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# Digital Risk, Digital Privacy and their Impacts on the Usage Intentions of Smart Senior Health Care Service

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## Abstract

*China is facing the aging problems. The development of smart health care is indeed beneficial to the integration and application of resources. However, smart health care also faces the digital divide, which is the difference in the ability of older people to access, analyze and process information while using digital tools. In this context, how to improve the elderly's willingness to use intelligent tools has become the focus of this paper. The objective of this study is to illustrate the current status; to validate the correlation of digital risk, digital privacy, digital trust and the usage of smart tools among the elderly in the era of digital divide; and lastly to make recommendations to relevant departments. Data was collected by questionnaire survey. A total of 266 valid samples was received. Results revealed that in the era of digital divide, digital risk and digital privacy perceived by older adults are negatively correlated with digital trust and usage intentions of smart tools. And digital privacy has a greater impact on the usage intentions of smart tools, while the variables of research model are considered. Such the government departments should strive to control the digital risks and digital privacy of smart tools was further suggested.*

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## 1. Introduction

China is entering a period of population reduction, and it will not be easy to avoid high aging through external population growth. Furthermore, the elderly and disabled elderly are increasing (He & Liu, 2019; Li & Qiu, 2020; Zhang & Fang, 2021), which brings serious challenges to the existing health and wellness system. It is urgent to develop the health and wellness cause (Ding & Xiong, 2020; Han & Shen, 2021; Li, Zhao, & Ji, 2020). However, different health care regulations and regulations in different regions lead to different problems facing aging and health care. Such as fragmentation of government support, unsupported pension (raising), unbalanced allocation of pension resources, and insufficient effective supply were met (Yen, 2021). How to deal with these aging problems and avoid the impacts on financial, economic and social stability has become the focus of government at all levels.

Reflecting on the above health care problems, the research has pointed out that intelligent healthcare seems to be a feasible solution. Intelligent healthcare integrates tourism, old-age care, nursing and other resources based on the internet platform to provide healthcare services, which has the advantages of promoting the match between supply and demand, helping to solve the dilemma of "unassisted old-age care", and improving the efficiency of resource allocation (Chen & Shao, 2021; Qing, 2021; Xi, Ren, & Zhai, 2014; Yang, 2019).

However, the research content of intelligent health care has been widely seen in virtual old-age care, intelligent old-age care, artificial intelligence home old-age care, etc. (Ding, Ding, Zhou, & Ouyang, 2019; Du & Sun, 2020; Sui & Peng, 2016; Zhang, Guo, & Bai, 2021). Furthermore, they've explored the technologies supporting intelligent wellness services, such as information technology, home safety technology, home care and healthcare technology (Jin, Xia, Zhang, & Li, 2018; Sui & Peng, 2016; Zhang & Song, 2015). Moreover, smart health medical equipment, construction and household industries were studied (Wu, 2021; Zhang, 2021). The smart pension industry is entering a mature stage. There are relatively few studies on intelligent health

care from the perspective of the needs of the elderly, especially the existing studies that ignore the digital divide of the elderly.

The digital divide comes from the lack of the elderly in the use and adaptation of intelligent tools, which is often reflected in data acquisition, analysis and processing. Smart health care services are supported by internet-based information technology, but the digital divide hinders the promotion of smart health services. Gaps exist in the access of individuals and households to information and communication technologies (ICTs) and in the use and use of connectivity for various activities (Zhang & Zhu, 2021). Digital divide is divided into ICT access (access) difference, ICT use difference and ICT use consequence difference (Li & Ke, 2021; Xu & Ma, 2020). There is a digital divide among people of different ages, regions, income and education levels (Xu & Ma, 2020). The elderly has the most serious problem of digital divide and are called "digital refugees" (Huang, 2020; Lu & Wei, 2021; Zhang, 2021). The participation of families, the government and all sectors of society attempts to solve the problem of digital divide through the development of LOHAS (Lifestyles of Health and Sustainability) technology, family inter-generational feedback and education for the elderly (Wang & Zhang, 2021; Yang & Jin, 2021; Yu & Liu, 2021; Zhou & Lin, 2018).

