Research Paper

Research on Old Community Public Space Based on Behavior-Environment Perspective:

A Case Study of Harbin's Chunming Community

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Abstract

At the end of 2019, the outbreak of COVID-19 affected people's physical and mental health. Community public space, as an important spatial carrier to meet residents' activities and emotional needs, has an extremely important impact on people's physical and mental health.This paper adopts the PSPL research method to investigate and evaluate the public space and residents' behavior in Harbin Chunming community, divides the public space environment elements of the old community into three levels: residential level, group level and residential building level, and conducts correlation analysis on the satisfaction of each level element and residents' behavior and activity characteristics to explore the solution strategy of the main contradiction of residents' behavior-space mismatch in the old community. The results of the study show that residents' activity spaces exhibit safety, proximity and spontaneity, and there are significant differences in activity spaces and types of activities among different age groups; further analyzing 20 environmental elements related to behavioral activities using correlation tests, the study proposes a progressive renovation strategy for community public spaces from a two-dimensional perspective of demand and satisfaction. The study provides a new perspective for the renovation of old communities, and explores the renovation paths for community quality improvement under the behavior-environment correlation, and its findings have certain guiding significance for the practical projects of old community renovation.

Keywords

Behavior-Environment Perspective, Community Public Space, PSPL Survey, Gradual Transformation Strategy

1. Introduction

Community space, as an important space carrier to meet residents' daily activities and emotional needs, has an important impact on people's physical and mental health, and its research has been paid attention to. In 2019, faced with the sudden epidemic situation and the normalization of epidemic prevention and control, the role of community public space in residents' physical and mental health is particularly prominent. However, the old community is often located in the core area of the city. Facing the dilemma of the rapid development of the city, the increasing shortage of urban land and the constant erosion of public space, how to make the limited community public space play its role to the maximum extent,

become the favorite place of community residents, and play a positive role in regulating residents' physical and mental health is the main research purpose of this paper.

Based on this, this study attempts to explore the correlation between residents' behavior and public space environment from the perspective of behavior-environment correlation, and dig out what environmental factors affect residents' behavior characteristics (activity frequency and activity duration) in depth. Finally, a two-dimensional coupling model of demand and satisfaction is established by using the screened environmental factors, giving priority development suggestions to the factors that affect behavior, and exploring the updating strategy of gradual transformation of public space in old communities. The research on the transformation of community public space environment from the perspective of behavior-environment correlation has important practical significance for the renewal of old residential areas in China. It can not only "use the limited resources on the cutting edge" as much as possible, but more importantly, make residents have more interaction with the environment, so as to promote richer activities and more dynamic places to meet people's growing demand for a better life.1.1. Subheading

2. Research methods and research areas

2.1. Research methods

Western scholars studied the relationship between user behavior and space environment earlier than China, and made corresponding research results. In the early research, in 1970, William. H. White, an American sociologist, observed and analyzed the use of urban park squares by means of behavior observation and photo recording, were the early research on the behavior characteristics of urban public space users [1]. With the deepening of research, new research methods appear constantly, and the research on the relationship between urban public space users' behavior and space gradually matures, from simple qualitative description to comprehensive research methods combining qualitative and quantitative methods [2].

Among them, PSPL (Public Space Public Life Survey) has been widely used in the related fields of urban public space in western countries in recent years because of its characteristics of combining rational cognition with perceptual experience. This method, put forward by the team of Jan Gehl, Denmark, is an evaluation method for the quality of urban public space and the public living conditions of citizens. It takes various types and scales of public spaces in the city as the research object, and the core is people and their activities [3]. Jan Gehl once described the PSPL survey method as "just like a doctor examining a patient". It is necessary to fully understand people's public life and the use of the existing public space, so as to explore the relationship between public life and public space, get the factors that influence or promote the use of public space, and then guide the design of public space in a targeted way [4].

Therefore, this study adopts PSPL research method, and intends to use questionnaire survey, map marking, Field observation and interview to conduct qualitative and quantitative research and evaluation on the public space environment and crowd activities in old communities, and further use correlation test analysis to explore solutions to the main contradiction between residents' behavior and public space dislocation in old communities.

