EFFECTS OF OPEN SPACES ON THE INTERPERSONAL LEVEL OF RESIDENT SOCIAL CAPITAL: A COMPARATIVE CASE STUDY OF URBAN NEIGHBORHOODS IN GUANGZHOU, CHINA

A Dissertation

by

BIN KANG

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2006

Major Subject: Architecture

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ABSTRACT

Effects of Open Spaces on the Interpersonal Level of Resident Social Capital: A Comparative Case Study of Urban Neighborhoods in Guangzhou, China.

(May 2006)

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China has experienced the rapid socioeconomic change that leads to the evolution of social and physical environment in urban neighborhoods. In recently built neighborhoods, residents lack mutual trust and a sense of community; the neighborhood open spaces have been improved but still do not function well for developing resident social capital.

Social capital is a comprehensive concept for evaluating community development. The purpose of this study was to evaluate residents' social capital in China's urban context and to examine the relationships between social capital and neighborhood open spaces. The review of literature identified five interpersonal factors of social capital: social network, trust, security and safety, belongingness, and engagement, which were related to neighborhood physical environment.

In the city of Guangzhou, two neighborhoods were selected as study fields and

two hundred and fifty subjects were randomly selected in each neighborhood to participate in a questionnaire survey. More than 75% subjects returned questionnaires. Ten residents of them then participated in semi-structured interviews. Observation recorded residents' activities in open spaces. Data were analyzed by statistical methods and domain analysis strategy.

The results of statistical examinations demonstrated that residents living with a large number of neighborhood open spaces had higher degrees of social capital than residents lacking open spaces; residents using open spaces frequently developed higher degrees of social capital than residents using open spaces less; residents who were satisfied with their open spaces held higher degrees of social capital than those who were not satisfied with open spaces.

Semi-structured interviews explained that well-designed open spaces attracted inhabitants to participate in outdoor activities, which encouraged social interaction among residents, enhanced their mutual trust, expanded social network, and strengthened belongingness to neighborhood. However, open spaces were found not to obviously improve resident engagement. Observations unveiled that a highly versatile and flexible outdoor space was the favorite place for residents of all ages.

For my parents, wife, and daughter

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CHAPTER I

INTRODUCTION

1.1 BACKGROUND

Hauser (Hauser & Duncan, 1965) statistically defined the degree of urbanization of a nation as the proportion of the non-agricultural population residing in urban area compared with the entire population. In the West, during the process of modern urbanization, the number of those who live in an urban place was improved from three persons of every hundred in 1800 (Golden, 1981) to more than two out of every five persons by 1985 (Hauser and Gardner, 1980). For example, in 1960, 70 percent of U.S. population was urbanite. In addition, according to a United Nation forecast, by the year 2025, approximate 62 percent of the world's 8.2 billion inhabitants will be living in urban areas (Abu-Lughod, 1991). The direct consequence of the constant increase of population in recent 200 years is the emergent need for housing, especially in urban areas. In United States, nearly 5.4 million low-income households have severe housing need (The State of Nation's Housing, 2001), which account for 5.14% of 105 million households and 5 percent of U.S. population.[1] In 1995, HUD (Department of Housing & Urban Development) classified two million housing units as seriously inadequate and 2.8

This dissertation follows the style and format of *Environment and Behavior*.

million households lived in units housing more than one person per room (The State of Nation's Housing, 1999). The need for housing is a prevalent issue in the world, even more urgent in developing countries because in 21 century a large number of developing countries including China are experiencing urbanization at a high speed.

Since 1978, China's rapid urbanization has resulted in a variety of changes in the whole nation, such as huge housing need, higher urban population density, private-owned housing, heterogeneity of social strata, and weak neighborhood relationship. Among the aspects at the macro level, three aspects mainly influence the social changes in China's urban neighborhoods.

1.1.1 Urbanization

Urbanization is considered a major indicator of modernization. However, China's urbanization rate now stands at merely 31 percent, 15 percentage points lower than the world's average level, 27 percent less than that of medium-income countries and 47 percent lower than that of high-income countries.[2]

China is in a accelerating period of urbanization during which a large number of cities are emerging. Since the beginning of 1990s, it has witnessed a bigger enhancement in China's urbanization level. In recent years, the urbanization growth rate has been kept at nearly two percentage on average annually. The number of China's inland cities has

risen to 660 from 193 within the 11 years from 1990 to 2001, among which the extra-large cities with a non-agricultural population of over one million increased from 31 to 41 in number; the number of cities with a population of 500,000 to 1 million people is 54 and the number of medium-sized cities with a population of 200,000 people to 500,000 is 217. The city-covered area has reached 4.089 million square kilometers, an increase of 2.192 million square kilometers as against that in 1990, an increase from 20 to 42.6 percent in proportion to the total Chinese territory on land.[3]

This accelerating urbanization leads to the rapid growth of population in urban areas as well. The townspeople in the year of 2001 took up 37.7 percent of the total population in China, a proportion of 10.3 percentage higher over that of 1990. From 1980 to 1999, China's urban population more than doubled from 171 million to 381 million. By 2050, it is estimated that there will be 960 million urban populations in China, compared with its 452.4 million urban populations in 2001, which will exert huge pressure on housing provision.[4]

1.1.2 Housing Provision

The improvement of housing construction and human settlements has been placed at the top of China's development agenda by expanding reform scale. Since 1993 when the housing reform was launched by China's central government, the ownership of

housing has been gradually transferred from state-owned to private owned. In 1978, 98% of urban housing was state-owned and managed by work units.[5] The majority of urban citizens resided in living quarters that were typically adjacent to and constructed by their work units.[6] Housing was one of welfares distributed by work units to their own employees. Thus, in previous living quarters, residents were not only neighbors but also coworkers in work units. This type of overlapping social role formed tight and intimate social ties among inhabitants, although there were various social strata within the compound of the work unit and living quarter. After 1993, housing is developed by real estate firms and purchased or traded as a market commodity. State and work units are no longer responsible for providing housing for their employees.

The improvement of housing has gained increasing financial inputs as well. Between 1979 and 1999, a total of 3,717.3 billion Yuan was invested in the construction of residences in urban area. The newly built residences covered a floor area of 16.4 billion square meters. The per capita residential area for urban residents increased from 3.6 square meters in 1978 to 9.8 square meters in 1999. In accordance with the Ninth Five-Year Plan for Urban Housing Construction and the Development Objectives, by 2000, each urban household had a residence; 70 percent of urban families had a residential flat with fairly complete utilities and with the per capita living area reaching 9 square meters and the per capita usable area 14 square meters, and the quality and

functions of residences were improved. By 2010, each urban household will have one residence with complete utilities, the per capita living area reaching 10 square meters, and the per capita usable area, 15-18 square meters. [7]

1.1.3 Urban Environment

In 1950s and 1960s, the former Soviet Union impinged intensive influence upon China's social, economic, and even ideology development. The practice and administration of city planning used the Soviet Union for reference, including principles, analyzing methodologies, technical styles, and procedures. The overall layout of residential areas were planned based on the super block neighborhoods which had a distinct axis with buildings arranged along the streets and stood either north-south or east-west, exhibiting a strong sense of order and formalism. Housing forms, under the ideology of "Socialist Content, and National Forms," mostly were Soviet mode of four- or five-stories standard apartment buildings with internal corridor (Lu *et al*, 2001; Schinz, 1989). During the harsh period of the 1960s characterized by large debt payments to the Soviet Union after the friendship between China and the Soviet Union was broken; a Western embargo; and a natural disaster, the government appealed to the collective conscience of sacrifice, endurance, and thrifty lifestyle. This trend strengthened the super block by adding more public functions so as to be suitable for the movement of people's

commune occurred in 1960s. The economic reform aroused market demand for housing leading to dwellings' changes from floor area, unit pattern, surrounding landscape to high technology level. The principles guiding housing design and construction are experiencing a significant transition: "one flat for each household" → "everything done for human beings" → "better by nature"; in other words, to develop housing based on human needs.

Cities keep expanding out to the original suburb and rural areas, and numerous housing projects have been developed to accommodate people and to satisfy people's need of more living space. The traditional layout of low rise housing placed along streets was substituted by master-planned communities in which multi-storey multi-family buildings are arranged beside concentrated open spaces, such as shared common outdoor spaces, or neighborhood parks. The scale of neighborhoods is getting larger. For example, Qifu Xincun, a community in Guangzhou, China, accommodates 13,000 households and occupies 1.2 square kilometers. In contrast to the trend in Western societies that advocates mixed use community to revitalize city center, China's urban housing is spreading out to the suburbs, separated from working and commercial areas.

If Chinese population is viewed as a whole aggregate of organisms, the populations in other countries are its external environment affecting the transition of China's urban housing more intensively. The implement of state economy reform and

opening policy in recent two decades has guided China into a global network of countries by enhancing the adjustability of social ideology and rearranging the political organization. Global environment firstly brings economic influences on China and accelerates China's economic transition in that most foreign investment is concentrated on secondary and tertiary industries. Thereafter, cultural and ideological influences gradually change behavioral patterns. For instance, disco was scolded as an immoral activity in early 1980s, but now numerous teenagers are learning street dancing from TV programs. Likewise, changes in urban housing are represented in various aspects. In addition to simple living space, housing is now sometimes combined with more functions, such as the emergence of SOHO (small office home office). Housing style is also varying from the dominance of modernist box to the juxtaposition of a large number of styles including European, American prairie, and so forth. Designers are even more excited not only by western philosophy and theories, such as constructionist, postmodernism, new urbanism, and the like, but also by foreign designers and design firms.

1.2 RESEARCH PROBLEMS

The changes of the external macro-environment of China's urban neighborhood lead to the changes in micro-environment. After 1993, the newly constructed urban neighborhoods consist of residents working for different work units, instead of coming from same one. This means China's urban neighborhoods are currently changing into 'real' mixed social strata besides mixed income. Normally, the heterogeneous classes do not stimulate frequent intergroup social interaction (Tajfel, 1982). The current relationships among neighbors in the majority of newly developed neighborhoods are extremely weak. It was reported that 90 percent of residents in those neighborhoods did not know their neighbors.[8] This phenomena deviates from the traditional Chinese belief that "a relative far off is less help than a neighbor close by." Therefore, research is needed to find solutions for re-establishing intimate relationships in China's neighborhoods that make inhabitants feel that they are living in a big family.