In summary, this study attempts to explore various issues faced by the elderly in smart health care in the era of the digital divide. This study concerns that the lack of confidence in the use of smart tools in the elderly may lead to differences in the willingness to use smart tools. The lack of confidence may come from issues of digital risk and digital privacy. Therefore, the objective of this study is to illustrate the current status; to validate the correlation of digital risk, digital privacy, digital trust and the usage of smart tools among the elderly in the era of digital divide; and lastly to make recommendations to relevant departments.

## 2. Literature Review and Hypotheses

### *2.1. The Concept of Digital Divide*

The concept of the digital divide is originated in the developing countries and is defined slightly differently by author. According to the definition of the National Telecommunications and Information Administration in 1999, the digital divide/digital gap is the gap between the information richer and the information poor man. In 2013, China's Information Administration has defined it as the gap in the ownership and use of modern information technology between different social groups. Under this definition, other domestic scholars have defined the digital divide, respectively, such as the gap between different generations in the use of digital resources to participate in public activities, the acquisition and use of information resources (Pan & Yang, 2022); The difference in the distribution of information technology in different regions and among different groups leads to a certain gap in the process of production and life of different groups (Wang, Li, & Huang, 2022); and the physical, psychological, economic, knowledge and literacy barriers and other influencing factors of the elderly's internet use, as well as the barriers of family, technology and network services (Ding, Fu, & Xu, 2022). Accordingly, this study defines the digital divide of the elderly as the gap in their participation in digital activities, access and use of information resources caused by their own and external factors.

As the elderly are generally faced with somewhat limited of digital divide, their willingness to use smart tools and participate in smart health care is also limited in the context of digital economy. Their physical factors such as visual, auditory and cognitive abilities decline, which affects the willingness of the elderly to use intelligent software functions (Zhang et al., 2021). More often, psychological factors will affect the willingness to use intelligent tools, such as psychological closure, stereotyping and technophobia (Ding et al., 2022). This stereotype of smart software or technophobia may be different from the traditional way of dealing with things by face to face. They may feel uncertain about the outcome of using smart tools while dealing with health and wellness issues. And they do not have enough confidence and trust in smart tools. Therefore, their willingness to accept network electronic products is still resistant (Fu & Liang, 2020).

### *2.2. The Concept of Digital Risk*

Reflecting on mentioned above, the uncertainty part of the outcome of using smart tools is the concept of perceived risk. Marketing research has confirmed that one of the key factors in purchasing behavior is perceived risk (Kumar & Grisaffe, 2004; Pires, Stanton, & Eckford, 2004). It has been defined as "alternative decision attributes that reflect variation in possible outcomes" (Gefen, Karahanna, & Straub, 2003). This possible outcome change is known as uncertainty (Yen, Hung, & Liu, 2014). Accordingly, this study defines digital risk as "the comprehensive assessment of the uncertainty derived from the use of intelligent tools by the elderly in the era of digital ". The higher the uncertainty of the outcomes, the higher the digital risk can be met. On contrary, the lower the uncertainty of the outcomes, the lower the digital risk can be presented.

In the era of intelligent services, consumers prefer online transactions, and their purchase decisions are often faced with higher risks, while comparing with the low-risk orientation of traditional face-to-face transactions. Taking the digital divide situation of the elderly as an example, about 47.9% of the elderly have not adapted to online shopping, and 53.8% have no information query ability (Wang et al., 2022), indicating that the elderly seems to face high digital risks, which resulting in their inability to enjoy the dividends of the digital economy (Ding et al., 2022).

Due to the engraving impression or fear of technology on smart tools, this fear may be one of the ways to show digital risks and one of the reactions to the uncertainty of the use of smart tools. However, such uncertain response behavior will affect their willingness to accept and use intelligent tools (Fu & Liang, 2020). Studies have confirmed that perceived risk and trust affect the willingness to use intelligent tools (Kamal, Shafiq, & Kakria, 2020; McKnight & Chervany, 2001; Pavlou, 2003). Accordingly, the following hypotheses are proposed:
*Hypothesis 1: In the era of digital divide, the perceived digital risks of the elderly is likely to affect their usage intentions of smart tools.*
*Hypothesis 2: In the era of digital divide, the perceived digital risk of the elderly is likely to affect their digital trust.*

### *2.3. The Concept of Digital Trust*

Trust is a person's assessment of the confidence and trustworthiness of another person to be trusted (Yen, 2017). Digital trust can be defined as the assessment of elderly people's confidence and trust in intelligent tools in the era of digital divide. When the elderly people assess their confidence and trust in intelligent tools is high, it is called high digital trust. Otherwise, it is called low digital trust.

