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How Does the Intelligent Monitoring System Influence the Sense of Security of the Elderly in Home Care? A Case Study of the Hubin Community in Ningde City

Yan Ma and Wei Xu *

School of Architecture and Urban-Rural Planning, Fuzhou University, Fuzhou 350108, China
* Correspondence: 211520025@fzu.edu.cn

Abstract: Under the background of rapid aging in China, the security of the elderly in home care has become the focus of social attention. The present study takes the Hubin community of Ningde City as the case study area; and uses hierarchical regression analysis, structural equation model, and other methods to explore the influence path of the sense of security of the elderly in home care under the moderating effect of the intelligent monitoring system, and the subjective and objective demands for such equipment among the elderly. The results showed that compared with family care and social support, the influence of individual health on the sense of security of the elderly in home care was dominant. The intelligent monitoring system can play a negative moderating effect in the process of individual health directly affecting the sense of security of the elderly in home care, and indirectly improving the sense of security of the elderly in home care. Therefore, under the premise of paying attention to the individual health of the elderly at home, the reasonable application of the intelligent monitoring system and full play to its moderating effect is a practical way to improve the sense of security of the elderly in home care. In addition, the family and society should also pay more attention to the security of the elderly in home care, so as to promote the overall improvement of their sense of security.

Keywords: home care; smart senior care; a sense of security; structural equation model; moderating effect

1. Introduction

At present, China's population is aging rapidly, and China is about to become a deep aging society. In 2021, the population aged 60 and over was 264 million, accounting for 18.7% of the total population. At the same time, the demand for home care services is becoming more and more diversified and personalized, which is the best way for the elderly to choose in China. Although the Chinese government has formulated many public policies and planned many service facilities for the elderly, problems still exist; the imbalance of the supply of and demand for service facilities, poor living environments, and accidents, which have a very negative impact on the sense of security and life satisfaction of the elderly in home care [1].

In view of the above problems, scholars have conducted a lot of research on the demand for services for the elderly, and their life satisfaction and happiness; and on the evaluation and optimization of the spatial configuration of service facilities for the elderly, and elderly-friendly cities and communities. Scholars believe that the demand for elderly services is characterized by differentiation, diversity, and multiple levels, with huge stage differences [2–4]. Scholars believe that economic and social attributes, family care, social support, and living environment have an impact on the life satisfaction and happiness of the elderly [5–8]. In terms of the evaluation and optimization of the spatial configuration of service facilities for the elderly, scholars evaluate the quantity, fairness, accessibility, and other aspects; and put forward some strategies, mainly about selecting

facility location, promoting fairness, and improving block walkability [9–11]. In terms of elderly-friendly cities and communities, scholars have put forward requirements for housing, transportation, outdoor environments, technology, and other aspects [12–14]. At present, artificial intelligence technology is widely used in many areas of residents' daily life. Scholars have begun to study the application of artificial intelligence technology in home care, and some research results have verified that the application of artificial intelligence technology in medical [15], social [16], entertainment [17], safety [18], and other areas can directly or indirectly have a positive impact on the life satisfaction of the elderly. In addition, Tymkiewicz discusses the significance of smart cities for the elderly, and the planning strategy for an elderly-friendly sustainable smart city; and believes that planners should identify the needs of the elderly and work with the community to design the architecture of elderly-friendly and sustainable smart cities [19].

