Original Research Article

Managing Digital Skills to Influence Intentions across Gender in Smart Senior Care Services Context

ABSTRACT

China is facing aging population and digital divide problems. How to response the issue has become an important and emergent theme to the government and elderly institutes. The purpose of this study is to verify the current situation and correlation of perceived digital skills, digital attitudes toward smart care tools and willingness to use smart senior care tools among older people in an aging society, analyze the mediating role of digital attitudes, analyze the influence of gender differences on the relationship between variables, and put forward suggestions. Data was collected by questionnaire survey and 403 valid respondents were received. Findings show that digital skills are the antecedents affecting digital attitudes and usage intentions. Digital attitude plays a partial mediating role between digital skills and use intention, and the mediating effect is significant. Gender has significant differences in the relationship between digital skills and digital attitudes. Suggestion such as the government can consider the direction of publicity through traditional media and lectures, and strengthen the new media publicity policy was made.

Keywords: aging population, digital divide, digital skills, digital attitudes, smart senior care services

1.Introduction

China is the world's most populous country with a population of 1.4 billion. In 2020, the seventh census data showed that the proportion of the working population over 60 years old in China (old-age dependency ratio; ODR increased rapidly from 18.94% in 2010 to 29.53% in 2020, indicating an aging population. The aging population generates pension problems, which test China's pension policy, pension system load and financial planning [1]. Also due to the aging of the population, disadvantaged elderly groups such as disability, marriage loss, widowhoodness and left-behind are derived [2,3]. The development of smart old-age care tools can reduce the dependence of elderly people on old-age care institutions or social workers, which seems to be one of the solutions to deal with the aging population [4].

Furthermore, the aging of the population makes some older people lack the digital

foundation, resulting in the phenomenon of digital divide. This phenomenon describes the gap in the acquisition of new technologies between different groups [5], the difference between individuals forms the difference in the acquisition and use of information technology resources [6], and the gap in the access, use and effect of ICT. It is a kind of participation inequality in the digital society [7]. In other words, the development of smart pension tools also has to deal with the digital skills of the elderly, otherwise the elderly will not use the smart pension platform and will not be able to solve the pension problem. Therefore, it has become an important issue for the government and nursing homes to clarify the relationship between digital skills and willingness to use smart tools among the elderly.

In addition, according to the survey of the World Health Organization, the average life expectancy of Chinese male in 2022 is 73.64 years old and that of female is 79.43 years old, and the life expectancy of female is about 6 years longer than that of male [8]. The survey results show that the longer the life expectancy, the longer the elderly need, the greater the demand for various smart old-age tools, and the higher the requirements for operation skills will be met. In this case, female, who live longer and have longer access to smart retirement tools, seem to be expected to have higher digital skills. However, few studies have explored gender differences in the use of smart old-age tools, and there is still a theoretical gap. It is necessary to explore gender differences and put forward countermeasures, which have positive help for the formulation of smart pension policies and the construction of pension facilities. It is necessary to clarify the influence of gender on digital skills and the use behavior of smart pension tools.

In summary, the purpose of this study is to verify the current situation and correlation of perceived digital skills, digital attitudes toward smart care tools and willingness to use smart care tools among older people in an aging society, analyze the mediating role of digital attitudes, analyze the influence of gender differences on the relationship between variables, and put forward suggestions.

2.Literature Review

2.1 Concept of digital divide for elderly people

The digital divide comes from the lack of elderly people's use and adaptation to smart tools, which is often reflected in data acquisition, analysis and processing [4]. Smart health services are supported by internet-based information technology (ICT), but the digital divide hinders the promotion of smart health services. The phenomenon of digital divide exists among people of different ages, regions, incomes and education

levels [9], and it is the most serious among the elderly, who are known as "digital refugees" [10,11,12]. Resolving the digital divide will be conducive to the promotion of smart pension policy.

Further, the digital discrimination has really affected the daily life of elderly people [13]. A part of the artificial intelligence technology to isolate the induced the elderly internal society [14]. The willingness to use smart tools and participate in smart wellness of those elderly people is also limited due to the older people generally face the digital divide, and it makes them present lower intentions to adopt the senior care service in digital economy situation [4]. Their physical factors such as visual, auditory and cognitive abilities decline, which affects the willingness of the elderly to use intelligent software functions [12]. More often, psychological factors will affect the willingness to use intelligent tools, such as psychological closure, stereotyping and technophobia [15]. This stereotype of smart software, or technophobia, may be different from the traditional way of dealing with things face to face. They may feel uncertain about the outcome of using smart tools to deal with health and wellness issues, and have certain confidence and trust in smart tools. Therefore, their willingness to accept network electronic products is still resistant [16].

