Research on New Media Usage Behaviors, Influencing Factors and Social Contact Mode of the Elderly

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Abstract. The elderly should not become burden of the society. They still have strong sense of participation and sense of contribution in society through convenient high-efficient new social media, exploring social values of the elderly and making them a strong impetus of social development. Considering the population growth of the elderly and the increasing popularization of new media-based social contact in the current age, new media usage behavior data of the elderly were collected through questionnaire survey and in-depth interview. Factors of new media usage behavior of the elderly were analyzed by SPASS and four main influencing factors were concluded: serviceability, usability, value and willingness (SUVW) of the elderly using new media-based social contact. Next, the media-based social contact model of the elderly was constructed by the theoretical model approach based on SUVW. The new-media social contact mode of the elderly verified and discussed through some cases of china. Finally, shortcomings of this study were disclosed and the some reflections and prospects were proposed according to the large fuzzy improvement space in this field. These deserve further deep researches in future.

Keywords: The elderly · New media · Usage behaviors · Influencing factors · Social contact mode

1 Introduction

Both developed countries and developing countries pay more and more attentions on a series of advantages brought by demographic dividends in recent years. The population of the longevity old increases gradually as economic living standard improves increasingly. On one hand, China's two-child policy which was issued in the last year is beneficial for maintaining the labor's scale reasonably. On the other hand, it is good to decrease aloneness of the elderly. Meanwhile, with the continuous development of internet and mobile internet, the new media-based social communication which has characteristics of digitization, interaction and mobility becomes more and more popular. New social media orients to more and more population groups, from pupils to the elderly.

Considering degraded visual and hearing senses, weakened cognitive ability and difficulty in accepting new things of the elderly, new media-based social contact of the elderly shall pay more attentions on studying new media usage behaviors and social contact mode of the elderly. This research topic emerges at the right moment. Firstly, existing researches on the elderly using new media social services were reviewed in this paper. Secondly, influencing factors against the elderly to use new media for social contact were analyzed and summarized through questionnaire survey and in-depth interview. Finally, a set of flow system to optimize the elderly using new media-based social services and innovate the service design mode was established based on these variable factors.

2 Literature Review

2.1 Connecting Older Adults

Robert Steele (2013), an informatics professor from the University of Sydney, led a team to study the program of "connecting older adults", concluding that social media could be used as an effective tool to decrease aloneness of the elderly. This research involves 150 respondents of 55 years old or higher and most were older than 65 years old. Before the experiment, researchers made a short training to the elderly. About 80% older adults answered that they would continue to use social media after the experiment and 65% agree or strongly agree that social media are very convenient.

By comparing data before and after the experiment, researchers found that older adults using social media feel significantly less lonely. Most respondents also reported that the usage of social media helps them to deepen connection with the community and participation in community activities.

2.2 Usage Behaviors of the Elderly for Social Contact and Influencing Factors

There is a strong intrinsic logicality between new media usage behaviors of the elderly and its influencing factors. Usage behaviors are the basis of service design and service design is the perfection and supplementation of usage behaviors. They supplement each other. The social contact design for the elderly could better and the elderly could participate in social activities better as long as paying high attentions to media usage behaviors by the elderly and analyzing corresponding influencing factors.

Most of existing researches on media usage behaviors of the elderly focus on the computer end and exploring the relationship between usage behavior data and user experience and interests. For example, based on the psychological knowledge-internal drive theory, Lucas (2006), an American scholar, found that the internet surfing behavior of older users is closely related with their interests on the webpage content. On this basis, he suggested to describe such correlation by the linear regression model. Based on this research result, Buultjiens (2008), an Australian scholar, proposed the combination of 6 types of users' minimum browsing behaviors. Furthermore, two internet surfing behaviors that influence interests of older users were acquired through

mutual conversion of three types of behaviors, thus disclosing the quantitative relation between UE and key behaviors.