However, there is still a lack of research on security, and the sense of security of the elderly in home care, which is closely related to their quality of life and satisfaction. In China, accidents are one of the main causes of death among the elderly, and falls account for 49.3% of all accidents, most of them occurring at home [20] (p. 15). Due to the high incidence of home care security problems, and the difficultly of helping them in time, many elderly people lack a sense of security in home care. Therefore, research on home care security is of great significance for optimizing the quality of home care services and improving the sense of security and satisfaction of the elderly in home care. Common home care security measures include: home environment with aging-friendly design, third-party home care services, portable emergency help equipment, indoor sensor alarm, etc. [21]. These measures to some extent ensure safety, but are limited by a poor guarantee ability, poor real-time feedback, low convenience, high operating cost, and great difficulty in promotion [22]. The intelligent monitoring system can collect and process video data in real time, and determine—through bone point detection and human posture recognition—whether an elderly person has fallen, and inform the person's family. The intelligent monitoring system can realize the real-time monitoring and timely treatment of accidents such as falls. Compared with traditional safety measures, it has advantages such as a stronger guarantee, better real-time, higher convenience, and lower cost. However, there is a difference between the security of home care, and the feeling of the elderly themselves. Although existing studies have proved that artificial intelligence technology has a positive effect on life satisfaction, the effectiveness and mechanism of improving the sense of security of the elderly in home care still need to be further explored.
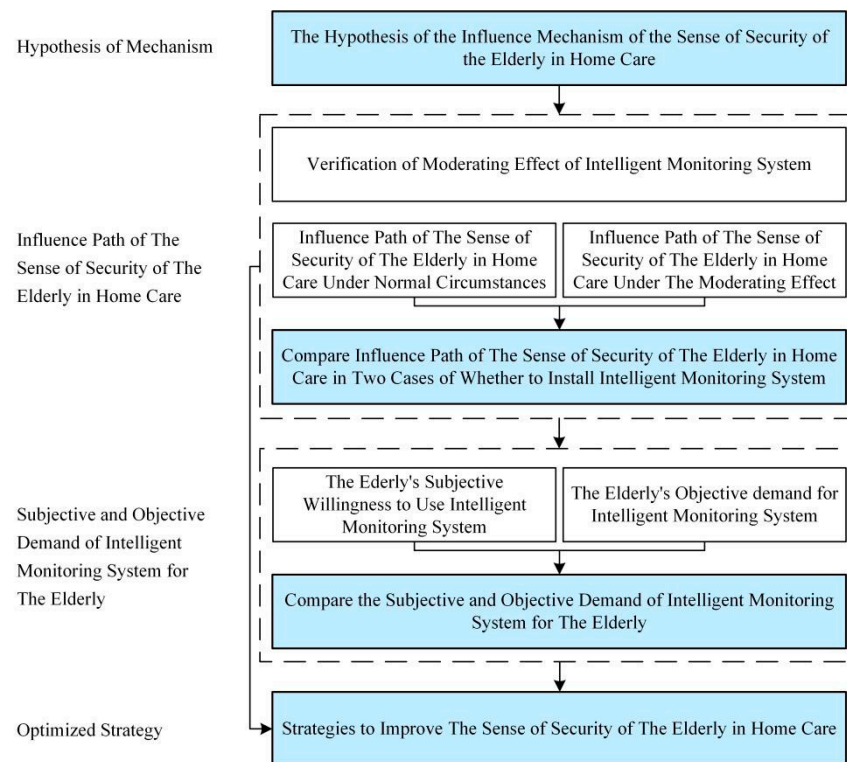
The increased aging of the population and the frequent occurrence of home care safety problems make the sense of security of the elderly in home care become a problem that cannot be ignored. However, research on the influence path of the sense of security of the elderly in home care and the mechanism of intelligent devices on the elderly is lacking. Therefore, the purpose of the present study is to explore the influence path of the sense of security of the elderly in home care, the influence mechanism of the intelligent monitoring system on the sense of security of the elderly in home care, and the subjective and objective demands for the intelligent monitoring system of the elderly. On the basis of the results of these analyseis, the present study aims to forward the improvement strategy of home care and the optimization strategy of the intelligent monitoring system. The present study hopes to provide a supplement and reference for the research on the application and effect of artificial intelligence technology in home care and the demand of the elderly for intelligent elderly care services.

2. Methods and Data

2.1. Research Framework

The present study constructs a research framework on the influence path of the sense of security of the elderly in home care under the moderating effect of the intelligent monitoring system (Figure 1). Firstly, based on the previous research of the sense of security of the elderly in home care, the present study would construct the influence mechanism

hypothesis. Secondly, the present study would verify the moderating effect of the intelligent monitoring system on the sense of security of the elderly in home care, and then analyze and compare the influence path of the sense of security of the elderly in home care in two cases of whether to install the intelligent monitoring system. Thirdly, the present study would analyze and compare the subjective and objective demands of the intelligent monitoring system of the home elderly. Finally, based on the above analysis, the present study would put forward strategies regarding improving the sense of security of the elderly in home care and optimizing the intelligent monitoring system.

Figure 1. Research framework of the influence path of the sense of security of the elderly in home care under the moderating effect of the intelligent monitoring system.
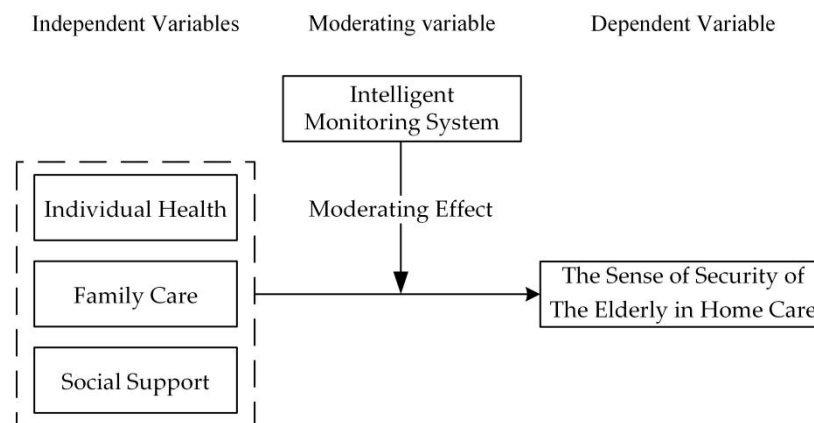
2.2. Methods

2.2.1. The Hypothesis of the Influence Mechanism of the Sense of Security of the Elderly in Home Care

Home care is a kind of socialized service with family as the core, community-based and professional services, which mainly focus on solving the difficulties in daily life of the elderly living at home. As a subjective psychological feeling, the sense of security is influenced by many factors, such as the individual himself and the external environment, and these influencing factors are not completely independent, but complex relationships. Maslow's hierarchy of needs believes that safety needs are the next level of demand after physiological needs are met [23], and a sense of security is the most important factor affecting mental health; it is the feeling of eliminating fear and anxiety, making the heart feel safe, confident and free [24]. Previous studies on the sense of security of the elderly have revealed that factors such as individual health [25], family care [26,27], social support [28] and environment can directly affect the sense of security and life satisfaction of the elderly. Living environment factors such as the age-friendliness of the infrastructure [29], acoustic environment [30,31] and poverty environment [32] can also directly or indirectly affect the sense of security and life satisfaction of the elderly. The research object of the present study —— the sense of security of the elderly in home care, emphasizing that the

elderly feel comfortable and stable in daily life in the residence, and avoid excessive worry about accidents.

