

An Empirical Study on the Factors Affecting Elderly Users' Continuance Intention of Shared Nurses

This article was published in the following Dove Press journal:
Risk Management and Healthcare Policy

Chunyan Xie
Shulei Jia
Chaozhu He

School of Nursing, Nanchang University,
Nanchang 330006, People's Republic of
China

Objective: Based on the technical acceptance model, expectation confirmation model, and perceived risk theory, this study aims to analyze the factors and their effects on shared nurse users' continuance intention in the process of e-health consumption.

Methods: This research established a measurement tool that fits the topic of this study and a model of shared nurse continuance. From January to May 2020, 373 valid samples from elderly individuals living in urban areas of Jiangxi Province, China, were collected by convenience sampling in order to analyze through empirical research their continuance intentions of selecting shared nurses. The theoretical models and research hypotheses were verified by structural equation modeling with AMOS 25 software.

Results: The measurement model indicated that the theoretical constructs have adequate reliability and validity, while the structured equation model is illustrated as having a high model fit for empirical data. The hypothesis test results showed that expectation confirmation positively affects perceived ease of use; both of them have positive effects on perceived usefulness and satisfaction. Perceived usefulness and satisfaction play an intermediary role in expectation confirmation and continuance intention. Perceived ease of use and perceived usefulness positively affect continuance intention. Perceived risk negatively affects perceived usefulness and continuance intention.

Conclusion: This study expanded the application of the technology acceptance model, expectation confirmation model, and perceived risk model in e-health by investigating the factors that influence elderly users' continued intention to use shared nurses. Based on these empirical findings, we derived implications for the design and operation of the shared nurse platform, and suggestions on relevant management departments and incentive structures for using e-health. The results of this study provide important implications for further research and practice of mobile health care.

Keywords: e-health, home care, technology acceptance model, expectation confirmation model, perceived risk

Introduction

Since the 21st century, the aging of the population has become a global public health problem. According to the National Bureau of Statistics of China, at the end of 2018, there were 249 million elderly people over the age of 60 in China, including 166 million elderly people over the age of 65, with 65% of the total having chronic diseases and 44 million having disability or dementia.¹ The large aging population has surged the demand for elderly care, which is one of the important reasons for the emergence of shared nurses.²

In China, there is a shortage of nurses. According to data released by the China National Health and Health Commission, at the end of 2017, the ratio of doctors

Correspondence: Chaozhu He
School of Nursing, Nanchang University,
461 Bayi Avenue, Donghu District,
Nanchang, People's Republic of China
Tel +86-1380-352-3962
Fax +86 0791-86362043
Email ncdx0121@163.com

and nurses was about 1:1.1, while developed countries were 1:4 or 1:5, which is still a large gap between China and other developed nations.³ In addition, the salary of nurses is generally low—which makes the nursing industry unattractive—so that some of them will consider switching professions. The emergence of shared nurses has provided more employment opportunities for nurses and increases their income, which may attract more nurses to the nursing field and ease the shortage of nurses for society.

On the basis of the implementation of the Healthy China Strategy, the health industry of China has further development. At the same time, the concept of shared nurses came into being with the growth of the sharing economy.⁴ Patients can make appointments for home care on their mobile phones and then provide door-to-door nursing services such as injection, infusion, blood collection, and so on. Through shared nurses, the procedures for patients to queue, register, and pay can be simplified, which not only saves time but also relieves the burden on medical resources. It has solved the problem of medical treatment for many elderly people and relieves the pressure of social pensions. However, there are still many difficulties in the development of shared nurses. Many patients are unwilling to try or give up using shared nurses again because of some unpleasant experiences. For example, patients would be afraid that the shared nurse is not standardized and would not risk making an appointment. Besides, since the cost of shared nurses is several times higher than that of hospitals, and the online payment method is adopted, the potential financial risks of shared nurses are inevitable.⁵

In recent years, many researchers have conducted studies on the topic of shared nurses, but most of them are based on the perspectives of nurses and the government. Few studies are based on users' needs and real experiences.⁶ The success of a shared nurse depends more on the users' continuous use rather than on accidental use.⁷ Therefore, exploring the impact mechanism of users' continuous use of shared nurses will help the government and enterprises grasp the market demand, so as to enhance users' stickiness. In this study, by combining the technology acceptance theory (TAM), expectation confirmation model (ECM), and perceived risk theory, a theoretical model that affects users' continuance intention of shared nurses is proposed. This study thus contributes to the sustainable development of precise elderly health care based on empirical analysis.

Research Model and Hypotheses

Technology Acceptance Model (TAM)

The TAM proposed by Davis based on the theory of rational behavior⁸ was originally used to explain the user's attitude toward the acceptance of information systems. Further, it is one of the authoritative theories of such research. The theory proposes two decisive variables: perceived usefulness and perceived ease of use. Perceived usefulness refers to the degree to which the user thinks the product can help him or her, and perceived ease of use refers to the ease the user feels when using the product. Both of these are the basis for users to accept the new technology. Davis confirmed that users can determine their behavioral intentions if they perceive the usefulness and ease of use of the product, and perceived ease of use can indirectly affect their behavioral intentions through perceived usefulness. This theory was gradually used in the field of e-commerce. For example, after surveying the use of IT systems, Taylor⁹ indicated that perceived usefulness and ease of use were significant factors affecting participants' acceptance behavior. Liao⁷ confirmed that continuance intention was not only affected by perceived usefulness but also by satisfaction through an empirical survey of online university users. In addition, his research also found that perceived ease of use is a direct factor affecting satisfaction. In the process of using shared nurses, users need to use mobile phones to facilitate appointments, payments, evaluations, and other functions. Whether the technologies are easily accepted by users, the effectiveness of a product will affect users' intention to use them again. Based on the above analysis, we hypothesize:

H1: Perceived usefulness positively affects continued intention.