In developed societies, while people's physical and material needs are satisfied by various industries and government programs, the social dimensions of quality of urban life, to some degree, have not drawn much attention (Frick, 1986). The fact is that the "decline of community" has become a catchphrase since modernization and industrialization. Even at the very beginning of industrial civilization, sociologists pointed out that social changes like the separation of home from work, the reduction of

the size of households, and urbanization might reduce the social ties among people (Badura, 1986). In addition, human ecologists, such as Robert Park and Amos Hawley, also argued that the increasingly diverse division of labor would reduce the interdependences within communities (Hawley, 1950). Thus, one of the major issues we are facing today is, compared to the gains in economic and material aspects of modern life, whether the social aspects of life have been improved as well.

Since people's social life is too inclusive to be improved only by single one aspect, it is necessary to use a comprehensive concept to understand it and then improve it. In this study, as the investment and resource embedded in people's social network, social capital (stated more detailed in Chapter II) was applied for analyzing the social life in China's urban neighborhood. Especially, five interpersonal factors of social capital were emphasized: social network, trust, belonging, safety and security, and engagement. The research was conducted with reference to previous studies on Europe and Mexico explored the man-built environment affecting urban social identity (Uzzell, Pol, & Badenas, 2002; Valera and Guardia, 2002).

1.3 RESEARCH OBJECTIVES AND QUESTIONS

In most of China's urban neighborhoods, residents live in multi-storey, multi-family buildings which cause very high population density and limited area in each flat, as well as very high building density. Thus, only are neighborhood open spaces accessible places for outdoor activities and socialization. This study explored how the changes of physical pattern of neighborhoods influence social capital in China's urban neighborhoods that are experiencing rapid and profound change, whereas traditional means of developing social networks are no longer valid. Based on research problems, research objectives are:

1) To identify the extent of residents' social capital in Tongde Garden and Lingnan Garden.

2) To identify the relationship between residents' usage of open spaces and social capital.

3) To identify the relationship between residents' satisfaction with open spaces and their usage of open spaces.

4) To identify whether the physical attributes of open spaces facilitate or impede adults using open spaces.

This study combined two types of research methods--qualitative and quantitative method—to explore the relationships between people's social capital and neighborhood open spaces. Research questions were used to guide qualitative research:

1) Regarding the usage of open spaces

- How do they use open spaces?
- What kinds of social interaction occurred in open spaces?
- Which open spaces do they use most to interact with their friends?
- Do they think participating in activities in open spaces will expand and improve their social network?

2) Regarding identification of outdoor public places:

- In the neighborhood, what is its spatial hierarchy?
- What are physical features included in each space?
- Can inhabitants articulate their territoriality in neighborhood?

3) Regarding residents' satisfaction with open spaces:

- Are they satisfied with their living environment including environmental quality and safety? To what degree? If negative, how to improve it?
- What physical features of open space are their favorites?
- What can be done to improve the degree of residents' satisfaction of open spaces?

1.4 RESEARCH HYPOTHESES

Quantitative research was applied in this study to statistically analyze the data collected by survey questionnaires and testing four hypotheses generated based on the literature review.

Hypothesis 1: Those adults and the elderly who live in a neighborhood with a large number of open spaces have developed a higher level of social capital than those who live in a neighborhood lacking open spaces.

Hypothesis 2: The shorter the distance between residents' flats and neighborhood open spaces, the more often the residents will use these open spaces, and therefore will have developed a higher degree of social capital.

Hypothesis 3: Within a neighborhood, those residents who use the open spaces frequently have developed higher levels of social capital than those who use open spaces less.

Hypothesis 4: Those residents with a higher degree of satisfaction with neighborhood open spaces have developed higher levels of social capital than those residents who are not satisfied with neighborhood open spaces.

1.5 SIGNIFICANCE OF THE STUDY

The application of social capital to urban design and urban planning provides a new perspective for community development. China's urban growth and its impact on quality of life are different from western societies in both the scale and intensity. This study was the first to introduce social capital theory to Chinese architects and urban planners, so that they can understand the man-built environment relationship more holistically. Also, this study highlighted the social-psychological-physical aspects of China's urban housing situation, as a complement to present studies on the policies and land use planning of China's urban housing.

The proposed study filled the gap between open space provision and the development of social capital. In regard to physical environment, other studies have found that the improvement of walkability within a neighborhood will improve residents' social capital (Leyden, 2003); enhancing spatial hierarchy of yard, street, and park was proven to increase social interaction (Newman, 1972; Girling & Helphand, 1994). Since the 1990s, the open space system in China's neighborhoods has evolved from streets only to a combination of streets, small spaces between buildings, and neighborhood parks. Residents' social life is transferring from streets to concentrated outdoor spaces. Those parks, however, based on investigator's observation, are mainly for visual pleasure and seemingly do not function well as common platforms for residents' socialization.

Moreover, community association and organizations are quite few in China. Thus, the neighborhood park appears to play an important role in stimulating social capital among residents.

The subjects of this study were adults and the elderly within target neighborhoods. The existing studies on open spaces mostly focus on the lives of children and the elderly. However, adults should not be ignored in that neighborhood park or shared common spaces are the most convenient opportunity for socialization in urban neighborhoods. Through exploring adults' perception and cognition, the understanding of open space will be enriched.

1.6 DEFINITIONS OF TERMS

- Urbanization rate: the proportion of the none-agricultural population living in urban areas comparing with entire population.
- Dwelling unit: means a single unit of residence for a household.
- Multifamily dwellings: means buildings consisting of two or more dwelling units.
- Multistory dwelling unit: means a dwelling unit with finished living space located on one floor and one or more floors immediately above or below it.
- Neighborhood open space: an area in a neighborhood that is accessible for active and passive activities and recreation, and for providing other public benefits.

- Extra large city: in China, a city in which the non-agricultural population in urban and suburb area exceeds one million.
- Large city: in China, a city in which the non-agricultural population in urban and suburb area exceeds 500,000 and less than 1 million.
- Centrally planned economy: the centrally planned economy is an economic system in which economic decisions are made by central government, who determine what sorts of goods and services to produce, how they are to be priced, and allocated.
- Housing reform: officially started in 1998, the housing reform engenders a new management system in the production, consumption and allocation of housing; China's Homeownership-Oriented Housing Policy leads to privatization of housing stimulating the change of housing as welfare to housing as a commodity.
- Floor-area rate: the ratio of the floor area of buildings to the area of the entire land.
- Architecture density: the ratio of the total area of the ground floor of buildings to the total area of the land, presented in per cent.
- Greenery rate: the ratio of the total area of the land for greenery to the total area of the land, presented in per cent

NOTES:

1. The numbers are computed based on U.S. Bureau of the Census, 2000.
2. Data were cited from *People's Daily* Online http://english1.people.com.cn/200505/12/eng20050512_184776.html, August 11, 2005
3. ibid.
4. Data were cited from *People's Daily*, November 12, 2002
5. Data were cited from Modern China Urban Construction, 1990.
6. During the central-planned economy era, almost all the factories, shops, companies, schools, hospitals, and so forth, were owned and operated by the state. Any one of them was a unit of the state for production. Thus, working unit was the basic unit represented the state and government, which administrated all the employees and took care of their daily life as well. For example, working units were responsible for people's basic health care, residence, entertainment, and education.
7. Data were cited from China Statistic Yearbook, 2000.
8. Cited from www.sina.com.cn, November 23, 2003.

CHAPTER II

REVIEW OF LITERATURE

2.1 INTRODUCTION

Integrating human beings, physical environment, and socioeconomic factors, a neighborhood acts as the fundamental ecological unit of a society (Hawley, 1950). A community is fabricated by a number of neighborhoods, and then in combination with other communities to compose a society. After World War II, traditional western neighborhoods with intimate relationships among residents have gradually been replaced by neighborhoods where people maintain their social relations and friendships with outsiders. Comparatively, the sense of community has become rather weak due to lacking common interest and goal, or having various life styles (Putnam, 2000).

In China's urban area, a large quantity of new housing has been built, which greatly improved people's living condition. However, the demolishment of old neighborhoods and the large scale of re-settlement into new neighborhoods have broken up previous intimate relationships. Moreover, the rapidly changing working rhythm and lifestyle make residents feel remote to each other. In this study, subjects of questionnaire survey and interviewees expressed that they had lost a sense of belongingness, security, and territoriality within their neighborhoods.

Threatened by many problems of urban sprawl, such as high ways, lack of services, and development pressure, both poor and middle-class residents, in the United States, are seeking socially suitable and livable neighborhoods (Heisler, 1984). As early as 1973, Mike Royko (1973) pointed out that the reasons for the resurgence of interest in neighborhood included: (1) a result of the energy crisis and diminished mobility, people did not need to own a car and can walk to grocery, school, and all other services within the neighborhood; (2) the public fiscal instability of a slow-growth economy, which led to a decentralization of city function into local level and promoted more neighborhood control; (3) various contemporary social issues, such as continued anomie, urban isolation, and/or rootlessness, impelled people to depend more on neighbors, promote neighborhood self-reliance, and volunteer time and resources for reclaiming neighborhood spaces. In response to this trend, New Urbanism emerged in 1970s based on principles of planning and architecture that work together to create human-scale, walkable communities. New Urbanism promotes "the creation and restoration of diverse, walkable, compact, vibrant, mixed-use communities composed of the same components as conventional development, but assembled in a more integrated fashion, in the form of complete communities. These contain housing, work places, shops, entertainment, schools, parks, and civic facilities essential to the daily lives of the residents, all within easy walking distance of each other."[1]

"Community", more or less, is an unfamiliar term to Chinese. It appeared once during 1950s and then was abandoned. Nevertheless, as the tie between working units and housing allocation broke up, community development is drawing more and more attention from sociologists, government officials, and other professionals. Many studies were already conducted on civic associations and community organizations (Pei, 1998; Ren, 2004; Zhang, 2004). In addition, recently, Chinese government is promoting the development of harmonious society, and the starting point is to create harmonious neighborhoods and communities.