The external environment of each residential area, and the internal environment of residential buildings in the Hubin community are similar to each other; most of them lack aging design, and the influence of environmental factors on the sense of security of the elderly in home care is not considered. In conclusion, the present study proposed hypotheses about the influencing mechanisms of the sense of security of the elderly in home care (Figure 2). The independent variables are individual health, family care and social support; the dependent variable is the sense of security of the elderly in home care; the moderating variable is intelligent monitoring system. The individual health degree, family care degree, and social support degree of the elderly at home directly affect the sense of security of the elderly in home care. In this process, the intelligent monitoring system can indirectly affect the sense of security of the elderly in home care through the moderating effect.

Figure 2. Hypotheses about the influencing mechanisms of the sense of security of the elderly in home care.

2.2.2. Validation of the Moderating Effects Based on a Hierarchical Regression Analysis

The moderating effect means that in the process of the influence of the independent variable on the dependent variable, when the moderating variable takes different values, the influence degree of the independent variable on the dependent variable will change significantly. The moderating effect can be expressed by the following formula.

$$Y = aX + bM + cXM + e \qquad (1)$$

In Equation (1), X, Y and M are the independent, dependent and moderating variables, respectively. XM is the interaction term of X and M. The interaction term is the product of the independent variable and the moderating variable. a, b and c are the regression coefficients of Y versus X, M and XM, respectively, and e is the error value.

The moderating effect can be verified by a hierarchical regression analysis:

First, the regression analysis of Y to X and M, obtained R_1^2;

Second, the regression analysis of Y for X, M and XM, and R_2^2, if R_2^2 is significantly higher than R_1^2, the moderating effect is significant [33].

For example, Tao established hierarchical regression models to analyze the moderating effect of physical activity (PA) between problematic mobile phone use (PMPU) and depression in university students. In this case, PA is the moderator variable, PMPU is the independent variable, and depression is the dependent variable. The results indicate that PA moderates the association between PMPU and depression [34].

2.2.3. Impact Pathway Analysis Based on the Structural Equation Model

Structural equations integrate many methods such as path analysis, regression analysis and factor analysis; and compared with traditional multiple regression analysis, structural equations have certain advantages in the comparison of multi path influence degree and discrimination of multivariate logical relationships. Structural equation models usually include three matrix equations:

$$x = \Lambda_x \xi + \delta \tag{2}$$

$$y = \Lambda_y \eta + \varepsilon \tag{3}$$

$$\eta = B\xi + \Gamma\eta + \zeta \tag{4}$$

Equations (2) and (3) are measurement models, Equation (4) are structural models, x, δ, y and η are exogenous observable variables, exogenous latent variables, endogenous observable variables, and endogenous latent variables, respectively; B and Γ are path coefficients [35].

For example, Long established a structural equation model to examine the interaction between individual psychological factors and contextual city factors related to energy-saving behavior. The case compared the path coefficients of individual psychological factors and urban background factors. The results indicated that energy-saving behavior is mainly influenced by individual psychological factors, while energy-saving promotion behavior is influenced by both individual psychological and contextual city factors [36].

2.3. Data Source

2.3.1. Introduction of the Study Area

The present study selected the Hubin community in Ningde City as the case study area for the questionnaire survey and visit. The Hubin community is located in the Dongqiao Economic and Technological Development Zone, Jiaocheng District, covering an area of about 80.75 hectares, and having 9 residential areas under its jurisdiction. Communities with aging rates of more than 10% of have been commonly defined as aging communities [37]. By the end of 2019, the permanent resident population of the Hubin community was about 20,000, among which about 5000 people were over 60 years old, with an aging rate of 25%, which is typical of an aging community. In 2020, the Hubin community built a smart management platform (Figure 3), which has made achievements in smart government affairs, smart property, smart pension and other aspects. The home care service center of the Hubin community has applied the intelligent monitoring system, which has achieved relatively ideal results in the security of the elderly. The pre-survey results show that the community residents have a certain understanding of the intelligent monitoring system. Of the respondents, 58.4% said they had experienced such systems, and 28.3% said they had installed such systems in their homes. Therefore, selecting the Hubin community as the case study area has a good theoretical reference and practical demonstration significance.

2.3.2. Data Procurement

China's Law on the Protection of the Rights and Interests of the Elderly stipulates that all citizens of the People's Republic of China over the age of 60 are the elderly. Since the retirement age of Chinese women is generally 55 years old, the women aged over 55 years old and male residents aged over 60 years old and above were selected as the survey objects. The sample size can be calculated by the following formula:

$$N = z^2 \times p(1-p)/e^2 \tag{5}$$

In Equation (5), N, z, p and e are the minimum sample number, confidence interval, sampling proportion and error value, respectively. In this study, 95% confidence is used, the error range is controlled within 7%, and the z value is 1.96. The minimum sample size N was calculated to be 146.