2.2. Research area

The study area of this paper is located in the Chunming community of Curve Street, Nangang District, Harbin. The study area is a fan-shaped area enclosed by Xidazhi Street, Jiaohua Street, Shangjiashu Street, Xiajiashu Street, Tiegong Street, and Zhuan Street, with a total community area of 13.23 ha (Figure 1). The Chunming community has a long history and the curved street where it is located is an early modern

neighborhood in Harbin. Being a Russian colony in its early days, it was influenced by western planning and construction ideas, showing a grid of squares and a radioactive composition. Since the 1980s, most of the buildings in the area function as residences for the employees of Harbin Railway Bureau, and the community is surrounded by Subway Line 2, West Railway Station, Harbin Institute of Technology, Harbin Railway Bureau, orthopaedic hospital, museums and so on. With complete commercial facilities and medical convenience, the community can meet the basic needs of daily life within the living circle. In the past ten years, Chunming community has been renovated three times, in 2013, 2018 and 2020, but most of them are building repair and infrastructure renovation, and there are no major changes to the public space of the community.

Community public space is the place where residents' behavioral activities occur most often, and it is also the object of this research. During the initial community visits, we sorted out the basic situation of various types of public spaces within Chunming community. According to the types of public spaces, they were divided into four categories: square, green, street and courtyard (Figure 2). There is no large-scale activity square in the community, but mainly consists of a large space between houses, which is the main sports ground for residents; the community street space not only carries the function of transportation, but also has the function of residents' activities; the space between houses in the community is the necessary way for residents to get to the residential buildings, and is also the main site for the elderly's usual activities, where residents also carry out activities such as drying, socializing, chess and recreation; the community green space is another important public space in the community. As another important public space in the district, it is used and visited, and it also plays a role in regulating the climate in spring and summer. The curved streets, due to their geographical characteristics, produce public spaces in front of houses with different forms and height differences, as well as arc-shaped linear activity public spaces linking various neighborhoods and groups, which exacerbate many problems such as low utilization rate, poor vitality, low quality, and poor maintenance and management in later years (Figure 3).

Figure 1. Overview of the research area and its surroundings.

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Figure 2. Current status of public space utilization.

Figure 3. Current status of public space quality.

3. Research content and result analysis

3.1. Research content

The research contents mainly include questionnaire survey, map marking, field observation and interview. In order to reflect the scientific nature of this survey, we conducted a pre-survey on behalf of the region, aiming at preliminarily understanding the basic situation of Chunming community, the characteristics of residents' activities and spatial activities, aiming at the problems found and residents' wishes, and then determining the problem factors of the spatial environment in combination with literature, and making a formal survey questionnaire. The questionnaire consists of three parts: First, the basic information survey of residents: gender, age, education level, occupation, household demography and residence duration; 2. Investigation on the characteristics of residents' behaviors and activities: referring to the outdoor activities theory of Danish scholar Jan Gehl [5], the types of activities are divided into three categories: necessary activities, spontaneous activities and social activities, and the frequency, duration and spatial level of 15 activities are investigated (Table 1); III. Survey on residents' demand and satisfaction for community environmental elements (Table 2).

Formal questionnaires are distributed in every group and main road intersection in Chunming community. In order to ensure the authenticity of the questionnaire and make it represent the residents and merchants in Chunming community to the greatest extent, the distribution time of the questionnaire is selected to be distributed centrally within one week, with a total of 125 questionnaires and 100 valid questionnaires, with an effective rate of 80%.

Table 1. Summary of Activities Types of Community Residents in Chunming.

Activity type	Specific activities
Necessary activity	Commuting, walking, picking up grandchildren, buying food and shopping.
Spontaneous activity	Planting, walking dogs, basking in the sun, exercising, browsing and watching, playing with grandchildren.
Social activity	Square dance, chat, culture and entertainment, chess and calligraphy, neighborhood communication.

Table 2. List of evaluation indicators of community residents' demand and satisfaction for community environmental elements in Chunming.

Hierarchical relationship	Primary factor	Secondary elements	Satisfaction degree	Degree demand
A Residential level	A1 road	A11: peripheral roads		
		A12: parking lot		
	A2 activity site	A21: public square		
		A2: greening the Park		
	A3 greening	A31: centralized greening		
	A4 facilities	A41: public service facilities		
B Group level	B1 road	B11: road		
		B12: laying the floor		
		B13: height difference		
		B14: parking		
	B2 site	B21: living place	Very dissatisfied (1 point)	Very unimportant (1 point)
		B22: healthy venues		
		B23: leisure venues		
	B3 greening	B31: group greening		
	B4 living facilities	B41: garbage disposal point	Not satisfied (2 points)	Not important (2 points)
		B42: bicycle parking		
		B43: grocery store		
C Residential Building level	C1 pathway	C11: road in courtyard	Average (3 points)	Average (3 points)
		C12: ramp		
		C13: steps		
		C14: handrails	Satisfied (4 points)	More important (4 points)
	C2 entrance	C21: canopy		
		C22: entrance door		
		C23: ramp	Very satisfied (5 points)	Very important (5 points)
		C24: steps		
		C25: facilities		
	C3 bottom opening degree	C31: green space in courtyard		
		C32: bottom business		