Additionally, with the continuous updating and development of mobile internet, many scholars focused on new media as the mobile end and attempted to study behavioral habits of the elderly and interaction design related with cell phone from. Relationship between behavioral habits and mental satisfaction of the elderly using social media services was analyzed by collecting data about cell phone using habits of older adults. Van Biljon et al. (2010) put forward the cell phone acceptance model of the elderly based on the technology acceptance model (TAM) and explored various factors that influence the elderly using cell phones, especially objectivity and procedure influencing factors. Later, Conci et al. (2012) established the TAM of the elderly to cell phone by combining the behavioristics and used perceived safety, self-actualization and enjoyment as the internal willingness. They found that social impact influences the perceived serviceability and willingness to some extent, whereas cell phone supports have some influences on willingness and perceived usability. These reveal that the internal willingness is important. Gobel (2013) concluded the two-factor model theory. In this theory, technological anxiety and perceived changes of the elderly are used as internal and external factors to explore the elderly make social contact based on cell phone. It found that resistance of older users will influence perceived serviceability. The technological anxiety is negatively correlated with perceived usability and is positively correlated with resistance behaviors of the older users, but the resistance changes are negatively correlated with perceived usability and are positively correlated with resistance behaviors of the older users. On this basis, Stamato et al. (2015) concluded the internal relationships of the elderly using cell phone with context of users, perceived serviceability, perceived usability and willingness. Finally, based on statistics, psychology and artificial intelligence, Lin Chuang et al. (2016) preliminarily explored the evaluation model of user satisfaction based on behavioral habit and pointed out relationships of subjective factors of human and objective factors of environment with user experience and social contact service quality.

To sum up, researches on usage behaviors and influencing factors of the elderly using new social media as well as how to improve interaction still have a large fuzzy space. No targeted and systematic researches have been reported yet. Combining above mentioned and more associated research results, four main factors (SUVW) that influence the elderly using new social media were analyzed and summarized in this paper. Based on SUVW, a theoretical model for optimizing new media usage of the elderly for social contact was constructed.

3   Research Methods

3.1   Main Research Methods

Firstly, numerous researches on usage behavior of new social media and user satisfaction of the elderly using new media were reviewed and analyzed. Secondly, related influencing factors were disclosed by combining psychology, statistics, behavioristics and human-computer interaction design. Thirdly, a questionnaire was designed by

combining these information factors and 425 older users were interviewed. Questionnaire survey results and interview results were compared to further disclose other influencing factors. Finally, correlation between SUVW and older users' satisfaction to new media was analyzed by SPASS and a primary theoretical model of new media-based social contact of the elderly was constructed.

3.2   Questionnaire Design

In this paper, basic information of respondents were collected firstly (Table 1). Next, a series of problems related with the elderly using new social media were designed carefully to measure impacts of social media based on EXCEL descriptive analysis of 1012 questionnaires on older users' satisfaction to new media (Table 2), which were used to measure relationship between SUVW and usage behaviors. Correlation between answers of another 425 respondents and SUVW was analyzed by SPASS. All variables were masurd by the Likert scale (1–5). The SUVW were scored from 1–5 and the final mean of each factor was acquired. Since these variables belong to grading and sequencing variables, Spearman's rank correlation coefficient which is deduced by Spearman (An English psychologist and statistician) is appropriate to "two-variable correlation" analysis:

Table 1. Basic information of the elderly

Age	55–59	60–64	65–69	Over 70
Gender	Male		Female	
Education	≤ Primary	Junior	Senior	≥ College
Retirement	Yes		No	
Living Alone	Yes		No	
Work Out	Never	Seldom	Sometimes	Often
Use Social Medium	Yes		No	

Table 2. Correlation analysis between SUVW and user satisfaction

Variables	Questions	1	2	3	4	5
Serviceability	1. New media helps me to communicate with others more conveniently.					
	2. The diversified development of new media enriches my daily life (e.g. shopping and medical service).					
	3. New media helps me to make more friends with similar people.					
	4. New media is useful to me.					
Usability	5. New media is easy to operate for me.					
	6. New media makes it easy to communicate with my friends.					
	7. New media helps me a lot to make friends.					
Value	8. New media makes my life meaningful.					

(*continued*)

Table 2. (*continued*)

Variables	Questions	1	2	3	4	5
	9. New media helps me to know the latest situations of my friends.					
	10. New media will leak my privacy security.					
	11. New media disturb my life.					
Willingness	12. I will encourage more peers to use new media.					
	13. I wouldn't use new media more, because it brings me a lot of troubles.					
	14. I want to use new media more in future.					