Figure 3. Smart management platform of the Hubin community.

In this survey, 200 questionnaires were distributed in the Hubin Community Home Care Service Center, Tianmao City Square, South Bank Park and other places where the elderly gathered, and 166 valid questionnaires were collected, which met the sample size requirement of 95% confidence.

The content of the questionnaire mainly included the respondents' economic and social attributes, the sense of security in home care, the willingness to use the intelligent monitoring system, individual health, family care, social support and other issues. The value and description statistics of each variable in the questionnaire are shown in Table 1.

2.3.3. Reliability of the Sample Data

The reliability test of sample data in statistics mainly includes: the test-retest reliability method, the complex reliability method, the half reliability method and the α reliability coefficient method. Among them, the α reliability coefficient method is the most common method, as follows:

$$\alpha = \frac{K}{K-1}(1 - \frac{\sum S_i^2}{S_t^2})$$ (6)

In Equation (6), α is the reliability coefficient; K is the number of test questions, S_i^2 is the variance of each subject's score, and S_t^2 is the variance of the total scores of all subjects.

To test the reliability of the scale questions involving the sense of security of the elderly in home care, the calculated a coefficient was 0.775, indicating that the questionnaire design had high internal consistency, and the sample data had high representativeness and confidence.

Table 1. Variable assignment and description statistics (N = 166).

Latent Variables	Observable Variables	Variables Assignment	Mean Value	Standard Deviation
	Sexual	1 = Male; 2 = Female	1.51	0.501
	Age	1 = Age 55–59; 2 = Age 60–69; 3 = Age 70–79; 4 = Age 80 and over	2.51	0.837
	Educational background	1 = Primary school and below; 2 = Junior middle school; 3 = High School; 4 = College degree; 5 = Graduate degree	2.07	0.902
	Household income	1 = Less than RMB 50,000/year; 2 = RMB 50,000–100,000/year; 3 = RMB 100,000–150,000/year; 4 = RMB 150,000–200,000/year; 5 = Over than RMB 200,000/year	3.11	1.198
	Have the respondents ever used the intelligent monitoring system?	1 = No; 2 = Yes	1.58	0.494
	Whether the respondents installed the intelligent monitoring system in their house?	1 = No; 2 = Yes	1.28	0.452
	Are the respondents willing to use the intelligent monitoring system?	1 (Very reluctant to)–5 (Very willing to)	3.19	1.258
	Sense of security of the elderly in home care	1 (Very unsafe)–5 (Very safe)	3.86	1.040
Individual health	Healthy condition	1 (Very unhealthy)–5 (Very healthy)	3.68	0.934
	Self-care condition	1 (Unable Self-care)–5 (Fully self-capable)	3.64	0.985
Family care	Living situation	1 = Live alone; 2 = Live with spouse; 3 = Live with children; 4 = Live with three generations and above	2.61	0.926
	Family relationship	1 (Very harmonious)–5 (Very harmonious)	4.14	0.916
Social support	Neighborhood relationship	1 (Very harmonious)–5 (Very harmonious)	3.29	0.991
	Social activities	1 (No participation at all)–5 (Frequent)	3.29	1.090

3. Results

3.1. Influence Path of the Sense of Security of the Elderly in Home Care

3.1.1. Verification of Moderating Effect of Intelligent Monitoring System

In the present study, the whole sample is divided into two independent samples according to whether the interviewees installed the intelligent monitoring system. The

sample without the installed intelligent monitoring system is named group 1, and the sample with the installed intelligent monitoring system is named group 2. In order to explore whether and how the intelligent monitoring system affects the sense of security of the elderly in home care, the t-test of two independent samples was analyzed. In order to explore whether and how the intelligent monitoring system affects the security of home care, the average value of the two independent samples was compared. The mean values of home care security in groups 1 and 2 were 3.76 and 4.11, respectively, and the two independent samples had a significant difference of 5% level. It shows that the installation of the intelligent monitoring system can improve the sense of security of the elderly in home care to some extent. However, when the regression analysis on whether the intelligent monitoring system had an impact on the sense of security of the elderly in home care, the significance level of the results was less than 5%. It indicates that whether the intelligent monitoring system is installed or not does not directly affect the sense of security of the elderly in home care, but may indirectly affect the sense of security of home care through the moderating effect.

In order to explore whether there are moderating effects and which process occurs—the hierarchical regression analysis of the independent variable and moderating variable to the dependent variable, as well as of the independent variable, moderating variable and interaction term to the dependent variable—were conducted, respectively. In this analysis, the independent variables are individual health, family care and social support; the dependent variable is the sense of security of the elderly in home care; the moderating variable is whether to install the intelligent monitoring system; and the interaction term is the product of the independent variable and the moderating variable. The calculated results are shown in Table 2.

(1)　Individual health

Both health and self-care show 1% significance on the sense of security of the elderly in home care, and the regression coefficient value B > 0, indicating that health and self-care have a direct positive effect of 1% on the sense of security of the elderly in home care. $\Delta R^2 > 0$, and ΔF showed 5% significance, indicating that the moderating effect is significant; while the interaction term showed 5% significance, and the regression coefficient value B < 0, indicating that the moderating effect is negative. Therefore, in the process of individual health directly affecting the sense of security of the elderly in home care, the intelligent monitoring system can indirectly affect the sense of home care through the negative moderating effect; that is, it can reduce the impact of individual health on the sense of security of the elderly in home care, so as to indirectly improve the sense of security of the elderly in home care.

