# The research on the impact of the physical environment in the high rise residential complex on the local inhabitants' meeting place[1]

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**Abstract:** Due to the scarcity of the land resource, more and more new development or redevelopment in China takes high rise as its building form. The large-scale development of the high rise residential complex has dramatically changed the urban fabric and the daily lifestyle of many Chinese inhabitants, particularly the way by which inhabitants meet together. The paper attempts to evaluate how the shift of the physical environment affects the mode of the inhabitants' behavior in the public meeting space. Based on the case of Houxiandaicheng, a typical residential complex in Beijing with the distinctive varieties of the layout of the high rise building clusters, the paper first describe the general features of the inhabitants' daily life in their leisure time and maps the features of the daily activities of the residents in the meeting place. Then it illustrates the relation between open place and the flat location of each inhabitant who plays in the outsider place and analyzes the correlation between the features of the open space and social relation based on the site. The study finds that there is a weak correlation between the size of the meeting place and the social behavior and neighborhood relationship; but a high-positive correlation between the types of the meeting place and the social behavior and neighborhood relationship; the quality of the meeting place has some impacts on the social behavior and neighborhood relationship, but the quality is not the decisive factor in the high rise residential complex. Besides the literature examination, the research methodology primarily consists of site observation, interview, behavior mapping and social network analysis.

**Key words:** the meeting place, the high rise residential complex, social network, neighborhood relation

## 1 Introduction

Because of the rapid urbanization and the scarcity of the land resources, high rise residential areas have become more and more common in not only coastal cities but also inland cities of China. This kind of complex has not only changed the appearance of the urban space, but has also affected the residents' daily life in the neighborhood. This kind of area sometimes leaves us a deep impression with some words like "high rise ", " less sky exposition", and "depress". However, when we walk into the area, the space between two high-rise buildings is much more wider than the one between two multistoried buildings, partly because of the planning ordinance to the basic sunlight demands. In some complex, the distance between high-rise buildings can even reach 80-100 meters, and makes it a "huge courtyard " which can be shared by the hundreds of residents in those buildings. However, the high density of population in the complex doesn't indicate people getting more contacts with each other. Actually, they meet on the road like strangers, and live without any words to their neighbors, which reflect an apathetic neighborhood relationship and a lack of the inner social cohesion to a certain extent. Due to the development of the modern transportation、 network and information technology, the traditional neighborhood which is regarded as " local entity" has entered a recession， but the place identity, local organization, and social capital in residential area are still playing important roles according to

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some relevant studies. Lots of residents at different ages are eager for enjoying a certain contact with their neighbors. B. Wellman once took a long-time investigation on the residents of Toronto in Canada, through which he found that the proportion in the active network in local neighborhood would increase dramatically when "contacts" is used as the factor of analysis instead of "tie", and so does the number of individual friendship with the feature of active contact originated from "locality". Although neighborhood has been liberated from "traditional constraint" which is all-inclusive and with highly solidarity, it still embodies some features derived from sociability, supportability, and identity.

Although those literatures have helped us a lot to understand the social structure deeply, however, there are few study connecting the social network with social space, and even fewer with the high rise residential areas. The open space in high rise residential area is totally different from the one in multistoried residential area. The differences on the horizontal and vertical scales between the two kinds of residential areas are big. Therefore, how much of an impact can the high rise residential area have on the residents' social neighborhood? Which features of open space in high rise residential area are related to the neighborhood social network? And how can those features affect the neighborhood social network? Those questions form the point of departure for the study.