In this chapter, resources were reviewed in regard to the relationships between social capital and neighborhood open space. The development and transition of social relationships in neighborhood were discussed firstly. The second section was about the concept of social capital. Thirdly, the history and benefits of open space were narrated. The fourth section discussed social interaction in high density housing. The last part was to explore how physical design of neighborhood open space actually and/or potentially affects social interaction and social capital.

2.2 THE CHANGES OF SOCIAL RELATIONSHIPS IN NEIGHBORHOODS

Since 19th century, the transition from *Gemeinschft* (community) to *Gesellschaft* (society) has led to the changes in inhabitants' relationships in neighborhoods (Tonnies, 1887). Cooley (1962) also used primary (*Gemeinschft*) and secondary (*Gesellschaft*) relationships to describe the human relationship in neighborhood. Primary relationship is the sentimental relationship that predominates in family, village, and town with a mainly agricultural economy and local culture, while secondary relationship is based on associations and larger level social units of metropolis and state, and based on the complex trade and industry. Although individuals in modern cities intend to develop brief, superficial and socially uprooted relationships so as to avoid psychic overload (Wirth, 1938; Fischer, 1982; Flanagan, 1995), Wireman (1984) observed the third dimension of relationship in urban communities, that is, the intimate secondary relationships, which describes relationships with the dimensions of primary relationships, such as warmth, rapport, and intimacy, but occur within the secondary settings. The intimate secondary relationships focus on specific public matters rather than diffuse purposes and not concern with the personal backgrounds, family relationships, or even others' personality. Thus, the intimate secondary relationships facilitate the social cohesion in a neighborhood. Forrest & Kearns (2001) argue that a society without social cohesion will suffer social disorder and conflict, disparate moral value, extreme social inequality, low

levels of social interaction between and within communities and low level of place attachment. Social cohesion depends on the willingness of people in a heterogeneous society to cooperate for adaptation (Stanley 2003).

During the past one hundred years in the West, however, the traditional ties of community including shared space, close kinship links, shared religious and moral values have gradually given their way to anonymity, individualism and competition. Information technology forms a new type of virtual social network and a greater fluidity that form more superficial contacts and erode the residual bonds of spatial proximity and kinship (Forrest & Kearns, 2001). The macro-level of social transitions results into the changes of people's ordinary social relations at the micro-level (Mann, 1970). Castells (1997) believes that the new ways of living involve a higher degree of discontinuity and risk in everyday life for many households and individuals with a higher incidence of job loss, illness, drug dependency, loss of earnings and assets. Furthermore, Forrest and Kearns (2001) point out that a society without social cohesion will suffer "social disorder and conflict, disparate moral value, extreme social inequality, low levels of social interaction between and within communities and low level of place attachment."

Neighborhood is "the bundle of spatially based attributes associated with clusters of residences, sometimes in conjunction with other land uses" (Galster, 2001) and has been regarded as a central focus in that if social cohesion is to be achieved at a

societal level, then this will be derived from improved forms and quality of social interaction at the local level. As a term used firstly by sociologist Emile Durkheim, social cohesion is viewed as an attribute of a society dealing with the connections and relations between societal units and the interdependence between the members of a society, shared loyalties and solidarity (McCracken, 1998; Jenson, 1998). It is usually described with the strength of social relations, shared values and communities of interpretation, feelings of a common identity and a sense of belonging to the same community, trust among members as well as the extent of inequality and disparities (Woolley, 1998). Berger-Schmitt (2000) distinguished two dimensions defining social cohesion: (1) the reduction of disparities, inequalities, and social exclusion, which reduces exclusion, non-Involvement, and rejection (Jenson, 1998); inequalities and inequities, cultural diversity, and geography divisions (O'Connor, 1998); and the absence of social inclusion (Woolley, 1998); and (2) the strengthening of social relations, interactions and ties, which enhances belonging and legitimacy acting as a mediator in conflict of a pluralist society (Jenson, 1998); ties that bind values, identity, and culture; associations and networks, infrastructure, values and identity (O'Connor, 1998); and interaction and connection (Woolley, 1998). The dimensions embraced within the second category are generally considered as the social capital of a society, which is an essential foundation of the social cohesion (Maxwell 1996).

2.3 THE UNDERSTANDING OF SOCIAL CAPITAL

2.3.1 The Concept of Social Capital

Social capital is not a new concept (Portes, 1998). Even, Bian (2001) argues that the Chinese centuries-old concept of *Guanxi* is very close to social capital. There is a variety of theoretical perspectives of social capital that was initially applied it into the development of economy. Although social capital includes institutions, relationships, the attitudes and values governing people's interaction, and contributes to economic and social development, it goes beyond the sum of them and acts as a glue to bind them together (Social Capital Initiative 1998).

Social capital is primarily associated with sociologists, such as Ronald Burt, Nan Lin, and Alejandro Portes. Whereas physical capital refers to physical objects and human capital refers to the properties of individuals, social capital refers to the connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them. Lin (2001) defines it as both the investment and the collective resources embedded in people's social networks. Coleman (1988) provided a general conception of social capital as "a variety of different entities, with two elements in common: they all consist of some aspects of social structure, and facilitate certain actions of actors, whether personal or cooperated, within the structure." The second approach is related to political scientist Robert Putnam. At the local level and within a

certain area, social capital is defined as "features of social organization such as networks, norms and trust that facilitate co-ordination and co-operation for mutual benefit. Social capital enhances the benefits of investment in physical and human capital" (Putnam 1993). Within Putnam's "horizontal associations" between people as the "networks of civic engagement", Narayan (1999) further labels social capital as "Bonding social capital", which mediates homogeneous intra-group relationships, whilst "Bridging social capital" concerns heterogeneous relationships between groups with different social background. By integrating these two categories of understanding of social capital, here a definition of social capital is proposed:

> *Social capital is both individuals' sentimental, social, and economical investments and the collective resources embedded in people's social networks, and the features of social associations and organizations, such as norms and trust, that facilitate the co-ordination for mutual benefits and a sense of community*.

Synthesizing Putnam's five dimensions of social capital (1993), Immerfall's (1999, cited from Berger-Schmitt 2000) three levels of social capital and Forest & Kearns' (2001) eight items of social capital, the factors defining social capital are categorized into interpersonal level and the intermediary associations and organizations level (Table 2.1).

TABLE 2.1
Factors of Social Capital

Social Capital	
Interpersonal Level	Organizational Level
Network: the density, frequency, and extension of the structure of people's social relationship (Duck 1998);	Empowerment: people participate in the decision-making and take action to initiate changes;
Engagement: the participation of people in social and neighborhood activities and events;	Associational activities and common purpose: residents form informal and formal organizations for their interests;
Trust: that people feel they can trust their neighbors and local organizations responsible for governing or serving their area;	Supporting networks and reciprocity: residents co-operate to attain mutual benefits and help when needed;
Security and safety: residents feel safe in the neighborhood and are protected from epidemic diseases, air and water pollution, and traffic threat;	Collective norms: residents' cooperation, reciprocity, and shared behavioral patterns.
Belonging: that people feel they are members of a group and belong to the neighborhood.	

Therefore, social capital is to be achieved in the process that residents collectively organize to support themselves through intensive social interaction. Social capital functions as to facilitate information exchange between individuals, enhance the influence of social ties on agents, such as supervisors in organizations, and decision making, enable individuals to get reciprocal credits of accessing collective resources, and

reinforce identity and recognition (Lin, 2001). The decline of social capital is regarded as the main reason of neighborhood decline: “networks disrupt and weaken, population turnover erodes familiarity and trust, the community disengages, and there is a general sense of disillusionment” (Morrison, 2003). Hence, this decline leads to a vicious circle within which hostile interactions among the residents and a general disaffection with local environment damage people’s willingness to participate in cooperation with others, and then again lead to worse social capital.

There also appears to be a strong relationship between the possession of social capital and better health. “As a rough rule of thumb, if you belong to no groups but decide to join one, you cut your risk of dying over the next year in half. If you smoke and belong to no groups, it’s a toss-up statistically whether you should stop smoking or start joining” (Putnam, 2000). Social capital is very important in that, firstly, communities with strong social capital provide social support to the establishment of resident social identity determining the health promotion; secondly, residents holding high level of social capital will have stronger perceived control over their daily life so as to reduce anxiety and stress (Cambell & Jovchelovitch, 2000; Cambell & Gillies, 2001). Increasingly, social capital has come to be explored based on social interactions between individuals within the same social group (Whitehead & Diderichsen, 2001). Thus, the understanding of social capital is rooted in the understanding of community.

2.3.2 Understanding Social Capital Based on China's Urban Community

As discussed in previous section, social capital can be understood based on individual level and organizational level. The analyses of the application of social capital in China will be in line with these two levels as well. In the West and China, there are similarities and differences in terms of community, regions and even entire nations.

The individual level of social capital in the West is similar to Chinese notion of *Guanxi*, which is generally understood as the close relationships among individuals, like Bourdieu's (1986) social capital: a private asset that only serves those individuals who hold such connections. In current Chinese society, individuals are mainly dependent on the close and informal relationships with relatives and long-term friends, which are called as *Guanxi*. The meaning of *Guanxi*, however, exceeds the general meaning of relationships or connections: it involves the exchange of favors or a reliance on personal connections to obtain a public or private good (Walder, 1986; Yang, 1994)); it is related to personal relations involving the giving of social status and the networking of mutual dependence (Davies *et al.,* 1995); it is the concept of drawing on connections in order to secure favors in personal relations, and the practical strategy that best ensure personal relationship building, utilization, and development (Luo, 2000). Putting these elements together, *Guanxi* means personal relations, the use of personal relations, and the obligation and reciprocity in exchange based on trust. Therefore, in regard to individual

level, the interpersonal level of social capital equals the principles of *Guanxi* and can be utilized in China. In his study of 621 laid-off workers in city of Wuhan, China, Zhao (2002) investigated the role and effect of interpersonal social capital in those laid-off workers' re-employment. Based on questionnaire survey data, the analysis showed that the laid-off workers' possessed poor intermediary social capital, but still could count on interpersonal social capital to get re-employed. Of 529 workers who got re-employed, 61.5% used social capital in finding their first job. Also, he found that 33.6% of the workers got 'substantial help' from their network, 36% got a combination of 'substantial help and information', and 30.4% got 'information only'.

