

Catching silver consumers in China: an integrated model of Chinese older adults' use of social networking technology

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Abstract:

Purpose: This study aims to gain a more holistic understanding of Chinese older adults' perceptions and use of social networking technology. **Design/methodology/approach:** Grounded in the extended unified theory of acceptance and use of technology (UTAUT2) and expectation-confirmation (ECM) theory, the study proposed an integrated social media user engagement model and tested the model utilizing the data collected from 323 Chinese older adults. **Findings:** The results reveal that half of the relationships in the proposed model were supported. Specifically, performance expectancy, facilitating conditions, social influence and hedonic motivation were all found to have a significant positive influence on perceived value. In addition, the results confirmed the positive impact of facilitating conditions on satisfaction. Both perceived value and satisfaction were also found to have a significant positive effect on Chinese older adults' intention to engage in social networking technology. **Originality/value:** Chinese older adults are embracing Internet technologies at a greater rate; thus, understanding their perspectives of social networking technology offers valuable insights. This empirical study enhances understanding of the nature and strength of the relationships in the proposed integrated social media user engagement model in the context of Chinese older adults.

Keywords: older adults | social media | social networking technology | perceived value | satisfaction | UTAUT

Article:

Introduction

The increasing number of older persons in the population has implications for nearly all sectors of society. Older adults are those aged 60 or 65 years or over (United Nations, 2019); they are adults undergoing late midlife and approaching old adulthood. According to "World Population Ageing 2017" (United Nations, 2017), the global population aged 60 or older was 962 million in 2017, more than twice as large as in 1980 when there were 382 million older persons worldwide. Furthermore, by 2050, the number of older persons is expected to double again, reaching nearly

2.1 billion. While often stereotyped as weak, dependent and unwilling to change, older adults today are among the most demanding customers who pursue independent, active and socially connected lifestyles (Lee and Coughlin, 2015). Contrary to social perception, older adults are aware of technological benefits and willing to try new technology (Hunsaker and Hargittai, 2018).

The rapid growth of mobile technology, the internet and various social media apps is changing older adults' lives in many ways. Social networking services (SNSs) have been viewed as the most exciting interactive interface on the internet (Hu *et al.*, 2018; Naqvi *et al.*, 2019). They enable users to communicate beyond local or social boundaries and offer possibilities to share user-generated content like photos and videos (Coelho and Duarte, 2016). The vast popularity and steadfast use of social media provide a unique opportunity for older adults (Hu *et al.*, 2018). The use of SNSs may help older adults who have reduced social engagement due to age-related factors such as retirement connect more effectively with their social contacts. Older adults who use SNSs reported higher perceived support from friends, wider social networks and greater social connectedness (Hunsaker and Hargittai, 2018; Yu *et al.*, 2016).

Despite the potential positive impact of Internet technology on older adults, academic research attention to older adults' perceptions of Internet use has been minimal so far (Kuoppamäki *et al.*, 2017). Older adults are becoming an important market segment for all Internet-based services, but Chinese older adults' use of social networking technology is overlooked in the literature. This study aims to fill the gap through the following objectives: (1) to propose a theoretical model based on the extended unified theory of acceptance and use of technology (UTAUT2) and expectation-confirmation (ECM) framework to investigate user engagement of social networking technology, (2) to empirically test the proposed model using data collected from Chinese older adults and (3) to provide practical insights for better understanding of Chinese older adults' social media engagement behavior. The study contributes to the literature by developing an integrative model to enhance our understanding of the relationships between the drivers of social media use and older adults' engagement behavior. Moreover, it focuses on older adults in China. We draw implications for our understanding of this understudied population.

Literature review

Chinese older adults and their Internet use

In 2019, China's total population was 1.4 billion; particularly, the population count of those 55 years and above was about 340 million, accounting for approximately 24% of China's total population (US Census Bureau, 2019). To put the power of this consumer segment into perspective, in 2019, the number of China's older adults alone (55 and over) was approximately equal to the entire US population (US Census Bureau, 2019). Globally, nearly one in four persons aged 60 years and over in 2017 lived in China (United Nations, 2017). The share of older people aged 60 years and over in China was projected to increase from 16% in 2017 to 35% in 2050 (United Nations, 2017).

As of March 2020, China's Internet users reached 904 million (up 75.08 million from December 2018), and the internet penetration rate was 64.5% (up 4.9% from December 2018) (China

Internet Network Information Center, 2020). As of March 2020, the number of mobile Internet users reached 897 million (99.3% of the total Chinese Internet user population), compared with 420 million mobile Internet users (69.3% of the total Internet users) at the end of 2012 (China Internet Network Information Center, 2013, 2020). In 2019, there were around 882 million social media users in China (Statista, 2020a, b). By 2020 March, 16.9% of China's total Internet users were 50 years and above, compared with 6.2% in 2012 (China Internet Network Information Center, 2013, 2020). From a global perspective, in 2019, a total of 17% of global Internet users were 55 years and older (Statista, 2020a, b).