2 The theory of space-based social network analysis

The earliest social network analysis is about in 1930s, a famous anthropologist of the United Kingdom named A. R. Brown concerned on the research of social structure. During 1930s to 60s, a serial of research, such as K. Kewin on the group structure, Moreno on sociogram, F. Heider on the social attitude, those researches promoted the discussion of social structure, and kinds of net concepts such as centralization, density, structure balance, and block etc. went deeper. Along with the theory, method and technology of social network analysis are being mature, social network analysis has become one of the important social structure research models. Social network can be used to analyze the strong ties and weak ties of one group. In 1970s,M. Granovetter proposed "the strength of weak ties", he suggested the weak ties would build a bond among groups and organizations, meanwhile the strong ties would maintain the inner relationship of the organization; Burt raised the theory of the structural hole, and proposed that there wasn't a necessary relationship between the tie strength and the amount of the social resources; L. Nan put forward that： the weaker the social network is, the more instrumental it will be in getting social capital, and also, individuals will get heterogeneous capital much easier. On the neighborhood level, the meeting place, mixed land-use, good design for houses, neighbors' walking suitability, the individual motives for others, limited individuals' choices, and the dependence among groups and so on, all those factors could affect the contacts among neighbors.

Based on the theory of social network analysis, the paper regards the open space in residential area as a special "actor", which becomes a key node in the social network. The paper will explore the relationship between the special "actor" and other actors (residents) with the social network methods. Firstly, I surveyed the social activities of the residents in open space, and had an analysis on their regularities; then, I mapped the residents' activities which took place in open space and the neighborhood social network between the special "actor"— place and other actors (residents), and calculated the density and centrality of the network; at last, I analyzed the relationship between the features of the open space and neighborhood social network. Based on

the observation of the basic characteristics of the open space in residential area, I present the research assumption as follows: the larger the scale of open space in residential area is, the stronger neighborhood social network will be; the richer the functional types of open space are disposed, the stronger the neighborhood social network will be; the higher the environmental quality of open space is, the stronger the neighborhood social network is.

The relevant data and materials are gotten mainly by on-the-scene observation, activities mapping and semi-open structured interview, the date of the field survey is from March 28 to April 7 (both workdays and weekends are included) with 97 effective questionnaires. The interviewees are the residents at different ages and on different income levels.. The case of our investigation is "Houxiandaicheng (HC)"—a typical high rise residential complex in Beijing, a middle and top grade residential area built in 2004 and located on the 4th Ring Road at the east of CBD. The site area is about 20.63 hectares with the floor area ratio 2.54 and 12500 or so population, among which 65% is migrant tenants. Youth and middle-aged people comprise about 70% of the HC population, and the rest 12% and 18% are respectively old people and children. This residential area is divided into four districts by local streets. The northeast district is district A with the area of 2.5 hectares and about 2600 residents; the northwest district, district B, is the smallest with about 1.8 hectares and 1900 residents; the southeast district, district C, is the largest with about 4.5 hectares and 4800 residents; the southwest district is district D with about 2.5 hectares and 2900 residents. There are clear differences in the layout of the open space in the four districts, which makes it more convenient to compare the space features of the four blocks and its neighborhood social network.

## 3 The features of the social activities in the public space in the residential area

As the social activities of residents are a media which connects the public space and neighborhood social network, the paper focuses on the social activities of residents first.

The developed public transportation, high owning rate of automobile, and amounts of beautiful parks, those factors attract Beijing citizens to go around in their leisure time. So do the residents in HC. Sometimes, they enjoy views, breath fresh air, play, meet friends and etc. in Caoyang park, Beihai, Temple of Heaven, even on the Fragrant Hill in their weekends, 30 minutes away from the complex by car, But at most time, residents have their social activities in the public space in their residential area. There same regularities present on the residents' behaviors through their weekends activities. According to the activity mapping of the 4 districts, the residents of district D have the highest activity intensity. There are even 70 persons playing in its open space during the peak moment; and on the contrary, the residents of district B have the lowest with only 15 persons during the peak moment; although district C owns most residents and largest land scale, there are only 30 persons during the peak moment. Compared with district C, district D has almost more than twice number of people playing in the public space (fig. 1, 2). It indicated that residents' activity intensity has a certain relationship with the open space in residential area.

