

Study on the improvement of Elderly activity demand in Outdoor Public Space in Urban Communities -A case study of Wuhan in China

Hong-Chao Xu¹, Wan-Sok Jang², Young-Hwan Pan^{3*}

¹Ph.D.Course, Dept. of Experience Design, TED, Kookmin University

²Professor, School of Art & Design, Wuhan University of Technology

³Professor, Dept. of Experience Design, TED, Kookmin University

도시 공동체 실외 공공 공간에서의 노인활동의 개선조치에 관한 연구 -중국 우한시를 중심으로

허충초¹, 장완석², 반영환^{3*}

¹국민대학교 테크노디자인전문대학원 경험디자인학과 박사과정

²우한이공대학교 예술디자인대학 교수

³국민대학교 테크노디자인전문대학원 경험디자인학과 교수

Abstract This paper studies the activities characteristics of the elderly aged 60-75 years old who can take care of themselves in the community public space, and puts forward the design principles of the community public space in the aging society. Using the methodology of experience design, through naturalistic observation, questionnaires, interviews and shadowing, the spatial and temporal characteristics of daily activities of the elderly are analyzed. In the community public space, the behavior of the elderly is essentially a social activity to get more attention and communication. This determines the needs, time, frequency and duration of activities of the elderly in community public space. In the community public space, the behavior of the elderly has the characteristics of long-term and regularity, and its behavior changes slightly with the space, the objective factors that affect the elderly are gender, age and climate. The subjective factors are lifestyle, family members and income level.

Key Words : Urban elderly, Community public space, Service design, Experience design

요약 논문은 스스로 자신을 부양하는 60-75세 도시 노인들의 공동체 공공 공간에서의 행동특성을 연구하여 노령화 사회의 공공 공간 디자인원리를 제안한다. 경험디자인 방법론을 활용하여 자연 관찰 방법, 설문, 인터뷰 및 그림자 추적 등을 통해 노인들의 일상 활동에서 시공간의 특성을 분석한다. 공동체의 공공 장소에서 노인들의 행동은 본질적으로 더 많은 관심과 교제를 얻는 사회적 활동이다. 이것은 노인의 공간 사회 활동 수요, 활동 발생 시간, 활동 빈도 및 지속 시간 등에 대해 결정한다. 지역 공동체의 공공 장소에서 노인의 행동은 장기적이고 규칙적인 특성을 가지고 있으며, 그 행동은 공간에 따라 약간 변화하지만, 더 큰 영향을 미치는 객관적인 요소는 성별, 연령 및 기후이며, 주관적인 요소는 생활 방식, 가족 구성 및 소득 수준이다.

주제어 : 도시 노인, 공동체 공공 공간, 서비스, 경험디자인

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*Corresponding Author : Young-Hwan Pan(peterpan@kookmin.ac.kr)

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1. Introduction

The research object of this paper is the 60-75-year-old elderly who have self-care ability in Wuhan. These people have basically stable income sources, relatively good physical function and good mental outlook. Most of these people have only one child, and some old people help their children raise their grandchildren[1]. Apart from some children working in the field and living alone, a large part of them live together with their children, which is more prominent after the birth of their grandchildren. In order to maintain their private space with their children, community public space is the most popular space for making friends and entertaining activities for the elderly[2].

With the acceleration of China's urbanization process and population aging, the problem of urban population aging has become more and more prominent. Taking into account the physical and psychological needs of the elderly, young people and elderly use public space time and method conflicts to face these problems and use service design methods to identify contacts and pain points. Firstly, through questionnaires, observations, surveys and interviews, we can understand the activities, time, space and path of the elderly, and analyze the general temporal and spatial characteristics and spatial and temporal differentiation characteristics of the daily activities of the elderly[3], and then according to the characteristics of each activity type. The outdoor activity space of the residential community is classified, combined with the analysis of the influence factors of the activity space, the environmental influence factors of the elderly group in the behavior track are extracted, and the influence degree of environmental elements on the outdoor activities of the elderly is summarized [4]. Finally, the space and time of the high-frequency active nodes in the behavior track of the elderly are analyzed.

2. Method

2.1 Background research

The elderly refers to citizens over 60 years of age. A society whose population over 60 years old accounts for more than 10% of the total population, or whose population over 65 years old accounts for more than 7% of the total population, is called an aging society or an old-age country.

