
The Improvement of User Experience of Elderly in Hubei Province, China

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Abstract: *In China, few studies have been conducted specifically on the quality of life of elderly hospice patients. 2020, when the coronavirus outbreak occurred in Wuhan, Hubei Province. The researcher has personally experienced the closure of Wuhan and the desperation of the elderly to live because of mobility problems and chronic diseases. The importance of mobile health care for the elderly was deeply felt.*

Research Purpose: *Propose design solutions to optimize the hospice care mobile application by co-creating the discovery design process. To make the mobile application for hospice services more responsive.*

Research Method: *The researcher selected 20 respondents aged 60 and above to participate in face-to-face interviews. The real needs of the respondents were recorded and organized through semi-structured interviews, observation and interaction. MAXQDA software was used to do qualitative analysis. The preferred design of the user interface and user experience of the hospice app for the New Older was determined.*

Main Results: *By co-design the discovery design process, user participation in the co-design of the hospice app was found to help improve the sense of user service experience for Chinese elderly using a hospice-based mobile application.*

Keywords: *Hospice Care Mobile Application, User Experience, Collaborative Design, Newolder.*

1. INTRODUCTION

Collaborative design is a design led process that uses creative participatory methods. There is no nor a set of check lists to follow. Instead, there are a patterns and principles



that can be applied in different ways with different people. Collaborative designers can make decisions, but not just suggestions [3] (Barbara A Jack, 2012).

The collaborative design is an approach that allows a team to design together. It can help teams build a shared understanding of both the design problem and the solution. It provides the means for them to work together to decide which functionality and interface elements best implement the feature they want to create.

Collaborative design is still a designer-led activity. And the designer's responsibility to call collaborative design meetings. Sometimes, we will have informal chats and drawing together. [16] (Jeff Gothelf & Josh Seiden, 2016).

Problem Statement

1. China's Civil Affairs Bureau reported on October 23, 2020, that the country's old population will top 300 million, ranging from mild to moderate aging. However, there have been few studies in China that have explicitly looked at the quality of life of elderly hospice patients (Wang & Wang, 2020).
2. With China's aging population, hospice care has emerged as a rapidly rising new service need in the medical and pension areas (Lu Jiehua, 2017).
3. According to the Economist's Information Unit's 2015 "Quality of Death Index study," the Chinese mainland placed 71st out of 80 major countries in terms of end-of-life care (Wu Qiong, 2021).
4. In recent years, the use of telemedicine and mHealth has increased rapidly in the China (Leung, Guo, & Pan, 2018).

Nowadays, with the deepening of aging in China, hospice care has become a rapidly growing new service demand in the medical and elderly care fields. The Wuhan Bureau of Statistics announced in May 2021 that the resident population of Wuhan is 123,265,518, of which 2,124,397 are 60 years old and above, and 1,456,172 are 65 years old and above. Older people are often accompanied by disabilities, dementia, multiple diseases, and life care problems. They have a separate web platform, but it is not fully functional and the experience of using it is poor. There is no mobile app, and contact can only be made by phone or by arriving at a designation. This is inconvenient. Especially during COVID-19.

The researcher mainly researched and analyzed the literature in the categories of hospice service design, co-design, and mobile health. It can be found that interview research method, co-design group and questionnaire design, are the more commonly used research methods. The theme of the research objectives is about co-design to improve the user experience for health care services, patients, families and caregivers.

In addition, the role of mHealth in palliative care was explored. The study showed that co-design can improve the user experience perception.

The purpose of this study is to apply service design thinking by exploring research on hospice services and encouraging the participation of people with lived experience in co-design. Researchers believe that this study will help and benefit older adults, families with older adults, and health care professionals in creating a higher quality hospice system that



enables smart services rather than the original marketed services. Especially during COVID-19.