Theoretical foundation

The UTAUT2 model and ECM framework provide the theoretical foundation for the present study. Venkatesh *et al.* (2003) developed the unified theory of acceptance and use of technology (UTAUT) as a comprehensive synthesis of prior technology acceptance research. Venkatesh *et al.* (2003) proposed four key constructs in UTAUT, which are predicted to impact technology adoption and use: performance expectancy, effort expectancy, social influence and facilitating conditions. These four attitudinal dimensions act as the determinants of intention to use technology. However, the original UTAUT emphasizes the importance of utilitarian motivation and is more suitable for technology use in organizational contexts. Later, Venkatesh *et al.* (2012) modified the original UTAUT model to formulate UTAUT2 by adding three additional key constructs (price value, hedonic motivation and habit) to pay particular attention to the consumer use context. Macedo (2017) applied the UTAUT2 framework in her study and found that its applicability is well extended to the consumer context due to its comprehensiveness and high explanatory power. However, both Venkatesh *et al.* (2012) and Macedo (2017) recognized that future studies can identify other relevant factors to increase the applicability of UTAUT2 to a wide range of consumer technology use contexts. The present study is an effort to develop a more comprehensive approach by integrating an ECM perspective with the UTAUT2 framework.

ECM theory posits that before a transactional experience occurs, customers form an initial expectation for a specific product or service (Bhattacharjee, 2001). As customers acquire certain experiences with the product or service, their evaluative opinions arise from comparing original expectations against perceived performance. In the SNS context, ECM of social media use is users' perception of the congruence between expectations of social media use and the actual perceived performance. Users' satisfaction is an affective state of appraisal following social media use. When social media users perceive their usage expectations are confirmed favorably, the perceived value of their social media experience is high. The consumers' positive evaluation of their social media use leads to an overall affective state of social media use, demonstrating satisfaction and persistent engagement. Satisfied consumers are more likely to appreciate the confirmed outcome and engage in active use of social networking technology. Krasnova *et al.* (2017) and Chang and Zhu (2012) applied the ECM perspective in theorizing SNS users' continuance intentions.

Development of hypotheses

Effect of performance expectancy on perceived value and satisfaction

Performance expectancy is defined as the degree to which using a technology will provide benefits to consumers in performing certain activities (Venkatesh *et al.*, 2012). Performance expectancy, similar to perceived usefulness, mainly relies on the presence of a felt need (Hauk *et al.*, 2018; Venkatesh *et al.*, 2016). In this study, performance expectancy captures older adults' perceptions of the extent to which using a particular social networking technology will provide benefits to them, meet their needs and help them achieve their goals.

Focusing on examining Chinese older adults' behavior, we argue that socioemotional selectivity theory (SST) provides a relevant rationale for our study regarding older adults' needs. SST considers the dynamics of need development across people's lifespan. It maintains that as people get older and perceive their lifetime as more limited, their values and needs shift (Carstensen *et al.*, 2003). Older adults prefer activities that satisfy their life meaning and social needs (e.g. family and close social relationships). SNSs bring Chinese older adults many conveniences. They use SNSs as an important source of recreational, social and health information and an effective and efficient channel for exchanging social support and staying connected with their social ties. Thus, older adults' use of SNSs improves their sense of empowerment, life satisfaction and well-being (Coelho and Duarte, 2016; Zhou, 2019). Our extensive literature review supports a positive impact of performance expectancy on SNS users' perceived value and satisfaction in the context of older adults (Coelho and Duarte, 2016; Macedo, 2017; Yu *et al.*, 2016; Zhou, 2019). Thus, we hypothesize:

H1a. Performance expectancy positively and strongly influences perceived value.

H1b. Performance expectancy positively and strongly influences satisfaction.

Effect of effort expectancy on perceived value and satisfaction

Effort expectancy refers to the degree of ease associated with consumers' use of technology (Venkatesh *et al.*, 2012). It captures older adults' perception of the extent to which they feel comfortable using social media. Studies show that individuals' learning abilities are influenced by their fluid cognitive abilities, such as the effectiveness of working memory, memory capacity, processing abilities and ability to coordinate simultaneous activities (Hauk *et al.*, 2018). As increased age is found to be associated with decreased fluid cognitive abilities, older adults generally face physical and cognitive barriers and have lower technology familiarity (Lee and Coughlin, 2015). It becomes more difficult for older adults to develop new technology-related skills and learn complex operation procedures (Berkowsky *et al.*, 2018; Hauk *et al.*, 2018).

In the context of older adults' use of SNSs, while it is important to meet their needs by offering practical benefits of SNSs, it is critical that older adult users are not overwhelmed with too many features and options (Lee and Coughlin, 2015). When older adults feel comfortable using social networking technology, they are more likely to identify its perceived value and feel more satisfied with using it in their daily lives. Our extensive literature review supports that the degree of ease associated with the use of SNS has a strong effect on older adults' attitudes toward SNS

(Coelho and Duarte, 2016; Hauk *et al.*, 2018; Hunsaker and Hargittai, 2018; Macedo, 2017; Zhou, 2019). Thus, we hypothesize:

H2a. Effort expectancy positively and strongly influences perceived value.