('1 = Strongly Disagree, 2 = Little Disagree, 3 = Agree, 4 = Little Agree, 5 = Strongly Agree')

$$r_s = 1 - \frac{6 \sum_{i=1}^{n} D_i^2}{n(n^2 - 1)} \tag{1}$$

Where n is number of variable data pairs, $D = x_i - y_i$ ($i = 1, 2, 3, \ldots n$)(X_i and Y_i are ordinal number of value of each case on X, Y.) Spearman coefficient of rank correlation ranges between $-1 \sim +1$. When $r_s > 0$, two variables are positively correlated. When $r_s < 0$, two variables are negatively correlated. The higher the absolute value is, the stronger correlation between these two variables. Scores of these factors are shown in Fig. 1.
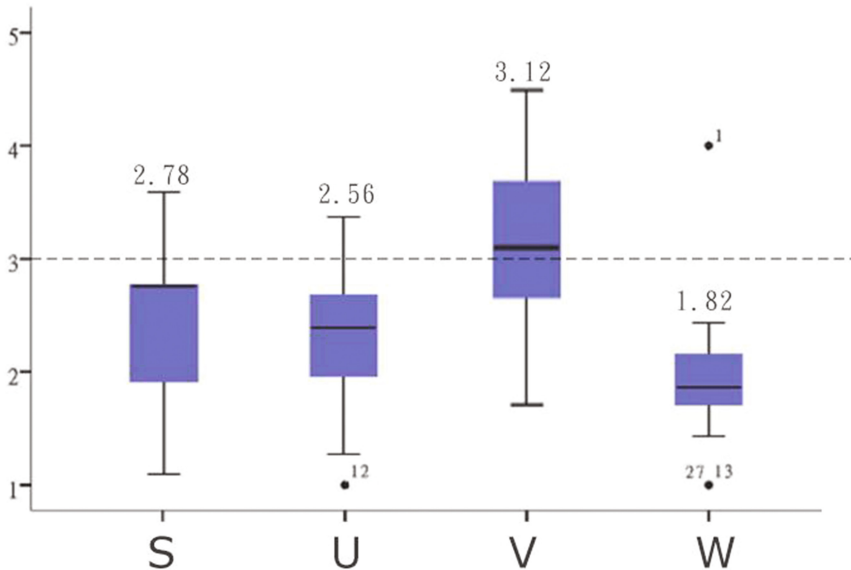

Fig. 1. Scores of SUVW

4   Impact Factor

A total of 1462 respondents were selected for the in-depth interview and questionnaire survey (425 for in-depth interview. 1012 questionnaires were sent offline and online, including 25 invalid questionnaires.). According to the investigation process and results, 83% older users' satisfaction to usage of current social media is lower than the mean value, which is attributed to different factors (Fig. 2).

Fig. 2. 17 influencing factors of new media usage behavior of the elderly

4.1   Classification of Subjective and Objective Influencing Factors

Influencing factors of the elderly using new social media which were gained from literature review and practice survey were classified into subjective and objective factors. The research framework is shown in Fig. 3. Subjective factors refers to attitude and emotions of older users to new social media, including individual attitude to aging, intention to accept and learn new things, individual emotion to social contact, and open-minded degree. Objective factors cover four aspects, including demographic factors, health factors, economic factors and social factors. There are 17 subjective and objective influencing factors. Finally, these 17 factors were classified into SUVW from the perspective of new media usage behavior of the elderly.
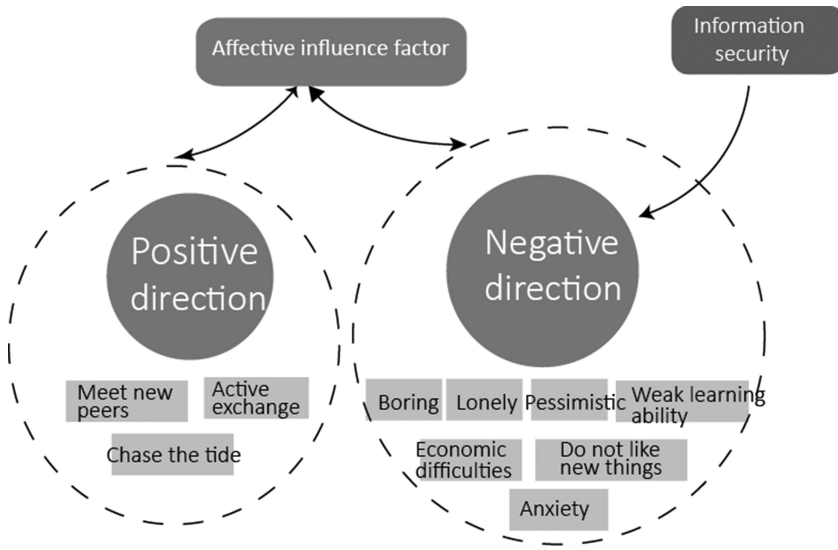
Fig. 3. Positive and negative emotional factors of SUVW

4.2   Positive and Negative Emotional Factors Influencing New Media Usage Behaviors of the Elderly

Some emotional factors may be gained by discussing SUVW from the psychological perspective which influencing new media usage behaviors of the elderly (Fig. 3). Emotional factors are mainly divided into positive factor and negative factor. Positive factor are conducive to encouraging the elderly to use new social media. Negative factor represents that these factors hinder the elderly to use new social media. Sense of security is the most important influencing factor. Sense of insecurity of the elderly to new things is the biggest internal cause of the negative factor. Emotional factors were not analyzed thoroughly and shall be further discussed in future researches.