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	C33: expansion		
C4 facade aesthetic degree	C41: color, wall surface, window form		

3.2. Analysis of residents' behavior in public space

(1) General situation

Through questionnaire survey and observation records, the PSPL research method are obtained. From the gender distribution (Figure 4-1), there are slightly more women than men. From the age distribution (Figure 4-2), people of all ages are involved in the survey sample, and the distribution is relatively reasonable, among which the elderly over 60 years old account for 50%, the middle-aged people between 45 and 59 account for 33%, and the prime of life between 30 and 44 accounts for 12%. The distribution of the three age groups is relatively concentrated, accounting for 95% of the total sample. The interviewees' academic qualifications are mainly concentrated in primary school and below, secondary school , and high school or college accounting for 85% of the total sample (Figure 4-3). The respondents' family structure is mainly two-person family and three-person family, accounting for 81% of the total sample. As the apartment types in Chunming community are mainly small apartments of 30 to 40 flats, the proportion of four-person family and five-person family is very small, only 1% respectively (Figure 4-4). The residence duration is mainly more than five years, accounting for 74% of the total sample. As Chunming Community is an old community with unit system, most residents are retired employees and their relatives of the former railway administration (Figure 4-5). According to the occupational statistics of respondents (Figure 4-6), the main occupational identities of respondents are retired or unemployed people and self-employed, accounting for 60% of the total sample.
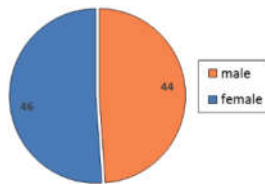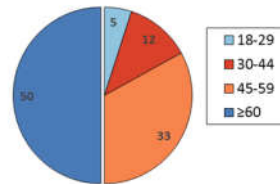
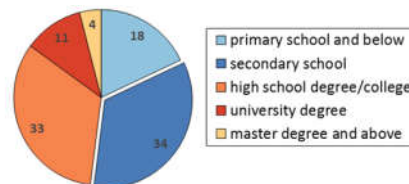Figure 4-1.Genderstatistics.　　　Figure 4-2. Age statistics.　　　Figure 4-3. Education level statistics.
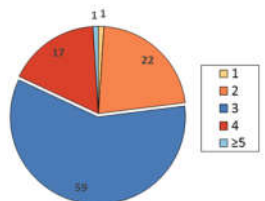
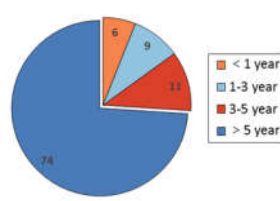Figure 4-4. Household

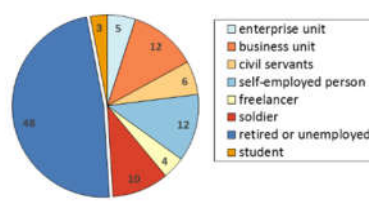demography.　　　Figure 4-5. Residence duration.　　　Figure 4-6. Occupational statistics.

(2) Activity type

Through field observation and investigation in Chunming community, the residents' activities are classified into three categories: necessary activities, spontaneous activities and social activities according to Jan Gehl 's behavior by using behavior observation and questionnaire interview. Residents are divided into four age groups according to their age, and the behavior types of people in each age group are counted (Figure 5). It can be seen that: firstly, from the abundance of activities, people aged 30-44 and over 60 have rich types of activities, accounting for almost all types of activities; As the people aged 18-29

are mostly students and people who have just worked, the activities in the community are very limited, and all types of activities are the least. Secondly, from the distribution of activity types, people aged 45-59 have the richest social activities, but those who are in the stage of the sandwich generation have less spontaneous activities; People aged 18-29, except for essential activities, seldom have other types of activities in the community. Finally, from the perspective of specific activities, such activities as picking up grandchildren and playing with grandchildren only occur among residents over 60 years old; This planting activity only occurs in the two age groups of 30-44 and over 60.
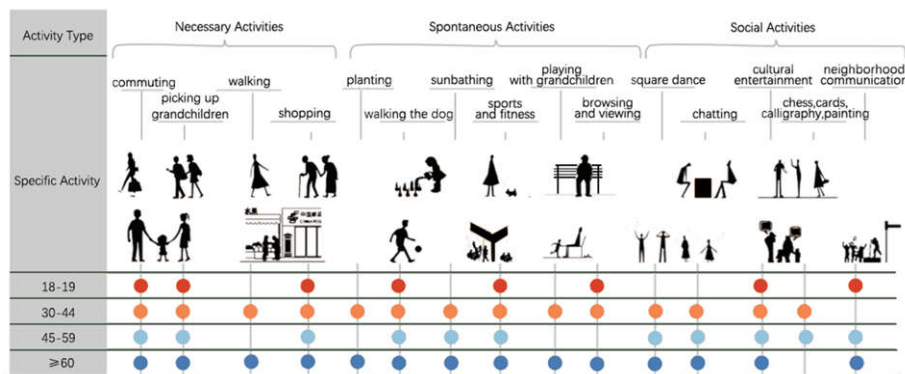