H2b. Effort expectancy positively and strongly influences satisfaction.

Effect of social influence on perceived value and satisfaction

As people socially interact, they undergo various social influences that shape their perceptions. Several closely related theories, such as the theory of planned behavior and the technology acceptance model, include the impact of subjective norms in technology acceptance decisions. In this study, social influence, a construct similar to subjective norms, captures Chinese older adults' perceptions of the importance attributed to using social media by those who are important in their lives, such as family, friends or people whose opinions are valued. Older adults are more likely to place increased salience on social influences. They seem to depend more on social factors, especially the participation of others to whom they closely relate (Hauk *et al.*, 2018). Previous research demonstrates a direct effect of social influence on older adults' use of computers and the internet (Macedo, 2017). Their decision to use social media largely follows their children's, grandchildren's, close friends' and community members' participation (Lee and Coughlin, 2015). With more of their friends, family members and peers using social media, older adults are more likely to identify its perceived value and feel more satisfied with their experience (Macedo, 2017; Zhou, 2019). Thus, we hypothesize:

H3a. Social influence positively and strongly influences perceived value.

H3b. Social influence positively and strongly influences satisfaction.

Effect of facilitating conditions on perceived value and satisfaction

Facilitating conditions refer to consumers' perceptions of the resources and support available to perform a behavior (Venkatesh *et al.*, 2012). They capture older adults' perception of the environmental barriers or availability of resources related to the use of social networking technology. Past research on information and communication technology (ICT) acceptance in older adults frequently reveals computer anxiety and generally negative views (Berkowsky *et al.*, 2018; Hauk *et al.*, 2018). Facilitating conditions include access, resources, knowledge and availability of social and technical support. It is highly recommended that novice users are supported by an Internet-savvy mentor/friend/family member to get acquainted with data privacy protection issues, registration processes, discussions and sharing content and other relevant information (Zhou, 2019). When older adults receive more support, they will be more likely to perceive the value of using SNSs. Facilitating conditions enhance older adults' awareness of technology and their Internet and social media self-efficacy, foster a sense of social inclusion and open more opportunities to use technology. Older adults' perception of facilitating conditions is important to them and strongly influences their perceived value of social media and their affective state of social media involvement and engagement (Lee and Coughlin, 2015; Macedo, 2017). Thus, we hypothesize:

H4a. Facilitating conditions positively and strongly influences perceived value.

H4b. Facilitating conditions positively and strongly influences satisfaction.

Effect of hedonic motivation on perceived value and satisfaction

Hedonic motivation refers to the pleasure derived from activities. It has been shown to play an essential role in determining technology use in the consumer-use context (Venkatesh *et al.*, 2012). Integrating hedonic motivation into UTAUT2 complements UTAUT's strongest predictor, which emphasizes utility (Venkatesh *et al.*, 2012). Hedonic motivation is based more on affective or emotional gratification and is more subjective and experiential. Recent studies by Macedo (2017) and Kim *et al.* (2013) supported the role of hedonic motivation in consumer adoption of Internet and mobile technology.

In the social media context, Martín-Consuegra *et al.* (2019) maintained that hedonic motivation stimulates browsing on social media sites; enhances interaction with the tools, apps and social media content; and furthers perceived value and satisfaction. SNSs feature many enjoyable tools and applications. Older adults' experience in SNSs can satisfy their intrinsic needs and lead to higher perceived value and satisfaction when the experience provides fun and excitement. Thus, we hypothesize:

H5a. Hedonic motivation positively and strongly influences perceived value.

H5b. Hedonic motivation positively and strongly influences satisfaction.

Effect of perceived value on engagement intention and the mediating role of satisfaction in the perceived value-engagement intention relationship

The marketing literature characterizes perceived value as customers' overall assessment of product or service utility based on a perception of what is received (benefits they gain) and what is given (price they pay) (Yang and Peterson, 2004). Individuals use social media for information sharing and social relationship development to satisfy their personal, social and emotional needs. The perceived emotional, affective and social benefits of using social media enhance older adults' quality of life and social connectivity. Perceived costs for social media use include monetary payments and nonmonetary sacrifices. Monetary payments consist of Internet connection costs (broadband); mobile service subscription; cost of computer, tablet or smartphone; and cost of computer and Internet skills training. Nonmonetary sacrifices could include time, anxiety about learning social media operations and stress experienced by consumers when adopting and using social media.

According to Oliver (1999), satisfaction is defined as pleasurable fulfillment. From a service marketing viewpoint, satisfaction relates to customers' affective state and subsequent feelings toward an offering derived from their evaluation of service consumption experience (Hu *et al.*, 2018; Oliver, 1999). Satisfaction with social media use refers to a positive affective feeling

toward social media use and relies on users' perceptions and evaluations of social media features and actual performance (Hu *et al.*, 2018).

