

Exploring Mixed Social Space Design for Infants and Caregivers in Residential Community

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Abstract: It is necessary for creating more attractive and incorporate social living space to increase more opportunity for infants and caregivers, which are interacted and influenced by multiple users, better than designing exclusively for them. The proposed research hopes to identify a new form of public social space in residential community, which is for addressing the increased social isolation experienced by infants and caregivers in mainland China. Design elements and attributes in landscape and facilities will be merged in order to evaluate the influence that design has on social incorporating and interaction. This proposed study aims to understand how a social space development supports social incorporating and raises fertility rate in mainland China.

1. Introduction

Research shows that social space serves multiple users, which contributes to the formation of children's spatial perception ability (Jean Piaget, 1929), as well as encourages peer interaction (Zhang Wenxin, 1999) and interaction between neighbors in urban community (Li xianjuan, 2015). The various possibilities of social lifestyle of the public social space in the neighborhood promote the relationship between them and the residents, including influencing helping learning and learning each other, which is conducive to the development of infants' cognitive ability, and has a positive effect on the psychology and physiology of infants and caregivers. The social space includes outdoor and indoor public social areas, co-working space, recreational facilities, auxiliary learning facilities, and infrastructure.

Infants are neglected in the design space because they are too young. Most of the space design are to consider children over three years old. In recent years, Co-working space has become a trend in western countries, because more and more people want to keep balanced between doing work and taking care of babies (Jill Ceder, LMSW, JD, 2018). In terms of theoretical research, the research of urban public parent-infant space planning and design in China is still at an initial stage. In 2010, Huang Qilin began to study the parent-child environment space in the residential community environment. The scope of parent-child space is extended to the field of public space, and analysis of the status of indoor and outdoor parent-child space, to study static and dynamic parent-child space. Then the theory and research results are combined to return to the residential community environment category, exploring design strategies, and explore design details and

spatial form of parent-child space. SHI Xin' research(2014) on The Design of Urban Public Space for Children Based on Environmental Behavior Theory, from the perspective of environmental behavior, further study of children's age characteristic, space cognition, environmental requirements and activities.

In this paper, aims to summarize the design factors for a new social living model that will address the social isolation experienced by infants and caregivers in daily life. The research is to understand the needs of infants and caregivers, as well as the social behavior patterns about infants, caregivers and multiple users. The study will focus on identifying design factors of these spatial and facilities settings which meet their different needs and trigger these behaviour. The research will display a conclusion of how design factors affects social-living. A mixed method will be designed to collect both quantitative and qualitative data for examination.

2. The Current Situation of Infants and Caregivers in Mainland China

The growing number of newborns with the implementation of the universal second child policy in mainland China has led many infants and caregivers to live in social isolation, but kindergartens only accept children over three years of age. Many babies are placed at home and taken care of by caregivers because they are too young. the increasing mothers have to give up their jobs and the increasing grandparents have given up their retire life to take care of babies. However, there is no suitable facilities for infants and caregivers doing outdoor activities in most of our existing public space in residential community, and as a result many infants do not know how to interact with peers, some of caregivers only live around their infants, and seldom interact other people. Some of mothers even get depressed.

3. Comparison between Two Types of Public Space of Residential Community in Mainland China

I will choose two different types of public space in residential community for analysis, which are the traditional relative's courtyard and new residential community. The traditional relative's courtyard and the new residential community are two different forms of the old and new courtyard in the Chinese mainland. They are the public space that the residents go out from the apartment to the downstairs, it is very close to residents. These two types residential community of Zhengzhou city are taken as the research object.

3.1.The Traditional Relative's Courtyard

Chinese traditional relative's courtyard is that a state owned enterprise purchase the land, and plan to build the residential building for its employees, who purchase and live in.They were mainly built in the 70 to 90s of the last century. It used to be the main form of residence for Chinese urban residents. Most of them are in the old town of the city. So this kind of residential courtyard is not planned as a whole. There is no large space for activity. The passages between the building and the building are also narrow.