Figure 5. Statistical of activity types of different age groups.

(3) Activity time

Residents are divided into four types according to their types, namely, children, middle-aged people, the elderly and the disabled. Summarize the behavioral activity time of various types of people, and get their behavior trajectory (Figure 6).

Children's activities can be roughly divided into two categories. Pre-school children's activities need parents' company, and they tend to play with their peers, with a certain degree of aggregation. Activities are concentrated in sunny hours after 10 a.m. and around 2 p.m. The main activities of children who go to school take place after school and on rest days. After school at five o'clock in the afternoon, children usually go to the market to buy food with their parents or play in the courtyard. After finishing homework in the evening, I will also play and exercise with my friends.

Among adult , a few office workers will do outdoor activities (including morning exercises and after-dinner activities) in the community. Walking after work or on rest days is the most common activity, followed by going to the market to buy food after work from 5:00 to 6:00 in the afternoon. Some middle-aged people will go to the community square to do square dancing or other fitness activities from 6:00 to 7: 00 in the afternoon. Housewives who take square dancing as their main outdoor activities are the main components of middle-aged outdoor activities.

The elderly are the main users of outdoor activities. In this case, after breakfast, lunch or dinner, you can see the figure of the elderly's outdoor activities. At around 9:00 a.m., the elderly usually choose to sit in the sunshine downstairs. After 10:00, they will go to the community square. At this time, the elderly will gather in these two spaces to play chess or chat. 1:00 pm to 4:00 pm is also the main time for them to go out for activities. After dinner, some elderly people will dance square dance with middle-aged people.

Due to physical reasons, disabled people can't move easily, so they spend a short time going out for activities, and most of the places where activities take place are located in their own downstairs courtyard. Activities are mainly similar to those of the elderly. They are concentrated from 9:00 am to 10:00 am and from 1:00 pm to 4: 00 pm. They mainly focus on sunbathing, sitting quietly and chatting.

Occasionally, they will participate in chess and card activities. After dinner, they will choose to rest at home and rarely go out for activities.
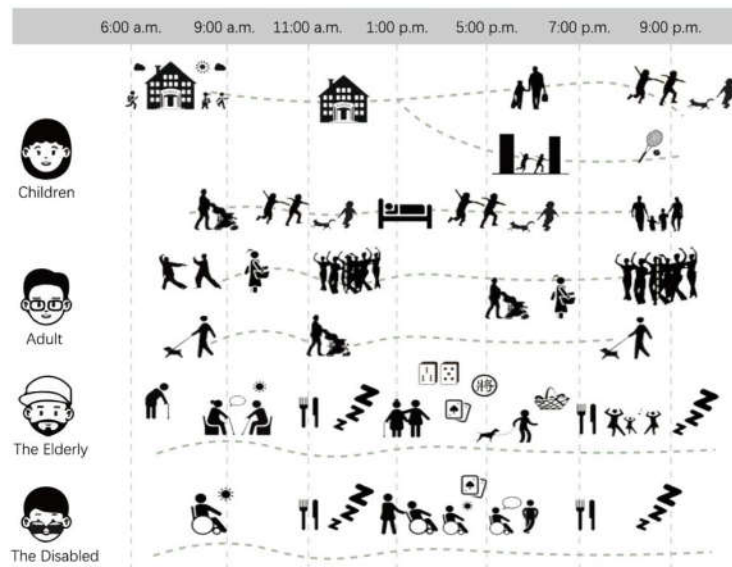

Figure 6. Trajectory diagram of residents' behavior activity time.