The total population of mainland China at the end of 2018 was 1395.38 million, 5.3 million more than at the end of the previous year. As shown in the figure total population Fig 1.

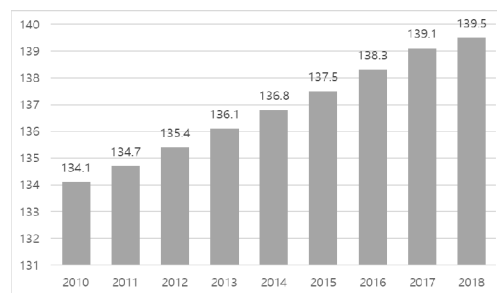


Fig. 1. 2010—2018 China's total population (Unit: Million) (According to the National Bureau of Statistics of China , Huajing Industrial Research Institute)

In terms of age composition, the working-age population aged between 16 and 59 was 901.99 million, accounting for 64.9% of the total population. There were 240.9 million people aged 60 or above, accounting for 17.9 % of the total population, of whom 158.31 million were aged 65 or above, accounting for 11.4%. In 2025, the population over 60 years old will reach 300 million, becoming a super-old country. As shown in the figure population age structure Fig 2.

Rapid urbanization in China has resulted in a rapid increase in urban population. As shown in the figure urban population statistics structure Fig 3.

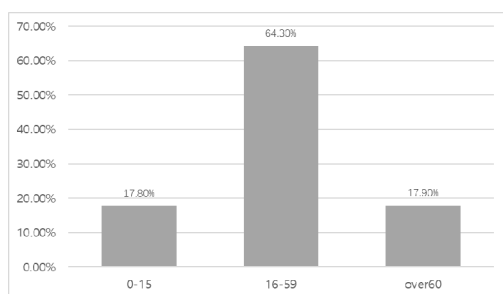


Fig. 2. 2010—2018 China's population age structure (According to the National Bureau of Statistics of China , Huajing Industrial Research Institute)

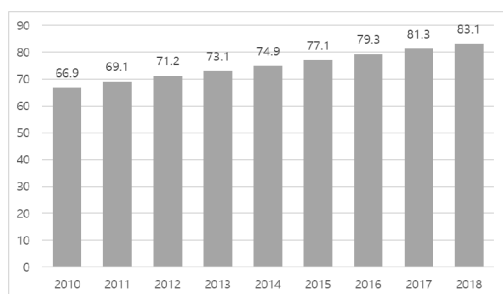


Fig. 3. 2010–2018 China's urban population statistics (Unit: Million)

Wuhan is located in the middle of China, the largest city in the region and the capital of Hubei Province, nicknamed “Chicago, China”. In 1993, Wuhan officially entered the ranks of an aging population. In this year, the number of elderly people aged 60 and over in Wuhan reached 710,000, accounting for 10.23% of the total population. By the end of 2018, the total registered population of Wuhan was 8.87 million, and the urbanization rate was 80.29%. Among them, the elderly population over 60 years old was 1.87 million, accounting for 21.27% of the total population. Among the elderly over 60 years old, there are 901,174 males and 978,221 females. As shown in the figure Wuhan aging population trend Fig 4.

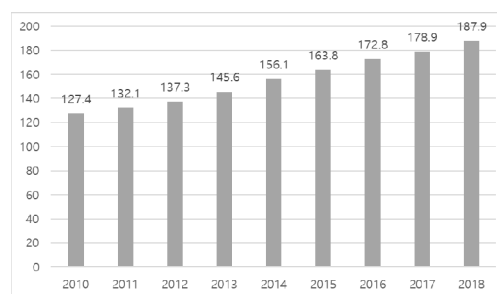


Fig. 4. 2010 – 2018 Wuhan aging population trend (Unit: 10000)

Europe, the United States, and Japan entered the aging society earlier, and their research on aging is very detailed, especially in indoors, furniture, and prevention of injuries. The goal is to create an Age-Friendly city[5]. In the community, the housing rights, housing property and lifestyle are different from those in China, and there are few studies on the sharing of community public space among the elderly. China is actively looking for solutions to the current aging problem, but these solutions are basically at the level of architecture and planning, and seldom systematically consider the problem from the perspective of service design. Therefore, this paper considers the new possibility of solving the problem from the five principles of service design. Through the service design method, improve the elderly's perception and requirements of the environment, as well as the requirements of space and facilities. They should meet their spiritual requirements of convenience, privacy, security and interest[6].