Previous studies have shown that trust and risk are both important factors in technology acceptance patterns (McKnight & Chervany, 2001; Pavlou, 2003), and trust is used as a determinant of smart wellness use behavior (Anderson & Dedrick, 1990). Therefore, the following hypotheses are proposed in this study:
*Hypothesis 3: In the context of digital divide, the perceived digital trust of the elderly is likely to affect their usage intentions of smart tools.*

### *2.4. The Concept of Digital Privacy*

Privacy has been described as a state of solitude (Yeoh & Fah, 2011), and in health care systems, information critical to patient privacy is particularly prominent, commonly referred to as information privacy. In the era of digital economy, we put a lot of personal information on intelligent platforms, and often face the problem of personal information protection. In this study, digital privacy is defined as the degree to which the personal information of elderly people is protected by the platform when they use intelligent tools. If the personal information protection degree is higher, it is called high digital privacy. Otherwise, it is called low digital privacy.

Moreover, it will reduce initiatives for the adoption of new digital technologies if users believe that their information cannot be securely placed on the web (online health care platforms) (Kirchbuchner, 2015; Martins, Oliveira, & Popovič, 2014). Therefore, privacy can be understood as the trust of information users in the use of their information by the system, because it will affect the trust and willingness of users to use the system (Kamal et al., 2020). Similarly, privacy concerns such as the adoption of electronic health records and various web-based health care interventions have been shown in the wellness literature to reduce willingness to use digital tools (Hossain & Prybutok, 2008; Wu & Chen, 2005). Accordingly, the following hypotheses are proposed in this study:
*Hypothesis 4: In the era of digital divide, the perceived digital privacy of the elderly is likely to affect their usage intentions of smart tools.*
*Hypothesis 5: In the era of digital divide, the perceived digital privacy of the elderly is likely to affect their digital trust.*

## 3. Methodology

### *3.1. Research Model and Hypotheses*

This study aims at investigating the relationships among digital risk (DR), digital privacy (DP), digital trust (DT), and usage intentions (INT) in smart senior healthcare (SSH) context. It focuses on those causal relationships of variables and the quantitative method would be appropriated to employee to our study.

Furthermore, four variables named digital risk, digital privacy, digital trust, and usage intentions were taken in the conceptual framework Figure 1. The negative relationship was proposed in digital risk - usage intentions, digital risk - digital trust, digital privacy - digital trust, and digital privacy -usage intentions paths; while the positive relationship between digital trust and usage intentions was set.

Five hypotheses are proposed based on previous studies, Kamal et al. (2020); Yen (2017) and Pavlou (2003). In the proposed model, that digital risk is likely to have a negative influence on usage intentions in smart senior healthcare context (H1); digital risk is likely to have a negative influence on digital trust in smart senior healthcare context (H2); digital trust is likely to have a positive influence on usage intentions in smart senior healthcare context (H3) are proposed. Furthermore, digital privacy was added. We proposed that digital privacy is likely to have a negative influence on usage intentions in smart senior healthcare context (H4); and digital privacy is likely to have a negative influence on digital trust in smart senior healthcare context (H5).