The daily activities of residents can be divided into 8 kinds: playing balls (basketball, tennis, ping pong)、 fitness (jogging, doing tai chi, equipment exercises), walking dogs, playing games (children), taking care of children (parents), chatting, having a rest and taking a walk. Different activities perform different laws, and there are 3 kinds of activities last for the longest time: playing games, taking care of children and playing basketball. When enjoying those 3 kinds of activities, many people are gathering in the public space. And chatting, having a rest, taking a

walk and walking dogs, these 4 kinds of activities have a changeable performance in the public space. The interesting thing is that residents would form a familiar group as soon as they share the have same activities, which leads to a high familiar lever. Majority of residents who have social activities in the open space says that the number of the familiar neighbors is about 70% among the neighbors who they know to each other, which means they generally have closer contacts during playing in the open space and children who take part in the activities know each other well. The number of neighbors playing outside who don't know to each other is less than 5% (Tab. 1). And the neighbors having same activities make a subgroup of social network, partly because the relationship would be improved through chatting with each other while they take part in same activities. And also, when they walk dogs or take care of children, dogs and children often act as a medium for them to start talking, and neighbors would get even more familiar as they play balls. And these may generate deeper relationship in the neighborhood, such as: a mum asks another one to take care of her child by the way; or teenagers communicate with each other before playing balls together, or neighbor A leaves his keys to neighbor B when A is out, and so on. This reminds us that neighbors still keep a collective memory and warm neighborhood relation among Beijing citizens which happened before the start of open and reform policy, Actually, it's a long absence relationship for many other neighbors nowadays in modern society.

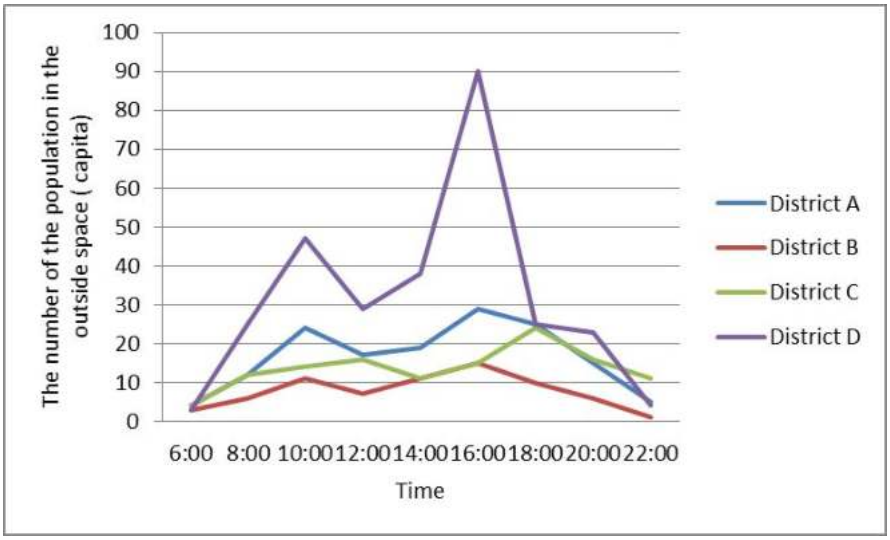


Figure1 The daily density of the inhabitants activities at differing blocks of Houxiandaichen
Source: author mapping