(2)　Family care

Both the living situation and family relationship showed a significance of 1% on the sense of security of the elderly in home care, and the regression coefficient value B > 0, indicating that the living situation and family relationship had a significant direct positive effect of 1% on the sense of security of the elderly in home care. ΔF is not significant, indicating that the moderating effect of the intelligent monitoring system is not significant in the process of family care directly affecting the sense of security of the elderly in home care.

(3)　Social support

Both the neighborhood relationship and social activities showed a significance of 1% on the sense of security of the elderly in home care, and the regression coefficient value B > 0, indicating that the living situation and family relationship had a significant direct positive effect of 1% on the sense of security of the elderly in home care. ΔF is not significant, indicating that the moderating effect of the intelligent monitoring system is not significant in the process of social support directly affecting the sense of security of the elderly in home care.
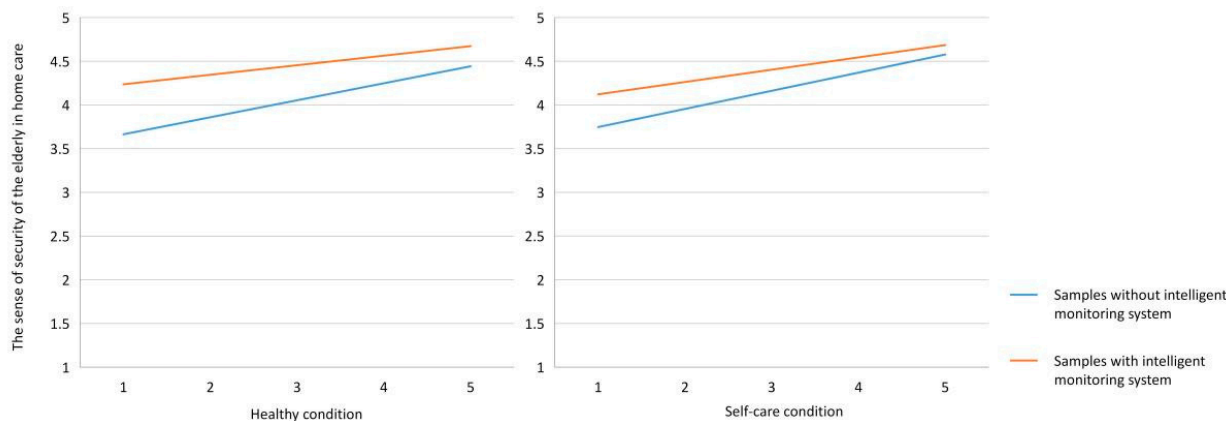
Table 2. Results of hierarchical regression analysis.

Variable Name	Index	Regression Analysis 1	Regression Analysis 2	Index	Regression Analysis 1	Regression Analysis 2
		B	B		B	B
Individual health	Healthy condition	0.682 **	0.778 **	Self-care condition	0.768 **	0.830 **
	Whether to install Intelligent monitoring system	0.633 **	0.572 **	Whether to install Intelligent monitoring system	0.380 **	0.375 **
	Healthy condition * Whether to install Intelligent monitoring system	-	−0.341 *	Self-care condition * Whether to install Intelligent monitoring system	-	−0.267 *
	R^2	0.383	0.401	R^2	0.552	0.564
	Adjust R^2	0.375	0.390	Adjust R^2	0.547	0.555
	F	50.567 **	36.176 **	F	100.489 **	69.715 **
	ΔR^2	-	0.018	ΔR^2	-	0.012
	ΔF	-	4.946 *	ΔF	-	4.209 *
Family care	Living situation	0.380 **	0.395 **	Family relationship	0.439 **	0.422
	Whether to install Intelligent monitoring system	0.323	0.324	Whether to install Intelligent monitoring system	0.269	0.262
	Living situation * Whether to install Intelligent monitoring system	-	−0.050	Family relationship * Whether to install	-	0.076
	R^2	0.138	0.138	R^2	0.171	0.172
	Adjust R^2	0.127	0.122	Adjust R^2	0.161	0.157
	F	13.008 **	8.649 **	F	16.854 **	11.228 **
	ΔR^2	-	0.000	ΔR^2	-	0.001
	ΔF	-	0.077	ΔF	-	0.152
Social support	Neighborhood relationship	0.436 **	0.430 **	Social activities	0.514 **	0.548 **
	Whether to install Intelligent monitoring system	0.138	0.132	Whether to install Intelligent monitoring system	0.054	0.102
	Neighborhood relationship * Whether to install Intelligent monitoring system	-	0.026	Social activities * Whether to install Intelligent monitoring system	-	−0.165
	R^2	0.187	0.187	R^2	0.297	0.302
	Adjust R^2	0.177	0.172	Adjust R^2	0.289	0.289
	F	18.773 **	12.448 **	F	34.482 **	23.354 **
	ΔR^2	-	0.000	ΔR^2	-	0.005
	ΔF	-	0.022	ΔF	-	1.068

** and * are significant at 1% and 5% levels, respectively.

In order to more intuitively show the intelligent monitoring system for the moderating effect on the sense of security of the elderly in home care, two cases, namely the intelligent

monitoring system installed and not installed, and individual health on influencing the sense of security of the elderly in home care are compared; with the health and self-care situations as independent variables, and the sense of security of the elderly in home care as the dependent variable, we draw the slope analysis diagram (Figure 4).