(4) Activity space

Observe and record residents' outdoor activities by means of behavioral annotation survey (Figure 7). According to the previous investigation and observation, it is found that there are a large number of active people in the community at 9:30, 12:00 and 17:00, so we choose to collect data around these three time points with an observation period of half an hour. From the perspective of space as a whole, residents' necessary activities basically take place in this type of space, mostly walking quickly and staying less; The place where residents' spontaneous behaviors happen is accidental, a few of them happen in the streets, and most of them happen around the courtyard of the residential area. Most of residents' social behaviors also take place in community courtyards.

Figure 7. Behavioral annotation on residents' behaviors and activities.

Summing up the above survey results, the activities of community people have three characteristics: safety, proximity and spontaneity. Safety means that when people use the outdoor public space, they will unconsciously approach the space that can provide support or shelter, such as the rest seats, pavilions, sports facilities and so on. This is because people themselves like to stay in places that are not disturbed and have a wide view, so this kind of space has the function of separation and protection, and it is easy to become a gathering place for people. Proximity refers to the observation of residents' behaviors and activities, which obviously reflects that residents will choose a shortcut with a clear purpose, and their daily short-term activities will also choose the nearest courtyard space for activities. Spontaneity means that people with the same interests often gather together spontaneously. In Chunming community, it is mainly reflected in the recreational activities of the elderly, such as square dancing in the open space, planting small gardens in the courtyard and so on. Because the elderly have more leisure time, it is easy to form a small spontaneous activity place in the community public space.

4. Correlation analysis of behavior-environmental factors

4.1. Correlation between behavior and space environment

The public space of residential area is closely related to residents' behavior. This survey tries to find the correlation between public space environment and residents' behavior in Chunming community by observing residents' behavior in the environment. Preliminary analysis results are as follows:

(1) Spatial function difference affects behavior.

In order to analyze the influence of the functional differences of community public spaces on behaviors, the following outdoor spaces are divided into the following seven categories based on the differences of dominant functions of spaces, and the frequencies of three types of outdoor activities in different functional spaces in Chunming community are roughly counted (Table 3). It is found that the spaces with different leading functions, on the premise of assuming the functions of specific places, also provide composite functions, providing diverse opportunities for community residents' communication and creating diverse communication atmosphere [6].

Table 3 Patterns of dominant functional space affecting outdoor activities

Dominant functional space	Function content	Necessary activities	spontaneous activity	Social activities
Passage space	Passage, connection, etc.	Many+++++	precious few	Less+
Congregation space	Organize community outdoor activities, etc.	More++++	precious few	More++++
Entertainment space	Play games, play cards and drink tea.	General++	More++++	Many+++++
Fitness space	Sports, competitions, etc.	General++	Many+++++	Many++++++
Viewing space	Enjoy the scenery, rest, etc.	Precious few	Many+++++	Less +
Recreational space	Walk, chat, etc.	General++	Many+++++	Less +
Leisure space	Sit still, sleep, etc.	Precious few	Many+++++	Precious few

Note: + indicates the degree of influence, and the more +, the more frequent activities.

(2) The degree of space openness affects behavior.

According to the openness of different spaces, the space types of Chunming community can be divided into the following three categories: semi-public space, semi-private space and traffic space. More public activities take place in the half-public space, which is the center and focus of community communication. Social activities and spontaneous activities of community residents are the main ones. Half-public space

plays a vital role in the continuity of residents' behavior and the integrity of living space, usually showing an open place with a certain area to accommodate many residents' activities at the same time. Semi-private space is often a place where recreational, leisure and ornamental activities take place, with strong privacy, mainly spontaneous activities. Suitable for a long stay, it is usually scattered in all corners of the community, which improves the popularity of the community as a whole. The primary function of traffic space is to meet the needs of safe and convenient traffic. Its publicity is strong, and the flow of people gathered is large. However, the crowd stays for a short time, and it mainly focuses on necessary activities and social activities. It has good connectivity and transition, so that residents can easily reach various sites outside the community.

(3) Spatial hierarchy affects behavior.

According to the types of activities in various spatial levels, make statistics on the environmental levels where all kinds of activities take place (Figure 8). It can be seen that, first of all, the group level is the main level for residents to carry out most activities, followed by the residential level, and the residential building level bears less activities. Secondly, most activities take place at all levels, which reflects the continuity of residents' activities. Finally, because there are many central courtyards in the groups of Chunming community, planting and sightseeing only take place at the group level.

From the activity frequency of each spatial level, the residents' activity frequency is classified according to each spatial level (Figure 9). It can be seen that the activity frequency of most activities is once a day, and the frequency of activities at the residential level decreases in turn. At the group level and the residential building level, the highest activity frequency is twice a day, while activities three times a day and four times a day rarely occur.