Therefore, pension policies should be implemented and effectively pay attention to the basic living needs of the elderly, preserve traditional service methods, and take into account different groups, and implement differentiated policies that highlight key groups [13]. In terms of this concept, technology, psychology and relationship, it is necessary to construct and improve the application of digital skills and literacy of the elderly [14]. In addition, age-appropriate construction, information capacity and literacy construction, and age-friendly environment construction are all powerful measures to eliminate the digital divide and let them enjoy the dividends of the digital economy [11].

2.2 Digital Skills

Digital skills are the products of the digital economy, which are the skills for users of digital tools to use digital terminals to collect, analyze and process information for communication or information feedback purposes [4]. In the digital age, many life and work projects need to be completed through digital tools, such as navigation, shopping, etc., which require somewhat digital skills. More specifically, during the pandemic of COVID-19, many elderly people have encountered a lot of inconvenience in their daily life such as travel, consumption, medical treatment and errands due to their lack of

internet use skills. Moreover, the lack of digital skills and the inability or unfamiliarity with the use of the internet also pose hidden dangers to the national epidemic prevention and control needs, resulting in a serious phenomenon of digital and social exclusion. At the same time, China is rapidly entering an aging society. By the end of 2019, the number of elderly people over 60 years old in China had reached 254 million, and the number will exceed 300 million during the 14th Five-Year Plan period. Under the collision of digitization and aging wave, the digital divide of the elderly in China deserves great attention [17].

Secondly, due to the lack or poor digital skills of some elderly people, they may face a higher risk of using them, which may lead to the elderly being cheated, resulting in hidden dangers in social security. Research has pointed out that about 47.9% of the elderly have not adapted to online shopping, and 53.8% have no information query ability [18]. It indicates that the elderly seems to face high digital risks, resulting in their inability to enjoy the dividends of the digital economy [15]. It can be seen that digital skills not only affect the willingness to use digital tools of the elderly, but also may affect their attitude towards using digital tools.

In addition, digital skills require the inclusion of social networks and national policies. From the perspective of social relationship network, the elderly can expand their social network through social media and obtain social capital, so as to improve subjective well-being and quality of life [19]. If the national policy wants to develop "Internet plus old-age care" (smart old-age care), the elderly should actively and effectively use social media to cover the digital divide, so as to obtain social resources fairly and share social welfare [20]. In other words, if older people have better digital skills, they can make good use of social media, expand their social network, and improve their quality of life in old age. They may have a higher probability of participating in smart old-age care, and their attitude toward smart old-age care may be more positive. Moreover, empirical studies also show that the digital skills of the elderly have a significant and positive impact on the willingness to use the smart tools and attitude toward to use those smart tools. Accordingly, the following hypotheses are proposed in this study:

Hypothesis 1: In the era of digital economy, the digital skills of the elderly are likely to affect their intentions to use smart senior care services.

Hypothesis 2: In the era of digital economy, the digital skills of the elderly are likely to affect their digital attitudes towards smart senior care services.

2.3 The concept of digital attitude

Traditionally, attitude has been viewed as an emotional and cognitive component of an individual behavior [21,22,23]. Among them, the affective component of attitude refers to the positive or negative feeling of an individual towards a specific issue, while the cognitive component refers to the instrumental utility of an individual's belief. Whether an individual acts depends on his judgment of the value weight of the target [22,24]. In other words, attitude is an individual's subjective tendency or judgment about people and things, no matter from the emotional side or instrumental cognitive side [25]. Individuals may engage in actions based on feelings that have no basis in fact. On the contrary, an individual may also rationally evaluate whether the result of the behavior brings enough benefits before deciding whether to do it or not. Therefore, the digital attitude of the elderly can be defined as the assessment of the elderly's emotional and cognitive tendencies towards the digital tools of intelligent old-age care services. The more positive the assessment of emotion and cognitive propensity is, the more positive his attitude towards the intelligent old-age service tool is. The opposite means the more negative his attitude is.

For the smart senior care service, if the elderly feels positive about the in service, such as community volunteers accompany to explain and use, family members and children guide them to use, which makes them feel happy, easy to use, convenient and other positive feelings, he may take actions to support the smart senior care service. On the contrary, he may ignore, disregard or oppose the smart senior care service. If an elderly person rationally evaluates that the ratio of benefits and costs brought by using smart senior care service is high (value judgment), that is, he might recognize that smart senior care service has the benefits of lower cost and higher benefits, and he may be willing to use it. On the other hand, if he thinks it is troublesome, may be cheated, unpleasant, and not beneficial to his life, he might be inclined to reject the use of smart senior care service. Accordingly, hypothesis 3 is put forward in this study:

Hypothesis 3: In the era of digital economy, the digital attitude of the elderly is likely to affects their intentions to use the smart senior care service.