For Putnam (1993) and Coleman (1988, 1990), social capital is a community resource that is beneficial to everyone in a community and is the by-product of other social activities, such as participation in choral societies, sports clubs, and so forth. In this sense, *Guanxi* does not share the same understanding of the intermediary social capital. In China, the concept of community was introduced from former Soviet Union in 1950s, due to its vague implication and deviation from the spirit of centrally planned and controlled socialist system, this concept had not been utilized in urban planning (Lu *et al*, 2001). Within the central-planned economy system, Chinese urban citizens attained jobs and almost every social service and welfare from a work unit. A work unit was a mini-society with relatively homogeneous population, single organization, and few

connections with other units in which all employees, meanwhile the residents of the living quarter provided by their work units, shared a common enterprise culture or value. Since the economic reform started in 1978, China's economic and social structure has been reconstructed to stimulate the separation of the provision of housing and social services from work units. The population in newly built neighborhoods is diversified by resident coming from different work units instead of previously coming from same one work unit. Residents' daily life, other than working time, is entirely managed by themselves but lack common values, social and institutional supports. Therefore, in current China society, people's sense of community appears to be lower than previous living quarters and people lost the previous collective consciousness (Chen, 2004).

The poor intermediary social capital in China urban neighborhoods is resulted from the lack of community organizations or associations. Peterman (2000) argues that, since in Europe the governments were well-established and strong but United States governments were relatively small and weak, the expansion of democratic ideals could be counted on governments in Europe while it were accomplished by voluntary organizations in United States. China's government has the similar situation to Europe so that organizations were not developed well, actually very weak in the past fifty years. In 1978, there were only 103 national associations, such as China Architect Association (Pei, 1998). Even after economic reform was started, China's government and Communist

Party still strictly control the social and political life to a great extent. Since then, the number of NGOs (Non-Government Organization) has increased dramatically. From 1979 to 1992, the number of national association increased 700% (Pei, 1998). The more developed civic associations, the denser the horizontal networks and the stronger the social capital among people (Couto, 1999). However, the increase of associations and organizations in neighborhood has not caught up with the pace of the development of national associations. There still is only one organization in neighborhood, the community residents committee-the former residential committee (Zhang, 2004), which impedes the community development in that the lacking of enough associations or organizations cannot support residents' intermediary level of social capital.

DeFilippis (2001) identifies the fundamental flaw of Putnam's understanding of social capital is not to include power. Lin (2001) also indicates that social capital is interwoven with the social structure and power. In the pyramid of a hierarchy, the majority of individuals is located at the lower hierarchy of social, economic, and political status and has limited accesses to resources; while few individuals with higher status occupy the top level of the hierarchy and enjoy the rich resources. Couto (1999) also demonstrates that an individual as a single social entity has limited capability to attain the resources he/she needs. The effective way to attain and secure the resources is through being organized together to mutually support each other and work with

governments. Marshal and Schram (1993) demonstrate that government should be empower citizens, organizations, and institutions to solve the problems by themselves. Empowerment refers to enhance an individual's or group's capacity to make choices and transform those choices into desired actions and outcomes (Alsop and Heinsohn, 2005). Empowerment to people will bring remote government to people by decentralizing its power and function through community organizations. Empowered people, even with lower SES (socioeconomic status), will attain better housing and living conditions, such as clean water, and less air pollution (Peterman, 2000; Carpenter *et al*., 2004).

China's government is devolving power to local governments and enterprises, and decreasing overall social and economic control. The traditional structure of Chinese government consists of municipal-district-subdistrict-residents committee, and residents committee is the basic unit and responsible for distributing the state policy to the local residents. The old residents committee is a governmental administration agency and all staffs are state employed. Its objective was to assist the government to carry out the decisions and policies of governments and China Communist Party, and manage local residents but not to empower the local residents. Based on a survey in Shanghai, 73.3% citizens regarded residents committee as "government" and thought they were managed by residents committee, and the ideal of residents committee as an "autonomic local organization" was only supported by 13.3% residents (Ren, 2004).

Since the provision of social services has separated from working units and China's social security system was still not mature, residents who were dependent on their work units previously have to rely on their neighborhood and residents committee. The current social reform consists of autonomy in local residents committee, development of NGOs, citizen's participation and volunteering (Ren, 2004). In some experiment cities, the members of residents committee has changed from composed by government staff to by the mix of government staff, representatives of residents, and representatives from local enterprises. Each resident representative is elected from fifty to one hundred residents and participate in the decision-making. However, the process of decision-making is still opaque to common people-"decision behind the door" (Centre for Applied Studies in International Negotiations, 2005). In contrary, Chinese people are eager to participate in community social activities. For example, based on Ren's (2004) survey in Shanghai, 56% residents express their willing to participate in community activities if the necessary social organizations are available, however, only 3.4% resident practically participate in voluntary activities under the current limited conditions. Thus, researchers proposed ideas of reforming government structure to facilitate empowerment and engagement as: the first level of municipal, the second level of district, and the third level of subdistrict and resident committee, which emphasizes the parallel structure of subdistrict and residents committee at local environment (Ren, 2004; Zhang, 2004).

2.4 NEIGHBORHOOD OPEN SPACE

2.4.1 The Concept of Open Space

Wilkinson (1983) pointes out a variety of factors that explain the present importance and even the increasing importance in the future of urban open space: urbanization, demographic changes, time available for leisure activities, income, traditional values, technology, communication, and government. In Europe, the development of open space can be traced back to as far as ancient Mesopotamia, 3500B.C. Woodland, vineyard, ponds, and well-designed trail system were provided to people for natural aesthetics enjoyment. About 3000B.C, multi-function places in cities were created for people's aesthetics happiness, sports, social interaction, politics, and shopping. Ancient Rome transferred private farms into gardens as public parks for recreation. In cities of the Christian era, market place and church square emphasized on aesthetics and physical activities for the noble and ruling classes (Wilkinson, 1983).

Furthermore, another important function of open space is to be a recreational facility. Frederic Law Olmsted advocated creating the pleasure ground on a city's outskirts with large trees, spacious lawns, meandering walks, and natural water features. During 1900 to 1930s, since the first official playground appeared in Boston, the playground idea spread to other cities through the public media and communications between settlement house workers. The playground idea became a movement because it

was an effective instrument to attract children into a fun environment so as to teach them in manners, morals, and sportsmanship. Playgrounds also were designed to be safe places where children could temporarily escape, through play, from the dire circumstances of their urban environments (Dickason, 1983). In the 1930s, the idealistic effort of using parks as a mechanism of social reform was abandoned (Cranz, 1982). Land began to be purchased for recreational purposes, not for playground or a small park. Correspondingly, parks became recreational facilities providing various services for the rapid growing population, such as playgrounds, parkways, stadiums, parking lots, and open beaches. Buildings in the recreational facilities were larger and more various function than that of in the playground era. However, the recreation era provided facilities but not space. The term of "open space" was used in Chicago as early as 1960, and from then, U.S. municipal systems and federal programs turned urban parks into open spaces that integrate the physical park and the recreation program (Cranz, 1982).

Open space is defined by various emphases. It may refer to the part of the three dimensional void that is not occupied by man-made features constructed for spatial enclosure (Cotton, 1964). By function, open space is viewed as an outdoor area which is open to the spontaneous activity, movement, or visual exploration of a number of people (Wilkinson, 1983). By form, urban open space refers to all areas in a city that are not occupied by a building or other construction (Bureau of Municipal Research, 1971).

2.4.2 The Benefits of Open Space

Besides land use, density, street pattern, ‘natural’ boundaries, and the condition of dwelling units, open space was introduced by Robert E. Park and E. W. Burgess as an important physical component of neighborhood (Robert, 1915). They indicated that open space might act as a focal point in a neighborhood and each house should be planned to be adjoined an open space. Open spaces are part of the neighborhood in two ways: (1) they are physically further from people’s home than domestic open space, such as private garden, which require a journey by walking or vehicles; (2) they are related to community social issue and/or context. Neighborhood open spaces include neighborhood park, playground, playing field and sports ground, school playground, streets, and natural green space (Woolley, 2003).

By the year 2025, half of the global population, around 3 billion people, will be living in urban areas (UNCHS, 1996). In such a high dense area, open space will bring people social benefits. A range of investigations has confirmed the importance of open space as a place for gathering and to foster the sense of community (Greenhalgh & Worpole, 1995). Open space is not only for passive recreation, such as, people stay being with others, meeting friends, or looking after children; but also for active recreation. Sainsbury (1987) found that urban outdoor activities provided chances for young and the elderly to develop feelings of well-being, self confidence, relaxation and independence.

Moreover, open space may contribute to people's physical health. DiGilio and Howze (1984) found that exercises in open space improved health and physical fitness by a range of active recreation pursuits. In addition, plants and wildlife in open space will improve human beings' mental health. Ulrich (1979, 1981) and Kaplan (1995) confirmed that natural views can aid people's attention and then have a restorative effect.

Furthermore, open space also can impact on the property values of a neighborhood. The value of land and property adjacent to an open space is higher than those further away from the open space. For example, New York Central Park, during 1856 to 1873, the value of property adjacent to it increased by nearly 900 percent, while others increased by only 100 percent. The presence of trees on an open space has been shown to increase residential property values (Woolley, 2003).

Finally, Neighborhood open space can bring environmental benefits to residents, such as reducing air pollution, ameliorating airflow, adjusting local temperature, ameliorating radiation and sunshine, and reducing noise pollution (Heisler, 1984).

2.4.3 Open Spaces in China Urban Neighborhood

The development of China's urban housing has experienced three stages: the starting stage of 1950s, the exploration stage from the late 1950s to 1970s, and the transition stage since the middle of 1980s (Lin, 2002). Correspondingly, open spaces in

residential quarters have changed patterns and functions.