Figure 4. Analysis of the slope of the moderating effects.

The results show that in the process of the health situation and self-care situation influencing the sense of security of the elderly in home care, compared with the samples without the intelligent monitoring system, the samples with the intelligent monitoring system have a higher the sense of security and a lower slope. This result once again verifies that the intelligent monitoring system can play a negative moderating effect in the process of individual health directly affecting the sense of security of the elderly in home care. In the sense of security of the elderly in home care, the difference between the samples of whether to install the intelligent monitoring system gradually decreases with the improvement of health conditions and self-care conditions. In short, the lower the health and self-care situation of the elderly at home, the more obvious the moderating effect of the intelligent monitoring system on the sense of security of the elderly in home care; that is, the intelligent monitoring system has the stronger indirect improvement effect on the sense of security in home care of the elderly with low health.

3.1.2. Analysis of the Influence Path of the Sense of Security of the Elderly in Home Care
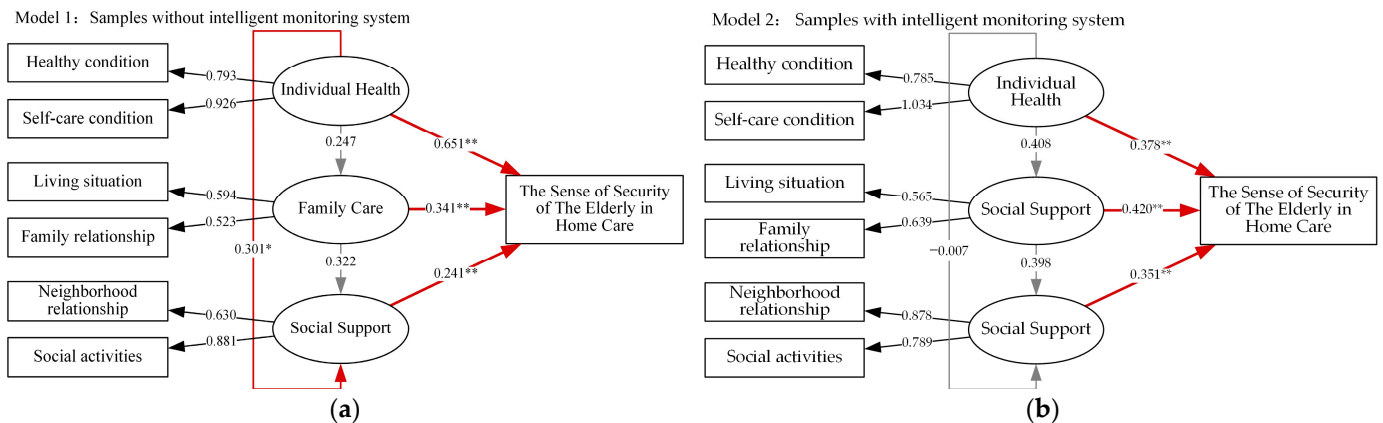
Based on the data of group 1 and group 2, we use AMOS to construct the structural equation model 1 and model 2 for the sense of security of the elderly in home care. We use CMIN/DF, RMSEA, and CFI to assess the fit of models 1 and 2. The fitting evaluation results (Table 3) indicate that model 1 and model 2 fit well overall, with high representativeness and confidence. The results of structural equation model analysis is shown in Figure 5.

The result of model 1 analysis shows that in the normal case without the installed intelligent monitoring system, individual health, family care and social support have significant direct positive impacts on the sense of security of the elderly in home care, among which the direct positive impact of individual health on the sense of security of the elderly in home care is dominant. The theoretical reason may be that in Maslow's hierarchy of needs, the satisfaction of physiological needs is the premise of safety needs, which can provide strong support for the safety needs, while love and belonging needs have a relatively weak effect on the safety needs. The practical reason may be that the elderly who choose home care have relatively good health and self-care conditions, and can obtain a sufficient sense of security by themselves, and obtain a relatively lesser sense of security in the outside world. In addition, individual health has a significant positive impact on social care by 5%, which can also be understood that when individual health directly affects the sense of security of the elderly in home care, it can indirectly affect the sense of security of the elderly in home care through some intermediary effect. The reason

may be that the elderly with better health and self-care conditions are more able to handle neighborhood relationships and participate in social activities.

Table 3. Goodness-of-fit statistics of the model and reference values.