2.4 Mediating effect of digital attitude

In the era of digital economy, the digital skills of the elderly may directly affect their intentions to use smart senior care services, as well as their digital attitude, and digital attitude may also affect their intentions to use them. In other words, there may be a

direct and indirect relationships between the variables of digital skills, digital attitudes and intentions to use the smart senior care services. Such direct and indirect effects may cause some confusion for government departments and pension institutions. Is the direct effect better or both? How should resources be allocated and invested? If there is only a direct effect, then the resources are fully invested in improving and upgrading the digital skills of the elderly; If there are indirect effects, the issue of digital attitudes in older people must be considered. This study suspects that digital attitude has a significant mediating effect, and the indirect effect is greater than the direct effect. To clarify this question, hypothesis 4 is proposed in this study:

Hypothesis 4: In the era of digital economy, the digital attitude of the elderly has a significant mediating effect on the relationship between digital skills and intentions to use smart senior care services.

2.5 The moderating role of gender in the variables' relationship

According to the social role theory, male and female have different socialization processes and different roles in society. Therefore, in the existing studies on gender differences, decision-making, behavior, personality and patterns are derived from these theories [26]. Studies have confirmed the difference between men and women. For example, Fischer (2015, p. 1718) [27] believed that gender is a topic worth studying in their own rights. Therefore, smart old-age care services are critical to the rights of the elderly, and it has theoretical and practical basis to explore the impact of gender differences on the willingness to use smart senior care services.

Moreover, as far as the market view is concerned, the empirical study of the journal of marketing management shows that the theory of theorizing gender and gendering has been confirmed in the study of marketing and consumer behavior. Men and women discuss different issues, showing different preferences for different products and purchasing decisions in many aspects [28,29]. This indicates that men and women may have different preferences in the decision-making process of participating in intelligent elderly care services. For example, compared with women, men are more interested in information and communication technology products [30], and men have a lower perception of purchase risk [31]. This situation may make elderly men with higher digital skills more willing to accept smart senior care services, while women may have lower digital skills and willingness to use smart senior care services.

Furthermore, men have commonly recognized of the functional value of possession [32], have greater brand awareness and are less willing to pay high prices for

commodities [30]. In this case, male elders with higher digital skills may query more elderly care services through the internet, which will have an impact on digital attitude and intentions to use smart senior care services. On the contrary, women may have limited digital skills and be more likely to be induced to digital attitudes and the willingness to use smart retirement.

In addition, choice explanation theory also explains gender differences in information processing [33,34], men's processing of choice usually relies on highly available clear information cues; Women, by contrast, evaluate extensively in an attempt to digest information before making a judgment. Between the gender, these differences may affect product evaluation and identification [35]. For both male and female older adults, this situation may also affect their digital skills, digital attitudes and intentions to use smart senior care services. Accordingly, the following hypotheses are proposed in this study:

Hypothesis 5: In the age of digital economy, gender of the elderly may have significant moderating effects among digital skills, digital attitudes and intentions to use smart senior care services.

Hypothesis 5A: In the age of digital economy, gender differences in older people may significantly moderate the relationship between digital skills and intentions to use smart senior care services.

Hypothesis 5b: In the digital economy, gender differences among older people may significantly moderate the relationship between digital skills and digital attitudes.

Hypothesis 5C: In the digital economy, gender differences among older people may significantly moderate the relationship between digital attitudes and intentions to use smart senior care services.

3 Methods

3.1 Research model and hypotheses

This study aims at verifying the relationships among digital inertia, digital skills, digital attitude, and intentions in smart senior care context. It focuses on causal relationships of variables and the topic is appropriated to employee the quantitative method.

There are four variables in the conceptual framework (Fig. 1), named digital inertia, digital skills, attitude, and behavioral intentions. Basically, positive relationships are met among digital skills, attitude, and behavioral intentions while the moderating effects of digital inertia on relationships of above variables are unknown.

Four hypotheses are proposed based on previous studies [36,37,38,39]. In the

baseline model, that digital skills are likely to have a positive influence on behavioral intentions in smart senior care context (H1); digital skills are likely to have a positive influence on attitude in smart senior care context (H2); and attitude is likely to have a positive influence on behavioral intentions in smart senior care context (H3) are proposed. Furthermore, In the moderating model, we proposed that digital inertia is likely to impact digital skills-attitude-behavioral intentions relationships (H4a, H4b, and H4c) based on our research objective.