From 1949 to 1956 was the initial development stage of urban housing in New China. During this period, the former Soviet "neighborhood" was introduced as the standard model for constructing urban housing (Figure 2.1). The Soviet neighborhood was defined by roads around a site so that there was no traffic inside, and residential buildings were arranged along the edges to form a closed cluster in which a kindergarten or shops may be included. Due to developing the heavy industry was the top priority goal in that era and the primary objective of this stage was to satisfy the basic housing needs, a limited amount of money was invested into housing construction, especially into open spaces, such as landscape, site furniture, and so forth (Lu *et al*., 2001).

The second stage started from 1957 was to explore the housing model suitable for Chinese society. The former Soviet model was abandoned because the friendly relationship between Chinese Government and Soviet government was broken up and all Soviet ideologies were criticized. Further, the two sides of housing facing east and west make the interior spaces of those living units very hot in summer and cold in winter. Therefore, in the long period of stage two, all residential buildings were constructed as parallel rows facing south (Figure 2.2). During this period, China's urban population was dramatically increased that caused the high pressure on housing provision, which did not allow extra areas for open spaces except for the spaces between two rows.

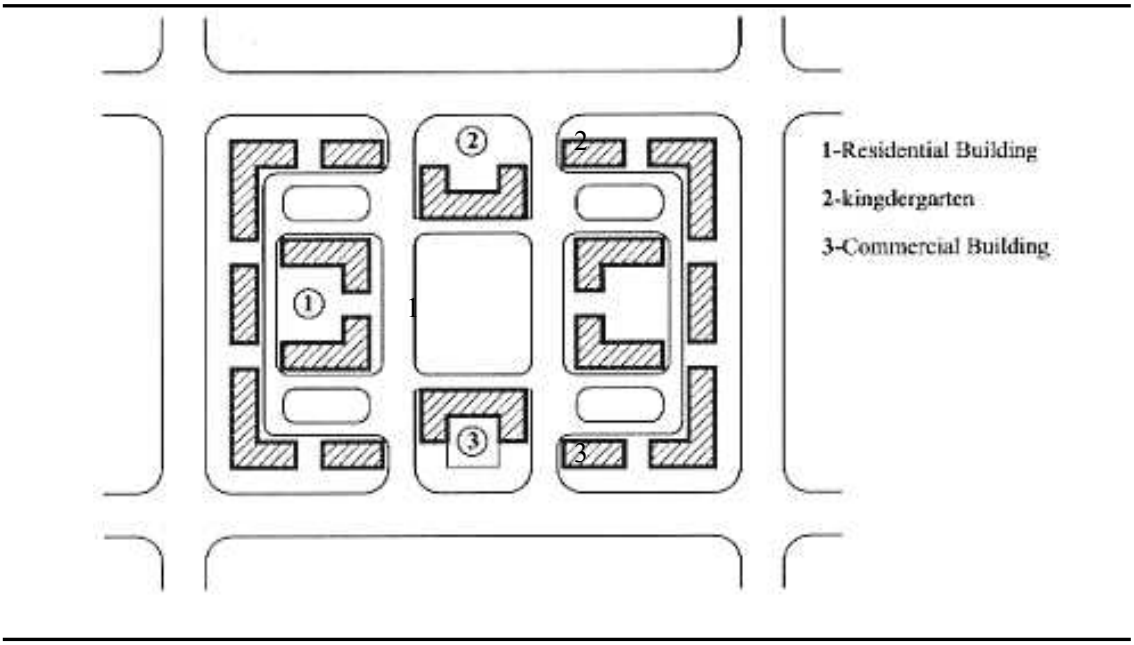


Figure 2.1: The Typical Soviet Neighborhood

In the third stage that was started from 1986 the development of urban housing has experienced the transition from only emphasizing the quantity of housing in previous stages to emphasizing not only the quantity but also the quality of living environment. The outdoor spaces in neighborhoods are gradually designed and constructed based on all aspects of human needs, such as spaces for sports, for exercises, or for children's play. In addition, developers are willing to invest a large amount of money on landscape and site furniture in open spaces to satisfy residents' needs (see Appendix F). The spatial hierarchy of neighborhood open space has been enriched from only two levels of public-private to three levels of public-semiprivate-private (Lin, 2002).

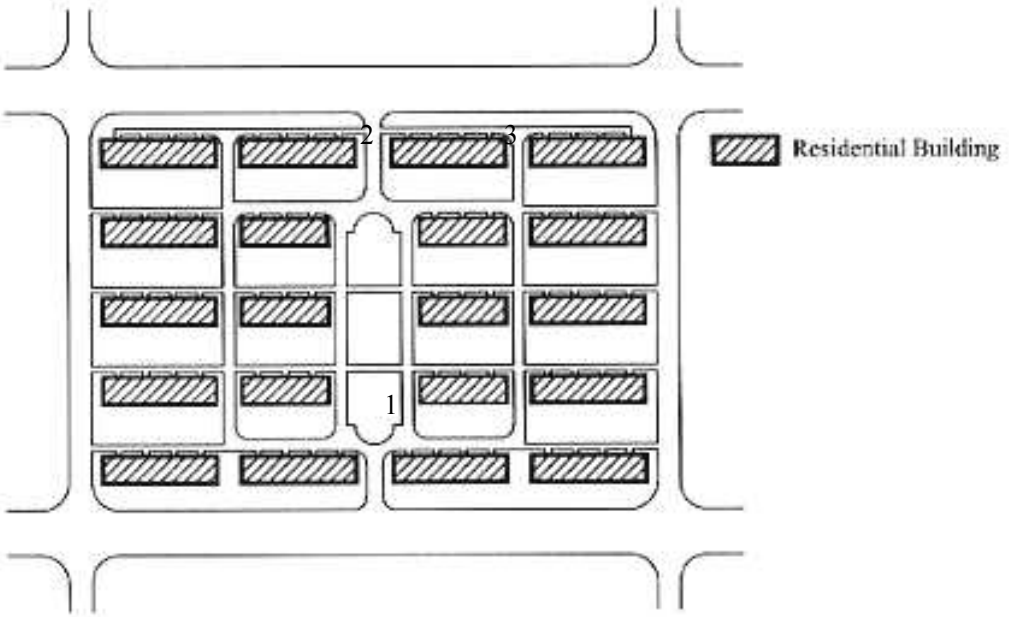


Figure 2.2: The Model of Living Quarter in Stage Two

However, currently, residents' activities in neighborhoods are still limited by open spaces in that there are few suitable outdoor spaces. Lin (2004a) investigated inhabitants' activities in three time slots daily and found that the types of their activities appeared quite limited due to the monotonous open spaces (Table 2.2). Consequently, residents spontaneously found spaces, site furniture, and amenities for their purposes, which were varied from their original functions (Lin, 2004b) (Table 2.3).

TABLE 2.2
Activities in Residential Area

Resident	Time	Activities	Place
The Elderly	6:00 a.m.~8:00 a.m.	Play *Taiqi*	Lawn
	12:00.p.m.~14:00 p.m.	Sunbathe	Lawn
	17:00.p.m.~18:30 p.m.	Play Chess, Chatting, read newspaper	Lawn, under trees
Adults	6:00 a.m.~8:00 a.m.	Jogging	Roads
	12:00.p.m.~14:00 p.m.	Mothers accompany children	Lawn
	17:00.p.m.~18:30 p.m.	Walking, Chatting	Roads, Lawn
Children	6:00 a.m.~8:00 a.m.	Play	Lawn, Roads
	12:00.p.m.~14:00 p.m.		Lawn, Roads
	17:00.p.m.~18:30 p.m.		Lawn, Roads

TABLE 2.3
Variant Use of Public Spaces

Planned Use	Variant Use
Lawn	Exercises
Steps and Sports Facilities	Sitting
Trees	Air clothes and quilts
Roads	Parking, eating, playing badminton
Bushes	Feeding pets

2.5 SOCIAL INTERACTION IN HIGH DENSITY HOUSING

2.5.1 The Concept of Social Interaction

The meaning of social interaction seems to be a common sense. However, there are various definitions describing its multifold connotation. Giddens and Duneier (2000) regard social interaction as the process by which individuals act and react to those around them. Social psychologists understand the meaning of social interaction in terms of people's reciprocal subjective communication. Rummel (1976) defines that social interactions are the acts, actions, or practices of two or more people who are mutually aware of other's selves, that is, any behavior intending to affect or take account of other's subjective experience. Nash and Calonico (1996) also think social interaction as a process of communication and mutual influence embedded in the contact among two or more minds. Based on the general definition of social interaction, in relation to housing environment, Unger and Wandersman (1985) emphasize more on the aspect of mutual support of social interaction among neighbors as well as the social network. Kim (1997) refers social interaction to "the social activities that neighbors engage in ranging from the exchange of greetings, and informal encounters to supportive social networks in a neighborhood." Housing, however, is a complex man-made integrity including not only physical environment but also social environment, which makes it necessary to the types, consequences, and characteristics of social interaction among inhabitants.

Taking place among human beings makes social interactions complicated. In many social interactions, individuals engage in unfocused and focused interaction with others (Giddens & Duneier, 2000). Unfocused interaction takes place whenever individuals exhibit mutual awareness of one another's presence, such as the encounter in a public space, while focused interaction occurs when individuals directly attend to what others say or do, such as stop for chatting when people encounter others. Rummel (1976) defined two types of social interactions: the distinct, specific, and determinate manifest interaction and the potential, determinable latent social interaction. Cooper Marcus *et al.* (1998) also identifies two categories of human activities: covert socializing, referring to people of all age without the intention of participating in mutual activities; overt socializing, actions with certain purposes and with the expectation of meeting others. However, unfocused interaction does not necessarily lead to focused interaction. Festinger *et al.* (1950) found that only if inhabitants have a certain degree of homogeneity of values, interests, and background can they create further relationship, such as friendship or home visits. Maslow (1954) argues that human beings have the social and affiliation need that strongly motivate them to establish close relationships (Baumeister & Leary, 1995).