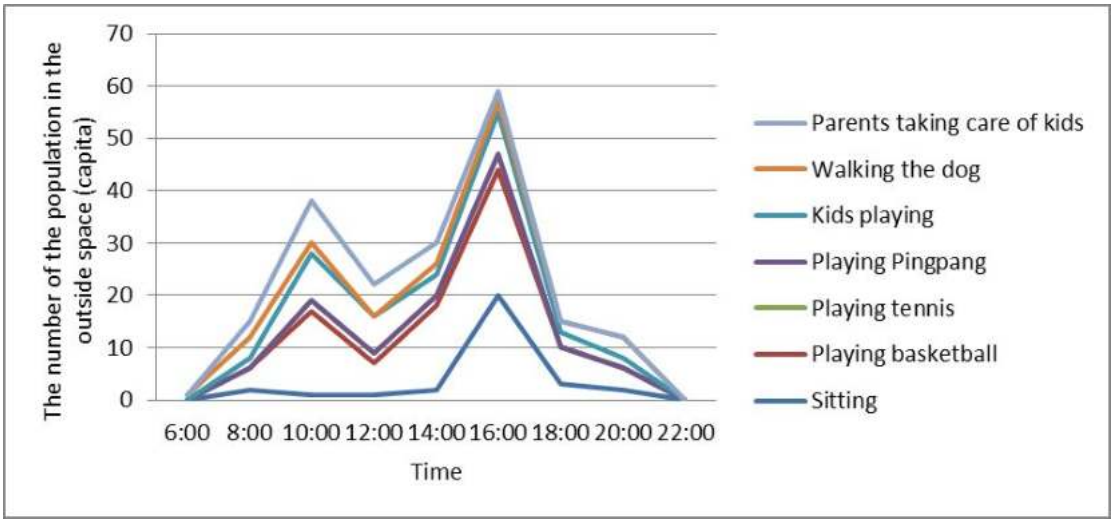

Figure 2 The daily density of the inhabitants 'different activities at block D of Houxiandaichen
Source: author mapping

Tab.1 The analysis of the relationship between the activities and the familiar extent among inhabitants in the open space in Houxiandaichen

| The familiar extent | Playing ball | Walking dog | Kids playing | Parents taking care of kids | Chatting | Sitting | Walking |
|---|---|---|---|---|---|---|---|
| Very familiar （%） | 40 | 64.7 | 41.7 | 44.1 | 41.3 | 43.2 | 52.1 |
| Familiar （%） | 38 | 17.7 | 58.3 | 23.7 | 35.6 | 29.8 | 22.2 |
| Know each other（%） | 20 | 14.7 | 0 | 28.8 | 23.1 | 27 | 23.6 |
| Strange（%） | 2 | 2.9 | 0 | 3.4 | 0 | 0 | 2.1 |
| Total（%） | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Source: author statistics

4 The analysis of the correlation between the public space and the space-based social network in the residential area.

On the basis of the analysis of the features of the residents' behavior in high rise residential area's public space, now, we will have a deeper study on the relevance between features of open public, such as size, the functional type and the environmental quality, and neighborhood social network.

4.1 The correlation between the size and neighborhood social network

By referencing the social network analysis theory, the study regards the open space as a special "actor", called "place node"; and the address of resident who has social activities in the public space is regarded as "flat node". After matching the relevant "place node" and "flat node" with line, we can get "relation line". Through intercepting a typical moment of residents' social activities in the public space, we mapped the "spots" and "lines", and got a graph of the space-based social network in the residential network (fig. 3). In the graph, the relevant "relation lines" perform a subgroup deriving from the place node. We can find from the graph of the space-based neighborhood social network that there isn't a strong relevance between the space size and the number of residents having social activities (tab.1). For example, district D owns 50 "relation lines", and 28 of them (about 56% of the total lines) come from the same block with the "flat nodes", while 22 of them (about 44% of the total flat nodes) are not from district D, among which 17 flat nodes are from the other 3 districts, and the rest 5 are from other complexes at the west of the HC. It shows that district D has a much more attractive for the neighbors in other districts. District C owns the largest area and population, but there are only 18 "relation lines" which is much less than district D. And actually, there are 22 "flat nodes" in district C, and 8 of them are relevant with district D, main for playing balls and taking a walk, it means that 36% of the district C's "flat nodes" prefers having social activities in other districts. District A illustrates more obviously at this point. As the courtyard is separated by a wall, the number of people having social activities in district A decreased sharply. As a result, there are 21 "flat nodes" in this district,

and only 9 of them have activities in district A, which comprise only about 43% of total flat nodes in district A. Most “flat nodes” appear in district D and B, main for playing balls, taking a walk, play games (children) and walking dogs. Also, district D gets the highest score in measureing the centrality (tab. 2, 3).