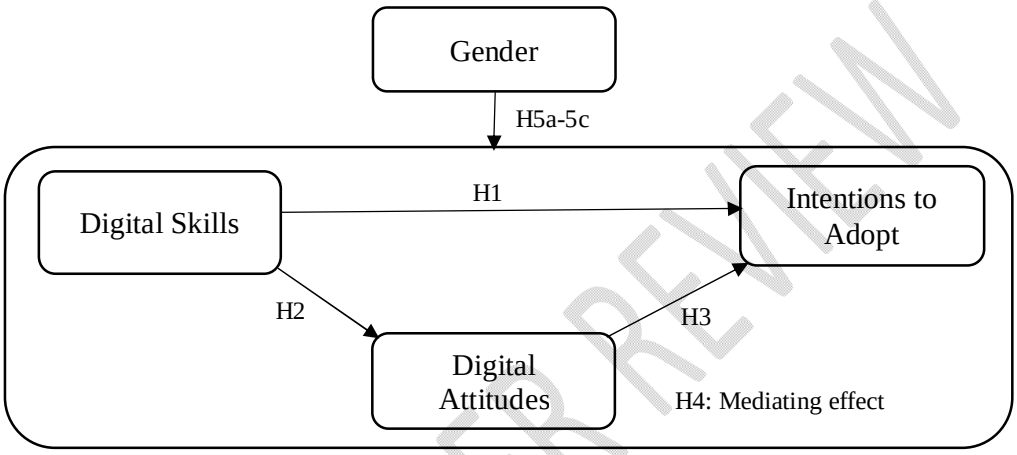

Fig 1. Research Framework

3.2 The instruments of the survey

Three variables used in the causal model were illustrated bellow. Digital skills (SK) was defined as "the skills or experience of collecting, analyzing, and processing the information about digital network" [37]. It was measured by three items, "I have enough skills about information collection", "I have enough skills about information analysis", and "I have enough skills about Information processing".

This study defined digital attitude (AT) as "the tendency about the usage of smart senior care service" [37,38,39]. Items including "The usage of smart senior care program is a good idea", "The usage of smart senior care program is a smart idea", and "I like this idea while using smart tools to deal with daily life needs" were employed for measuring the construct of attitude.

Considering to intentions to use smart senior care service (INT), it was viewed as "the extents to reuse, positive words of mouth, and recommended the smart tools" [38,39]. Those items, "Whenever I need, I'll process network through smart tools", "I'll tell the positive benefits of smart tools to other senior", and "I'll recommend the benefits of smart tools to other senior" were used to measure INT.

3.3 Questionnaire survey

Considering to the theme of the study was to verify the causal relationships with in variables, and the data collection requirements of our study such as the needs of large samples of experience on using smart tools, it would be appropriate to employ the questionnaire survey. The population was unknown and set on those seniors who were experienced smart tools during the past six month. They were conducted on site and online for collecting data.

The questionnaire was established on Questionnaire Start System. The link was send to relevant groups in May, 2022. Of 403 questionnaires obtained (Table 1), about 36.7% were male and 63.3%were from female respondents. At about 37.2% of respondents were 50-59 years of age, 43.4% of respondents were 61-65 years of age, 16.6% of respondents were 66-70 years of age, 2.7% of respondents were above 71 years of age. Approximately 16.6% of respondents were graduated from primary school or below; 32.5% of respondents come from secondary school; 27.5% were undergraduate; 20.8% got a bachelor degree; and only 2.5% of respondents were master.

With regard to the occupation, 3.5% of respondents work at government related sectors, 21.8% of respondents belong to industrial sector, 23.6% of respondents were commerce/service industry, 19.9% of respondents were farmers, 21.6% of respondents were educational industry, and 9.7% of respondents were retired/else. Approximately 27.5% of respondent's monthly income was below 3000 RMB, 48.1% of respondent's monthly income was 3001-6000 RMB, and 20.6% of respondent's monthly income was 6001-8000 RMB while 3.7% of respondent's monthly income exceeds 8000 RMB. The Correlation matrix of measurement was listed in Appendix A.

Table 1. Demographic Characteristics (n=403)

Item	Freq	%	Item	Freq.	%
Gender			Occupation (before retired)		
Male	148	36.7	Government department	14	3.5
Female	255	63.3	Manufacturing industry	88	21.8
Age (years old)			Commerce/service industry	95	23.6
50-60	150	37.2	Agricultural industry	80	19.9
61-65	175	43.4	Educational industry	87	21.6
66-70	67	16.6	Else	39	9.7
71 or above	11	2.7	Monthly income retired (RMB)		
Educational level			<3000	111	27.5
Primary	67	16.6	3001-6000	194	48.1
Secondary	131	32.5	6001-8000	83	20.6

Undergraduate	111	27.5	>8000	15	3.7
Bachelor	84	20.8			
Master or above	10	2.5			

3.4 Data analysis

In order to test the hypotheses of the study, descriptive statistics, confirmatory factory analysis (CFA), structure equation modelling (SEM), mediating effect analysis, and moderating effect analysis were run by SPSS 22.0 and AMOS 22.0 software.