Social interaction, however, can be either positive or negative. Positive social interaction means the actions by members of an individual’s social network that involve

both the positive evaluation and expectation of a person and the efforts to facilitate person's pursuit of personal goal (Vinokur & Van Ryn, 1993). Klinger (1977) found people related the greatest sense of meaning of lives to positive social interactions. Cohen and Wills (1985) documented how social interaction helped people maintain emotional and physical health in stressful life. An extensive body of evidence indicates that people who either lack or lost close relationships experience anguish, loneliness and bereavement (Strobe, Strobe, and Hansson, 1993).

If residents are dissatisfied with their living environment, they will suffer more stress and strain (Michelson, 1977). Research has consistently demonstrated that involvement in social networks is associated with greater levels of residential satisfaction (Adams, 1992; Phillips, 1996). Specifically, knowing the names of neighbors, having friends living in close proximity, and participating in local neighborhood activities have been shown to predict residential satisfaction (Phillips, 1996). Further, Kim (1997) found social interaction promoted inhabitants' residential satisfaction.

As an important factor promoting a sense of community, social identity can be facilitated by interaction directly and indirectly. A person's social identity is formed during the process that identifies him/her from others through interaction and comparison (Hogg & Abrams, 1988). Lalli (1992) argued that the greater the residential satisfaction promoted by social interaction as discussed previously, the stronger the urban identity.

Nevertheless, social interactions are not always beneficial to people. Vinokur and Van Ryn (1993) define negative social interaction as actions by members of a focal person's social network that negatively influences on the person, devaluates individual's worth, or undermines personal goals. Social interaction can be a source of conflict, strain, and disappointment, and, especially, negative interaction threaten people's health and well-being. Although negative interactions generally occur less often than positive interactions, they "arouse considerable distress that can exceed the beneficial effects of positive social exchanges" (Rook, 1998). In addition, negative social interaction is associated with worse physiological outcomes, such as increased cardiovascular and decreased immune function (Kiecolt-Glaser *et al.*, 1993).

Social interactions are also characterized by intensity that refers to strongly motivated intentions, such as a birthday party, or involving little emotion or peripheral intentions, such as riding in a car pool. In addition, the interactions may be extensive or narrow. They may invoke a range of activities, such as building a good academic department. Or the interactions may be narrow, restricted to particular activities, such as competition of a soccer game. Social interactions can also be characterized by their direction (solidary, antagonistic, mixed), extension, duration, or organization. All interactions manifest these characteristics to one degree or another and in various combinations (Rummel, 1976). Furthermore, social interactions are influenced greatly by

people's personality, emotion, socializing skill, and so forth.

Through summarizing previous studies on social interaction, a definition of social interaction in regard to neighborhood was proposed:

> *Social interaction refers to the intentional social acts and processes that benefit individual's well-being and form a supportive social network with intimate neighboring relationships throughout the whole neighborhood.*

2.5.2 Social Interaction in Neighborhoods

Because of its multifold meaning and occurrence among human beings, social interactions are influenced by the characteristics of human beings and other social factors. The effects of gender difference on social interaction have been reported, for example, women are more easily and desired to join social interaction than men (Carli, 1989; Maccoby, 1990). Smith *et al.* (2003) find that people at various ages have different levels of social interactions and networks. Personality is another factor influencing social interaction, such as shy people seldom participates in social events, or an individual with a high level of achievement-based constructs (i.e., autonomy and perfectionism) is easily correlated to negative social interactions (Flett et al., 1997). Social interactions may also be influenced by socioeconomic status. People with higher socioeconomic status may

have less intense relationships with their neighbors, but instead establish intimate ties with outsiders. People with lower socioeconomic status are more dependent on the locality for a intimate tie, or may be less involved with other neighbors because of mutual suspicion and distrust arising from the insecurities of lower-class life (Keller, 1968; Suttles, 1968; Zehner & Chapin, 1974).

Evidence suggests that the work of human brain is dependent on environmental context (Smith, 1979, 1988, 1994), so both the physical and social environment has an impact on human's social interactions. Architecture design and neighborhood planning obviously influence the willingness and capacity of people to engage in social activities. Higher density housing environments, although may cause psychological tension, can foster neighbor interaction as well. Physically segregated communities lead to diminished social and political skills and responses, and hence reduced civic participation (Fowler, 1992). The mixed land use, short blocks with concentration of use, and the combination of private and public life stimulate residents toward "looking after their street," and to develop networks of trust and confidence (Jacobs, 1969).

Traffic has an important impact on community solidarity. A dispersed, car-dependent society tends to separate people, put them in suburbs remote from work, shops and leisure, and break up communities (Appleyard, 1981). Automobility for those with access to cars reduces mobility for those without, causing social inequality and

reducing social solidarity. Walking and low-priced public transport most likely foster a sense of community in that they cater for everyone, including children, the poor and people with disabilities (Illich, 1974; Schaeffer & Sclar, 1975). In a study of three neighborhoods in San Francisco, Appleyard and Lintell (1972) found there were negative correlate between traffic load and human activities. Improving walking is believed to be an effective way for enhancing the encounter chances and facilitating social interaction (Leyden, 2003). In a traffic-free or traffic-segregation neighborhood, inhabitants have a higher level of interaction (Duff, 1961).

Amenities are to be designed in such a way, if well considered and placed, that they not only provide services but also encourage interaction. In high-rise blocks of apartments, without convenient communal facilities, there is little sense of community. In typical US suburbs, the dispersed physical layout discourages families to interact with neighbors. In Israeli kibbutzim, by contrast, the buildings are originally designed to foster high social interaction, for example the special rooms designed for communal child rearing. In Europe and North America, Co-housing combining private living quarters with some collective facilities stimulates social interaction (McCamant, 1988). A playground attracts not only children to use but also those parents to get involved conversations and social activities (Cooper Marcus & Sarkissian, 1986; Francis, 1998).

Within a neighborhood, especially in medium and high density housing

environment, open space acts as an important role in residents' daily life. In their postoccupancy studies, Cooper Marcus and Sarkissian (1986) indicate that the open spaces between buildings in medium or high density neighborhoods determine the success of housing. The common open spaces perhaps are not the determinants but may be the stimulators facilitating social interaction through attracting and promoting residents' hanging around and using these places. Grahame (2000) indicates that certain shape of space will have the higher potential supporting occasions-an intense form of social interaction. For example, a square is an ideal circulation form for occasion, and a rectangular shape with the ratio of length to width bigger than 2:1 will be a space encouraging movement but not ideal for interaction. People will use those open spaces with the 'right size' with which they feel comfortable. The ideal size is defined in terms of the area of the open space or the ratio of building height to open space width, which varies according to different region and culture (Cooper Markus & Sarkissian, 1986). The spatial hierarchy of open spaces leads to different degrees of territoriality that influences the intensity of people's interaction (Newman, 1972; Hillier & Hanson, 1984). Interaction versus solitude refers to the extent to which the environment promotes social interaction and the degree to which individuals are able to find privacy (Filinson, 1993). Personal preferences vary along this dimension. For example, although some individuals may enjoy the lack of barriers and even encourage a permeable personal space, others

may find such situations intrusive and intolerable (Kahana et al., 2003). Therefore, regarding the design of pathways in common open space, Cooper Markus & Sarkissian (1986) suggest that choicefulness should be provided to residents to avoid getting involved into unwanted interactions.

2.6 PHYSICAL DESIGN OF OPEN SPACES AND SOCIAL CAPITAL

A society cannot be understood if separated from its physical environment, while a place has no meaning if there are not people associated with it, that is, "the physical environment, as a material setting in which people live, is both a condition for and a consequence of a set of social relations." (Hillier and Hanson, 1984). Although built environment cannot solely determine the development of social interactions, it can enhance the opportunities for creating or impeding social networks and social interactions, which are fundamental for forming social capital.

Physical environment influences people's social capital through working on interpersonal factors directly, such as affecting social interaction, safety and security, belonging, and so forth. Among these factors, social interaction acts as the foundation of developing other factors. Therefore, the exploration of the relationship between physical environment and social interaction is one of the keys to understand how to improve social capital in a neighborhood, community, even a city.

A city affects citizen's social capital at the macro level of density, transportation, and land use. Higher density, although may cause psychological tension, can foster people interaction. Physically segregated communities lead to diminished social and political skills and responses, and hence reduced civic participation (Fowler, 1992). Compact city not only fully utilizes infrastructures and protects agricultural land, but also maintains more chances for interaction. Such as in some European cities, a concentrated decentralization mode—population is decentralized from inner city to its peripheral area but is concentrated into several spots of the peripheral area--is applied for dealing with the balance between city expansion and the requirement of density (Beatley, 2000). Traffic has an important impact on social capital. A dispersed, car-dependent society tends to separate people from each other, putting them in suburbs remote from work, shops and leisure, and breaking up communities (Appleyard, 1981). Zoning mechanism demarcates the city into different functional areas, which leads to the separation of working from living, of living from entertainment, and of day from night. To revitalize cities in the North America, the principle of mixed-use mode of land use has been applied. Contact between people is greater with mixed land use and building age, and short blocks with concentration of use. Under such combination of private and public life, residents tend toward "looking after their street," and developing networks of trust and confidence (Jacobs, 1969). In addition, individual's spatial cognition is determined by

city's obvious physical structure of edge, path, node, district, and landmark (Lynch, 1960). A clearly defined spatial cognition will help people establish a strong sense of place and belonging (Tuan, 1996; Reginster & Edwards, 2001).

Within a community, besides the city's physical characteristics, several other features are identified influencing social capital. Evidences indicate that there are negative correlates between perceived density and people's social interactions, as well as between perceived density and crime rate (Newman, 1972). Density is not necessarily equal to crowdedness and people's subjective feeling of density can be adjusted by physical design, such as divide a large scale dwelling into clusters, or divide a large neighborhood into several mini-neighborhoods so as to stimulate interaction (Cooper Marcus, 1986; Newman, 1996). People feel scared if get lost in an illegible environment (Kaplan, 1998), such as a neighborhood filling of architecturally identical and monotonously arranged buildings. Neighborhoods, if with a well defined spatial hierarchy of public, semi-public, semi-private and private realm, will stimulate residents using spaces (Hillier & Hanson, 1986; Grahame, 2000). Moreover, the promotion of mixed use in a community tries to combine working, shopping, and living together, leading people deeply bounded to their neighborhood, that is, strong belonging.