H2: Perceived ease of use positively affects continued intention.

H3: Perceived ease of use positively affects perceived usefulness.

Expectation Confirmation Mode (ECM)

Oliver proposed the expectation confirmation theory (ECT) which pointed out that the user's satisfaction will increase when the benefit achieved after the purchase was greater than his or her expectation, and the continuance intention of purchase will increase.¹⁰ Bhattacharjee used TAM and ECT to establish an ECM model. It is worth

noting that, unlike traditional ECT, Bhattacharjee mentions that it is inappropriate to build a positive relationship between the user's short-term emotional satisfaction and the long-term emotional perceived usefulness.¹¹ The ECM model can be integrated with other theories and is widely used in many fields such as online education, social networking, and communication. For example, Cho¹² confirmed—based on the ECM model to study the behavior of health apps after adoption—that perceived usefulness and perceived ease of use are significantly affected by expectation confirmation. Perceived usefulness is also affected by perceived ease of use, which together improves user satisfaction and promotes continued willingness to use the service. Hong¹¹ found that expectation confirmation affected the user's perceived ease of use and perceived usefulness, all three of which together affected satisfaction, which affected the continued use intention. As an abstract medical product, the usefulness of shared nurses has been verified if users have higher expectation confirmation, leading to a higher continuance intention. Based on the above theories and literature analysis, the following hypothesis is proposed for this study:

H4: Satisfaction positively affects continuance intention.

H5: Satisfaction plays an intermediary role in expectation confirmation and continuance intention.

H6: Perceived ease of use positively affects satisfaction.

H7: Expectation confirmation positively affects perceived ease of use.

H8: Expectation confirmation positively affects satisfaction.

H9: Expectation confirmation positively affects perceived usefulness.

H10: Perceived usefulness plays an intermediary role in expectation confirmation and continuance intention.

Perceived Risk Theory

Perceived risk was proposed by Bauer,¹³ and it referred to users' various uncertain feelings generated during purchase. However, Bauer did not indicate what perceived risks included. Conchar¹⁴ believed that the dimensions of perceived risk varied depending on the specific situation because different cultural backgrounds and different products will bring different perceived risks to users.

Therefore, it is necessary to research the risks that users would perceive during the use of a shared nurse.

First, users need to register an account on a mobile phone before booking a shared nurse, which may lead to the disclosure of personal privacy. Second, because users pay for nursing services online, should there be any problem with the app, it may cause economic loss to users. Third, a shared nurse is a new type of mobile medical product. Nurses leave the hospital to provide home care for the elderly, which may pose risks to users' health due to unpredictable medical accidents. Fourth, affected by the traditional culture, many elderly Chinese people care more about the perceptions of relatives and friends around them before they decide to purchase the service.¹⁵ Because shared nurses are a new type of medical service product, the opposition of family members or friends may lead to the loss of potential social status of the elderly, thus affecting their purchase behavior. Fifth, users will worry about the gap between service quality, service content, and their expectations after receiving the shared nurse service.¹⁶ Finally, after using a shared nurse, the users will have a psychological burden on the various conditions mentioned above.

Based on the above analysis, combined with the characteristics of shared nurses, this study selected privacy risks, financial risks, physical risks, psychological risks, functional risks, and social risks (all perceived) to measure the perceived risks of elderly users when using shared nurses. Bauer suggested that users will consider the possibility of adverse results before deciding to purchase the service, which negatively affects their intention to purchase or use. Numerous studies also show that perceived risk has a significant impact on continuance intention. For example, Shin¹⁷ studies the users' perceived risk when acceptance behavior occurs, and finds that perceived risk has a negative impact on users' willingness to use the service. Cocosila¹⁸ believes that perceived psychological risk is affected by perceived financial risk, social risk, and privacy risk, thus reducing users' continuance intention; Wolfenbarger's¹⁹ research on online shopping shows that privacy security has a high predictive effect on users' satisfaction. Blesik²⁰ believed that perceived risk will have a negative impact on the perceived usefulness of medical information sharing systems. In this type of research, it is agreed that perceived risk plays an important role in influencing the user's intention to use or continuous use of the product.²¹ Based on the above analysis, the study verifies the facts with the following hypotheses:

H11: Perceived risk negatively affects satisfaction.

H12: Perceived risk negatively affects continuance intention.

H13: Perceived risk negatively affects perceived usefulness.

Proposed Model

The model of this study was proposed based on TAM, ECM, and perceived risk theory, combined with previous studies and the definition of the above hypotheses. In this study, expectation confirmation, perceived usefulness, perceived ease of use, satisfaction, and perceived risk were taken as independent variables, while satisfaction and perceived usefulness were taken as intermediary variables, and continuance intention was chosen as the dependent variable. The research hypotheses among the theoretical constructs are presented in Figure 1. In the following study, to facilitate expression and calculation, the variable name abbreviations are also shown in this figure below.