The disadvantage is: There is less greening interspersed in the community. This research analysis of the infants and caregivers' public area in Chinese old relative's courtyard, which take the Relative's courtyard of provincial government as an example. There are few facilities for babies and caregivers, only small vacant land, people have to gather in the corner of this community, which are without a seat, or a rest area for the caregiver, so they just can stand up to take care of babies and children, or they will bring the small tool to sit by themselves. There are no breastfeeding rooms,the diaper and toilets, but the babies(0-6months)drink milk once every two hours. And there is no place

to sit there for mothers to feed their babies, and no private space to hide,so they have to go back home when their baby want to eat. If the caregivers take the babies in the traditional relative's courtyard for the long time, it will be finished or broke the chat with another people, so it is inconvenient. Them are open space, there are no shading facilities, so if you encounter rainy days, snowy days, strong winds or scorching days, babies and caregivers can't do any activities in those place.

The advantage is: There are lots of familiar neighbors, colleagues and friends in the same neighborhood, and lots of people can communicate with caregivers. Moreover, in psychological aspect, a caregiver has a sense of belonging.



Figure 1: The photos of the courtyard show the caregiver and babies in the traditional relative's courtyard.

3.2.New Residential Community

With the reform and opening up and the development of market economy, China's real estate has changed from company welfare housing to commercial housing. In the past, only the employees of the company were eligible to buy the houses of their own company. Now, if you have money, you can buy the house you want. Free competition in the market makes the quality and form of commercial housing better and better, accompanied by the emergence of new communities.

It is different with the traditional relative's courtyard, there are some facilities for infants and caregivers, such as the bunker, Slide, seesaw and other children's entertainment facilities, as well as elderly fitness equipment. On top of that, there are a lots of trees in this kind of residential communities. In addition, without the right facilities or space for the caregivers and their children, they gathered in the empty space, which under the shade of tree in the community, sitting on their own bench, the children sitting on the side of the road, and the smaller children lying in their own baby carriages. So it is not hard to find that people gathered those places with their children, standing there, or sitting on a fitness equipment, chatting or watching their cell phones.



Figure 2: The photos of the courtyard show the caregiver and babies under the trees in New residential community.

A survey was conducted about urban caretakers and infants' public spaces in these two spaces were selected for sent the questionnaire, and a total of 28 questionnaires were received, all of whom were carrying 0-3 year old children.

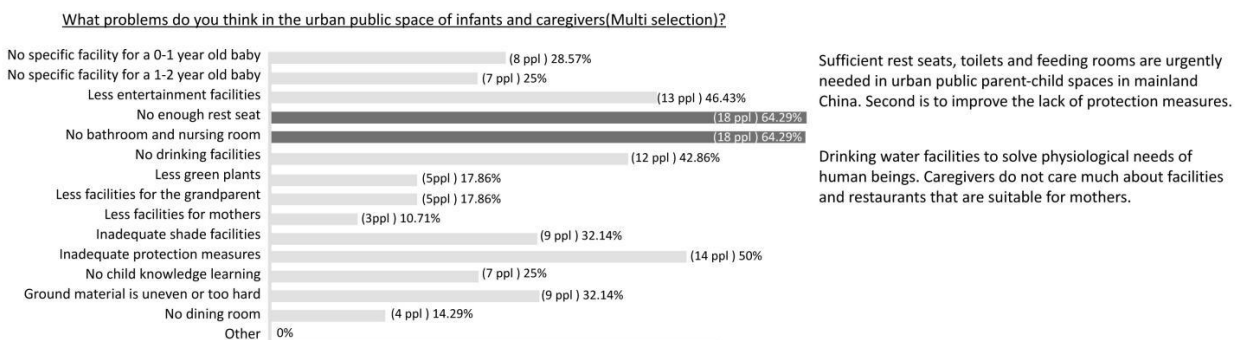
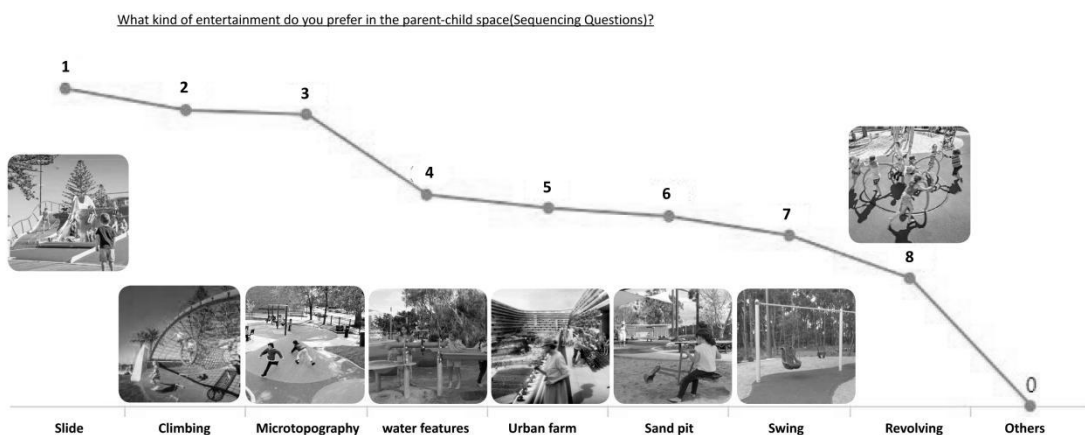


Figure 3: The table about problems in residential communities.