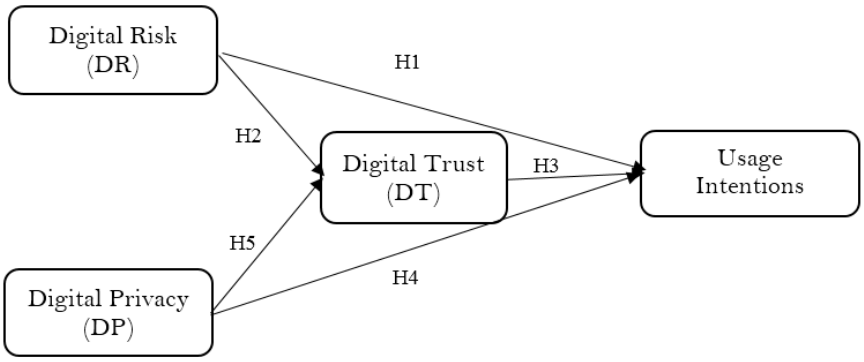


**Figure 1.** Research framework.

### *3.2. The Instruments of the Survey*

Four variables were undertaken in the causal model. digital risk (DR) was defined as "the extents of the costs, benefits, and uncertainty perceived by elderly while using digital tools" (Kamal et al., 2020; Pavlou, 2003). Three items were adopted to measure DR including "There is no uncertainty in using digital tools"," It won't hurt me to use digital tools", and "It doesn't cost anything to use digital tools".

Digital privacy (DP) was defined as "the extents of personal information protected by platforms and perceived by elderly while using digital tools" (Kamal et al., 2020). It was measured by three items, "Digital tools have no personal confidentiality", "Digital platforms don't know my personal information", and "Digital platforms do not protect my personal information".

This study defined digital trust (DT) as "the conference about the usage of smart senior healthcare program" (Kamal et al., 2020; Pavlou, 2003; Yen, 2017). Items including "Digital platform services are trustworthy", "I will pay attention to the prompts of the digital platform system", and "I believe in digital platform system" were employed for measuring the construct of digital trust.

Considering to usage intentions (INT), it was viewed as "the extents to reuse, positive words of mouth, and recommended the smart tools" (Pavlou, 2003; Yen, 2017). 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*

The theme of this study was to verify the causal relationships among 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 adopt 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 266 questionnaires obtained Table 1, about 39.1% were male and 60.9%were from female respondents. At about 25.6% of respondents were 50-54 years of age, 18.8% of respondents were 55-59 years of age, 23.7% of respondents were 60-65 years of age, 18.4% of respondents were 66-70 years of age, and 13.5% were above 71 years of age. Approximately 58.6% of respondents were graduated from primary school or below; 19.5% of respondents come from secondary school; 8.6% were undergraduate; 9.8% got a bachelor degree; and only 3.4% of respondents were master.

**Table 1.** Demographic characteristics (n=266).

| Item | Freq. | % | Item | Freq. | % |
|---|---|---|---|---|---|
| Gender | | | Occupation (before retired) | | |
| Male | 104 | 39.1 | Government department | 18 | 6.8 |
| Female | 162 | 60.9 | Manufacturing industry | 32 | 12.0 |
| Age (years old) | | | Commerce/service industry | 95 | 23.6 |
| 50-54 | 68 | 25.6 | Agricultural industry | 122 | 45.9 |
| 55-59 | 50 | 18.8 | Educational industry | 20 | 7.5 |
| 61-65 | 63 | 23.7 | Else | 24 | 9.0 |
| 66-70 | 49 | 18.4 | | | |
| 71 or above | 36 | 13.5 | Monthly income retired (RMB) | | |
| Educational level | | | <3000 | 125 | 47.0 |
| Primary | 156 | 58.6 | 3001-6000 | 81 | 30.5 |
| Secondary | 52 | 19.5 | 6001-8000 | 29 | 10.9 |
| Undergraduate | 23 | 8.6 | >8000 | 31 | 11.7 |
| Bachelor | 26 | 9.8 | | | |
| Master or above | 9 | 3.4 | | | |

With regard to the occupation, 6.8% of respondents work at government related sectors, 12% of respondents belong to industrial sector, 23.6% of respondents were commerce/service industry, 45.9% of respondents were farmers, 7.56% of respondents were educational industry, and 9% of respondents were retired/else. Approximately 47% of respondent's monthly income was below 3000 RMB (RMB is widely used in China. just like other country's currency), 30.5% of respondent's monthly income was 3001-6000 RMB, and 10.9% of respondent's monthly income was 6001-8000 RMB while 11.7% of respondent's monthly income exceeds 8000 RMB. The Correlation matrix of measurement was listed in Appendix A.