Methods

Survey Instrument

This study used the scales validated in previous studies as references to ensure the content validity of the items of the

questionnaire and made appropriate revisions to adapt to the Chinese medical environment. We improved the items through three procedures to promote the accuracy of the measurement tool. First, we translated the items selected from the previous study into Chinese. Second, a nursing manager, two clinical professors, and six postgraduates who were familiar with mobile data services were invited to form a focus group to check the Chinese wording of each item in the questionnaire to ensure its readability and comprehensibility. Third, we evaluated and refined the measurement items after the pre-survey to ensure the effectiveness of the content.

The content of the questionnaire included information about the subjects and the evaluation scale of the shared nurses. The first part was the basic information of the elderly, including gender, age, marriage, medical insurance, health status, living conditions, and nursing home around the community. The second part is the elderly users' evaluation scale for shared nurses. The specific measurement problems of variables on this scale are summarized in Table 1. The constructs of PU mainly consist of measures of perceived usefulness developed in the literature.²¹ The constructs of PEOU were developed

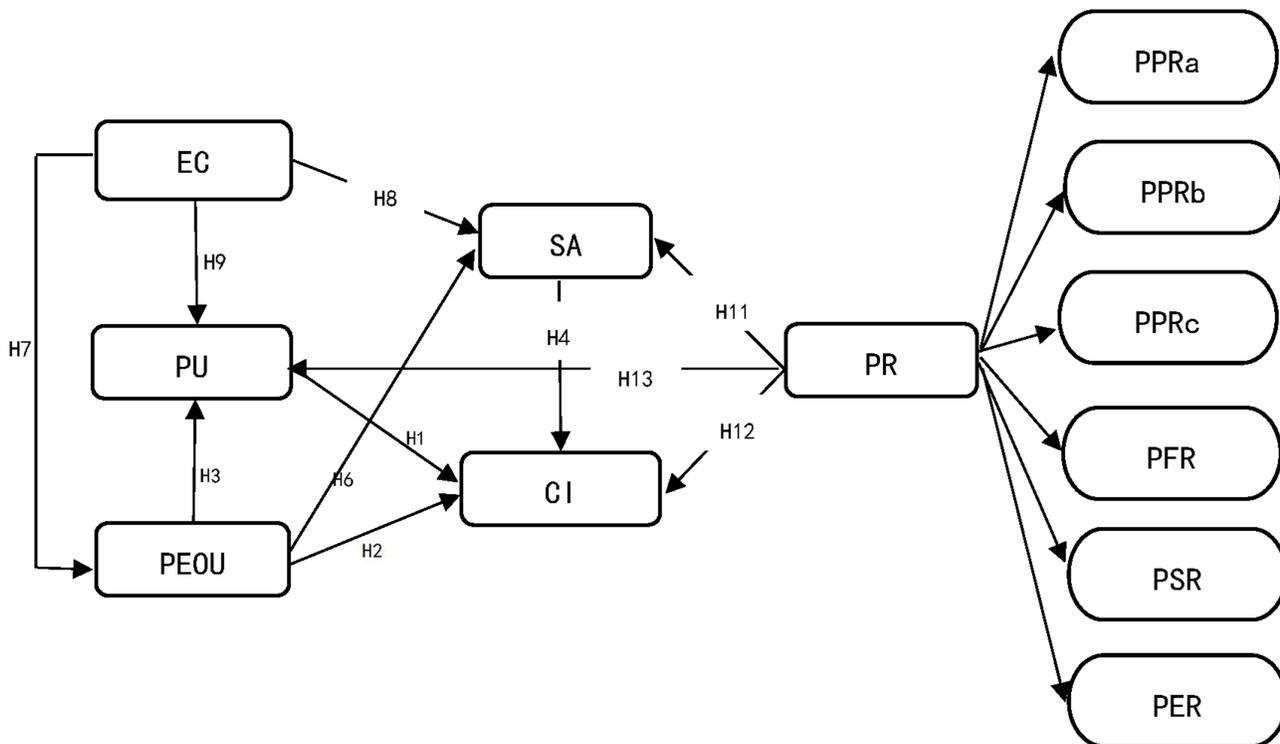


Figure 1 The conceptual model.

Abbreviations: EC, expectation confirmation; PU, perceived usefulness; PEOU, perceived ease of use; SA, satisfaction; CI, continuance intention; PR, perceived risk; PPRa, perceived physical risk; PPRb, perceived privacy risk; PPRc, perceived psychological risk; PFR, perceived functional risk; PSR, perceived social risk; PER, perceived economic risk.