5   Results

5.1   Research Results Analysis and Establishment of New Media-Based Social Contact Mode of the Elderly

Among 1462 random samples, only 17% older users are very satisfying with the usage of new social media, 52% express concerns to safety of new social media, and 31% haven't used new social media due to various reasons, such as economic factors, cognitive learning factors, physical health factors, etc. Based on relationships between SUVW and satisfaction, a primary theoretical model of new media-based social contact mode of the elderly was established (Fig. 4).
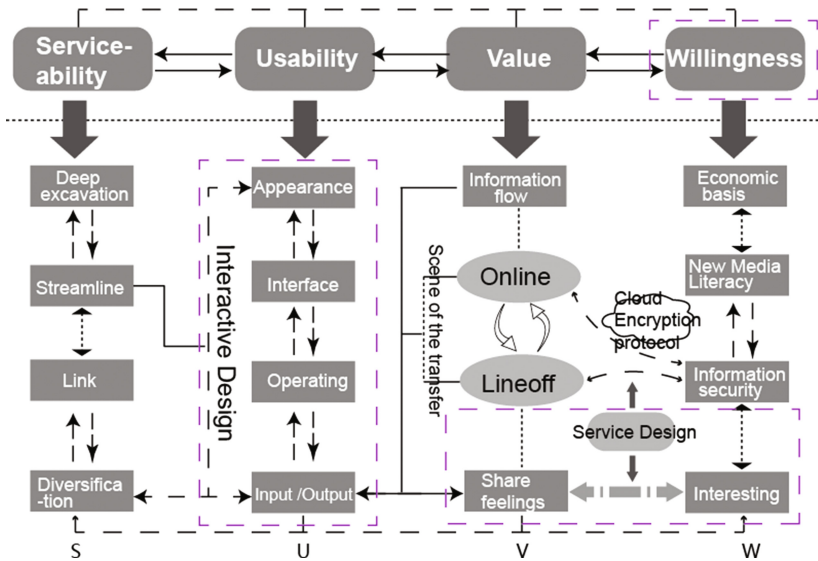
Fig. 4. SUVW model

The SUVW model is established by combining associated literature review and survey results. It constructs the theoretical new media-based social contact model of the elderly mainly from SUVW. Serviceability, usability, value and willingness supplement each other. Among them, willingness is the most important factor that influences new media-based social contact of older users.

When optimizing serviceability of new social media to older users, demands of older users for new social media shall be explored deeply. Next, these demands shall be simplified. Simplification of these demands covers two meanings. One is to eliminate all unnecessary and tedious application steps for older users. The other is to deepen rest demands thoroughly through design. Subsequently, linkage of new media-based social contact shall be improved. Such linkage also includes two meanings. One is to increase communications among older users through new social media, that is, man-man linkage. The other is to let older users to get contact with different new things through new social media, that is, man-thing linkage. Finally, the optimization goal of "serviceability" is to improve diversified life of the elderly, thus bringing the elderly a more colorful life.

Usability is mainly improved from interaction design, including appearance, interface, operation and information input/output. New media equipments for the elderly mainly refer to computer and cell phone. Appearance design of these products shall better conform to life and usage characteristics of the elderly. Interface of new social media equipments for the elderly shall be designed simple and clean, which is determined by the significantly weaker visual perception of the elderly compared to young population. Besides, more attentions shall be paid to man-machine interaction of new social media for the elderly. For example, interface switching shall consider page turning of the elderly comprehensively, such as how to slide pages, which fingers shall

be used, to what direction, etc. Since the elderly have poor physical movement, dull response and low educational background, input and output of new social media data shall be mainly voice interaction. This will be analyzed in the following case.

To improve value of new social media, it has to understand that social contact of the elderly is information input and output between the elderly and the outside world. The nature of information is propagation and exchange. Only exchanging information have values. Therefore, optimizing social contact value of older users shall pay more attentions to information communication and sharing between older users and the outside world. In the new era of prosperous internet development, the online-offline integrated social interaction mode has become an irreversible trend. Applying offline context for life services to online is in favor of better social contact of the elderly, which will be analyzed in the following text. The last and the most important points is that based on previous data analysis, changing the negative emotion of the elderly to new social media into positive emotion is the key to optimize service design of older users, which requires attentions to emotional communication between the outside world and the elderly throughout the design process.