According to the activity duration of each spatial level, if residents' activity duration is classified according to each spatial level (Figure 10), it can be seen that the duration of most activities is concentrated within half an hour and within one hour. The duration of activities in residential level and residential buildings is more than half an hour, and the duration of activities in group level is more than one hour. Although the residential level has the largest range of activities, residents mostly pass by, and seldom do activities within one hour, while the group level carries the most activities within one hour. Activities with a longer duration of more than one hour are the residential level, the residential building level and the group level in turn.
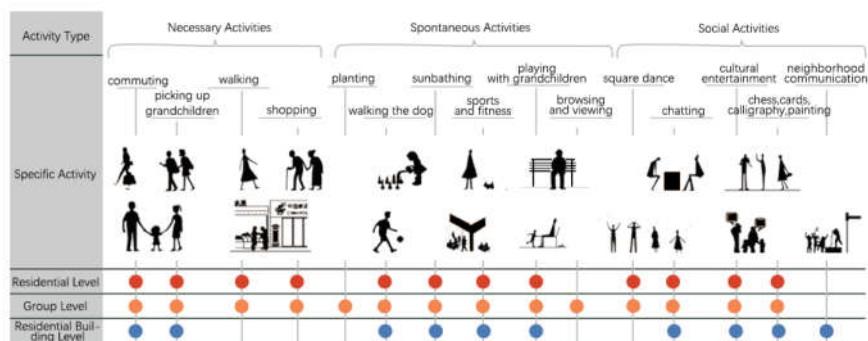

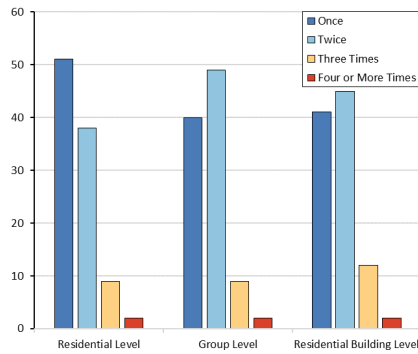**Figure 8. Statistics of activity types at various spatial levels.**

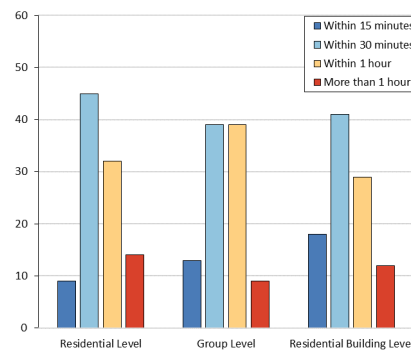Figure 9. Statistics of activity frequency in
different spatial levels.

Figure 10. Statistics of activity duration in
different spatial levels.

4.2. Analysis of influencing factors of spatial environment related to behavior activities

In order to further verify the influence of community environment on residents' behavior, a preliminary correlation analysis is made, that is, Pearson Correlation is used to test the correlation between the satisfaction of spatial environment elements at all levels of the community and two indicators of behavior (frequency and duration of behavior), that is, six groups of correlation tests are conducted.

Taking the analysis of the influence of residential area hierarchy elements on activity frequency as an example, the residential area hierarchy elements include six secondary index elements: surrounding roads (A11), parking lots (A12), public squares (A21), green parks (A22), centralized greening (A31) and public service facilities (A41). Table 4 shows the correlation results between the hierarchical elements of residential level and residents' behaviors. Pearson Correlation analysis shows that there is a significant positive correlation between community residents' behaviors and public squares, green parks, centralized greening and public service facilities, but no significant correlation with surrounding roads and parking lots.

Table 4. Correlation analysis between hierarchical elements of residential level and activity frequency.

Variable	A11	A12	A21	A22	A31	A41	Activity frequency
A11	1	-0.034	0.089	-0.052	-0.097	0.250*	0.037
A12		1	-0.089	-0.098	0.087	0.026	0.113
A21			1	0.035	0.140	0.073	0.053*
A22				1	0.174	-0.165	0.156*
A31					1	-0.279**	0.346**
A41						1	0.288**
Activity frequency							1

Note: *. There is significant correlation at 0.05 level (bilateral) ,
     **. There is significant correlation at 0.01 level (bilateral).

5. Putting forward the gradual transformation strategy

5.1. Analysis of demand and satisfaction of environmental elements in public space

After analyzing the correlation between satisfaction of community environment-related elements and behavior activities, 20 community environment elements related to residents' behavior interaction were obtained from six groups of data. However, the satisfaction of these elements is different, and the residents' demand for these elements is also different. Therefore, this study will establish a Two-

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Dimensional Model of demand and satisfaction, and give priority development suggestions to the factors that influence behavior.