Table 1 Items Used to Measure Research Constructs

Variable/Abbreviation		Item ID	Items
Perceived Ease of Use (PEOU)		PEOU1 PEOU2 PEOU3 PEOU4	The understanding and operation of shared nurse is very simple. I can use shared nurse flexibly. Shared nurse's using process is easy to learn. It's easy to use shared nurse.
Perceived Usefulness (PU)		PU1 PU2 PU3 PU4	Shared nurse enables me to get home care faster. Shared nurse saves money for me. Shared nurse gives me more options. I think shared nurse can improve my health and enhance my quality of life.
Perceived Risk (PR)	perceived economic risk	PER1 PER2 PER3	I am worried about the insecurity of online payment. I am worried about the unreasonable charge of shared nurse. I am worried about the extra cost of shared nurse.
	perceived physical risk	PPRa1 PPRa2 PPRa3	I am worried about my personal safety. I am worried about medical accidents. I am worried about the bad consequences for my health.
	perceived social risk	PSR1 PSR2 PSR3	I am afraid my relatives will not support me in choosing shared nurse. I am afraid my friends will blame me for using shared nurse. I am afraid that people around me will have prejudices about my decision to use shared nurse.
	perceived privacy risk	PPRb1 PPRb2 PPRb3 PPRb4	I am worried about my privacy being revealed. I am worried that shared nurse cannot keep health information confidential. I worry that shared nurse will use my privacy for other purposes without my approval. I am afraid the nurse cannot keep a secret for me.
	perceived functional risk	PFR1 PFR2 PFR3	I am worried about the poor quality of service provided by shared nurse. I am worried that shared nurse cannot solve my health problems effectively. I am worried that the services I get through shared nurse can not meet my expectation.
	perceived psychological risk	PPRc1 PPRc2 PPRc3 PPRc4	If using shared nurse can not get satisfactory results, it will affect my mood. If the quality of service provided by the shared nurse is not high and the treatment of the disease is delayed, I will be upset. If there is a loss of money and time in the use of shared nurse, I will have a sense of psychological imbalance. Due to various uncertainties of the Internet, I am worried that using shared nurse will cause me psychological burden.
Satisfaction (SA)		SA1 SA2 SA3 SA5	The decision to use shared nurse is right and wise. The experience of using the shared nurse will make me feel happy. Overall, I am satisfied with shared nurse. I am confident in the development of shared nurse.
Expectation Confirmation (EC)		EC1 EC2 EC3	The experience of using shared nurse was better than I expected. Shared nurse provides better service than I expected. Most of my pension expectations have been fulfilled.
Continuance Intention (CI)		CI1 CI2 CI3 CI4	I am interested in shared nurse. I would like to use shared nurse. I would recommend shared nurse to my family and friends. I think we should encourage people to use shared nurse.

from measures of perceived ease of use in prior studies with reference to establish a relationship with a company that provides services through an information system.^{7,22}

The SA constructs were derived from satisfaction measures in prior studies. The EC constructs were mainly based on expectation confirmation measures developed

by Bhattacharjee.²³ The CI constructs were applied to measure continuance intention in the studies by Bhattacharjee²³ and Premkumar²⁴ with reference to establish a relationship with a company providing services through an information system, and the modification of the users' situations applied to online tourism service websites to measure users' continuance intention. The constructs of PR were developed from perceived risk theory in prior studies.^{15-17,19}

In the design of the scale, the verification of each variable should use three items at least to ensure the rationality of the problem. In addition, when performing factor analysis and structural equation modeling (SEM), the items corresponding to each variable are less than 3, which may lead to unsatisfactory structural validity. A 5-point Likert scale ranging from 5 (highly agree) to 1 (highly disagree) was used in the study.

Data Collection

The study used convenience sampling to collect data from January to May 2020. The research group recruited nursing undergraduates as volunteers to enter the community to commence empirical research. The study participants consisted of elderly who live in the urban area of Jiangxi Province, China, who have various levels of experience with shared nurses. At the same time, in order to ensure the accuracy of the survey data, respondents need to have a clear awareness and normal hearing. Elderly patients with serious, critical disease or mental illness were excluded from the study. The investigation can be started after obtaining informed consent. To ensure the validity of the sample, before the investigation, the participants were asked whether they had used a shared nurse. Participation in the study was entirely voluntary, and no remuneration was provided.

Ethics Approval

To protect the rights and privacy of the participants, we obtained appropriate ethical approval for this study from the Ethics Committee of the Fifth Hospital of Nanchang with the number of 202,016. We declare that this study complies with the guidelines outlined in the Declaration of Helsinki. Before the investigation began, we informed the participants that their information would be protected and promised them confidentiality and anonymity. We also informed them that they could skip any question or withdraw at any time.

Data Analysis

Before testing the hypotheses, the reliability and validity of the reflective constructs and the research model were assessed. Tests were conducted to show the validity of the model constructs for the overall sample to ensure the adequate performance of the measurements. As suggested by numerous researchers, the quality of the reflective measurement model is determined by:

(1) Convergent validity (CV) refers to whether different methods can be used to measure the same construct of scale. Generally, the CV is acceptable if the following criteria were met:²⁵ 1) item loadings >0.7, statistically significant; 2) construct reliability (CR) >0.7; and 3) average variance extracted (AVE) >0.5.²⁵

(2) Discriminant validity refers to the degree of difference between one latent variable and other latent variable.²⁶ The square root of the AVE for each construct is higher than the correlation coefficient between the construct and all other constructs, indicating excellent discriminant validity.