In the West, improving walking condition and opportunity within communities is an effective way to enhance the encounter chances and facilitate social capital (Leyden,

2003). In a well designed traffic-free or traffic-segregation neighborhood, inhabitants, especially children and elderly adults, have a higher level of interaction (Duff, 1961) and the traffic accidents will be decreased so that people feel safer, especially for children and those parents with young kids (Cooper Marcus & Sarkissian, 1986).

In addition to fixed features like buildings, the semi-fixed features (i.e. trees) and unfixed features (i.e. benches) in open spaces affect social capital as well. Landscape in neighborhoods can enrich the spatial hierarchy; change an unfavorable meadow into a serial of coherent and charming spaces; and provide aesthetic pleasure and restorative function to residents. Landscape also embody inhabitants' collective memory by referring a unique "personality" to a specific site and can be a mnemonic device assisting people identifying their own place from others (Potteiger & Purinton, 1998). According to Uzzell et al. (2002) studies in Europe, this kind of physical identification will enhance belonging to their neighborhood. Moreover, there are lots of elements in landscape that affect social interaction directly. For instance, Kuo and Sullivan (2001), when studied on Robert Taylor Homes in Chicago, found trees acted an important role in social interaction. Compared to people who lived in places without trees, residents who lived near trees have significantly better relations with, and stronger ties to, their neighbors. The placement and arrangement of benches also impact on interaction. A bench placed in the center of an open space will be used less often; benches if placed face to face will

encourage more social interactions than placed side by side or back to back (Cooper Markus & Sarkissian, 1986; Gehl, 1987).

Building as the basic physical unit of a neighborhood can affect resident social capital in social interaction, safety and security, and belonging. Newman (1972) demonstrates that the number of neighbors an individual know decreases as the height of a building increases. In a Neo-tradition neighborhood, a porch is designed in front of housing and facing streets, leading to the increase of social interaction (Kim, 2001). Based on the principles of 'Defensible Space', to improve residents' security, buildings should be designed to enhance natural surveillance, such as, enhancing visual contact between kitchen and outdoor space so that mother can watch on child playing while doing housework. In addition, both Newman (1972) and Cooper Marcus & Sarkissian (1986) indicate that there is a negative correlate between the number of resident share one entry and feeling of safe. Lalli (1992) demonstrates that the uniqueness of building identified from other can support residents' belongingness. However, in mixed-incoming housing or affordable housing, architecture should be designed in such as way that although built as low cost, there is not obvious difference from market rate housing in terms of external looking (Davis, 1995).

2.7 CONCLUSION

2.7.1 How to Evaluate Social Capital in China

Based on its definition, the evaluation of social capital can be approached by interpersonal level and the intermediary association and organization level. The interpersonal factors of social capital are the fundamental forces building the intermediary organization factors; the development of intermediary level will further facilitate residents' network, trust, security, belongingness, and engagement (Figure 2.3). In China, the interpersonal factors of social capital can be utilized directly to measure resident social capital and community development. Regarding organizations, however, due to the weak NGOs and strong government control, those factors of western social capital cannot be directly used for measuring residents' social capital. China is just in its initial stage developing community and improving civilian empowerment. The first task is to encourage the social interactions among residents and to form all kinds of civilian community associations and organizations. Consequently, in this study, social capital was assessed by measuring five interpersonal factors.

Rohe (2004) indicates four key constructs: (1) the level of community engagement that includes horizontal engagement between local residents and vertical engagement with individuals and organizations outside the neighborhood; (2) the characteristics of local social network; (3) the level of trust among community members;

and (4) the extent and effectiveness of community organizations. Grootaert et al. (2004) introduced the Integrated Questionnaire for the Measurement of Social Capital (SC-IQ) in assessing the level of social capital, which focuses on applications in developing countries. In SC-IQ, six dimensions are considered: groups and network; trust and solidarity; collective action and cooperation; information and communication; social cohesion and inclusion; empowerment and political action. Thus, regarding China's urban neighborhoods, five dimensions are defined to measure social capital by the interpersonal factors (Table 2.4).

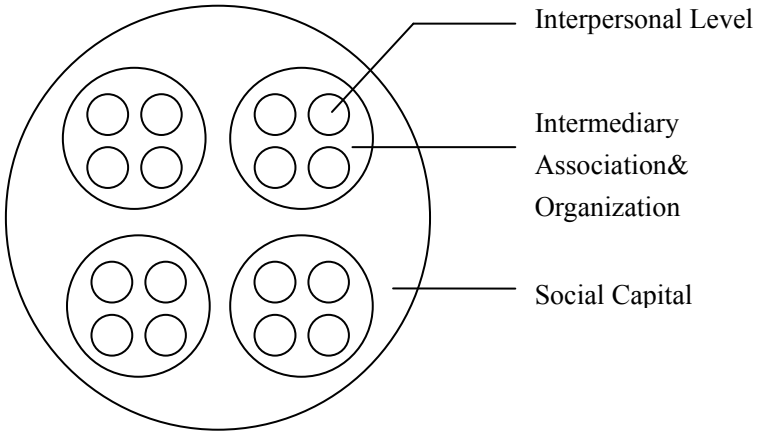


Figure 2.3: The Structure of Social Capital

TABLE 2.4
Items of Evaluating Interpersonal Factors of Social Capital

Interpersonal Factors	Item
Social Network	Network size
	Network level
	Network diversity
Trust	Trust in other residents
	Trust in neighborhood organization
Engagement	Social interaction
	Participation in neighborhood organization or group
	Voluntary activity
Belonging	Belong to a group or organization
	Belong to neighborhood
Safety & Security	Crime rate
	Traffic accidents
	Environmental quality: air, water, noise, smell

2.7.2 Theoretical Framework

Thus far, there are no existing studies focusing on the relationship between open spaces and people's social capital, neither a research framework. Through reviewing literatures regarding open space, human activities, and social capital, in this study a theoretical framework was generated for guiding the whole investigation and analyses. The relationships between open space and social capital are assumed existing but the

physical aspects of open space are not directly influence on social capital. Rather, open spaces impact on social capital by working on human activities and behavioral patterns in open spaces, on people's psychological reflection of physical environment, and on residents' environmental satisfaction. Further, inhabitants' reaction from these three categories will influence the interpersonal factors of social capital ((Figure 2.4).

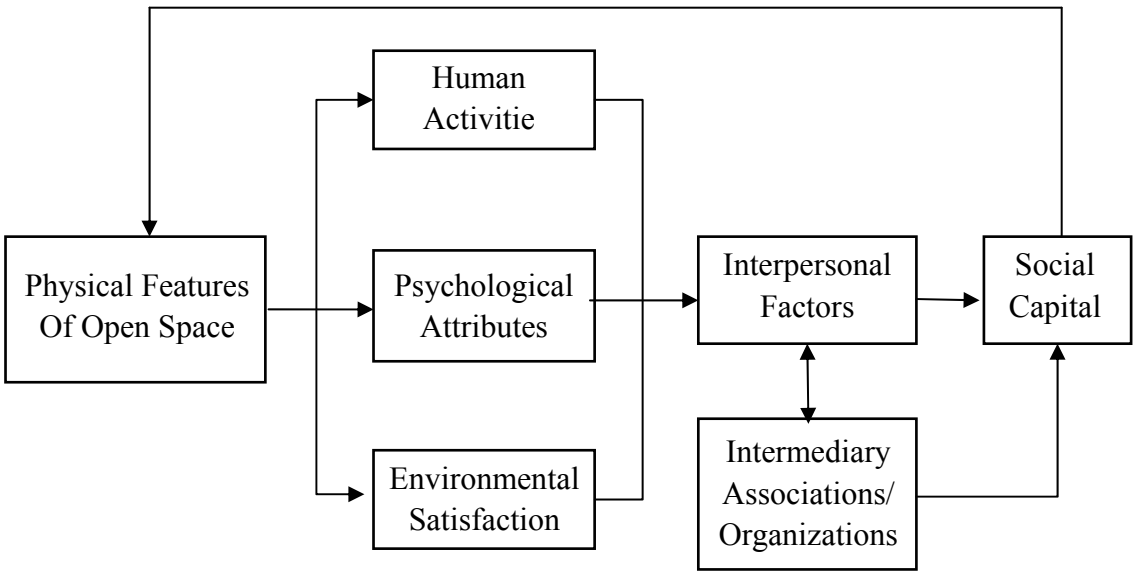


Figure 2.4: The Interactive Framework of Social Capital and Open Spaces

In detail, there are six physical attributes of open spaces are considered as working forces: location, size/scale, forms, physical features inside open spaces, spatial hierarchy, and landscape. The five interpersonal factors of social capital were assumed to be influenced by physical environment. In between, the combination of overt and covert

human activities, psychological attributes of open spaces (territoriality, security, and place identification), and environmental satisfaction of noise, air pollution, traffic, seating, etc, is the working platform transferring the impact of physical attributes of open space on social capital (Figure 2.5).

In neighborhoods and communities, it is significant to promote positive social interactions among residents so as to facilitate and enhance the social network with the intimate secondary relationships, trust and mutual obligation, residents' engagement, and a sense of belongingness. From an interdisciplinary perspective combining sociology, psychology, and architecture and urban design knowledge, social interactions can be stimulated by carefully physical environment design and active informal social organizations. Well designed open space can contribute social, physical, environmental and economic benefits to neighborhood and residents.

In general, social capital is a comprehensive concept utilized in many areas, including economics, public health, and community development. How to improve social capital is dependent on joint endeavor of sociology, social psychology, ecology, architecture, landscape architecture and urban planning. It is hard to achieve an ideal level of social capital by only one discipline, rather a holistic integration.