As mentioned above, willingness is the key factor that influences the older users to use new media for social contact. Survey results show that 31% older users are reluctant to use the new social media, which is directly caused by economic limitations. It is difficult to let more older adults to experience the new social media without economic subsidies from the society and the government. Caring the elderly is an indispensable virtue. Furthermore, strengthening the media education to the elderly is the premise of the elderly using new social media. Improvement of media education covers two aspects: one-to-one teaching and mutual environmental influences. The key to increase the willingness is to enhance interesting of social media, which is also the best expression and propagation mode of emotional communication. It can let the older users to enjoy themselves in the new social media, thus converting most negative emotions into positive emotions directly.

5.2   Application Case of Related Modes

The WeChat applet of China's Tencent and iFlytek Input of the Iflyteck Co. Ltd gave us good enlightenments on new media-based social contact of the elderly. On November 30th, 2016, Zhai Jibo of the Iflyteck Co. Ltd created a record of voice conversion of 400 Chinese characters per minute and maintaining 97% accuracy rate under external environmental disturbance. As mentioned above, with respect to usability of new social media, older users who have degraded vision, stubby fingers and slow response prefer voice input/output. Voice input can bring older users emotional intimacy and interesting of usage. However, older users are inconvenient to accept voice information in some special occasions and voice information must be converted into characters. iFlytek Input solves this interaction design problem well.

Older users are afraid of processing problems with complicated steps, which is caused by the degradation of different physiological mechanisms. Lapse of memory, poor ability of learning new things and worry on leakage of personal information restrict usage of new social media by the elderly. The WeChat applet of China's

Tencent also brings us some good enlightenment. The service flow of the WeChat applet is "Scan and Go". Users can apply the offline scenes of life to online through the "Scan" function of WeChat. For example, users can choose seat, order dishes and settle accounts in canteens by scanning the 2-dimensional bar code of the canteen, thus saving queuing. The scanned applications are stored in WeChat as applet and won't occupy memory of the device. Users can leave after the usage and no advertisements are offered. The WeChat applet can offer many references to service design optimization of new social media for older users. The cloud encryption protocol of the third party protects individual social interaction information of older users. The application of offline life services to online enrich the diversified life of older users through new media-social contact, increases their positive emotions, and strengthens interesting of life, which are good for the older users to make contributions to the society.

6   Conclusion and Future Work

With the prosperous development of new social media in the background of prosperous development of new media and annual growth of the elderly population in the background of gradual improvement of people's living standard, this paper discloses four influencing factors (SUVW) against the elderly using new media for social contact. Based on SUVW, the theoretical model of the elderly using new media-based social contract is constructed. Due to inadequate or rare research data on usage of new social media by older adults, this study reviews researches on social contact of the elderly, new media interaction design, service design and products for the elderly to analyze usage behavior of new media by the elderly, influencing factors as well as their relationships. Four influencing factors (SUVW) are concluded and used to establish the theoretical model of new media-based social contact of the elderly. Finally, feasibility, innovativeness and fuzziness of the established SUVW model are verified by related case studies in China.

Of course, this study also has some shortcomings, such as territory limitation of samples, sample size, subjective privacy of users in filling the questionnaire, etc. All of these will influence the summarization of factors that influencing new media usage by the elderly, thus further influencing integrity of the new media-based social contact mode of the elderly. Hence, future researches can focus on following aspects:

1. Explore emotional demands of the elderly deeply. The elderly use new social media is to make emotional communication of the elderly more harmonious and convert more negative emotions into positive ones. As a result, exploring emotional demands of the elderly can lay a solid foundation for the follow-up design.

2. Strengthen interaction design of new social media for the elderly. The gradual degrading physiological mechanism of the elderly determines the important role of interaction design in their new media-based social contact behaviors. This requires man-machine interaction simpler and more humanized.

3. Perfect service design of new social media for social contact of the elderly. The theoretical SUVW model of the elderly using new social media is explored preliminarily, which pays attentions to application of offline life services to online scenes and deep development of interesting. They can enrich the life of the elderly.

New media usage behaviors of the elderly, influencing factors and new media-based social contact mode of the elderly are meaningful. There is still a big practice fuzzy space in this field.

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