(3) Construct reliability (CR) indicates the consistency of the measurement. The CR must exceed 0.7.²⁷

After verifying that the measures behave appropriately for the overall data set, the structural model is evaluated. The adequacy of constructs in the structural model allows the evaluation of the explanatory power of the entire model as well as the estimation of the predictive power.²¹ The study applied fit and assessment indicators taken from some references,²⁸ with the following fit indicators: (1) ratio of the chi-square value to the degree of freedom ($\chi^2/d.f.$), (2) goodness-of-fit index (GFI), (3) adjusted goodness-of-fit index (AGFI), (4) comparative fit index (CFI), and (5) root-mean-square error of approximation (RMSEA). It is generally believed that the relative chi-square value (χ^2/df) is less than 5, and the RMSEA value is 0.05 or below, and the values of other fitting indicators are above 0.9, indicating that the model fitting meets the statistical requirements.^{28,29}

Results

Profiling of the Sample

This section presents the descriptive analysis results. Descriptive analysis was used to analyze the distribution of basic sampling data corresponding to the distribution of samples and to provide a preliminary understanding of the characteristics. The demographics in this study can significantly reduce the number of variables introduced in the model, which is conducive to the establishment of a simplified analysis

model. After excluding randomly filled or incomplete questionnaires, we finally obtained 373 valid questionnaires. The demographics of the respondents are shown in Table 2.

Measurement Model Analysis

By analyzing the pre-survey data, an exploratory factor analysis (EFA) was performed on the original 41 items. The results showed that KMO = 0.61 and the Bartlett spherical test ($P < 0.001$), indicating that the data were suitable for exploratory factor analysis. This study applied factor loading with a value exceeding 0.5 as the evaluation standard. If the factor loading for a measure fails to reach this value, this measure is not representative and should be removed; otherwise, it should be retained since its value exceeds the standard.²⁹ The item SA4 “Shared nurse service is very attractive to me” and PU5 “Compared with the traditional way of medical treatment, shared nurse is more convenient” were not significantly loaded in their respective dimensions, so the exploratory factor analysis continued after deleting these two items. The results showed that the KMO = 0.62, the Bartlett spherical test ($P < 0.001$), and

the commonness of all items was greater than 0.20. The factors are extracted by methods of principal components and the oblique rotation; then, 11 factors with feature roots greater than 1 were extracted, with a cumulative variance contribution rate of 73.07%. After the discussion and professional judgements of the research group, the 11 factors were named as perceived risk (perceived psychological risk, privacy risk, physical risk, social risk, functional risk, economic risk), satisfaction, perceived ease of use, continuance intention, perceived usefulness, and expectation confirmation. Finally, a formal survey scale with 11 factors and 39 items was formed, which basically conformed to the initial design of the scale (Table 1). The experts generally believed that the content of the scale was clear, easy to understand, and basically in line with the Chinese expression habits.

In terms of content validity, the measures of constructs in this study were based on foreign studies and were modified by nursing and clinic experts for use. The measures used thus comply with standards of content validity. As shown in Table 3, the CR of all latent variables in the

Table 2 Demographics of the Respondents

Category		Number	Percentage (%)
Gender	Male	167	44.77
	Female	206	55.23
Age	60–64	100	26.81
	65–69	118	31.64
	70–74	83	22.25
	75–79	31	8.31
	>80	41	10.99
Marriage	Married	322	86.33
	Unmarried, divorced or widowed	51	13.67
Insurance	Without any insurance	11	2.95
	Medical insurance for urban employees	224	60.05
	New rural cooperative medical insurance	50	13.40
	Medical insurance for urban residents	59	15.82
	Free medical service	29	7.77
Health condition	With chronic diseases	279	74.80
	Without any disease	94	25.20
Living situation	Only with children	42	11.26
	Only with spouse	145	38.87
	Live alone	19	5.09
	With spouse and children	123	32.98
	In day-care center	44	11.80
Nursing home	None	111	29.76
	Yes	262	70.24

Table 3 Reliability and Convergent Validity

Variable	Items	Factor Loading	Cronbach's α	CR	AVE
PPRc	PPRc2 PPRc4 PPRc3 PPRc1	0.76 0.78 0.84 0.80	0.88	0.87	0.63
SA	SA1 SA5 SA2 SA3	0.85 0.85 0.82 0.83	0.91	0.90	0.70
PEOU	PEOU4 PEOU1 PEOU3 PEOU2	0.77 0.73 0.77 0.80	0.86	0.85	0.59
CI	CI3 CI2 CI4 CI1	0.86 0.85 0.86 0.89	0.94	0.92	0.75
PU	PU3 PU1 PU2 PU4	0.82 0.81 0.85 0.80	0.89	0.89	0.67
PPRb	PPRb1 PPRb2 PPRb3 PPRb4	0.84 0.76 0.79 0.85	0.86	0.89	0.66
PSR	PSR3 PSR2 PSR1	0.76 0.80 0.79	0.83	0.82	0.61
PPRa	PPRa1 PPRa3 PPRa2	0.84 0.79 0.78	0.82	0.85	0.65
EC	EC1 EC3 EC2	0.77 0.71 0.72	0.77	0.78	0.54
PFR	PFR1 PFR2 PFR3	0.83 0.77 0.81	0.85	0.84	0.64
PER	PER1 PER2 PER3	0.82 0.75 0.80	0.80	0.83	0.63

scale is greater than 0.7. As for convergent validity, the factor loadings are all above 0.7, and the AVEs range from 0.734 to 0.865. As shown in [Table 4](#), in the discriminant validity, the square root of AVE for a construct is higher than its correlations with other constructs. The results

showed reliability, convergent validity, and discriminant validity of the measurement model at acceptable levels.