Previous research provides convincing evidence that affect is significantly influenced by cognition and demonstrates that perceived value represents customer cognitive assessment of the nature of relational exchanges with their service suppliers, and satisfaction reflects customers' overall affective feeling derived from the perceived value of the online service (Yang and Peterson, 2004). In a study of mobile users, Kim *et al.* (2013) confirmed that perceived value strongly and positively influences US mobile users' satisfaction. Thus, we hypothesize:

H6a. Perceived value positively and strongly influences satisfaction.

Continuous engagement in social networking technology is defined as the state of being involved, occupied and intrinsically interested in using social media (Kim *et al.*, 2013). Engagement relates to user experience characterized by attributes of affect, attention, curiosity, interactivity, motivation and so forth (O'Brien and Toms, 2008). Engagement is not a momentary and specific state; rather, it is a more persistent and pervasive affective-cognitive state (Kim *et al.*, 2013). Kim *et al.*'s (2013) study of mobile users maintained that perceived value strongly affects their engagement intention. Positive and favorable user experience is more likely to lead to long-term use arising from consumers' consideration of value received (Berkowsky *et al.*, 2018; Hu *et al.*, 2018). Thus, we hypothesize:

H6b. Perceived value positively and strongly influences engagement intention.

Satisfied customers are more likely to possess a higher involvement intention and recommend the product/service to their acquaintances (Oliver, 1999; Yang and Peterson, 2004). When people achieve a higher level of satisfaction with social media use, a mental linkage between usage behavior and situational cues is activated (Hu *et al.*, 2018), and they exhibit active involvement, leading to the formation of engagement behavior. Findings of Kim *et al.* (2013) and Gao and Bai (2014) supported the positive impact of satisfaction on mobile users' engagement intention. Thus, we hypothesize:

H7. Satisfaction positively and strongly influences user's engagement intention with social media.

Figure 1 illustrates the holistic and integrative conceptual framework, which is deemed suitable to explain the social media use behavior of Chinese older adults.

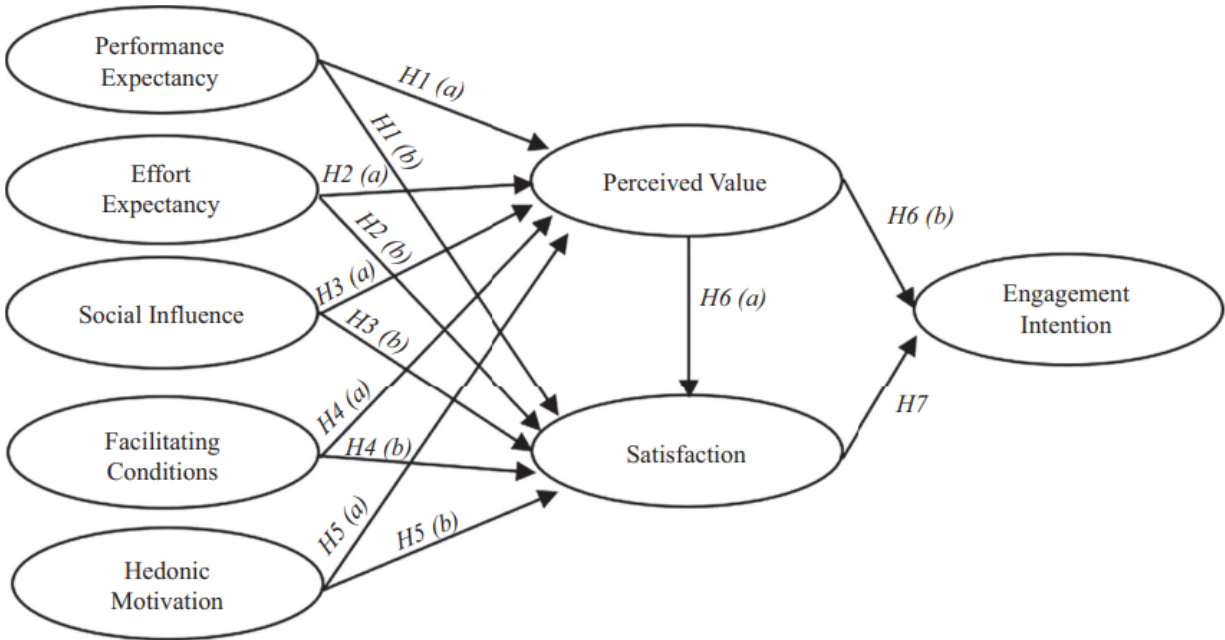


Figure 1. Research model and hypotheses

Research method

A survey was designed to test the proposed research model. The questionnaire had two parts: a demographic profile and the items of the constructs. We used measures adapted from past research, with modifications to suit the context of social media. Twenty-four items were used to measure the eight constructs in this study. The scale items for performance expectancy, effort expectancy, social influence, facilitating conditions and hedonic motivation were adapted from Venkatesh *et al.* (2012), and the measurement items for perceived value, satisfaction and social media engagement were adapted from Kim *et al.* (2013). The items were measured using a five-point Likert-type scale, ranging from “strongly disagree” (1) to “strongly agree” (5). Each item was translated into Chinese following Brislin's (1980) translation-back translation method by two Chinese researchers fluent in both English and Chinese. Furthermore, Douglas and Craig's (2007) collaborative and iterative approach was integrated to ensure that valid and reliable measurements were developed. Social networking platforms in China were chosen as the study stimuli. Qualtrics software was used to develop an online survey.