2.2 Community public space and its problems

Community public space refers to all the spaces between buildings within the community and public places open to all residents of the community, including roads, squares, green spaces, leisure sports fields, entertainment spaces, public event rooms, etc. As shown in the table community public space Table 1.

Table 1. Classification of Community Public Space

Main category	Minor classification	Specific contents
Traffic system	Road	Roadway, Main road, Walking track
	Park	Underground garage, Ground pool
Recreation system	Square	Square
	Playground	Basketball court, Table tennis court, Badminton court, Tennis court, Swimming pool
	Sports facility	Sports facility
	Children's playground	Slides, Bunkers, Climbing frames
	Rest facility	Seats, Pavilions
Public service system	Commercial facility	Shop, Vending machine
	Cultural facility	Entertainment room, Exercise room
	Medical facility	Medical room, First-aid facility
	Educational facility	Classroom
	Management facility	Management room, Management equipment
Auxiliary system	Service system	Lighting equipment, Audio equipment
	Sanitation facility	Washroom, Trash can
	Security facility	CCTV, Alarm equipment, Help-seeking equipment
	Greening	Trees, Shrubs, Flowers, Sculptures
	Other	Pet facility

In China, the developers mainly consider from a commercial point of view, their design is based on national and regional laws and regulations, and fully take into account the comprehensive factors of the design, more visual aesthetic, and superficial details are more important. However, the elderly who use the most public space in the community lack the right to speak. The government's legal standards are some broad data[7]. The design is based on the subjective and objective conditions of the elderly. The subjective conditions include: gender, age, income, family composition, etc. The objective conditions include season, weather, time, community environment, etc. The psychological characteristics and real needs of the elderly are taken into account, and the standards are relatively lagging behind. In reality, China has entered an aging society, and Wuhan has entered a super-aging society. The whole society knows that it has entered an aging society, but the overall consciousness has not changed.

2.3 Traditional living habits

Classified by the composition of family members, the composition of family members is one of the main factors affecting the activities of the elderly. Because of the traditional life concept and habits of Chinese people, their life habits are carried out around family members. The work and life pressure of young people in China is particularly high, and some related systems are not perfect enough. Young people need the help of the elderly to take care of their children after they get married and have children. This situation will continue until their children are 12 years old. This phenomenon is very common in China. It is a social norm. Chinese Confucianism makes the elderly willing to take care of their grandchildren and live with their grandchildren. In some extreme cases, children of the elderly work in other cities, and the elderly will take care of their grandchildren alone[8].

Living with grandchildren changes the old life pattern. All time and activities are carried out around grandchildren, taking care of the diet, daily life, study and work of family members. Elderly with preschoolers at home have a weak activity pattern. As long as the weather allows, they will take their grandchildren out for a walk every morning, afternoon and evening. Since their grandchildren go to school in kindergarten, the time of the elderly is changed according to the time of school. For example, their shopping, cooking and recreation are all changed according to their grandchildren's time of class and class over.

Elderly accompanied by pets (dogs) will take their pets out for a walk every morning and evening. Moreover, due to the particularity of pets, the time they regularly accompany their pets for a walk is not affected by the weather, but the length of walking time will be affected, such as rain, etc. As shown in the table elderly households and duration of activities Table 2.

Table 2. Classification of elderly households and duration of activities

Type	Amount	Average duration (hour)
Single	8	5.5
Couple	47	5.1
With children (without grandchildren)	65	9.3
With children (grandchildren are preschoolers)	119	3.9
With children (grandchildren are School-age)	136	6.7
With children (grandchildren)	12	6.5