4 Results And Discussion

In line with Anderson and Gerbing (1988) [40], this study adopted two-stage analytical procedures to validate the measurement model and structural model. It's suggested that the validity and reliability could be assessed by measurement model and hypothesized relationships within proposed model were estimated by structural model using the maximum- likelihood method [41].

4.1 The descriptive statistics and normality

As shown in Table 2, descriptive statistics, skewness and kurtosis were conducted. As expected, all of the absolute values of skewness were less than 3 and kurtosis did not exceed 10, which indicating no departure from normality [42]. Then, the psychometric properties of the constructs were assessed by calculating the Cronbach's alpha in terms of reliability coefficient [43] and the CFA and SEM were carried out in the next section.

4.2 Assessment of the measurement model

As shown in Table 3, the standardized factor loadings (SFL) exceed the recommended value of 0.50 and all indicators used in this study significantly loaded on their corresponding factors [43]. The convergent validity of the constructs in the measurement model were confirmed. Furthermore, AVE values of the constructs were also close to the level of 0.50, indicating that convergent validity of the measurement model was proved [42]. According to Table 4, the squared root of AVEs presented on the diagonal exceed the correlations between the constructs. Thus, the discriminant validity of the constructs was evidenced [44].

4.3 Assessment of the structural model

Following the validation of the measurement model, the proposed model with three constructs estimated with structural equations modeling to test the research hypotheses. Three steps were employed to estimate the parameters as well as the hypothesis testing. As shown in Table 5, the relationships of baseline model were

estimated in Model 1, Model 2, and Model 3. The overall fit indexes for the Model 3 was adequate (χ^2 =36.8, DF=24, p=.165, χ^2 /DF = 1.53, GFI=0.980, AGFI= 0.963, CFI= 0.986, RMSEA= 0.036) and the research hypotheses of baseline model were confirmed. As expected, the SK-INT relationship, SK-AT relationship, and AT-INT relationship were significantly and positively confirmed, which supported H1, H2, and H3. The R^2_{AT} was 0.499, and R^2_{INT} was 0.666.

Table 2. Descriptive statistics (n=403)

Question items	Mean	SD	Sk.	Ku.	SFL
Digital Skills (VE=64.25%, Cronbach's Alpha= 0.721)					
SK1: I have enough skills about information collection.	2.49	1.077	.389	-.478	.813
SK2: I have enough skills about information analysis.	2.52	1.096	.230	-.823	.781
SK3: I have enough skills about Information processing.	2.44	1.055	.512	-.270	.810
Digital Attitude (VE=63.72%, Cronbach's Alpha= 0.715)					
AT1:The usage of smart senior care program is a good idea.	2.09	.982	.679	-.106	.785
AT2: The usage of smart senior care program is a smart idea.	2.11	1.008	.678	-.110	.815
AT3:I like this idea.	2.02	.941	.645	-.231	.794
Intentions (VE=59.37%, Cronbach's Alpha= 0.656)					
INT1:Whenever I need, I'll process network through smart phone.	2.19	.856	.453	-.099	.770
INT2: I'll tell the positive benefits of smart phone to other senior.	2.19	.953	.574	-.086	.730
INT3:I'll recommend the benefits of smart phone to other senior.	2.23	.940	.553	-.051	.809

SD: Standard deviation; Sk: Skewness; Ku: Kurtosis; SFL: Standard factor loading; VE: Variance extracted

Table 3. Results of CFA (n=403)

Constructs	Indicator	λ	t-values	SMC	CR	AVE
Digital Skills (SK)	SK1	.710	14.279	.505	0.722	0.464
	SK2	.669	13.316	.448		
	SK3	.663	13.156	.439		
Digital Attitude	AT1	.673	13.317	.453	0.716	0.456
(AT)	AT2	.691	13.739	.478		
	AT3	.662	13.056	.438		
Intentions (INT)	INT1	.648	12.562	.420	0.661	0.395
	INT2	.569	10.834	.324		
	INT3	.663	12.892	.440		

Notes: λ: Standardized factor loadings; SMC: Square multiple correlation; CR: Composite reliability; AVE: Average variance extracted; All t-statistics are significant at 0.01 level; (χ^2 =84.7, DF=48, p=.001, χ^2 / DF = 1.765, GFI= 0.967, AGFI= 0.946, CFI= 0.969, RMSEA= 0.044)

Table 4. Discriminant validity of constructs

Items	M	SD	1	2	3
1.SK	7.45	2.59	0.681		
2.AT	6.21	2.34	.507**	0.675	
3.INT	6.61	2.12	.538**	.506**	0.629

*p<0.05, **p<0.01; SK: Digital Skills; AT: Attitudes; INT: Behavioral intentions; Diagonal elements are the square root of average variance extracted. Off-diagonal elements are the coefficients of correlation between factors