New Older

The 'New Older' are those who were born in the 1960s and later and are entering their old age. They belong to the second batch of baby boomers in the new China and have benefited from the reform and opening up and China's economic take-off to become a more affluent generation in China. Compared to the traditional elderly, their life experiences can be refined as follows: the youth of reform and opening up, the middle age of economic dividend and PC connectivity, and the later years of asset affluence and mobile connectivity. [17] (Statista, 2020)

These data prove that today's 'New Older' people have the ability and demand to consume in the future society, and also have the will to use mobile smart products. Therefore, it is important to make technology the driver of services for the elderly, and the key is to grasp the real needs of the elderly. In 2020, China's elderly population over 65 years old will reach 191 million, accounting for 13.5% of the total population, with one Chinese person in every four elderly people in the world. It is expected that the population aged 65 or older in China will reach a peak of 425 million in 2057, accounting for 32.9% to 37.6% of the total population.

The Dying Older People in China

China's National Health and Wellness Commission stated, 'In 2018, life expectancy per capital in China was 77.0 years, but healthy life expectancy per capital was only 68.7 years; the proportion of elderly people suffering from more than one chronic disease was as high as 75%, and there were more than 40 million disabled and partially disabled elderly people.' (Man, 2022) Population aging will be the direct cause of the continuous climbing and concentrated explosion of the total demand for healthcare in China in the coming decades. In 2018, China's population over 65 years old has exceeded 160 million, accounting for 11.9%, making it one of the developing countries that entered the aging society earlier.

Especially during COVID-19, the researcher felt deeply the importance of mHealth for the elderly. But many elderly people in China are suffering from chronic diseases. Because of the Chinese cultural background, most of the terminally ill elderly would choose home care. However, after the outbreak of COVID-19 in 2019, mobile health care becomes especially important.

Ageing Population as a User

The 'New Older' of seniors with money and leisure is expected to continue to maintain high consumption levels. A 2019 Japan Bureau of Statistics shows that the households with the highest amount of savings are those headed by 60- to 69-year-olds. In retirement, spending on leisure and entertainment, such as travel, is significantly higher than before the age of 50.



The researcher believes that new seniors have high spending power and are interested in cell phone novelties but need to improve the age-appropriateness of existing apps. Create an APP design with focus areas such as medical and health care, community services, etc., with the elderly as the user center.

Factors Affecting User Satisfaction

From the physiological point of view, elderly people have declining body functions, weakened vision, slower operation ability and reaction speed, and may encounter some confusion when operating. They may encounter some confusion when operating medical APPs. From the psychological aspect, elderly people have low cognitive ability and poor memory, they will forget quickly about new or unfamiliar things, accept slowly, and are prone to loneliness and anxiety.[14](XU Ruo-fei, 2019)

User Decision on Use or Choosing Mobile Application Product

Smart phones can open new opportunities for people with different levels of impairment through the assistive technology in the phone's Apps. By addressing accessibility during the mobile App design process, it is possible to improve older population's life quality in these cities. [2](Almao & Golpayegani, 2019)

This range of smart lifestyles plays an important role in the sense of the experience of living services for older people in today's society. It enhances the quality of life for older people, while also improving the ease of living.

Older people's needs are associated to the age related changes they face. The main issue is that services targeted at older people do not seem to address these needs in the visual presentation of information. This represents a universal barrier to communicate with older people, which prevents an active ageing. [2](Almao & Golpayegani, 2019)

Through a large amount of literature can also be understood that the elderly have a big demand for intelligent service life, but there are still many problems about this type of APP interface design and they have not been completely solved. Especially some APP for the elderly, so the researcher needs to understand the specific needs of the new elderly through questionnaires and face-to-face interviews. Including functional requirements and interface design requirements and so on. Never give new suggestions.

2. METHODOLOGY

For this study, an invitation to participate in the survey was sent along with the questionnaires and introduction, purposes of the study, time taken, assuring confidentiality, and offering contact information for assistance and additional information if needed. The researcher first did a pilot survey. Planning the target population and geographical area. When sending the questionnaire, I found that I could not send the specified city completely, only the province.



This online survey was conducted by So jump, and it is only aimed at the elderly over the age of 60, who are interested in hospice APP and have at least some knowledge and understanding. (If there are special circumstances, you can help the elderly around you to fill in.)By setting up screening questions, limiting the response time, ensuring the quality of data collection, and giving a reward of 6 yuan for each valid questionnaire completed. The sources of the questionnaires were: people around, employees and family members of employees of Sinopec Wuhan Branch, and sample services (6 yuan).