In this study, the target respondents are people aged 50 and over. The Institutional Review Board (IRB) is a committee established to review and approve applications for research projects involving human subjects. To ensure that the rights, privacy and welfare of the participants in this study were appropriately protected, we submitted the IRB application before the research was conducted. After the IRB application was approved, a pre-test of the online survey was performed with 15 Chinese older adults who were smartphone social media users. The respondents were asked to comment on the questionnaire, including the wording of the scales, the instrument's length and the questionnaire format. In the data collection, survey invitations with the online Qualtrics survey link were distributed to older adults (most were retired people) through WeChat (a powerful social media platform in China), as it allows the researchers to reach respondents over a wide geographic area quickly and efficiently. The survey's instructions

include a clear statement that the survey respondents should be people aged 50 or above. A screening question was placed at the beginning of the questionnaire to ensure only adults aged 50 and older took the survey. A snowball sampling method employing personal contacts was used to increase the sample size. In total, a sample of 331 responses was collected from China, and 323 responses were complete and valid for data analysis.

Results

Demographic characteristics

Of the respondents, 23.8% were between 50 and 54 years old; 31.9% were 55–64 years old, 26.3% were 65–74 years old and 17.9% were 75 or older. Seventy percent of the sample respondents were females and 30% were males. In terms of educational background, 40.6% of participants had college and above degrees. Most respondents were retired (73.1%) and lived with their spouse or children (91.3%).

Reliability and validity of the measurement model

First, to examine the internal consistency of the items, we checked Cronbach's alpha coefficients for the scales. Cronbach's alpha coefficients for all constructs met the recommended cut-off value of 0.70. As a result, all the constructs were acceptable, and a total of 24 items were retained for the eight latent variables in the study.

Then, we performed a confirmatory factor analysis (CFA) for the measurement model using Amos 25.0. The fit statistics in the measurement model indicated that all criteria met the recommended values: $(\chi^2)/df = 1.96$ ($p < 0.00$); Goodness-of-fit index (GFI) = 0.90; adjusted goodness-of-fit index (AGFI) = 0.86; comparative fit index (CFI) = 0.97; root mean square residual (RMR) = 0.02; and the root mean square error of approximation (RMSEA) = 0.05. All factor loadings, ranging from 0.63 to 0.93, were significant, indicating convergent validity (Hair *et al.*, 2010). The unidimensionality and convergent validity of the constructs were further assessed by composite reliability and the AVE. The composite reliability values for all the constructs, ranging from 0.91 to 0.96, are above the criteria of 0.7 (Hair *et al.*, 2010). The AVEs, ranging from 0.66 to 0.93, satisfy the criteria of 0.5 (Hair *et al.*, 2010). Table 1 shows the evaluation of the measurement model. Also, the square root of the AVE value for each latent construct was greater than the correlations between the construct and all others in the model, showing satisfactory discriminant validity of the measurement model (Hair *et al.*, 2010).

Structural model

The hypotheses illustrated in Figure 1 were tested collectively using structural equation modeling (SEM) performed in Amos. This approach is particularly appropriate for testing theoretically justified models. Each indicator was modeled in a reflective manner (as in CFA); the eight constructs were linked as hypothesized (Figure 1), and model estimation was done using the maximum likelihood technique.