As shown in Table 5, the satisfaction scores of 20 community external environmental elements related to residents' activities are ranked from high to low. The top three places are healthy sites, leisure sites and beautiful facades, and the last three places are parking lots, group roads and greening in courtyard. Chi-square test shows that the difference of satisfaction scores of community environmental elements ($X2=381.388$, $P<O.01$) is statistically significant. The demand scores of 20 community external environmental elements related to residents' activities are ranked from high to low. The first three places are leisure sites, group roads and public service facilities, and the last three places are group green space, front house greening and living sites. Chi-square test shows that the difference of demand scores of community environmental elements ($X2=313.345$, $P<0.01$) is statistically significant. Pearson Correlation analysis is used to analyze the values of demand and satisfaction scores, the analysis results show that Pearson Correlation coefficient between satisfaction and demand scores is 0.268($P=0.253$). The Spearman correlation coefficient with satisfaction degree scores is 0.214 ($P=0. 336$), so there is no correlation between satisfaction degree and demand degree scores in community environment, and there is no correlation between satisfaction degree and demand degree scores. It is in line with the conditions to draw pedigree diagram and establish a two-dimensional coupling model of demand degree and satisfaction degree to determine the priority development of community environment.

Table 5. Analysis of satisfaction and demand of community environmental elements.

Number	Key element	Satisfaction score	Sort	Demand score	Sort
1	Peripheral roads (A11)	3.74	6	3.56	17
2	Parking lot (A12)	2.92	18	4	7
3	Public Square (A21)	3.67	8	3.61	15
4	Greening Park (A22)	3.84	4	4.28	4
5	Centralized greening (A31)	3.75	5	3.96	8
6	Public service facilities (A41)	3.15	14	4.32	3
7	Road group (B11)	2.77	19	4.35	2
8	Parking lot (B12)	3.02	17	3.8	12
9	Floor laying (B13)	3.48	11	3.7	13
10	Living Place (B21)	3.08	16	2.7	20
11	Healthy Site (B22)	4.2	1	3.93	9
12	Leisure Site (B23)	3.94	2	4.36	1
13	Green space (B31)	3.09	15	3.44	18
14	Garbage disposal (B41)	3.49	10	4.06	6
15	Grocery store (B43)	3.33	13	3.89	11
16	Awning (C21)	3.69	7	3.63	14
17	Front House Greening (C31)	2.7	20	3.07	19
18	Bottom Business (C32)	3.46	12	4.15	5
19	Expansion (C33)	3.63	9	3.58	16
20	Beautiful facade (C41)	3.93	3	3.9	10
		X2=381.388	P < 0.01	X2=313.345	P < 0.01

5.2. The order of spatial gradual transformation from the two-dimensional perspective of demand satisfaction

Satisfaction and demand respectively represent the community residents' satisfaction with the current design and management of the community environment in Chunming and their expectations for the

future demand. In order to give full play to the environment's promotion of residents' behavior and provide strategies for the priority development of community environment construction, the 20 indicators of community environment are divided into five categories by using the system cluster analysis method. Figure 11 shows the classification and characteristics of each element of satisfaction and demand intuitively.
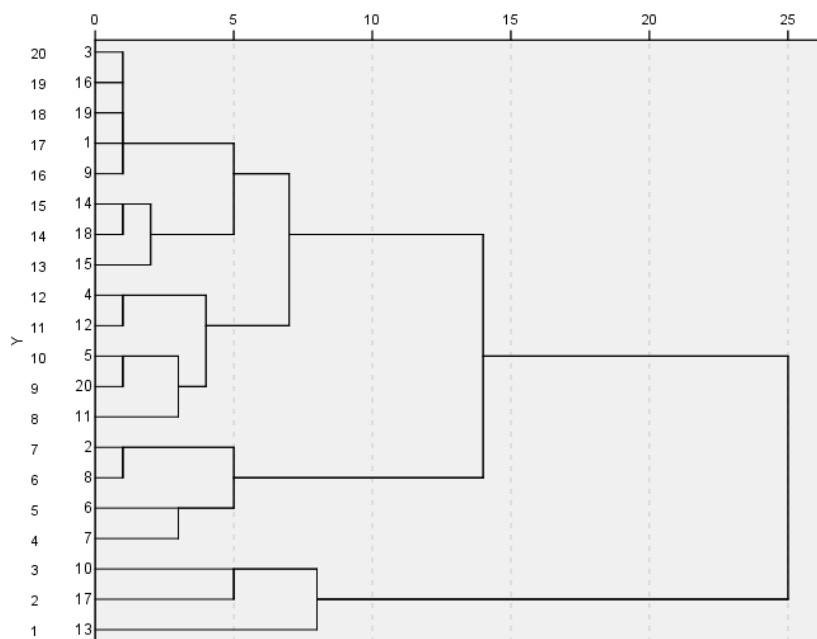

Figure 11. Tree diagram using average join (between groups).