2.4 Shadowing

Ms. Zhang : Community residents like to call it Ms. Zhang, who lives with three generations of his son and family. Like most retired elderly people in the community, Mr. Zhang, 66, has plenty of time after retirement. In addition to housework, she takes care of her granddaughter to go to school on weekdays. Every day, Ms. Zhang gets up at 6 o'clock to make breakfast for his family, and takes his granddaughter to school at 8 o'clock (his son and daughter-in-law work from 9 to 5). After sending her granddaughter to school, she goes to buy vegetables, then walks in the community and chats with friends and sits idly. At about 11 o'clock, she goes home to cook lunch, and at 12 o'clock every working day, Ms. Zhang and his friends have a fixed mahjong time until the end of 17 o'clock to pick up her granddaughter from school. Home cooking, after dinner about 19 o'clock with friends to dance square dance, 20 o'clock square dance and friends chat and exchange experience, about 21 o'clock home, 22 o'clock rest. Through shadowing, it can be concluded that the typical elderly use the public space and facilities in the community for time, use time and so on.

2.5 Square seat naturalistic observation

Without affecting the use of other activities and normal traffic, the seats in the square should be moved to different positions, distances and orientations. Different distances and orientations

will affect the chatting and communication of the elderly, and the seats will be adjusted to the most suitable state for communication[9].

The elderly has a fixed time and range of activities in the community square. The high frequency use time of seats is 6-9 a.m. and 5-9 p.m., which is slightly delayed or delayed with the seasonal change. The seats used by elderly people who often move in the square are 1-2 hours. It can be seen that the time node, the time length and the frequency of its activities are all affected by weather and climate. As shown in the figure activity pattern model Fig 5.

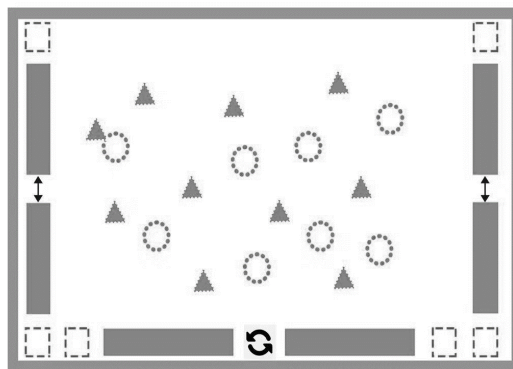


Fig. 5. Activity pattern model of the elderly in the community square

Through the observation, we can see that the number of seats, the size and distance of seats will have an impact on the behavior of the elderly. Their activities in the square are essentially a social need. In order to increase attention, they are looking for a cheap or group with common interests to integrate into it[10].

3. Results

3.1 Activities content of the elderly

This time, 389 questionnaires were distributed and 381 were effectively collected, all of which were aged 60-75 years old, including 198 females and 189 males.

The elderly are active members of the community's public space. The public space of the community is basically the most used by the elderly. The activities within the community are also large, and the activities are intensive, mainly walking[11]. When the elderly is old, due to the decline in physical function (menopausal syndrome and just leaving the job), they are prone to frustration and loneliness, and their ability to adapt to the environment is declining. The decline of muscles, bones and nervous system leads to a decline in physiological indicators such as vision, sensibility, responsiveness, strength, grasping power, lifting power, and standing durability [12]. The feelings of the environment are constantly changing, and should meet their spiritual needs, including comfort, privacy, fun and sociality, which is the necessity of their self-establishment into society.

Out-of-town time and activity content under different gender conditions are also quite different. Different leisure activities under different physical conditions, large classification can be divided into necessary behavior, leisure and entertainment behavior, social behavior and household behavior; according to the amount of physical activity for both static and dynamic. The activities include walking, walking dogs, musical instruments, fitness activities, Tai Chi and square dances. The quiet activities include sitting, riding, sunbathing, mahjong and chess. Different requirements for space and space are different, especially for moving activities that may affect

other people. This effect may be generated both in sound and on the field. As shown in the figure high frequency activities Fig 6.

The activities of the elderly are diverse in space and time. They have the necessary behavioral space for buying food and transporting the third generation, as well as spontaneous behavioral needs. The community public space should be people-oriented, taking into account the realities of the use group. Demand, pay more attention to vulnerable groups[13], embody the fairness and equality of universal design, and strengthen and promote the harmony of neighborhood relations[14].