Table 1. Confirmatory factor analysis for the constructs

Latent variables and observed indicators	Standardize factor loading	t-value ³
<i>Performance expectancy</i> ($\alpha = 0.92$, $CR = 0.95$, $AVE = 0.93^1$)		
1. Using social media mobile app X helps me accomplish things more quickly	0.93	– ²
2. Using social media mobile app X increases my productivity	0.91	22.60
<i>Effort expectancy</i> ($\alpha = 0.93$, $CR = 0.96$, $AVE = 0.87$)		
1. Learning to use social media mobile app X is easy for me	0.92	–
2. My interaction with social media mobile app X is clear and understandable	0.90	25.23
3. I find social media mobile app X easy to use	0.89	24.72
<i>Facilitating conditions</i> ($\alpha = 0.82$, $CR = 0.91$, $AVE = 0.66$)		
1. I have the resources necessary to use social media mobile app X	0.74	–
2. I have the knowledge necessary to use social media mobile app X	0.82	14.24
3. I can get help from others when I have difficulties using social media mobile app X	0.78	13.55
4. Social media mobile app X is compatible with other technologies I use	0.63	10.80
<i>Social influence</i> ($\alpha = 0.90$, $CR = 0.96$, $AVE = 0.83$)		
1. People who are important to me think I should use social media mobile app X	0.84	–
2. People who influence my behavior think I should use social media mobile app X	0.89	19.84
3. People whose opinions I value prefer I use social media mobile app X	0.86	18.80
<i>Hedonic motivation</i> ($\alpha = 0.93$, $CR = 0.96$, $AVE = 0.87$)		
1. Using social media mobile app X is fun	0.88	–
2. Using social media mobile app X is enjoyable	0.89	22.89
3. Using social media mobile app X is very entertaining	0.92	24.52
<i>Perceived value</i> ($\alpha = 0.86$, $CR = 0.94$, $AVE = 0.79$)		
1. Using social media mobile app X is an enjoyable experience	0.89	–
2. The overall value of my experience using social media mobile app X is outstanding	0.88	22.22
3. Using social media mobile app X represents good use of my time and money	0.73	15.88
<i>Satisfaction</i> ($\alpha = 0.87$, $CR = 0.95$, $AVE = 0.88$)		
1. Based on my total bill payments, I am satisfied with my use/engagement in social media mobile app X	0.89	–
2. Based on my total time spent, I am satisfied with my use/engagement in social media mobile app X	0.86	17.48
<i>Engagement Intention</i> ($\alpha = 0.89$, $CR = 0.95$, $AVE = 0.77$)		
1. I am going to continue to engage in social media mobile app X	0.93	–
2. I am willing to recommend engagement in social media mobile app X to someone	0.93	28.82
3. I will always try to use social media mobile app X in my daily life	0.73	17.05
4. I plan to continue to use social media mobile app X frequently	0.78	16.45

Note(s): 1. α = Cronbach's alpha, CR = composite reliability, AVE = average variance extracted

2. “–” means the path parameter was set to 1; therefore, no t-value was given

3. All loadings are significant at 0.001 level

The goodness-of-fit of the structural model was comparable to the previous CFA model. The fit indices indicated that the structural model was acceptable ($(\chi^2/df) = 1.98$ ($p < 0.00$); GFI = 0.90; AGFI = 0.86; CFI = 0.97; RMR = 0.02, and RMSEA = 0.05). The path parameters between exogenous and endogenous constructs in the structural model were examined to determine whether to accept the proposed relationships. The estimations from the structural model reveal that half of the relationships in the proposed model were supported (Table 2). Specifically, performance expectancy, facilitating conditions, social influence and hedonic motivation were found to have a significant positive influence on perceived value. In addition, the results

confirmed the positive impact of facilitating conditions on satisfaction. Furthermore, the results showed a positive effect of perceived value on satisfaction, and both perceived value and satisfaction were found to have a significant positive effect on Chinese older adults' intention to engage in social networking technology. Surprisingly, the impact of hedonic motivation on Chinese older adults' satisfaction with using social networking technology was negative.

Table 2. Structural model estimates

Hypotheses	From	To	Standardized coefficient	T-value	p-value	Results
H1a	Performance expectancy	Perceived value	0.18	3.28	≤0.01	Support
H1b	Performance expectancy	Satisfaction	-0.03	-0.43	>0.05	No support
H2a	Effort expectancy	Perceived value	-0.11	-1.62	>0.05	No support
H2b	Effort expectancy	Satisfaction	-0.013	-1.38	>0.05	No support
H3a	Social influence	Perceived value	0.16	2.67	≤0.05	Support
H3b	Social influence	Satisfaction	0.02	0.29	>0.05	No support
H4a	Facilitating conditions	Perceived value	0.18	2.15	≤0.05	Support
H4b	Facilitating conditions	Satisfaction	0.34	2.83	≤0.05	Support
H5a	Hedonic motivation	Perceived value	0.59	9.14	≤0.001	Support
H5b	Hedonic motivation	Satisfaction	-0.25	-2.10	≤0.05	No support
H6a	Perceived value	Satisfaction	0.82	5.35	≤0.001	Support
H6b	Perceived value	Engagement intention	0.74	11.31	≤0.001	Support
H7	Satisfaction	Engagement intention	0.14	2.25	≤0.05	Support

Discussion

Effect of performance expectancy and social influence on perceived value and satisfaction

The analysis results reveal that performance expectancy and social influence directly increase Chinese older adults' perceived value of using social networking technology; however, they do not have a significant direct impact on satisfaction. The results indicate that these two constructs have a significant and direct impact on older adults' cognitive evaluation of their social media use, but they do not directly impact the older adults' affective state. Our study confirms the previous research regarding the important role of perceived benefits and social influence in consumer adoption and use of ICT (Venkatesh *et al.*, 2012, 2016). Particularly, the study is consistent with previous studies evidencing that performance expectancy and social influence are two strong determinants in older adults' positive perception of values when using social media (Lee and Coughlin, 2015; Macedo, 2017; Zhou, 2019).