Fits Index	Reference Value	Model 1	Model 2
CMIN/DF	<3.00	1.164	1.367
RMSEA	<0.10	0.037	0.089
CFI	>0.90	0.995	0.972

Figure 5. Results of the structural equation model analysis: (**a**) Analysis results of Model 1; (**b**) Analysis results of Model 2. Rectangles are the observable variables, and ellipses are the latent variables. The red, blue, and gray arrows indicate significant positive, significant negative and insignificant effects, respectively. The values next to the arrows are standardized regression coefficients. ** and * are significant at 1% and 5% levels, respectively.
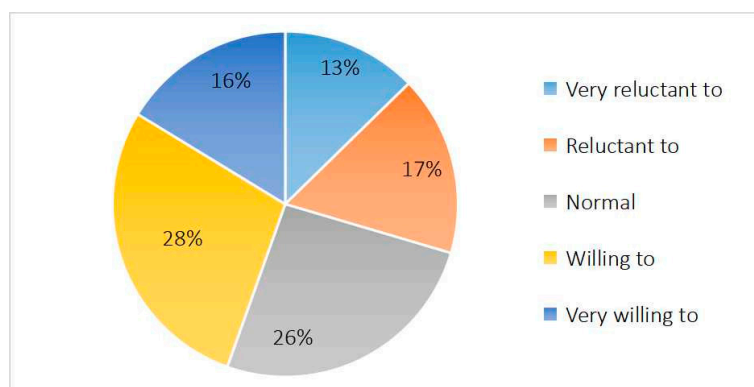
The result of model 2 analysis shows that under the moderating effect of the intelligent monitoring system, individual health, family care and social support still have a significant direct positive effect of 1% on the sense of security of the elderly in home care. However, the influence of individual health on the sense of security of the elderly in home care is significantly reduced, and the influence of family care and social support on the security of home care is significantly improved. Family care has become the primary factor affecting the sense of security of the elderly in home care.

3.2. The Subjective and Objective Demand for the Intelligent Monitoring System of the Elderly

3.2.1. The Subjective Willingness to Use the Intelligent Monitoring System of Elderly

The present study investigated the subjective willingness of the elderly to use the intelligent monitoring system; frequency distribution statistical results (Figure 6) show that more than 40% of the elderly are willing or very willing to use the intelligent monitoring system, a few elderly show general use intention, and nearly 30% of the elderly are unwilling or very reluctant to use the intelligent monitoring system.

In order to explore what factors can affect the elderly's subjective willingness to use the intelligent monitoring system, the present study conducted a linear regression analysis of the various economic and social attributes of the elderly. Results (Table 4) show that the factors which affect the subjective willingness of the elderly to use the intelligent monitoring system include age, educational background, household income, health condition, living situation, and social activities. Among them, the positive effect of elderly educational background on subjective intention to use was significant, at the 5% level; the positive effect of elderly household income on subjective intention to use was significant at the 1% level; the negative effect of elderly health condition on subjective intention to use was significant, at the 1% level; and the positive effect of elderly living situation and social activities on subjective intention to use was significant, at the 5% level.

Figure 6. The subjective willingness of the elderly to use the intelligent monitoring system.

Table 4. Regression analysis of the influencing factors.

Index	Sexual	Age	Educational Background	Household Income	Health Condition
B	−0.205	−0.450 **	0.247 *	0.312 **	−0.594 **
t	−1.202	−4.059	2.391	4.182	−4.245
Index	**Self-Care Condition**	**Living Situation**	**Family Relationship**	**Neighborhood Relationship**	**Social Activities**
B	0.171	−0.195 *	0.155	0.118	−0.217 *
t	1.299	−2.044	1.604	1.109	−2.178

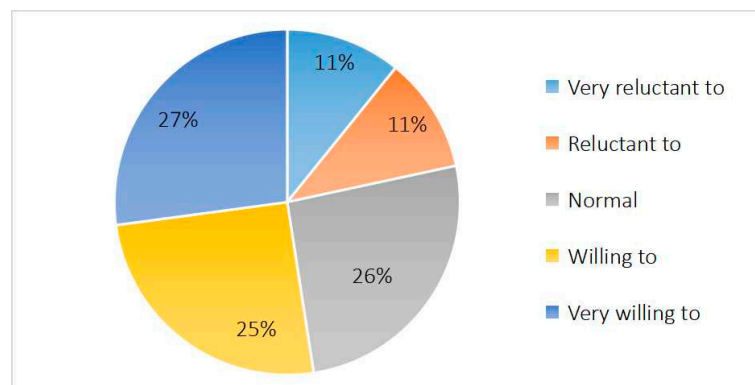** and * are significant at 1% and 5% levels, respectively.

Through interviews, the present study found that the reasons may be that age under 69 and highly educated elderly have a higher acceptance of new things, and high-income elderly are more willing to consume technology products. Thus, these two elderly groups are more willing to use intelligent monitoring systems. The elderly in better health are more optimistic about their self-security ability; the elderly who live with family descendants can fully receive their safe care; and the elderly who often participate in social activities are more likely to get help from their neighbors. These three types of elderly can be guaranteed from three aspects of individual health, family care and social support; their levels of the sense of security is relatively high. Thus, they are even more reluctant to use the intelligent monitoring system.

3.2.2. The Objective Demand for the Intelligent Monitoring System of the Elderly

Based on the China country assessment report on ageing and health [20] (p. 7), the influence path of the sense of security of the elderly in home care, and the questionnaire survey and interview of some family members of the elderly, the present study identified the objective needs of the elderly for the intelligent monitoring system.