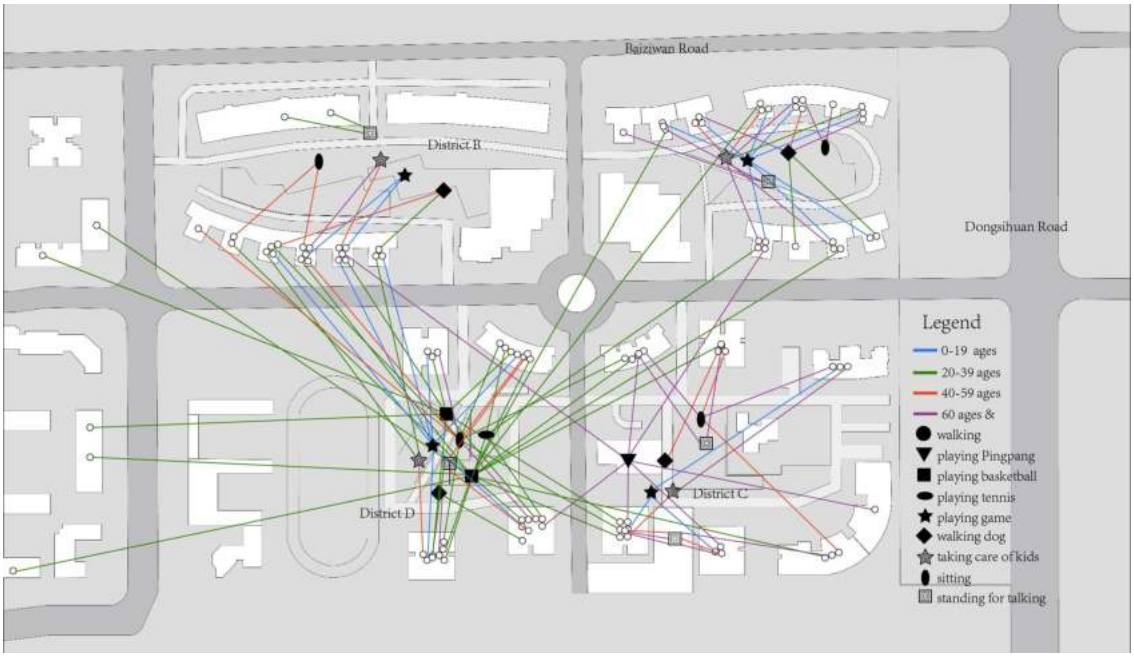


Figure 3 The space-based social network in differing blocks of Houxiandaichen

Source: author mapping

Tab.2 The analysis of the space -based social network in Houxiandaichen

| | | District A | District B | District C | District D |
|---|---|---|---|---|---|
| The amount of “flat nodes” | | 25 | 21 | 22 | 29 |
| Inside | “Flat nodes” in its own district | 20 | 9 | 14 | 28 |
| | “Flat nodes” outside of its own district | 5 | 12 | 8 | 1 |
| The amount of “relation lines” | | 20 | 9 | 18 | 50 |
| Inside | “Flat nodes” in its own district | 20 | 9 | 15 | 28 |
| | “flat nodes” in its own district | 0 | 0 | 3 | 22 |

Source: author statistics

Tab.3 Analysis of variables of the social network in Houxiandaichen

| | District A | District B | District C | District D |
|---|---|---|---|---|
| The amount of “relation lines” | 9 | 20 | 15 | 28 |
| Degree centrality | 9 | 20 | 18 | 50 |
| Standarded degree centrality | 0.09 | 0.21 | 0.19 | 0.51 |
| Betweenness centrality | 9 | 20 | 16.5 | 38 |

| | | | | |
|---|---|---|---|---|
| Standarded betweenness centrality | 0.09 | 0.21 | 0.17 | 0.39 |
| Closeness centrality | 194 | 174 | 179 | 164 |
| Standarded closeness centrality | 0.49 | 0.56 | 0.54 | 0.59 |

Source: author statistics

4.2 The relationship between the functional type of the public space and neighborhood social network

According to the map of the social activities in the public space, the functional type of the open space presents an obvious influence on the residents' social activities, because each functional type of place matches relevant residents' social activities. Overall, walking dogs, taking a walk and having a rest, such activities don't need high requirements for space disposition. However, physical exercises need a certain requirements for the space disposition generally. When children play, it would need a certain size of hard ground for running, riding tri-cycles and playing ball. Also, a playground with a small pool, sand holes, and slides, would help improve the attraction of the place to children. In terms of sociogram, district A has 5 subgroup: playing games (children), taking care of children (parents) , walking dogs, having a rest and taking a walk, the number is as the same as the one in district B; district C has 6 (one more with ping pong), and district D has 7 (two more with basketball and tennis compared with district C). The subgroup of basketball gets the most "flat nodes" about 12 where there is an informal basketball competition being held on one of the basketball sites. The number of "flat nodes" related to playing games is also big about 9 in district D, and the number of "flat nodes" related for parents to taking care of children is about 7. In all, children and parents are the main users of the open space. However, there isn't a big difference for walking dogs and taking a walk in the four districes.

