiency of home care, and improve the happiness and security of the elderly and their families.

6.1. To Improve the Cognition Level of the Elderly on Smart Home-Based Care

First of all, the government should publicize the concept of active aging, and create a humanistic view of happy home and intelligent elderly. The government uses the media to increase the awareness of smart home care. And the media can broadcast easy-to-understand publicity videos, so that the elderly can understand the smart home-based care in all aspects, and truly understand the smart home care. At the same time, we will actively help the elderly to establish a modern service view and consumption view. Through moderate subsidies and other ways, combined with the economic level of each elderly family, the implementation of the elderly home environment for the elderly, to meet the information needs of the elderly home, and then improve the living environment and quality of life of the elderly. Secondly, it is necessary to effectively obtain and analyze the needs of different elderly people and their families for smart home care services, encourage their children to actively carry out smart home care consumption, promote smart pension products into their families, and guide the supply with demand. Through the combination of internal and external methods, improve the cognitive level of the elderly to actively accept smart home-based care.

6.2. To Promote the Building of Demand-Oriented Big Data

The government and relevant departments should do a good job in financial support, encourage and support various market entities and scientific research institutions to increase investment in research and development, and promote the application of big data, cloud computing and other information technologies in home care products. Through these information technologies, we collect the panoramic demand data of the elderly in Hengshui city, and conduct data analysis to deeply explore the diversified service needs of the elderly in the city, combine with the income level of the elderly and their families, and improve the adaptability and precision of smart home care products. At the same time, to develop the service characteristics of the elderly, promote the comprehensive development of home care service products and business, actively develop help, urgent online products, regularly released to the society Hengshui city smart home care products scene demand, encourage different product solutions to participate in the competition, further optimize the home endowment service display, to response good service products provide publicity, display, commercial transformation and other special support, and promote demand oriented wisdom of home service products and application.

6.3. To Push the Cooperation of Social Forces

The construction of the smart home care model is not only closely related to the overall planning of the government and the service innovation of related industries, but also inseparable from the participation and cooperation of social forces, which is an important means to improve the effective supply of services. The construction of intelligent home care service requires family, community, society, market, government, and the government plays a leading role and uses the rights and responsibility relationship of the elderly, and the community understands the needs of the elderly through the service platform, timely links social organizations and related enterprises, and provides corresponding professional services according to the market resource integration logic. In terms of the integration of home care service resources, institutions, hospitals and related enterprises in the region can be included in the home care service information platform to help the elderly to enjoy direct and convenient professional services without leaving home. Therefore, to boost the development of smart home care in Hengshui city, we should establish and improve the "five social linkage" mechanism of community, social workers, community social organizations, community volunteers, and community public welfare and charity resources. Guided by meeting the needs of the elderly, through the government guidance and providing services, the society can realize the specialization and refinement of smart governance, so that the elderly' life can have more texture and improve their happiness index.

Project

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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