Table 5. Hypotheses testing for proposed model

Paths	M1		M2		M3	
	Estimate	t	Estimate	t	Estimate	t
H1: SK-INT	0.771***	6.589	0.832***	6.164	0.483***	3.993
H2: SK-AT			0.770***	7.594	0.707***	7.446
H3: AT-INT					0.400***	3.386
R^2_{AT}			.593		0.499	
R^2_{INT}	0.595		.692		0.666	
Model fitness						
χ^2	15.61		49.0		36.8	
DF	8		25		24	
p	0.048		0.003		0.165	
χ^2 / DF	1.950		1.961		1.53	

GFI	0.986	0.973	0.980
AGFI	0.965	0.952	0.963
CFI	0.986	0.974	0.986
RMSEA	0.049	0.049	0.036

*P<0.05, **P<0.01, ***p<0.001

4.4 Mediating effect of digital attitudes

In order to verifying the potential mediating effect of digital attitudes toward smart senior care service, a bootstrapping procedure recommended by Jose (2013) [45]. First, the number of bootstrapping samples was set at 2000 with a confidence level of 95%. As shown in Table 6, The model fit basically met the theoretical requirements (χ^2=36.8, DF=24, P =0.045, χ^2/DF= 1.53, GFI=0.980, AGFI=0.963, CFI=0.986, RMSEA=0.036). In terms of variable relationship, SK significantly affects the relationship between INT and AT, and AT significantly and positively affects INT. Hypothesis 1, Hypothesis 2 and hypothesis 3 are all supported. SK not only directly affects INT, but also Impact INT through AT.

Moreover, in terms of the mediating effect (Table 6), the indirect effect is 0.283(P <0.05), and the upper and lower limits of bias-corrected 95% confidence interval are 0.067-0.510, excluding 0, and the P value is less than 0.01, indicating that the indirect effect of the research model is significant, and AT plays the mediating role of SK-INT. In terms of the direct effect of SK-INT, the estimated value is 0.483, and the upper and lower limits of BIAS-corrected 95% confidence interval are 0.206-0.772, excluding 0, and the P value is less than 0.01, indicating that the direct effect of SK-INT is significant. Finally, in terms of the total effect of the mediating effect, the estimated value is 0.766, and the upper and lower limits of Bias-corrected 95% confidence interval are 0.638 to 0.892, excluding 0 and P value is less than 0.01, indicating that the total effect of SK-INT is significant. In other words, SK will not only directly affect INT (direct effect), but also affect INT (indirect effect) through AT. AT has partial mediating effect, and the mediating effect is AT a significant level.

Table 6. Results of Mediated Effects (Bootstrap method)

Path	Product of Coefficients		Bias-Corrected 95% CI	
SK-INT	Estimates	SE	Lower	Upper
Indirect effects	0.283*	0.111	0.067	0.510
Direct effects	0.483***	0.147	0.206	0.772
Total effects	0.766***	0.064	0.638	0.892

*p<0.05, **p<0.01, ***p<0.001

4.5 Moderating effect of gender

In order to evaluate the moderating role of gender in the relationships among the studied constructs, metric invariance tests were conducted. A non-restrict model was generated. The model included a good fit to The data (χ^2 =60.91, DF=48, P =.100, χ^2 /DF = 1.269, GFI=0.969, AGFI= 0.943, CFI= 0.986, RMSEA= 0.026). Then, the restricted model of structural weight was then compared to the full-metric invariance model whose fit to the data Were adequate (χ^2 =88.70, DF=69, P =.055, χ^2 / DF= 1.286, GFI= 0.956, AGFI= 0.943, CFI= 0.979, RMSEA= 0.027). The results of metric invariance tests show that the delta chi square (DF) = 88.7-60.9/69-48 = 27.8/21 = 1.32 < 3.54, p > 0. 01, which indicating the measurement model was invariance.

Moreover, a baseline model was first generated, which all the loadings across the two groups were constrained to be equivalent. The findings indicated that the model satisfactorily fits to the data. Then using a chi-square difference test, the baseline model was subsequently compared to three nested models in order to test invariance in the hypothesized paths across the groups. The results of the baseline model and the constrained nested models can be depicted in Table 7.

In the unrestricted model, the main difference between men and women is the effect of AT on INT, and the AT of men's perception of smart senior care service has insignificant impact on their intentions to adapt smart senior care service. On the contrary, women's INT is significantly affected by their AT.