4.3 The correlation between the environmental quality and the neighborhood social network

The four blocks of the HC belong to one residential complex, but they perform a certain differences because of the distinct planning and layout, later-stage management and property maintenance. In district A, the greenbelt between 2 buildings is comparatively attractive, and the trees there make a pleasant shade with a walking line and pergolas. Anyway, the environmental quality is good in district A. District B is a highly mixed block with the southern part for residents, the northern for SOHO and the eastern for business. As a result of management, there is a wall to separate the southern part and other parts, and to make the space break into pieces. In addition, because of the bad smelling from the trash cans by the main lane at the north of the residential area, the environmental quality is affected seriously. Although the northern part in district B is designed well, the property maintainers change majority of its hard ground into a parking site, that also lead a worsen quality. District C has a comparatively nice environment, but the hard ground is designed too boring and without careful maintenance; District D has a comparatively good maintenance, and majority of its open space is hard ground with a few trees. According to the evaluation from residents, the environmental quality of district A gets a highest score, district D follows behind, and district B gets a lowest one.

After having an analysis on the subgroups of playing games and taking care of children, we know that district B owns the fewest "flat nodes", and district A gets the most (fig. 4). It seems to

have improved the proposal that residents tend to have social activities in a better environment. But as we studied on the subgroup of having a rest (sitting), we found that district D owns most "flat nodes"(fig. 5). There is a certain number of elms out of the safety net of the basketball ground and tennis ground in district D, and under the elms, there are flower beds and chairs. Between two closed basketball grounds, there is a main lane which is 5 meters wide. So, residents would be attracted by the youth playing basketball unconsciously when they pass by, and maybe they would sit down to be their audiences. The old persons with some trouble in walking or sitting on wheelchairs, often prefer to stop under the elms to enjoy the warm sunshine while watching the basketball game.

Thus it can be seen that the environmental quality of place is a complex variable, and residents tend to choose a better open space, but meanwhile, rich humanity landscape is much more welcomed by residents. Such as the case of GC the sports places act as catalyst for the vitality of the open place.