According to the China country assessment report on ageing and health, the elderly and the elderly with poor health and self-care conditions are more dependent on the care of others. The influence path of the sense of security of the elderly in home care shows that elderly individuals living alone can obtain insufficient family care, and have a high risk of accidents such as falls. The statistical results of the willingness of the family members of the elderly to use the intelligent monitoring system (Figure 7) show that the intention of the elderly family members to use the intelligent monitoring system is slightly higher than the subjective intention of the elderly. Factors that influence the decisions of family members of elderly to install intelligent monitoring systems include age, living situation, health condition and self-care condition. For the elderly aged over 69, and who live alone or live with their spouses and have poor health and self-care conditions, their family members are more willing to install intelligent monitoring systems. In short, it can be considered

that the elderly who are aged over 69, have poor health and self-care conditions, and livie alone objectively need the intelligent monitoring system to ensure the safety of home care and enhance the sense of security of the elderly in home care.

Figure 7. The objective demand for the intelligent monitoring system of the elderly.

Comparing the subjective and objective demands of the elderly for the intelligent monitoring system, it is found that although the elderly aged over 69 need to install the intelligent monitoring system more objectively, their subjective willingness to use it is not high. Through interview, the present study found that the reasons include two points. First, some elderly aged over 69 who live with family descendants who can fully obtain their safety care may think it is not necessary to use the intelligent monitoring system. Second, some elderly aged over 69 do not understand enough about the intelligent monitoring system, and worry about personal privacy leakage, high cost, telecommunication fraud, electronic radiation and other problems, so they are unwilling to install the intelligent monitoring system at home.

4. Discussion and Conclusions

Frequent family accidents in the elderly have a very negative impact on the sense of security and happiness of the elderly. The present study takes the Hubin community in Ningde City as the case study area, uses hierarchical regression analysis, structural equation modeling and other methods to explore the influence path of the sense of security of the elderly in home care, the influence mechanism of the intelligent monitoring system on the sense of security of the elderly in home care, and the subjective and objective demand of the elderly for the intelligent monitoring system. The following conclusions have been drawn:

- In terms of the influence path of the sense of security of the elderly in home care, individual health, family care and social support of the elderly have significant direct positive effects on the sense of security of home care. In the routine case without the installed intelligent monitoring system, the influence of individual health on the sense of security of the elderly in home care is dominant;
- In terms of the influence mechanism of the intelligent monitoring system on the sense of security of the elderly in home care, in the process of individual health directly affecting the sense of security of the elderly in home care, the intelligent monitoring system can play a negative moderating effect and indirectly improve the sense of security of the elderly in home care. Under the moderating effect of the intelligent monitoring system, the influence of individual health on the sense of security of the elderly in home care is significantly reduced, and the degree of family care becomes the primary factor affecting the sense of security of the elderly in home care;
- In terms of the subjective and objective demand of the elderly for the intelligent monitoring system, the elderly aged over 69, who have poor health and self-care conditions, living alone, objectively need the intelligent monitoring system. Although most of the elderly are willing to use the intelligent monitoring system, some elderly

aged over 69 show low subjective willingness to use it due to their low understanding and acceptance of new things, which deviates from the objective demand.

Based on the above conclusions, the following practice recommendations have been made regarding improving the sense of security of the elderly in home care and optimizing the intelligent monitoring system:

- In terms of improving the sense of security of the elderly in home care, the elderly or their family members can install the intelligent monitoring system at home to ensure the safety of the elderly at home and improve their sense of security. Family members and community workers should pay more attention to the safety of the elderly in home care, especially to the safety of elderly people over 69 years and living alone;
- In terms of optimizing and promoting the intelligent monitoring system, research and development personnel can improve the intelligent monitoring system from the aspects of network security and product price, so that the elderly groups who objectively need such equipment are subjectively willing to use it. City and community managers should more extensively carry out the construction of smart elderly care in aging communities, and install intelligent monitoring systems in public places such as elderly activity centers and community elderly day care centers for the elderly, so as to add an intelligent guarantee for the security of the elderly in home care;
- In terms of the design of elderly-friendly smart cities and communities, planners should understand the service needs of the elderly, evaluate their willingness and ability to use smart devices, analyze the effectiveness of smart devices to help the elderly, and then carry out elderly-friendly design of smart devices, so that the elderly can better enjoy the convenience brought by smart cities.

The application and influence of artificial intelligence technology in home care is a subject worthy of further research. To some extent, the present study provides ideas for the research on the application and effect of artificial intelligence technology in home care, and the demand of the elderly for intelligent elderly care services. The research is of reference significance for the construction of an intelligent elderly care service system and elderly-friendly smart city and community planning.

The present study focuses in-depth on the Hubin community of Ningde City. The coverage of the questionnaire is relatively limited, and the sample of the intelligent monitoring system installed is relatively insufficient. In future studies, the questionnaires can be expanded, and different types of aging communities can be studied. When studying the influence path of the sense of security of the elderly in home care, and the subjective willingness to use the intelligent monitoring system of the elderly, the present study used the structural equation model and linear regression to analyze linear effects, while complex effects on non-linear effects are under-considered. In future studies, the methods can be further improved to reveal the non-linear effects in depth.

With the continuous promotion of the construction of smart communities and smart elderly care, the application of artificial intelligence technology in various life scenarios such as catering, shopping and transportation for the elderly can also be further studied. Artificial intelligence technology can better serve the multi-level and differentiated needs of the elderly, and comprehensively improve the quality of home care services.

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