From the caregiver's choice of activities facilities for young children, we can see that complex and challenging activities facilities, by young children's admiration, because characteristics of young children are curious, love to challenge .

Figure 4: The table about the entertainment facilities in residential communities.

What is the most attractive thing for your infants in public space (Multi selection)?

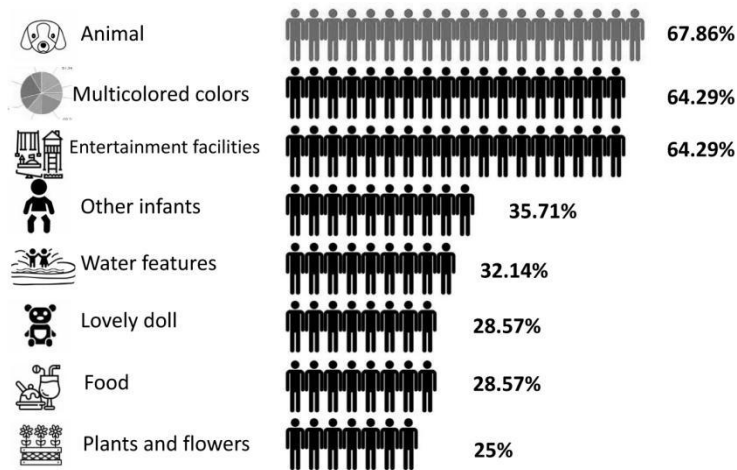


Figure 5: The table about the most attractive thing in residential communities.

According to this questionnaire survey, the result about comparison between the traditional relative's courtyard and the New residential community as follow:

Table 1: Comparison between the traditional relative's courtyard and the New residential community.

	The traditional relative's courtyard	the New residential community	Provide knowledge	Special activities	The percentage value	Social frequency
Rest seat	No	Yes	No	No	10%	0.137
Restroom	No	No	No	No	8%	0.012
Soft ground	No	Yes	No	No	6%	0.014
Water fountain	No	Maybe	Yes	Yes	8%	0.057
colorful	No	Yes	Yes	No	9%	0.072
Sunshade	No	Yes	No	No	9%	0.138
Entertainment facilities	No	Yes	Yes	Yes	16%	0.241
Green plant	Less	Yes	Yes	No	11%	0.024
Stone/Sand	No	Yes	No	No	4%	0.034
Feeding room	No	No	No	No	7%	0.064
A flat table	No	No	No	No	3%	0.081
Digital facilities	No	No	Yes	Yes	9%	0.126

4. Application of Digital Interactive Facilities in the Public Space of Residential Community

4.1. Interactive Projection Facilities

The interactive projection system uses the projection equipment suspended at the top to project the image effect to the ground or another surface. When the players entrance the projection area, who can directly use their feet or actions to interact with the virtual scene on the projection screen owing to the system identification, and various interaction effects will change with your steps. The interactive projection system is an interactive projection project integrating virtual simulation technology and image recognition technology. The project includes water ripple, turning, collision,

erasing, avoiding, following and other forms of expression. The audience interacts with the images on the surface through body movements. Imagine the images of various special effects blooming under persons feet, it will bring infants and caregivers a new experience.

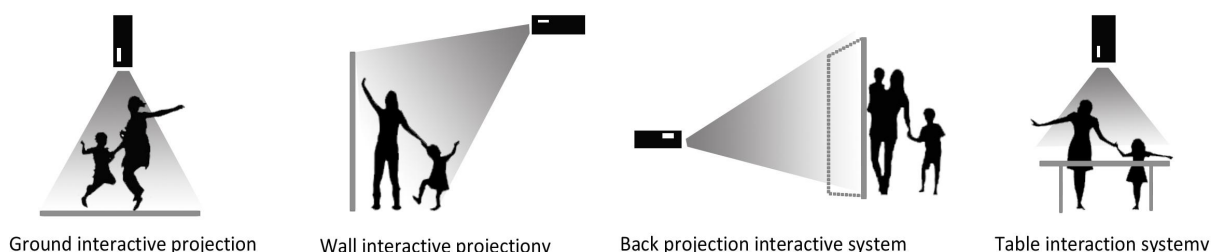


Figure 6: Implementation of interactive projection system.