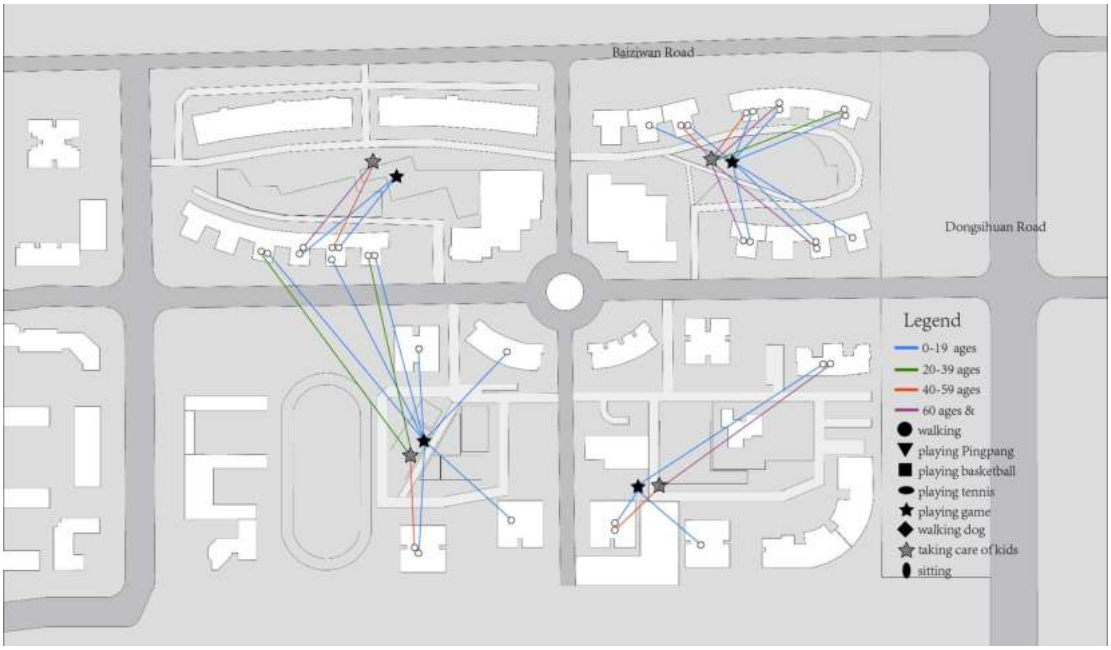


Figure 4 The social network based on the activity of (children) playing games in Houxiandaicheng
source: author mapping