The first category includes public squares (A21), awnings (C21), extensions (C33), peripheral roads (A11) and pavements (B13), showing the characteristics of "medium satisfaction and medium demand".

The second category includes garbage disposal (B41), bottom-level commerce (C32) and grocery store (B43), showing the characteristics of "high satisfaction and high demand".

The third category includes green parks (A22), leisure sites (B23), centralized greening (A31), facade aesthetic (C41) and healthy sites (B22), showing the characteristics of "low satisfaction and high demand".

The fourth category includes parking lots (A12), parking lots (B12), public service facilities (A41) and group roads (B11), showing the characteristics of "low satisfaction and low demand".

The fifth category includes living quarters (B21), green space in courtyard (C31) and group greening (B31), showing the characteristics of "low satisfaction and medium demand".

According to the principles of "demand first, satisfaction second", "similar demand degree, ranking from low to high satisfaction degree", the priority order of environmental transformation in Chunming community is determined, and the finally determined priority order of environmental transformation in Chunming community is: the third, the second, the fifth, the first and the fourth.

6. Conclusion and prospect

In this study, PSPL method was used to explore the relationship between residents' behavior and public space environment in Chunming community of Harbin, and 125 questionnaires were distributed, of which 100 were valid. Through the questionnaire results, field notes and interviews, and through a series of correlation analysis, the following conclusions are obtained: 1. The external space environment of the

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community restricts the behavior and activities of the community residents, and the residents' activity space shows the characteristics of safety, proximity and spontaneity, and there are significant differences in activity space and activity types among different age groups [7]. 2. Through Pearson Correlation test, 20 environmental factors that affect residents' behaviors are selected in Chunming community. 3. By analyzing the two-dimensional coupling model of demand degree and satisfaction degree of 20 selected environmental factors, the environmental factors are divided into five categories. According to the principles of "demand first, satisfaction second", "demand degree is similar, and satisfaction degree is ranked from low to high", the progressive transformation order of public space environment in Chunming community is put forward.

At present, the international research on the organic renewal of old communities has gradually matured, and more and more attention has been paid to the relationship between residents' behavior and public space in old communities. How to further explore more practical, efficient and low-consumption renewal strategies and methods is still a problem to be solved. With the help of PSPL method, this paper makes a preliminary summary and analysis of the public space and public life of residents in Chunming community in Harbin, and puts forward some countermeasures and suggestions for the renewal of public space in this community. However, the conditions and research methods of this survey are limited. In the follow-up research, it is necessary to further expand the sample size by combining new data and new methods and considering the influence of different seasons, so as to achieve more universal and accurate research, improve the objectivity, comprehensiveness and operability of the research, and provide theoretical basis and practical guiding significance for the transformation of public spaces in old communities.

7. References

[1] William H, White. and Ye Qimao, Translated by Ni Xiaohui, M. (2016) Social life of small urban space. Shanghai: Shanghai Translation Publishing House.

[2] Wu Yifan, Ni Danfei, Guo Liqing. (2020) 'Research on the organic renewal of the old city community based on the investigation of public space and public life —— taking Xiamen's Xiamen-Hong Kong old city area as an example', Urban Architecture, 17 (04): 5-10+15.

[3]Gehl, J.Gemzoe L,M. (1996) Public Space Public Life. Denmark:The Danish Architectural Press.

[4]Gehl, J.Gemzoe L. Svarre B, M.(2013) How to Study Public Life.Washington:Island Press

[5]Gehl, J. Translated by He Ren, M.(1992) Communication and Space. Beijing: China Construction Industry Press.

[6] Jian Xia, Han Xili, Li Guicai, Ceng Hui. (2011) 'Research on the model of promoting communication by outdoor shared space in urban communities', Human Geography,26(01):34-38.

[7] Zou Sicong, Zhang Shanqi, Zhen Feng.(2021) 'Research on the spatial measurement of community daily activities based on residents' time and space behavior and the influencing factors of vitality-taking Shazhou and Nanyuan streets in Nanjing as examples'. Advances in Geographical Science, 40(04):580-596.