Furthermore, considering the moderating effect of gender, only the chi-square difference test of the first path of the three paths has reached a significant level. The influence of perceived digital skills on the intentions to adapt smart senior care service is significantly different among respondents with different genders. Among them, the coefficient of female (β=0.515, t=3.830) is larger than that of male (β=0.410, t=3.830), and the explanatory power is 0.65 for female and 0.75 for male, respectively. The results showed that female's intentions to adapt smart senior care service to retire wisely was more likely to be influenced by their attitudes than male's. In other words, gender difference will weaken the relationship between attitude and the intentions to adapt smart senior care service.

Table 7. Hypotheses testing for moderated model

Paths	Male (n=148)	Female (n=255)	ALL (n=403)	Baseline model	Nested model
	Estimate(t)	Estimate(t)	Estimate(t)	χ^2 (DF)	χ^2 (DF)
H1:SK-INT	0.81(0.39)	0.24(1.72)	0.48***(4.00)	60.91(48)	74.42(49)

H2:SK-AT	0.69***(4.53)	0.72***(5.97)	0.71***(7.45)	60.91(48)	60.97(49)
H3:AT-INT	0.24(0.41)	0.53**(3.28)	0.41***(3.39)	60.91(48)	61.21(49)
R^2_{INT}	0.98	0.53	0.67		
R^2_{AT}	0.48	0.51	0.50		
Chi-squire testing					
H4a	$\Delta\chi^2/\Delta DF=(74.42-60.91)/(49-48)=13.52/1=13.52$(supported)				
H4b	$\Delta\chi^2/\Delta DF=(60.97-60.91)/(49-48)=0.06/1=0.06$				
H4c	$\Delta\chi^2/\Delta DF=(61.21-60.91)(/49-48)=0.30/1=0.30$				

*P<0.05, **P<0.01, ***p<0.001

Then, we display moderating effect of gender on Fig 2. First of all, the slopes of the two regression lines are positive (β_{Male}=0.558 and β_{Female}=0.366), indicating that there is a positive relationship between male's and female's perceived digital skills and their intention to use them. In the digital era, therefore, as the respondents' digital skills of smart tools become more proficiency, their ability to collect, analyze and process the data is higher. The possibilities of their usage to smart endowment tool again, pass positive word of mouth and recommendation to others would be higher. The digital skills and the use to the relationship between the two variables show significant positive correlation, Digital skills also significantly affect the willingness to use smart retirement tools.

Moreover, the intersection point of the two regression lines is close to 6.2, indicating that when the respondents' perceived digital skills are below 6.2, men are less willing to use smart retirement tools than women. However, when respondents' perceived digital skills were higher than 6.2, men were more likely to use smart retirement tools than women. When men's digital skills reach a certain level of proficiency, they have higher willingness to use them, positive word of mouth and recommend them to others than women.

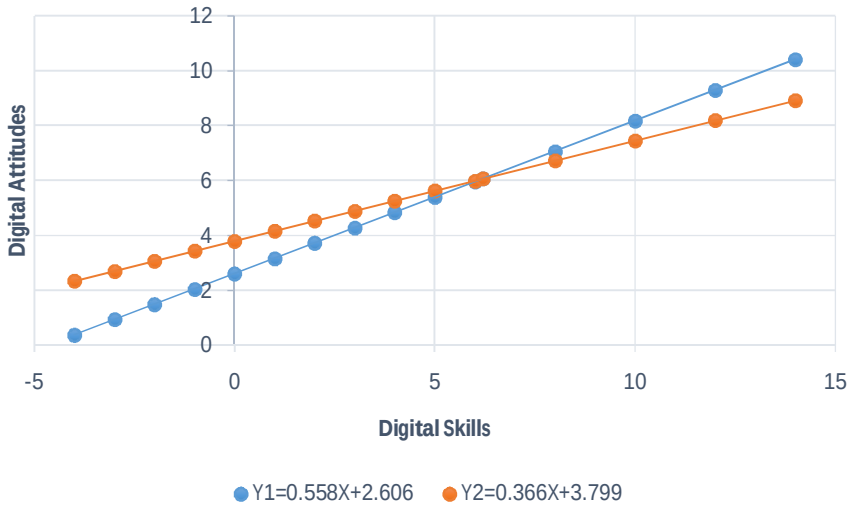

Fig. 2 The moderating effect of gender on digital skills-usage intentions

5 Conclusions and recommendations

The purpose of this study is to explore the current status and correlation of perceived digital skills, digital attitudes, and intention to use smart senior care services in an aging society, analyze the mediating role of digital attitudes, analyze the influence of gender differences on the relationship between variables, and make suggestions. Based on the above analysis, the following conclusions and recommendations are obtained.