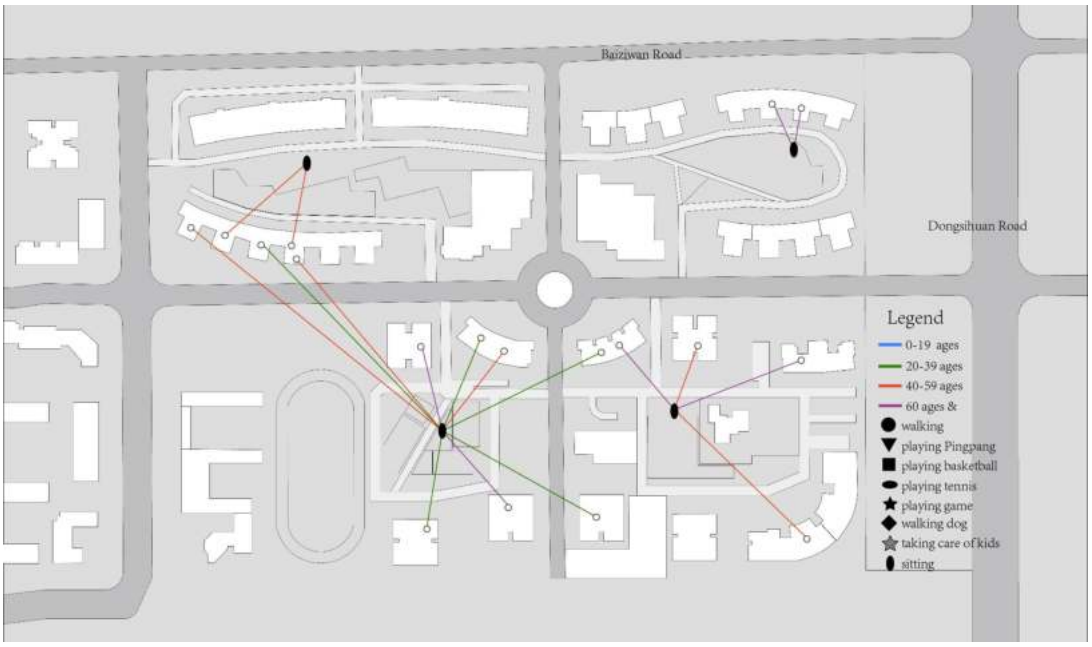


Figure 5 The social network based on the activity of sitting in Houxiandaicheng

resource: author mapping

6 Conclusion

Through regarding the open space in residential area as a main "actor" of the neighborhood, the paper establishes a kind of social network built by the "actor" and other "actors" (residents). The research found that: (1) the scale of the open space in high rise residential area does not have a clear correlation with the residents' neighborhood social network. Partly because of the relevant ordinance of the sunshine standard, there is a large distance between 2 rows of buildings, so it couldn't affect much on residents' daily activities even if the scale of open space is expanded. For instance, in the case of "HC" in Beijing, the open space scale of district C is 1.5 times as big as the one of district A, however, during the peak moments, the observed number of inhabitants in the open space in district A is a little more than the number in district C. (2) The functional type of open space in high rise residential area has a clear correlation with the neighborhood social network. Through the research, I found that different functional type of open space could build different neighborhood groups. Neighbors have high familiarity in a same neighborhood group, that's because those neighbors in the same group has lived in the same space for a long time, as a result, it's easier for them to get contacts. A free, open space with sport facilities could gather residents easily. For example, youth and middle-aged people are always seen in district D as it owns 2 basketball courts. This proves a proposal similar to Y. Gail—open space will be popular if there are things for residents to do. And it's also very important if the space is open and free, so that the utilization of the space will be fairly high. Sometimes, children rushed into the basketball court when there weren't any adults. They stumbled, lifted the ball up and tried to throw into the basket net like the elders under the attention of parents, this kind of humanity scene is not only a help for the children' socialization, but also reflects human nature, maternal love and the spirit of brave adventure. At the same time, it increases the compounded use of the space naturally, making the open space in high rise residential area be popular. (3) The quality of the open space has a certain impact on neighborhood social network. Good atmosphere of open space would attract many residents. For example, district A in "HC" has a good environment, and trees there make a

pleasant shade, so it's quite popular in the nice evenings. But in district B which has worse environment, the residents have much less activities there. However, the quality of the environment is not the main factor affecting residents' activities in open space. District D is payed more attention on hard ground environment with fewer trees, but more residents are willing to take a rest in district D than district A, although district A gets higher grades in the evaluation of the environmental quality. It indicates that although the green disposition is important in open space, we should also consider the function of open space, especially the demand of residents for contacts and "humanity landscape".

Although the open of the residential area and the basic building function of "courtyard" are not the key point in this research, they have a certain impact on neighborhood social network. In a word, the neighbors in high rise residential area can build much closer neighborhood social network through a right open space design. Lots of open space in high rise residential area has a huge potential on stimulating the neighborhood social activities in high rise residential area. Although the key point in my research is the social weak ties among neighbors, how to improve the social strong ties among neighbors with the open space in residential area should still be explored.

References

1 Donald E S．The Social Structure of Urban Neighborhoods．Urban Affairs Review[J]．1 979，14(5)：391-400．

2 Fischer C S．To Dwell Among Fronds：Personal Networks in Town and City[M]．Chicago：University of Chicago Press，1 982

3 Farrell S J，Aubry T，Coulombe D．Neighbourhoods and Neighbours：Do They Contribute to Personal Wellbeing[J]? Journal of Community Psychology，2004，52(1)：9-25．

4 Gronovette M．The Strength of Weak Ties[J]．American Journal of Sociology，1973(78)：1；360-1 580．

5 Hampton K，Wellman B．Long Distance Community in the Network Society：Contact and Support Beyond Netville[J]． American Behavioral Scientist，2001，45，(5)：476-495．

6 Hunter A．The Urban Neighborhood：Its Analytical and Social Contexts[J]．Urban Affairs Review，1 979，1 4(3)：267—288．

7 Putnam R．Bowling AIone[M]．New York：Simon ＆ Schuster。2000．

8 Piselli F．Communities，Places，and Social Networks[J]．American Behavioral Scientist，2007，50(7)：867-878．

9 Scott J．Social Network Analysis：A Handbook[M]．London：Sage Publications，2000．

10 Wasserman S，Faust K．Social Network Analysis：Methods and Applications[M]．Cambridge：Cambridge University Press. 1994．

11 Wellman B，Leighton B．Networks，Neighborhoods，andCommunities：Approaches to the Study of the Community Question[J]．Urban Affairs Review，1 979，1 4(5)：565--590．

12 Wellman B，Berkowitz S D．Social Structure：A Network Approach[M]．Cambridge：Cambridge University Press．1 988．

13 Wellman B．Community：From Neighborhood to Betwork[J]．Communications of the ACM。2005，48(1 0)：53-55．

14 Wellman B．Are Personal Communities Local? A Dumptarian Reconsideration[J]．Social Networks．1 996(1 8)：547--554．

15 Wong L H. Pattison P .Eobins G．A Spatial Model for Social Networks[J]．Physica A，2006(560)：99--120．