## 4. Results

### *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 (Bagozzi & Yi, 1988). Then, the psychometric properties of the constructs were assessed by calculating the Cronbach's alpha in terms of reliability coefficient (Nunnally & Bernstein, 1994) and the hypotheses testing was carried out in the next section. Table 3 reported the discriminant validity of constructs. Of all the coefficients of correlation were significant and less than 1 indicating discriminant validity of constructs was met.

**Table 2.** Descriptive statistics (n=266).

| Question items | Mean | SD | Sk. | Ku. | SFL |
|---|---|---|---|---|---|
| Digital Risk (VE=71.69%, Cronbach's Alpha= 0.800) | | | | | |
| DR1: I'm used to the established way of doing things. | 3.36 | 1.101 | -0.197 | -0.479 | 0.868 |
| DR2: I prefer the existed ways of doing things to trying new digital ways. | 3.30 | 1.182 | -0.048 | -0.942 | 0.825 |
| DR3: I don't like strange ways of doing things. | 3.28 | 1.049 | -0.013 | -0.525 | 0.847 |
| Digital Privacy (VE=79.85%, Cronbach's Alpha= 0.873) | | | | | |
| DP1: I have enough skills about information collection. | 3.36 | 1.080 | -0.025 | -0.668 | 0.892 |
| DP2: I have enough skills about information analysis. | 3.34 | 1.074 | -0.081 | -0.623 | 0.867 |
| DP3: I have enough skills about Information processing. | 3.29 | 1.069 | 0.092 | -0.678 | 0.921 |
| Digital Trust (VE=60.05%, Cronbach's Alpha= 0.664) | | | | | |
| TR1: The usage of smart senior care program is a good idea. | 2.84 | 1.204 | 0.027 | -0.868 | 0.797 |
| TR2: The usage of smart senior care program is a smart idea. | 2.67 | 1.080 | 0.137 | -0.492 | 0.739 |
| TR3: I like this idea. | 2.76 | 1.140 | -0.025 | -0.728 | 0.788 |
| Usage Intention (VE=59.37%, Cronbach's Alpha= 0.656) | | | | | |
| INT1: Whenever I need, I'll process network through smart phone. | 2.68 | 1.153 | 0.121 | -0.825 | 0.770 |
| INT2: I'll tell the positive benefits of smart phone to other senior. | 2.67 | 1.048 | 0.209 | -0.341 | 0.730 |
| INT3: I'll recommend the benefits of smart phone to other senior. | 2.65 | 1.065 | 0.074 | -0.484 | 0.809 |

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

**Table 3.** Discriminant validity of constructs (n=266).

| Items | M | SD | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|
| 1. Digital Risk | 9.94 | 2.82 | 1 | | | |
| 2. Digital Privacy | 9.99 | 2.88 | 0.873** | 1 | | |
| 3. Digital Trust | 8.26 | 3.02 | -0.835** | -0.808** | 1 | |
| 4. Usage Intention | 7.99 | 2.94 | -0.789** | -0.797** | 0.780** | 1 |

**Note:** Means coefficients were significant **p<0.01.

**Table 4.** Results of hypotheses testing.

| Paths | Model 1 | | Model 2 | |
|---|---|---|---|---|
| | Estimate | t | Estimate | t |
| H1: DR-INT | -0.227** | -2.918 | | |
| H2: DR-DT | | | -0.541*** | -8.142 |
| H3: DT-INT | 0.308*** | 4.780 | | |
| H4: DP-INT | -0.349*** | -4.789 | | |
| H5: DP-DT | | | -0.336*** | -5.050 |
| $R^2_{INT}$ | 0.698 | | | |
| $R^2_{TR}$ | | | 0.723 | |
| Model fitness | | | | |
| F-values (d1, d2) | 201.964(3,262) | | 343.771(2,263) | |
| VIF | 3.62-5.26 | | 4.20 | |

**Note:** means t-values were significant **p<0.01, ***p<0.001, DR: Digital Risk; DP: Digital Privacy; DT: Digital Trust; INT: Usage Intention; Estimate: Standardized coefficient; VIF: Variance inflation factor.