Structural Equation Model Analysis and Hypothesis Testing

When the reliability and validity requirements were met, the next step was to evaluate the goodness-of-fit of the SEM. Confirmatory factor analysis (CFA) is a test of the fitness of theoretical models and data, and the model fitting index is an important statistical indicator.²⁸ In this study, we used AMOS 25 software to carry out a model fitting test and compared the fitting index with the ideal value. The results showed $\chi^2/df = 1.03$, root-mean-square error approximation (RMSEA) = 0.01, goodness-of-fit index (GFI) = 0.92, adjusted goodness-of-fit index (AGFI) = 0.9, and comparative fit index (CFI) = 0.98. These metrics provided evidence of an adequate fit between the hypothesized model and the observed data.

The AMOS 25 program was used to analyze SEM, and the hypothesis was tested. The path coefficients supported all hypothesized relationships, except for H11. [Table 5](#) shows the standardized path coefficients and hypotheses testing results.

Test of Mediation Effects

In order to understand the linking relationships in the theoretical model, we used the bootstrap method proposed by Preacher³⁰ to test the mediation effect of the model by using 5000 resampling and 95% confidence intervals. The results are shown in [Table 6](#). The mediation effects of SA and PU are significant, and 95% confidence intervals do not include 0. Therefore, hypotheses H5 and H10 are verified.

Discussion

In this study, we verified the path of factors that affect the continuance intention of elderly users to use shared nurses by establishing a structural equation model.

According to [Table 5](#), the main positive factors affecting satisfaction are EC and PEOU, with PEOU positively affected by EC. If users feel that the shared nurse can not only meet their health needs but also simplify the medical process, save time, and reduce the burden of home care, they will tend to keep using it for home care. A high EC makes users feel quality service at a reasonable price and meets their demands psychologically, which improves users' satisfaction. Perceived ease of use is one of the

Table 4 Discriminant Validity

	PPRb	SA	PEOU	CI	PU	PPRc	PSR	PPRa	EC	PFR	PER
PPRb	0.794										
SA	0.047	0.838									
PEOU	0.026	0.634	0.770								
CI	-0.276	0.421	0.554	0.865							
PU	-0.212	0.442	0.566	0.803	0.821						
PPRc	0.356	0.017	0.062	-0.254	-0.198	0.811					
PSR	0.261	0.039	0.101	-0.283	-0.177	0.332	0.780				
PPRa	0.369	-0.006	0.018	-0.299	-0.194	0.356	0.338	0.804			
EC	-0.025	0.532	0.493	0.447	0.538	0.009	0.034	0.023	0.734		
PFR	0.253	0.006	0.109	-0.220	-0.151	0.335	0.380	0.417	0.007	0.802	
PER	0.414	-0.022	0.058	-0.261	-0.216	0.375	0.376	0.416	0.020	0.320	0.792

Notes: Diagonal elements (in bold) represent square root of the average variance extracted (AVE) value for the corresponding construct. Nondiagonal values are the correlation.

Table 5 Testing Results of Hypotheses

Hypothesis	Dependent Variable	Independent Variable	Estimate	SE	CR	P	Results
H7	PEOU	EC	0.607	0.085	7.113	***	supported
H9	PU	EC	0.261	0.077	3.414	***	supported
H13	PU	PR	-0.628	0.108	-5.810	***	supported
H3	PU	PEOU	0.411	0.060	6.888	***	supported
H6	SA	PEOU	0.476	0.055	8.601	***	supported
H8	SA	EC	0.486	0.075	6.510	***	supported
H11	SA	PR	0.022	0.080	0.280	0.78	unsupported
H4	CI	SA	0.507	0.055	9.259	***	supported
H2	CI	PEOU	0.184	0.057	3.203	**	supported
H12	CI	PR	-0.428	0.087	-4.932	***	supported
H1	CI	PU	0.447	0.054	8.330	***	supported

Notes: **p<0. 05; ***p<0. 001

Table 6 Testing Results of Mediating Effects

Hypothesis	Estimate	Lower Value	Upper Value	Mediation
H5: CF-SA-CI	0.246	0.167	0.340	supported
H10: CF-PU-CI	0.117	0.055	0.194	supported

important variables in TAM, and the results indicated that PEOU is also an important positive factor affecting users' satisfaction with shared nurses. Because the appointment and payment functions of the shared nurse must be completed by mobile phones, and the research object of this study is the elderly who learn to use information systems slowly, the complicated process will affect the elderly users' experience and reduce their satisfaction.

Perceived usefulness is another important variable in the TAM. Hypothesis 3, H9, and H13 have been verified in this study, indicating that PU is positively affected by EC and PEOU as well as negatively affected by PR. The higher the

users' PEOU during using the shared nurse, the easier it is for the elderly users to use, and the stronger it is for their PU. The elderly's PEOU on shared nurses is mainly reflected in downloading the app, registration, appointment, payment, evaluation, and other aspects. Therefore, the operators of shared nurses should design simple and easy-to-use apps for the elderly. When the gap between the users' expectation and the actual utility is small, the users will feel the prior expectations and demands have been verified; that is, the expected practicality of the product has been achieved, which improves the users' PU of shared nurses during the subsequent use so as to increase the users'

continuance intention to use it. For this reason, H10 is verified. In addition, the potential risks of shared nurses can also negatively affect users' PU. For example, once users think that the functions of the shared nurse cannot meet their expectations after they use it, they will doubt their performance and usefulness, and even worry about whether it would harm their health, reduce the frequency of using shared nurses, or refuse to use it again.