3.2 Activities time

The time nodes of the behavior of the elderly usually have a clear rule. The time and law of the elderly's work schedule are directly related to their family composition. The elderly who live alone or couples are freer and more regular[15], and Cohabitation of children, especially those with the third generation, is carried out around the third generation, with less free time and the strongest regularity. The activity time of the elderly runs through the morning, evening and evening. The elderly is generally used to getting up early in the morning, in the morning at 6-7 o'clock, wake up in the community for morning exercise or walking, 8 o'clock breakfast; 9-11 will carry out some relatively quiet recreational activities in the community, such as various Musical Instruments and board games. Lunch is usually around 12 o'clock, after lunch usually take a nap; Some sports activities, such as badminton and table tennis, will be held from 14:00 to 16:00. Around 18 o'clock at dinner time, after dinner to go out for a walk or literary activities, most of the elderly at this time will have a collective square dance. For example, there is little difference in the time nodes of grandchildren in the family, but there are more time nodes: children will be sent to school at 8



Fig. 6. Gender ratio of high frequency activities in the elderly

o'clock, and children will be picked up from school at 16 o'clock. Time is just embedded in the original life behavior pattern. From the time of behavior occurrence, the node of behavior occurrence of the elderly is clearly visible, and has a strong regularity in time, and spends a long time in public space, but there are some differences in individual behavior time. Most of the elderly are active under their own inherent laws. Regular activities determine the law of different behavior occurrence of the elderly[16].

The time spent by the elderly in community activities is not affected by working days or two-day rest. It is the real resident population in community space. There are three dense time spent by the elderly in community space: 9-10 a.m., 13-16 p.m. and 19-21 p.m. This rule is not affected by the composition of the elderly family.

By summarizing the commonality of the activities of the elderly in the community public space, the track of activities, the use frequency and use time of facilities are summarized, and more accurate Suggestions are put forward in view of the deficiencies in the current design.

3.2 Influence factor

Design should allow the elderly to better integrate into modern life, rather than excessive care and protection, which will create psychological barriers that easily lead to group isolation and isolation. According to the characteristics of each activity type, the outdoor activity space of the residential community is classified, the environmental impact factors of the elderly group in the behavior track are refined, the influence degree of subjective and objective factors on the outdoor activities of the elderly is summarized, and the high-frequency active nodes in the behavior track of the elderly are analyzed. Space and time, based on the type of outdoor activities and influencing factors of the elderly, create a harmonious and comfortable community environment.

The behavior of the elderly in the public space of the community largely determines their living conditions and physical and mental health, and better improves the quality of life of the elderly. The physiology, lifestyle and health needs of the elderly determine the requirements for sunshine ventilation and sanitation, the limitations of its scope of activities and the special requirements for the environment. The public space activities of the community elderly are divided into two categories: the factors affecting the activities of the elderly are mainly divided into objective factors and subjective factors. As shown in the figure factors affecting the behavior Fig 7.

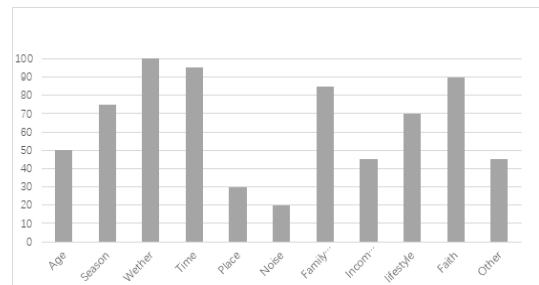


Fig. 7. Factors affecting the behavior of the elderly

Subjective factors include: gender, age, education level, income level, family composition, lifestyle, family type, etc. Objective factors include: season, weather, time, size, location and noise. It can be seen that the weather, season, time, family composition and religious belief have a decisive influence on the behavior of the elderly. These behaviors are long-term and regular, and their behavior does not change significantly due to differences in material space. The biggest influencing factor for the elderly when they are active in the public space of the community is the weather. For example, in summer, the temperature in Wuhan is relatively high, and the outdoor activities are relatively reduced. The more extreme situation is the impact of rain and snow. In the rain and snow, the elderly is only in the community. Only

a few indoor public spaces carry out activities, and the activities receive the influence of the nature of the activities, and some of the elderly people's needs and hobbies affect the factors at this time.