The questionnaire is divided into 3 main sections, the first of which is personal information. There were seven items included in this part, which would be put as demographic variables to describe statistics when necessary, such as the gender, the income, age, marital status, physical condition or the experience, etc.

The second part, the pilot survey corresponds mainly to the three needs indicated in the KANO model. Basic Needs, Expectation-based Needs and Excitement-based Needs to design the questionnaire.

Users' needs and expectations were summarised from existing hospice applications and aggregated into three levels of need. The researcher used a Likert scale to gather the views of a small group of new and existing users. Users were able to make judgements on a scale of 1 to 5 based on their understanding. (1 strongly disagree 2 disagree 3 no opinion 4 agree 5 strongly agree). The third part is intention to use. theintention to use dimension refers to the user's positive or negative use of Co-design, the user's happiness, pleasure or disgust, depression with the Co-design Hospice App.

The questionnaire used in the actual survey is composed of 19 items in 5 dimensions, and the Liket 5-point scale is used to obtain the user satisfaction of APP products that use collaborative design to participate in hospice care. Finally, a qualitative study was conducted on 20 face-to-face interviewers using MAXQDA software, and a summary of preference design was made.

3. RESULTS AND DISCUSSION

After removing other cities and questionnaires that did not meet the time criteria, there were 276 questionnaires. The invalid sample was then processed using SPSS. A final sample of 232 valid samples was determine, the number is about equal to 12.2 times of questions. Depending on the number of questions in the questionnaire, taking the pre-test questionnaire as an example, it is recommended that the number of pre-test samples should be 3~5 times or 5~10 times the number of questions in the subscale of the most pre-test questions.(Wu Minglong, Tu Jintang, 2011; Tinsley & Tinsley, 1987; Comrey, 1988). The researcher used SPSS software to quantitatively analyses the reliability and validity of the questionnaire.



Table 1: Reliability Analysis

Reliability Statistics (Cronbach Alpha)			
Items	Corrected Item-Total	Cronbach Alpha if Item	Cronbach
	Correlation(CITC)	Deleted	α
Your gender?	-0.082	0.699	0.688
Your age?	-0.050	0.718	
Your education?	0.049	0.703	
Your monthly income is about?	0.200	0.687	
Your Marital Status?	-0.136	0.708	
Your physical health condition?	0.080	0.692	
Do you understand what user participation in co-designing a hospice mobile app means?	-0.360	0.725	
Do you think the hospice app, co-designed with user participation, can meet your basic needs in daily life?	0.426	0.662	
Using a hospice app that was co-designed with user participation makes it easier to access hospice services at home, especially during an epidemic?	0.493	0.651	
A hospice app designed with user participation and co-design can better meet your individual needs.	0.404	0.662	
Using a hospice app co-designed with user participation can enhance your quality of life.	0.446	0.658	
Using a hospice app that was co-designed with user participation can improve your mood.	0.439	0.657	
Hospice app design with user participation and co-design can increase your user satisfaction.	0.443	0.657	
The hospice app is designed with user participation and co-design to better meet your user needs.	0.493	0.652	
Compared to the current hospice app, the hospice app design with user participation and co-design is more innovative.	0.398	0.661	
The user participation in the co-design of the hospice app will help to promote and popularize the knowledge.	0.373	0.665	
You intend to continue using the hospice app that was co-designed with user participation in the future.	0.462	0.655	
If you or a family member needs it, you'll be more likely to use a hospice app that was co-designed with user participation.	0.494	0.654	
If you have the opportunity, would you like to participate in co-designing a hospice app that better meets the needs of seniors?	0.409	0.663	

Cronbach α (Standardized): 0.666

The reliability analysis, as can be seen from the table above, shows that the reliability coefficient value of 0.688 is greater than 0.6, thus indicating that the quality of the study data reliability is acceptable. The value of the reliability coefficient of the study data is higher than 0.6, which collectively indicates that the quality of the data reliability is acceptable.