5.1Conclusions

- In terms of the perceived digital skills, digital attitudes and the current situation of the use intention of smart elderly care services, the average value is low, and the difference in digital skills is large. The older respondents had a lower average perception score (less than 3), which suggests that they may prefer the way they acquire and process information when it comes to digital skills. In terms of digital attitude, their cognitive and emotional aspects of digital economy may be weak. In terms of the use intention of intelligent old-age service, they may prefer the traditional way of old-age care, and have low willingness to use, positively spread and recommend intelligent old-age service. On the whole, respondents have relatively limited cognition on the trend of digital economy and intelligent elderly care services, which is worth pondering and exploring the reasons.
- In terms of the correlation between the perceived digital skills, digital attitudes and the use intention of smart elderly care services, the three have a significant positive correlation, and digital skills significantly affect the use intention (smart elderly care services) and digital attitudes, and digital attitudes significantly affect the use intention. Digital skills are the antecedents affecting digital attitudes and

usage intentions. If the government and pension enterprises want to improve the elderly people's usage intentions of intelligent old-age care services, they should give priority to improving and upgrading the elderly people's digital skills.

- In terms of mediating effect, digital attitude plays a partial mediating role between digital skills and use intention, and the mediating effect is significant. This indicates that the digital attitude of the elderly must be taken into account if the government departments and pension institutions want to enhance the use intention of smart old-age services. This is because the influence mediated by digital attitudes contributes 36.9% of the total predictive power. Therefore, changing the cognition and emotion of the elderly towards the digital economy has become one of the thinking directions for government departments and pension institutions.
- In terms of the moderating effect, gender has significant differences in the relationship between digital skills and AT. Men with numerical skills above a mean of 6.2 had significantly higher numerical attitudes than women. The findings of this study show that when elderly people's perceived digital skills are low, women's digital attitude is higher than that of men, which is more likely to affect their intention to use smart old-age services. However, when men's digital skills were above a certain level, their cognitive and emotional assessments of the digital economy were significantly higher than women's. Therefore, when improving the digital attitude of the elderly, government departments and nursing institutions can try to distinguish between genders, establish and improve their digital skills, and help improve their intention to use smart elderly care services.

5.2Recommondations

Recommendations to government departments are listed below.

- Because the average score of variables is low, and the difference is large. Government departments should focus on improving the elderly people's digital skills and digital attitudes under the digital economy, so as to strengthen their intention to use smart old-age services and promote smart old-age service policies. At the present stage, the government can consider the direction of publicity through traditional media and lectures, and strengthen the new media publicity policy.
- Digital skills have a direct impact on the use intention and digital attitude. Government departments should take digital skills into account when making pension policies, and evaluate ways to enhance and improve digital skills. Digital attitude affects the use intention. When promoting smart old-age service policies,

government departments should consider the functions and benefits of smart old-age service for the elderly, and systematically strengthen the emotional component connection of smart old-age service, which will help improve their use intention.

- Gender has a moderating effect on digital skills and digital attitudes. Government departments can take this factor into account when making pension policies to formulate digital skills improvement plans.

Recommendations for nursing homes are presented below.

- When receiving elderly people, nursing homes should give priority to investigating and identifying their digital skills so as to provide corresponding services.
- When providing senior care services, the senior care institutions can match the elderly with different digital skills, so that the elderly with high digital skills can assist the elderly with low digital skills, which is conducive to service cost control and service efficiency improvement.
- When providing senior care services, senior care institutions can change their digital attitudes through function and benefit profiles and emotional links to induce the elderly to use intelligent services.

Recommendations for subsequent research are displayed below.

- This study successfully analyzed the factors, named digital skills and digital attitude, affecting the elderly people's intention to use smart senior care services. However, the average score of the measured variables was low and the variance was large. Follow-up research can verify this issue and put forward improvement countermeasures.
- Our study has investigated the relationship between digital skills, digital attitudes and intention to use, and subsequent studies will continue to explore the influence of other factors on the intention to use smart elderly care services, such as involvement and habits.
- Current study has clarified the influence of gender on the relationship between variables. There may be other moderating variables, such as education level and income status, which are worthy of continuous analysis in subsequent studies.

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Appendix A: Correlations between variables

Items	M	SD	Digital Skills			Digital Attitudes			Intentions		
			SK1	SK2	SK3	AT1	AT2	AT3	INT1	INT2	INT3
SK1	2.49	1.08	1								
SK2	2.52	1.10	.450**	1							
SK3	2.44	1.06	.498**	.443**	1						
AT1	2.09	.98	.388**	.290**	.345**	1					
AT2	2.11	1.01	.351**	.346**	.250**	.463**	1				
AT3	2.02	.94	.317**	.337**	.294**	.426**	.478**	1			
INT1	2.19	.86	.340**	.369**	.291**	.320**	.336**	.326**	1		
INT2	2.19	.95	.365**	.307**	.341**	.246**	.282**	.248**	.328**	1	
INT3	2.23	.94	.309**	.377**	.291**	.377**	.318**	.355**	.448**	.393**	1

*P<0.05, **P<0.01