### 4.2. Hypotheses Testing

The hypothesis model of this study has four variables DR, DP, DT, and INT. DR, DP are independent variables, and DT and INT are dependent variables. Therefore, there are two regression equations in this study, which are as follows:

Model 1: The prediction of INT

$INT= a_1+b_{11}DR+b_{12}DP+b_{13}DT+e_1$

Model 2: The prediction of DT

$DT= a_2+b_{21}DR+b22DP+e_2$

In this study, SPSS 22.0 (Statistical Program for Social Sciences) software was used for multiple regression analysis, and the analysis results are summarized in Table 4.

In model 1, the dependent variable is INT, and the independent variables are DR, DP, and DT. The results showed that the model fit was appropriate (F=201, P <0.01), and the VIF value was less than 10, indicating that the collinearity problem was not serious. In terms of variable relationship, DR and DP significantly and negatively affected INT with an influence coefficient of -0.227(t=-2.918) and -0.349(t=-4.789), while DT significantly and positively affected INT with an influence coefficient of 0.308(t=4.780). The independent variable could effectively predict 69.8% of the variation of the dependent variable. Accordingly, H1, H3, and H4 are supported.

In model 2, the dependent variable is DT, and the independent variables are DR and DP. The results showed that the model fit was appropriate (F=343, P <0.01) and the VIF value was less than 10, indicating that the collinearity problem was not serious. In terms of variable relationship, DR and DP significantly negatively affected DT, and the influence coefficient was -0.541(t=-8.142) and -0.336(t=-5.050), and the independent variable could effectively predict 72.3% variation of the dependent variable. Accordingly, H2 and H5 are supported.

### 4.3. Discussion

Based on the analysis, this study finds that DR, DP and INT are negatively correlated. This indicates that when the elderly perceive higher digital risk, they have lower willingness to use smart tools. The higher their perception of digital privacy, the lower their willingness to use smart tools was met. Moreover, DR and DP revealed significantly and negatively affect INT, indicating that elderly people's perception of digital risk and digital privacy would significantly and negatively affect their willingness to use smart tools. However, digital trust is positively correlated with INT, indicating that the higher the perceived digital trust of the elderly, the higher their willingness to use smart tools. Moreover, the perceived digital trust of older adults has a significant and positive impact on their willingness to use smart tools. The results are consistent with the existing studies.

Furthermore, in terms of the prediction of digital trust, the results show that negative correlation was confirmed among perceived digital risk, digital privacy and digital trust of the elderly. It implies that the higher their perceived digital risk and digital privacy, the lower their perceived digital trust. Moreover, the perceived digital risk and digital privacy of the elderly significantly and negatively affect digital trust, which has not been found in other studies, and this is a new finding in this paper.

In addition, in terms of the overall paths, digital risk and digital privacy not only directly affect the elderly's intention to use smart tools, but also impact it through digital trust. The overall influence of digital risk on the intention to use is 0.394(0.227+0.541*0.308), and the overall influence of digital privacy on the intention to use is 0.452(0.349+0.336*0.308). The influence of digital privacy on the intention to use intelligent tools of the elderly is greater while only the variables of research model are considered.

In summary, in the process of using digital tools, not only their confidence, trust and attention to smart tools will decrease, but also their willingness to use such smart tools again, spread them positively and recommend them to their friends and relatives will reduce, when the elderly respondents perceive higher uncertainty, higher cost and damage to their rights and interests. Therefore, how the government departments, health care institutions and smart platform managers manage and control digital risks has become an important factor for whether the elderly can generate digital trust and use intention. Secondly, in the digital privacy, the elderly will have confidence and trust to smart tools, and also can directly improve their usage of smart tools, spread positive words and recommendation only occurred when elderly perceive the information is protected, and the intelligent tool attaches importance to personal privacy and do not use personal information without authorization. Further, the influence of digital privacy on the usage intentions of smart tools and digital trust is greater than the digital risk. The government departments, smart health care institutions and intelligent platform managers should pay more attentions to and control the digital privacy of smart tools.