Table 2: Validity Analysis

Items	Factor Loadings					Communalities
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	
Your gender?	-0.021	-0.010	-0.173	0.017	0.833	0.725
Your age?	-0.269	0.218	-0.023	0.737	-0.087	0.671
Your education?	0.047	-0.106	0.786	-0.194	-0.094	0.679
Your monthly income is about?	-0.037	0.212	0.821	-0.005	-0.211	0.764
Your Marital Status?	-0.088	-0.099	-0.152	0.692	0.225	0.570
Your physical health condition?	0.330	-0.148	-0.201	0.619	-0.282	0.634
Do you understand what user participation in co-designing a hospice mobile app means?	-0.366	-0.085	-0.532	0.152	-0.342	0.565
Do you think the hospice app, co-designed with user participation, can meet your basic needs in daily life?	0.662	0.130	0.243	-0.241	0.094	0.581
Using a hospice app that was co-designed with user participation makes it easier to access hospice services at home, especially during an epidemic.	0.307	0.622	0.058	-0.251	0.135	0.566
A hospice app designed with user participation and co-design can better meet your individual needs.	0.586	0.242	-0.079	-0.219	-0.080	0.462
Using a hospice app co-designed with user participation can enhance your quality of life.	0.337	0.596	-0.096	-0.292	-0.048	0.530
Using a hospice app that was co-designed with user participation can improve your mood.	0.561	0.223	0.251	-0.017	0.175	0.458
Hospice app design with user participation and co-design can increase your user satisfaction.	0.594	0.281	-0.027	-0.010	-0.124	0.447
The hospice app is designed with user participation and co-design to better meet your user needs.	0.466	0.393	0.134	0.116	-0.026	0.404
Compared to the current hospice app, the hospice app design with user participation and co-design is more innovative.	0.633	0.121	-0.042	0.042	0.000	0.419
The user participation in the co-design of the hospice app will help to promote and popularize the knowledge.	0.046	0.639	0.014	-0.010	-0.293	0.497
You intend to continue using the hospice app that was co-designed with user participation in the future.	0.244	0.579	0.211	0.108	0.161	0.477
If you or a family member needs it, you'll be more likely to use a hospice app that was co-designed with user participation.	0.303	0.606	0.007	0.174	0.083	0.496
Eigenvalues (Initial)	4.296	2.024	1.456	1.140	1.029	-
% of Variance (Initial)	23.864%	11.242%	8.090%	6.333%	5.717%	-
% of Cum. Variance (Initial)	23.864%	35.107%	43.196%	49.529%	55.246%	-
Eigenvalues (Rotated)	2.753	2.333	1.875	1.779	1.204	-
% of Variance (Rotated)	15.297%	12.962%	10.419%	9.882%	6.686%	-
% of Cum. Variance (Rotated)	15.297%	28.258%	38.677%	48.559%	55.245%	-
KMO			0.817			-
Bartlett's Test of Sphericity (Chi-Square)			884.196			-
df			153			-
p value			0.000			-

Note: Blue indicates that the absolute value of loading is greater than 0.4, and red indicates that the communality is less than 0.4.



Excluding the last question, as can be seen from the table above: all the research items correspond to a common degree value higher than 0.4, indicating that the information on the research items can be extracted effectively. In addition, the KMO value is 0.817, which is greater than 0.6, indicating that the data can be extracted effectively. In addition, the variance explained values of the five factors were 15.297%, 12.962%, 10.419%, 9.882%, 6.686% respectively, and the cumulative variance explained after rotation was 55.245% > 50%. Meaning that the information content of the study items can be effectively extracted.

Table 3: KMO and Bartlett's test

KMO and Bartlett's Test		
KMO		0.817
	Chi-Square	884.196
Bartlett's Test of Sphericity	df	153
	p	0.000

The validity was verified using KMO and Bartlett's test, as can be seen from the table above: with a KMO value of 0.817 and a KMO value greater than 0.8, the study data is well suited to extracting information (a good side reaction to the validity). The reliability and validity analysis data provide good evidence that the word questionnaire is reliable and valid and that the questions are well designed to respond effectively to the researcher's research objectives.