Since H1, H2, H4, and H12 were verified, this study believed that the continuance intention of elderly users is positively affected by satisfaction, PEOU, and PU, while negatively affected by PR. The starting point of any product is to meet the users' needs, and given that no one is likely to choose a product without a function, the usefulness of the shared nurse is the basis for maintaining the users' continuance intention to use. Some elderly people choose to use shared nurses because it meets their need for home care. If users feel the gap between the actual utility and their expectation is far, it will lead to negative emotions and make them lose the confidence to continue using a shared nurse. Therefore, the degree of EC can indirectly affect the continuance intention through satisfaction, which is consistent with hypothesis H5. Therefore, we should improve the function of shared nurses, simplify the use process, and provide various services of door-to-door nursing care with the permission of national policies to accurately meet the needs of the elderly.

Studies have shown that elderly people are more sensitive to the perception of risk than young people. First, the cost of shared nurses is relatively higher than that of hospitals, and most of their retirement pensions are not high, so the price of shared nurses is an important factor for the elderly to consider. It is worth noting that Chinese long-term care insurance has not yet been fully covered, so most of the elderly often need to depend economically on their children. If their families do not agree, it may hinder the elderly's choice to select shared nurses. In addition, the corresponding laws and supervisory mechanisms of the shared nurse lack perfection. The nurses leave the hospital to provide home care for patients, which may pose a potential safety hazard for users and themselves. Once users find using a shared nurse may have some adverse consequences, they will no longer tend to use the service. In addition, the shared nurse involves users' privacy, including health records, disease history, home address, and family members. Therefore, once users feel their privacy is not protected, they will refuse to take the risk of using the product. In short, the lower the PR of shared nurse users, the more

they will trust it and increase their intention to continue using it, which is supported by hypothesis H12.

Based on the above analysis, the findings of this research have several implications for healthcare policies. It is recommended that businesses focus on improving the functional practicality and use-value of the shared nurse, simplify the operation process, and enhance the technical level and service quality of nurse practitioners to improve the users' PU, PEOU, and satisfaction, and increase users' stickiness. In addition, it is also recommended to increase the social visibility and reputation of shared nurses in multiple ways. In order to reduce the perceived risk to users, operators should set up a one-button call function for the alarm mechanism and purchase personal insurance for each user to minimize the damage caused by some accident, and ensure the payment security of the platform to reduce the users' property loss. Furthermore, the government should accelerate the improvement of the nursing insurance system by considering the fee of shared nurse services into medical insurance, strictly controlling the qualifications of enterprises, and improving relevant laws and supervision mechanisms involving the privacy protection of elderly users, handling of medical incidents, and standardizing and supervising the qualifications of nurse practitioners to protect the users' legitimate rights.

Conclusion

The contribution of this research is the development of an integrated model that synthesizes TAM, ECM, and perceived risk theory to explain the continuance intention of elderly users of shared nurses, which expands the application of the three theories in the field of e-health. The measurement model indicated that the theoretical constructs have adequate reliability and validity, while the structured equation model is illustrated as having a high model fit for empirical data. In this study, the data collected from the urban area of Jiangxi Province empirically tested the model, and all the hypotheses, except H11, were supported. According to the analysis of the results, this study put forward a realization path on how to maintain and improve the users' demands of the shared nurse in the discussion section in order to reduce the risk of development and investment for it, which has some guidance for other mobile medical research.

Limitations and Implications for Research

The theoretical contribution of this study is to move the frontier of continuance behavior research to users'

continuance behavior territory by using newer models to facilitate such research in an e-health context. However, this study could only validate the extension of the TAM and ECM models within a limited setting. Due to the growing aging problem and short development time of shared nurses in China, we regard the elderly as the main users of shared nurses to investigate. It only included a limited number of 373 elderly users in a specific region of southern China. The mindset of these elderly people can be influenced by the specific Chinese public health system as well as by regional characteristics, which is also a limitation of this study. Further research across different regions or cultures is necessary to verify the findings of our study. In addition, the trend of young people who suffer from chronic diseases and cancer is more obvious, which increases the demands for home care, and young people will become another subject of shared nurses. Researchers interested in applying the proposed framework to other constructs are encouraged to use this research model on users with different professional backgrounds. Furthermore, with the support of the Chinese government for mobile health care, it is important to analyze the influence of China's policies, laws, social environment, and other factors for the sustainable development of shared nurses in the future.

Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

Funding

This study was financially supported by a grant (20181BBG70021) from the Science and Technology Foundation of Jiangxi Province and the Scientific Research Project of the Chinese Nursing Association in 2019 (ZHKY201917).

Disclosure

All authors declare that they have no conflicts of interest for this work.