4. Conclusion

The design should make the elderly better integrated into modern life, rather than excessive care and protection, which will cause psychological barriers, and easily lead to group isolation and isolation. According to the characteristics of activity types of the elderly, this paper classifies the outdoor activity space of the residential community, and summarizes five points based on the influencing factors of the activity space, the time of the elderly's behavior activities, and the high-frequency activity node space in the behavior track.

4.1 universality

In order to meet the 7 principles of the most basic universal design, the object of community public space service should be all residents regardless of age and physical condition, not only for the elderly as a special group, it is easy to make the elderly feel lonelier and more isolated.

4.2 Suitability

The design should be universal and unique. The design should be close to nature, restore nature, and adapt to different areas. The same design principle will often cause homogeneity. Based on the design principles, it will be based on the weather and climate of each area. Different adjustments in space, details, materials, colors, styles, forms, etc., can not only ensure the quality but also reflect the characteristics.

4.3 Cultural

In the traditional Chinese concept, the elderly will help their children to take care of their grandchildren and take care of them for a long time. Living together, young people have no time because of work pressure, and many elderly people will always take care of their children to middle school from retirement (according to Chinese tradition and The age structure, the time of retirement for the elderly and the stage of raising children by children, which is considered very happy in China called the joy of heaven), and in extreme cases will also take care of grandchildren to get married and have children. Therefore, the children's play area is combined with the leisure area for the elderly, and the resources are appropriately tilted towards the elderly and children. Both the elderly and children belong to vulnerable groups and need to be protected. They can take care of the children and the elderly and exchange entertainment. In the design, pay attention to the physiological and psychological characteristics of the elderly and children, and grasp the scale space.

4.4. Participation

Let the elderly participate in the design and landscaping of the community. The maintenance and planting of greening in the community can be handed over to the elderly for care, which can not only save the expenditure of community public expenses, but also enable the elderly to design and manage the greening vegetation by themselves, give the elderly a place for communication and fitness, increase the diversity of the landscape, and determine the type of vegetation according to the vote With the shape, you can plant some fruits and vegetables, hold the activities of honoring the elderly in the harvest carnival every autumn (combined with the traditional Chinese festival of honoring the elderly on Sep. 9th), enrich the entertainment

activities of the community, draw closer to the feelings of the community neighbors, create a sense of belonging, and promote the harmony of the community.

4.5 Sustainability

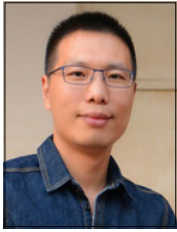
Socio-economic and technological development is dynamic, and the physical functions of the elderly are declining with age. Faced with these physiological changes of the elderly, comprehensive consideration should be given to the landscape layout, color matching, and corresponding service facilities, so as to enable the needs of the elderly and the needs of other age groups to reach a balanced state. Possible changes in behavior and activity needs are taken into account, making them sustainable and scalable, avoiding waste of resources.

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허 홍 초(Hongchao Xu)

[정회원]



- 2004년 7월 : 우한이공대학 환경디자인학과(학사)
- 2007년 6월 : 우한이공대학 환경디자인학과 (석사)
- 2018년 3월 ~ 현재 : 국민대학교 테크노디자인전문대학원 경험디자인학과 박사과정

· 관심분야 : 경험디자인, 서비스디자인
· E-Mail : xuhongchao@gmail.c

장 완 석(Wan-Sok Jang)

[정회원]



- 1997년 2월 : 성균관대학교 한국철학과(학사)
- 2000년 6월 : Wuhan University 미학과(석사)
- 2004년 12월 : Wuhan University 미학과(박사)
- 2005년 7월 ~ 현재 : Wuhan

University of Technology 예술디자인대학 교수

· 관심분야 : 사용자 경험, 서비스 디자인
· E-Mail : wansok2000@hanmail.net

반 영 환(Young-Hwan Pan)

[정회원]



- 1991년 2월 : 한국과학기술원 산업공학과(공학사)
- 1993년 2월 : 한국과학기술원 인간공학(공학석사)
- 1999년 8월 : 한국과학기술원 인간공학(공학박사)
- 2006년 9월 ~ 현재 : 국민대학교 테

크노디자인전문대학원 교수

· 관심분야 : 인터랙션 디자인, 사용자 경험(UX)
· E-Mail : peterpan@kookmin.ac.kr