Social networking technology brings older people many conveniences and provides an ideal platform for maintaining relationships with both family ties and non-family ties to engage in social contact regardless of geographical location or time (Yu *et al.*, 2016). As an important source of social, recreational and health information, it supports Chinese older adults to freely generate content and share their self-generated content with family, friends and community members (Zhou, 2019). The primary motivation for older adults' adoption of social networking technology is to connect with family members such as adult children, relatives and grandchildren so they can keep up with their children's and other family members' lives. In fact, older adults

indicated that exchanging messages and pictures between younger and older generations is vital in learning social networking technology (Coelho and Duarte, 2016).

Effect of facilitating conditions on perceived value and satisfaction

Facilitating conditions were found to have a significant and direct impact on Chinese older adults' perceived value and satisfaction. These results are consistent with the UTAUT2 and ECM assumptions and confirm the essential role of facilitating conditions in previous research on older adults' use of ICT (Lee and Coughlin, 2015; Macedo, 2017). A Pew Research Center report shows that the majority of older adults lack confidence in their ability to use new digital devices to complete online tasks, and older groups comprise a larger share of those who are described as “digitally unprepared” (Anderson and Perrin, 2017). While Chinese older adults feel the positive impacts of SNS on society and people's lives, most of them still need help with using social media apps. The study demonstrates that Chinese older adults view the availability of resources, knowledge and support as essential for using social media, and these facilitating conditions greatly increase their perceived value and satisfaction.

Effect of hedonic motivation on perceived value and satisfaction

Hedonic motivation has a direct positive impact on perceived value, which confirms previous studies regarding the important role of hedonic motivation in the context of consumer technology usage (Tang *et al.*, 2019; Venkatesh *et al.*, 2012, 2016). Chinese older adults find it enjoyable to post videos and pictures and use video and voice call functions.

Interestingly and surprisingly, the unexpected result, the strong negative effect of hedonic motivation on satisfaction, implies that hedonic motivation does not lead to older adults' satisfaction with their social media experience. One possible explanation could be that Chinese older adults feel they spend too much time on social media. As social media is used in many different ways and more frequently, it is likely that people are obsessed with social media and spend too much time in the virtual world, which consumes a person's time, energy and attention and impairs other important life areas. Although Chinese older adults enjoy using social media to get news information and stay connected with friends and family, they are also the primary target of false or misleading news and advertisements on social media platforms. Their unpleasant experience with undesirable or unreliable information on social media could also negatively affect their satisfaction with social networking technology.

Effect of effort expectancy on perceived value and satisfaction

One interesting result from the study shows the effort expectancy construct has no significant influence on perceived value or satisfaction, indicating the degree of ease associated with social media use does not affect Chinese older adults' perceived value of and satisfaction with social media. These results do not confirm the findings from Venkatesh *et al.* (2012) or Macedo (2017). A possible explanation could be that social media interfaces are generally user-friendly. It is likely that older adults can use social media quickly with the help and support of family members and friends. In addition, some mobile companies offer phone models specifically designed for older adults. Efforts have been made in China to develop senior-friendly interfaces

to facilitate older adults' use of the Internet, such as larger fonts, high contrast background, easy-to-operate keyboards and better video and audio applications (Pan and Jordan-Marsh, 2010). The system's senior-friendly interface design proved to significantly reduce Chinese older adults' anxiety about Internet use (Pan and Jordan-Marsh, 2010).

Linkages between perceived value, satisfaction and engagement intention

The study findings demonstrate that perceived value strongly influences older adults' satisfaction, and both perceived value and satisfaction strongly impact engagement intention. Although both perceived value and satisfaction show a positive effect on Chinese older adults' engagement intention, we found that perceived value is a much stronger factor than satisfaction in influencing engagement intention to use social media.

The strong and positive impact of perceived value on satisfaction confirms previous research on the relationship between perceived value and satisfaction (Kim *et al.*, 2013; Yang and Peterson, 2004). Perceived value is a key driver of customer satisfaction, which, in turn, positively affects engagement intention. Furthermore, perceived value has a direct and significant influence on engagement intention. These findings demonstrate the mediating role of satisfaction regarding the relationships between perceived value and engagement intention.

Implications

Theoretical implications

This study examines SNSs user behavior in an understudied population, Chinese older adults, just as this population is rapidly embracing Internet technologies. From a theoretical perspective, this study has provided evidence supporting the validity of jointly using UTAUT2 and ECM as relevant theoretical bases to effectively explain social media user behavior in the context of Chinese older adults. This empirical study enhances our understanding of the nature and strength of the relationships between the drivers of social media use and Chinese older adults' use and engagement behavior.