The frequency analysis shows that 55.17% of women and 44.83% of men were interested in hospice applications, followed by those aged 66-70. They accounted for 61.21% and 20.69% respectively. In terms of your education, 'high school' was the highest at 34.91%, with a further 34.91% of the sample having a university degree or higher. In terms of your monthly income, '3001-5000yuan' accounted for the highest percentage at 38.36%. 84.8% of the sample were married. 63.79% of the sample chose general health (occasional illness) With these data it can be proven that the 60-70 years old are the main user group of our study, the 'New Older'. Then the New Older people are the ones who are interested and concerned about the Mobile application of hospice care.

Most of them have received higher education and their monthly income is medium to high level in Hubei region. So they do have a certain level of spending power and awareness. Most of the older people in the sample are married and in average health. Then, through the previous literature review we can learn that Chinese older people prefer to age at home, including receiving hospice services. This proves that the hospice mobile application is a smart mobile product that meets their needs.

The researcher used Cross (chi-square) analysis to study how your age corresponds to your opinion on user involvement in co-designing hospice mobile applications that can meet your basic needs in everyday life. The frequency analysis allows us to conclude that the number of 60-70 years old is 81.9%. 55.63% of users aged 60-65 years chose to agree and 17.61%



strongly agreed, while 60.42% of users aged 66-70 years chose to agree and 14.58% strongly agreed. For those aged 71-75, 69.57% agreed, for those aged 76-80, 71.43% had no opinion, and for those aged 80 and over, 33.33% had no opinion.

From these data, it is evident that older people believe that user participation in the design of a mobile application for end-of-life care can better meet the daily needs of older people and increase user satisfaction. For the qualitative analysis section, the researcher used MAXQDA software. Twenty interviews and photographs were included for documentation, and ultimately the collated documents were analyzed using MAXQDA software. The researcher used the content of the face-to-face interviews to determine the design of the new seniors' preferences for the hospice app. Face-to-face interview questions:

- (i) Do you think participating in co-design could improve user satisfaction with the Hospice MOBLIE APP?
- (ii) Which designs would you like to see optimized? The researcher edited the transcripts of the 20 interviewees into 20 word documents and imported them into MAXQDA software for qualitative analysis. A total of 26 hierarchical codes and sub-codes were edited at the list of codes. This is one of the most common architectural patterns for systems. The figure below shows their primary and secondary relationships. With 'What features can be added to meet the needs of seniors using' as the main line, APP functional design, APP interface design, APP system design, and Users' emotional needs are subdivided as the second order. 17 out of 20 interviewees thought that co-design can improve senior user satisfaction, and 3 interviewees answered no opinion. They are shown in blue and brown color in the table below respectively. Secondly, we can see that the orange color has the largest proportion.

4. CONCLUSION

This study was conducted on elderly people in Hubei Province, China, to find out whether co-design could improve user satisfaction and meet the needs of elderly users. During the epidemic, the people of Hubei, China, underwent significant psychological changes. The general public was also more aware of the fact that elderly people were ill at home and unattended, etc. The researcher empathised with the situation and therefore embarked on a two-year long fieldwork and research analysis. The researchers found that local residents, having experienced the life and death of the epidemic, had a higher expectation of quality of life and were more willing to spend money to enjoy a better quality of life. Acceptance of a sensitive word like death has also become higher. It is also because of the epidemic that people are becoming aware of the importance of mobile applications, especially for those who suffer from illnesses.

Then the elderly, as a group with a high frequency of illnesses, are also starting to look for and find mobile smart products that combine with medicines and medical health knowledge. A good option is the Hospice Mobile application, which includes home care, medication reminders, emergency calls and Buddhist rituals. The researcher found that new seniors in



particular have no barriers to smartphone use, but will simply prefer a more minimalist process. Especially for some functional needs, seniors will be more explicit about their expectations and needs.

For this study, the researcher will conduct a more detailed data survey and analysis at a later stage. Interviews will be conducted to gain a deeper understanding of the needs of older users and to work with them to design a hospice mobile application that better meets their needs.

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