## 5. Conclusion

China is facing the aging problems, the development of smart health care is indeed beneficial to the integration and application of resources. However, smart health care also faces the digital divide, which is the difference in the ability of older people to access, analyze and process information using digital tools. In this context, how to improve the elderly's willingness to use intelligent tools has become the focus of this paper. Based on the above analysis and discussion, this study draws the following conclusions:

- In the era of digital divide, the average scores of perceived digital risk, digital privacy and digital trust, and usage intentions of smart tools of the elderly are not high.
- In the era of digital divide, digital risk and digital privacy perceived by older adults are negatively correlated with digital trust and usage intentions of smart tools.
- In the era of digital divide, the perceived digital risk and digital privacy have a significant negative impact on digital trust and usage intentions of smart tools.
- Digital privacy has a greater impact on the usage intentions of smart tools, while the variables of research model are considered.

This study puts forward the following suggestions based on the above conclusions.

In the era of digital divide, the government departments should strive to control the digital risks and digital privacy of smart tools, educate the elderly, let the elderly have confidence in smart tools and trust them, and use smart tools for health care activities. In terms of specific actions, the establishment the laws and regulations of intelligent tool control is needed. Regular inspection of the use of personal information by smart tool providers and publication of inspection results are conducive to reducing the perceived digital risks and digital privacy of the elderly, and improving their digital trust and the usage intention of smart tools.

Furthermore, regarding to the management of health care institutions and intelligent tools, the managers and staff should be educated and trained in digital risk management and digital privacy. Through these training activities, staff can understand the meaning and connotation of digital privacy, the use of personal information, etc. When serving the elderly, the scope of collection and use of personal information should be informed in detail, and digital privacy should be improved to gain the trust and use intention of the elderly. In addition, relevant procedures should be clearly informed in the work and service process to reduce the uncertainty and cost of using intelligent tools and gain the trust and willingness of the elderly to use them.

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**Appendix A.** Correlations among indicators.

| Items | M | SD | Digital risk | | | Digital privacy | | | Digital trust | | | Usage intentions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | DR1 | DR2 | DR3 | DP1 | DP2 | DP3 | DT1 | DT2 | DT3 | INT1 | INT2 | INT3 |
| DR1 | 3.36 | 1.10 | 1 | | | | | | | | | | | |
| DR2 | 3.30 | 1.18 | 0.576** | 1 | | | | | | | | | | |
| DR3 | 3.28 | 1.05 | 0.618** | 0.531** | 1 | | | | | | | | | |
| DP1 | 3.36 | 1.08 | 0.645** | 0.705** | 0.657** | 1 | | | | | | | | |
| DP2 | 3.34 | 1.07 | 0.644** | 0.550** | 0.722** | 0.631** | 1 | | | | | | | |
| DP3 | 3.29 | 1.07 | 0.669** | 0.627** | 0.734** | 0.757** | 0.703** | 1 | | | | | | |
| DT1 | 2.84 | 1.20 | -0.611** | -0.655** | -0.579** | -0.635** | -0.638** | -0.588** | 1 | | | | | |
| DT2 | 2.67 | 1.08 | -0.626** | -0.551** | -0.685** | -0.628** | -0.615** | -0.654** | 0.585** | 1 | | | | |
| DT3 | 2.76 | 1.14 | -0.605** | -0.596** | -0.706** | -0.629** | -0.688** | -0.658** | 0.719** | 0.691** | 1 | | | |
| INT1 | 2.68 | 1.15 | -0.554** | -0.674** | -0.576** | -0.619** | -0.594** | -0.622** | 0.691** | 0.537** | 0.638** | 1 | | |
| INT2 | 2.67 | 1.05 | -0.534** | -0.494** | -0.641** | -0.637** | -0.637** | -0.614** | 0.543** | 0.641** | 0.624** | 0.622** | 1 | |
| INT3 | 2.65 | 1.07 | -0.627** | -0.645** | -0.675** | -0.702** | -0.678** | -0.677** | 0.668** | 0.564** | 0.664** | 0.774** | 0.760** | 1 |

**Note:** **p<0.01.