Prior research on older adults' adoption of technology has reviewed factors associated with their adoption and use of technology (Lee and Coughlin, 2015) or employed the widely used technology acceptance model (TAM) (Pan and Jordan-Marsh, 2010). However, the factors in Lee and Coughlin (2015) have not been specifically tested with older age groups. The TAM is limited by its parsimony, as it cannot provide sufficient information for understanding older adults' perceptions and use of social media. Previous UTAUT2-related studies focused mainly on consumer technology acceptance and use in developed countries and by younger user populations. Few studies have focused on the older user population in emerging markets. Thus, this study contributes to the literature by assessing the effectiveness of the proposed integrative model on Chinese older adults' use of social networking technology. Moreover, the holistic and integrative model proposed is beyond the concept of technology acceptance. It examines the concept of engagement specifically in the social media context. The results provide empirical evidence for the factors impacting social media user engagement, including the drivers

(performance expectancy, effort expectancy, social influence, facilitating conditions and hedonic motivation), perceived value and satisfaction.

Practical implications

To understand the practical implications, it is necessary to explain the dynamics of Chinese older adults' lives. Due to China's one-child per family policy since the late 1970s, Chinese older adults aged 50 or over are experiencing dramatic changes in family dynamics. Many of them are facing empty-nest syndrome as their children have left home for college or a job. More Chinese older adults live separately from their children and grandchildren. Moreover, unlike previous generations, many Chinese older adults today are not expected to take care of their grandchildren, since young couples in China, especially in cities, want to raise their kids themselves, following the Western culture. As a result, they do not have to center their lives around their grandchildren and have free time to pursue their own interests. With fewer family responsibilities, older adults are curious about what is happening in society, in China, around the world and what other people are doing.

The results of the positive and strong effects of performance expectancy, social influence, facilitating conditions and hedonic motivation on perceived value indicate that Chinese older adults acknowledge and appreciate the usefulness, benefits and enjoyment social networking technology brings to their lives. People within Chinese older adults' social groups such as family members, friends and close community members motivate older adults to use and realize the value of social networking technology. They act as advocates of social networking technology, promoting its use and providing guidance in using SNSs. The dramatically increased availability of smartphones, mobile Internet and high-speed Internet connections in people's daily lives and the free social media apps enable more Chinese older adults to easily see and understand the benefits of social networking technology. There are some "voluntary nonusers" who are currently quite content without social media in their lives. However, with more of their family members and friends using social media, the benefits of social networking technology may motivate them to become future social media users.

Among the five determinants of social media use, only facilitating conditions have a strong and positive direct effect on satisfaction, implying the utmost importance of facilitating conditions in older adults' satisfaction with social media. With more seniors living alone, Chinese older adults may experience difficulties in getting support from their children, grandchildren and young neighbors. Policymakers and practitioners need to build better conditions to facilitate Chinese older adults' social media use. Good technical support for older adults should be patient, paced, jargon-free, accessible and long-term (Pan and Jordan-Marsh, 2010). It is important that young people are patient and understand the specific needs and difficulties older adults have. Xie's (2007) study found that older Chinese were more satisfied and comfortable with support from their peers since they shared similar learning experiences and were easy to communicate with. Future interventions to promote older adults' social media use should recognize the importance of peer-learning.

It is important to help older adults understand how to use social media safely and appropriately. Although Chinese older adults enjoy using social media, they should not be obsessed with it.

They should not treat social media as a complete replacement for in-person interaction. They need to be aware of the risks in social media use, such as unreliable information and false advertisement. Literature suggested that constructive use of social media is associated with increased psychological well-being, enhanced cognitive functioning, self-efficacy, wider social networks, a greater sense of community and independent lifestyle, and thus is expected to improve the lives of older adults in many ways (Yu *et al.*, 2016).

Successful technologies in the consumer use context are not just simply usable; they should engage users. Technology engagement is beyond technology acceptance, as engagement consists of the user's ongoing activities, attitude and intrinsic interest (Kim *et al.*, 2013). The findings of the study suggest that older adults' engagement intention toward social media can be generated by improving their satisfaction and offering high perceived value. Perceived value is a key driver of satisfaction. The study suggests that Internet and social media firms should provide a product portfolio and value-added free services that are in demand to increase the perceived value of social media for Chinese older adults. When technology firms develop an environment that fosters user engagement in using the product or service, they can achieve a higher level of user loyalty and better product/brand image, thus increasing their competitiveness in the market.

Limitations and future directions

Several limitations of the study need to be addressed. First, our study sample consisted of a convenience sample of Chinese older adults within limited geographical locations, which may have skewed the results due to their more frequent use of SNSs; thus, caution should be taken when generalizing the research findings. Second, the study was limited to the context of Chinese older adults. Future cross-cultural study could provide more insights into the behavior of older consumers. Third, we only included Chinese public social media platforms and did not consider community types. Fourth, we did not integrate other socio-demographic or psychological variables. Future research may integrate the comprehensiveness of the research model developed in this study with socio-demographic variables and other psychological constructs to assess social media use behavior more accurately among older adults.

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