The research through three years to analysis and research on five infants who are from 6 months to 3.5 years old. The conclusion is as follow:

These different entertainment interactive systems are for different ages of young children. Among them, children over 1.5 years old can participate in the ground interactive system, while the wall interactive system requires children over 2 years old to be able to play freely. In contrast, it is the lowest age requirement for children the table interaction system, which children over 8 months old can take part in it. On top of that, they can all interact indirectly with people of other ages in these interactions.

Table 2: The table show analysis and research on five infants on interactive projection facilities.

	Ground interactive projection	Wall interactive projection	Back projection interactive system	Table interaction system
Infant 1	1.6-year old	2-year old	2.1-year old	1-year old
Infant 2	1.5-year old	1.11-year old	2.5-year old	8-month old
Infant 3	1.2-year old	2.2-year old	2.2-year old	1-year old
Infant 4	1.7-year old	2-year old	2.4-year old	11-month old
Infant 5	1.4-year old	1.10-year old	2.6-year old	10-month old
Average value	1.5-year old	2-year old	2.5-year old	11-month old
Social frequency	0.341	0.259	0.287	0.113

4.2. Interactive Touch Screen

It is difficult for infants to understand some new knowledge, especially those who have just learned to speak. Because of the limited environment and things infants come into contact with, if the high-tech digital landscape design, such as interactive touch screen, is added in the residential area, which children's knowledge resources can be scientifically integrated by information technology, so that children and adults can communicate and learn in the interaction that greatly stimulates children's cognitive interest, and improves children's cognitive efficiency, and improves the effectiveness of children's learning activities.

For instance: when children are using the flat touch screen to play certain learning programs, adults use their hands to draw common circles, triangles and rectangles on the touch screen, and children carefully observe their the drawing methods and processes. After that, infants can't wait to draw pictures on the touch screen, as well as they can imitate the actions of adults. the others, lots of

the shapes are showed on the multi-media touch screen, then the screen shows the corresponding objects to deepen infants' comprehensive cognition. Through small games, infants can experience the knowledge of mathematics or language in playing, and develop their ability of map recognition and drawing.

In the whole interactive process, it also promotes the interaction between caregivers and infants, or some older children will be willing to share and teach young children. It is increasing interaction and communication between residents

5. Conclusions

From 1980 to 2015, the government implemented the one-child policy in mainland China, which has influenced most of children: The only child has a significantly lower sense of trust, greater reluctance to take risks, lower competitiveness, and are more pessimistic and less responsible(L. Cameron, 2013). After the opening of the second child, this problem still exists. Most children before the age of three have long been alone with their caregivers. They urgently need to interact with peers or older children or other adults. It not only helps them imitate and learn from others, but also plays a positive role in their mental health.

For caregivers, whether they are mothers or grandparents, they are prone to different degrees of depression or the feeling of isolation over time, due to giving up their previous work or lifestyle. Hence, It is necessary to create more opportunities for them to interact another people and create more possibilities.

In view of the existing problems of the landscape design, which is for infants and caregivers in the residential community in Mainland China. The application of digital information technology, such as interactive projection facilities and Interactive touch screen in the landscape design is discussed and its feasibility is proved. At present, the analysis of the current situation of the landscape in residential community, through the questionnaire survey and object tracking survey, it is concluded that entertainment facilities, sunshade facilities, green plants, rest seats, toilets, feeding rooms, and other facilities can increase the communication between infants and caregivers with others on the one hand. On the other hand, it is convenient for caregivers to take care of infants outside.

Although this study is based on residential communities in mainland China, the purpose of the study is to provide reference and experience for further investigation and discussions in this relatively neglected but important design area in the world. This study can provides reference for landscape architects, environmental designers and other related disciplines, and has certain reference value for the development and planning of public social space in residential communities in the future together with the good design principles derived from the understanding of public social sites in residential communities, which inspire the attention of the government or relevant agencies, and propose new development models in policy, planning and management.

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