References

- National Bureau of Statistics of China. Total elderly population in China 2018; 2019. Available from: <http://data.stats.gov.cn/easyquery.htm?cn=C01&zb=A030607&sj=2018>. Accessed September 9, 2020.
- Chen KH, Ning L. Evaluation of shared nurses APPs. *Chinese Nursing Res.* 2019;33(11):1849–1855.
- Liao LF, Zhao F. The present status of nurse sharing in china. *Soft Sci Health.* 2019;33(9):16–19.
- Liu QX, Sun HY, Yu SP, et al. Difficulties and countermeasures of “internet + nursing service” in China. *J Nursing Sci.* 2019;34(17):11–13.
- Xie CY, He CZ, Hong YR, et al. Research progress on the model of “shared pension” in the context of aging. *J Nanchang Univ.* 2019;59(5):92–95.
- Guo XJ, Gai YB, Wang JY, et al. Research status of “Internet + nursing service” mode in China. *J Nursing Administration.* 2020;20(05):314–317.
- Liao CC, Chen JL, Yen DC. Theory of planning behavior (TPB) and customer satisfaction in the continued use of e-service: an integrated model. *Elsevier Sci Publishers B V.* 2007.
- Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Mis Quarterly.* 1989;13(3):319–340. doi:10.2307/249008
- Taylor S, Todd P. Assessing IT usage: the role of prior experience. *MIS Quarterly.* 1995;19(4):561–570. doi:10.2307/249633
- Oliver RL, Cognitive A. Model of the antecedents and consequences of satisfaction decisions. *J Marketing Res.* 1980;17(4):460–469. doi:10.1177/002224378001700405
- Bhattacharjee A, Perols J, Sanford C. Information technology continuance: a theoretic extension and empirical test. *J Comput Inf Syst.* 2008;49(1):17–26. doi:10.1080/08874417.2008.11645302
- The CJ. Impact of post-adoption beliefs on the continued use of health apps. *Int J Med Inform.* 2016;3(87):75–83.
- Bauer RA Consumer behavior as risk taking, in Hancock RS (Ed.) *Dynamic Marketing for a Changing World. Proceeding of the 43rd Conference of the American Marketing Association, Chicago.* 1960:389–398.
- Conchar MP, Zinkhan GM, Peters C, et al. An integrated framework for the conceptualization of consumers' perceived-risk processing. *J Acad Marketing Sci.* 2004;32(4):418–436. doi:10.1177/0092070304267551
- Joe T, Sharon T, Rebecca P. The relation of social isolation, loneliness, and social support to disease outcomes among the elderly. *J Aging Health.* 2006;18(3):359–384. doi:10.1177/0898264305280993
- Jacoby J, Kaplan L The components of perceived risk. In: Venkatesan M, editor. *Proceedings of the 3rd Annual Convention of the Association for Consumer Research.* Chicago IL. 1972:382–393.
- Shin DH. Towards an understanding of the consumer acceptance of mobile wallet. *Comput Human Behav.* 2009;25(6):1343–1354. doi:10.1016/j.chb.2009.06.001
- Cocosila M, Archer N, Yuan Y. Early investigation of new information technology acceptance: a perceived risk-motivation model. *Communications Association Information Systems.* 2009;1(25):30.
- Wolfinger M, Gilly MC. eTailQ: dimensionalizing, measuring and predictingetail quality. *J Retailing.* 2003;79(3):183–198. doi:10.1016/S0022-4359(03)00034-4
- Blesik T, Bick M. Adoption factors for crowdsourcing based medical information platforms. Knowledge Science, Engineering and Management: 9th International Conference, Passau, Germany. 2016:172–184. doi:10.1007/978-3-319-47650-6_14
- Dünnebeil S, Sunyaev A, Blohm I, et al. Determinants of physicians' technology acceptance for e-health in ambulatory care. *Int J Med Inform.* 2012;81(11):746–760. doi:10.1016/j.ijmedinf.2012.02.002

22. Davis FD, Bagozzi RP, Warshaw PR. User acceptance of computer technology: a comparison of two theoretical models. *Manage Sci.* 1989;35(8):982–1003. doi:10.1287/mnsc.35.8.982
23. Bhattacharjee A. Understanding information systems continuance: an expectation-confirmation model. *Mis Quarterly.* 2001;25(3):351–370. doi:10.2307/3250921
24. Bhattacharjee A, Premkumar G. Understanding changes in belief and attitude toward information technology usage: A theoretical model and longitudinal test. *Mis Quarterly.* 2004;28(2):229–254. doi:10.2307/25148634
25. Fornell C, Larcker DF. Evaluating Structural equation models with unobservable variables and measurement error. *J Marketing Res.* 1981;24(2):337–346. doi:10.1177/002224378702400401
26. Chen SC, Liu ML, Lin CP. Integrating technology readiness into the expectation–confirmation model: an empirical study of mobile services. *Cyberpsychol Behav Soc Netw.* 2013;16(8):604–612.
27. Nunnally JC. Psychometric theory. *Am Educ Res J.* 1978;5(3):83.
28. Roca JC, Chiu CM, Martínez FJ. Understanding e-learning continuance intention: an extension of the technology acceptance model. *Int J Human - Computer Studies.* 2006;64(8):683–696. doi:10.1016/j.ijhcs.2006.01.003
29. Hair JF, Black WC, Babin BJ, et al. *Multivariate Data Analysis: A Global Perspective.* 7th ed. NJ, USA: Prentice Hall; 2010.
30. Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav Res Methods.* 2008;40(3):879–891. doi:10.3758/BRM.40.3.879

Risk Management and Healthcare Policy

Dovepress

Publish your work in this journal

Risk Management and Healthcare Policy is an international, peer-reviewed, open access journal focusing on all aspects of public health, policy, and preventative measures to promote good health and improve morbidity and mortality in the population. The journal welcomes submitted papers covering original research, basic science, clinical & epidemiological studies, reviews and evaluations,

guidelines, expert opinion and commentary, case reports and extended reports. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/risk-management-and-healthcare-policy-journal>