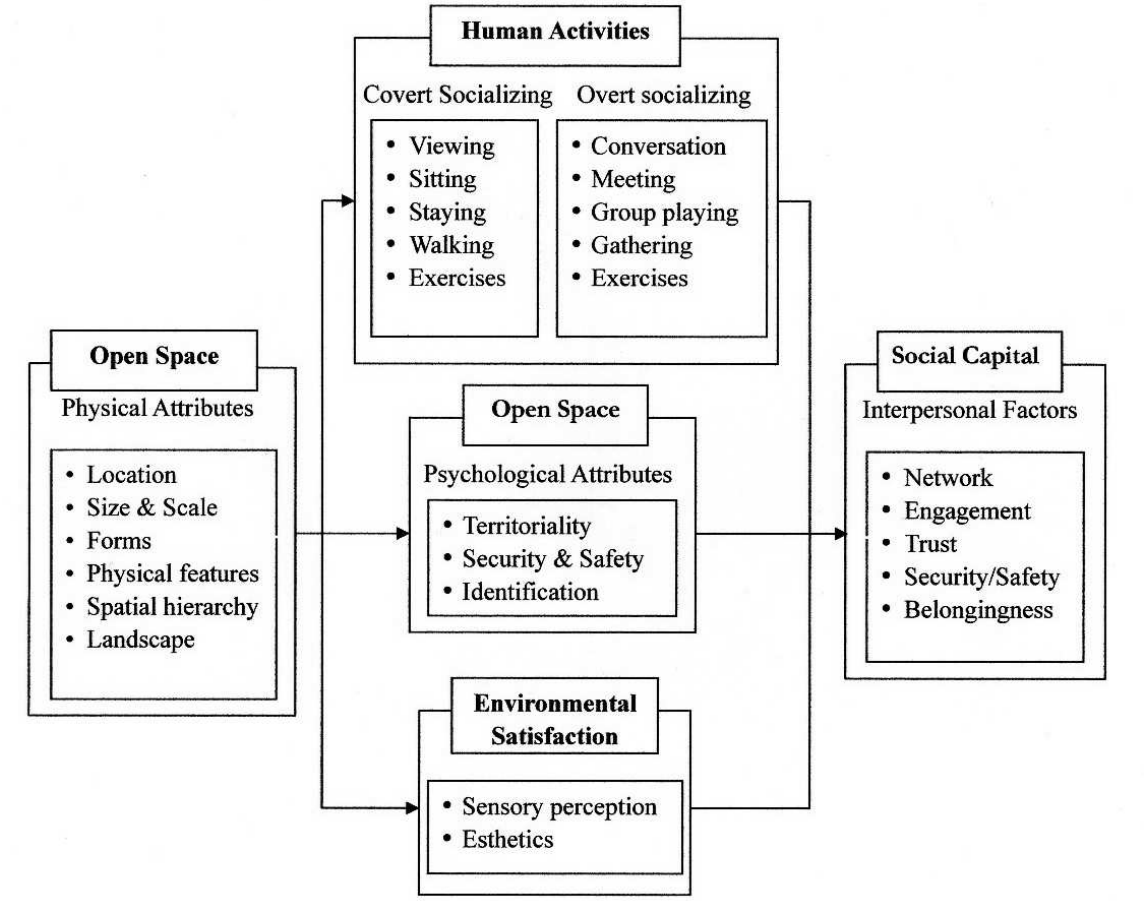


Figure 2.5: Theoretical Framework

NOTES:

1. Information cited from: http://www.newurbanism.org, accessed in March, 2006.

CHAPTER III

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The purpose of this research is to explore the relationship between social capital and open spaces, to find why social interactions were weak in China's newly built urban neighborhoods, to analyze inhabitants' usage of open spaces, and to identify physical features of open spaces that affect social interaction. Quantitative research methods were applied to analyze questionnaires and the latent reasons behind these data were answered by face-to-face semi-structured interviews.

This study followed the Naturalistic paradigm and its inquiry axioms: natural settings implying realities cannot be understood in isolation from their contexts, human as the primary data-collecting instruments, utilization of tacit knowledge, and purposive sampling (Lincoln & Guba, 1985). Qualitative research was in line with ethnographic field methods including observation and semi-structured interviews. The rationale of choosing the ethnographic method was based on the research problems and questions embedded in multiple sections; and because ethnographic research is effective in dealing with problems in "relationship of community residents, families…local communities and in interaction between these communities…" (LeCompte & Schensul, 1999a).

3.2 RESEARCH FIELDS

Two neighborhoods in Guangzhou, China, were selected as the research fields. The selection of Guangzhou was because: it is one of Chinese biggest cities with huge population, providing rich demographic diversity; based on Guangzhou Statistical Yearbook 2004, this city has a population of 7.25 million and covers 7,434 square kilometers; it is the capital of Guangdong province which was the earliest province to begin economic and housing reform in China, and thus has a whole history of housing from 1949; unlike Peking as a political city and Shanghai as a economic city, Guangzhou is a city for civilian life; its climate is suitable for outdoor activities: the average outdoor temperature is 72.8 degrees Fahrenheit; the lowest is 56 degrees Fahrenheit in January and the highest is 87 degrees Fahrenheit in July.

The target study fields are two neighborhoods, Tongde Garden built in 1997 and Lingnan Garden built in 2000. Both of them are located in Tongdewei area, a sub-district located in the Northwest of Guangzhou City (Appendix B) where 130,000 people living in this area of 3.59 square kilometers. As the government of Guangzhou adjusted its development strategy to expand the urban area to Southeast, Tongdewei has been, more or less, ignored for a long time. Currently, the majority of people living in this area belong to low- and lower-middle income groups. A highway separated these two neighborhoods, Tongde Garden is located on the north side and Lingnan Garden on the

south side. The main entrances of two neighborhoods are located on the west side of Xica Road. Their scale are similar in land area, housing development, and population (Table 3.1). Tongde Garden occupies an area of 89,500 square meters and accommodates 1,638 units. The floor-area rate is 1.83. There are about 5,500 (3.4 persons/unit) residents living in 52 nine-storey multifamily buildings. A primary school is located in the middle of the neighborhood, but not opened to residents after school hours. There are two small parks in the north and south part respectively, and a tennis court in the south section. Tongde Garden (Appendix C) is a typical first generation neighborhood concerning only providing enough living space and basic landscape (Cai, 2005).

TABLE 3.1
General Index of Tongde Garden and Lingnan Garden

		Tongde Garden	Lingnan Garden
Overall Land Area	m^2	89,500	68,800
Overall Building Area	m^2	163,785	119,015
Housing Area	m^2	148,765	106,435
Commercial Building Area	m^2	3,500	3,820
Municipal Facility	m^2	3,720	3,460
Education Facility	m^2	7,800	5,300
Number of Units	-	1,638	1,446
Population	Person	5,500	4,916
Floor-area Rate	-	1.83	1.73
Building Density	%	23.46	29.30
Greenery Rate	%	26.14	31.55

The land area of Lingnan Garden is approximate 68,800 square meters that accommodates 1446 units. The floor-area rate is 1.73. There are 4,916 residents living in six clusters of six-storey multifamily buildings. Four parallel streets, Lingnan Street One to Four, are arranged from east to west side. The second street, Lingnan Street Two, is a commercial street providing some basic services, including a mini-supermarket, haircut, gift shop, community center, and so forth. The third street is called as 'the health road' that is equipped with various equipments for people's exercises and, in the north end of Lingna Street Three, there is a small stage for performance. The entire housing was divided into nine clusters. In each of six clusters, there is an internal courtyard with various facilities, such as fish pond, pavilion, small stage, benches, or classical Chinese garden. The layout of Lingnan Garden is viewed as a model of the third generation neighborhood (Cai, 2005) in which not only are people's living space fully considered but also the local climate and culture (Appendix D).

3.3 RESEARCH POPULATION AND SAMPLING

In every research, a crucial issue is whether the research conclusions can be generalized beyond the immediate pool of research subjects (Kidder, 1981). The target populations were 5,500 residents in Tongde Garden and 4,916 residents in Lingnan Garden. But, subjects were limited to five age groups: the young adults from 25 to 30 years-old and from 31 to 40 years-old; the middle aged adults from 41 to 50 years-old and 51 to 60 years-old; and the elderly who are 61 years-old and up. The reason of choosing residents at least 25 years-old was that this study focused on people's perception and usage of neighborhood open space. Children and young teenagers mainly use the open spaces near their living unit. Thus, they hardly get the whole picture of the neighborhood open spaces. Teenagers and young adults under 25 years old normally spend their majority of spare time outside of the neighborhood, for example, on a college campus. The residents over 25 years old are comparatively more stable due to life stage and employment; and are willing to spend more time in neighborhoods because of owning the real estate. The first four groups constitute employed subjects and the majority of Chinese urban citizens are retired after 60 years old.

Since the populations of the two neighborhoods cannot be used in their entirety, random and quota sampling methods were combined to select research subjects. Firstly, the formula (Bernard, 2002) $n= Z^2 (P) (Q) / (\text{confidence interval})^2$ was used to estimate

the number of sample needed for research. Here Z=1.96 (at 95% confidence level), P=Q=CI=0.05, thus 384 was the sample size. Then, to determine the actual sample size, it was assumed that 99% of units were usable, 75% of them would return questionnaires, and 99% of returned questionnaires could be used for the study. Therefore, the actual sample size was 500=384/ (0.99x0.75x0.99), namely, 250 units in each neighborhood.

According to the characteristics of the layouts of the two neighborhoods, the sample was drawn approximately evenly in terms of the geographic position of units. Based on the master plan of Tongde Garden the direction of north-south is longer than the direction of west-east. One hundred units were drawn randomly from the north section, 100 units were drawn randomly from the middle section, and 50 units were drawn from the south section. In Lingnan Garden, four housing clusters closed to four corners including Cluster I, III, V, and IX and Cluster VI in the middle were selected and fifty questionnaires were distributed in each of these five housing clusters.

Due to people's increasing self-protection from strangers in Guangzhou, it is very difficult to get a satisfactory response rate, if questionnaires are mailed directly to households. In this study, the investigator first contacted the facility managers of both neighborhoods and explained the purpose and procedure of the study. After several conversations, they agreed to support the investigation by assigning their security staff to distribute and collect the questionnaires.

3.4 INSTRUMENTS

3.4.1 Questionnaire

In this study, questionnaires were used as one instrument for collecting data for quantitative analysis. 250 questionnaires were distributed to 250 households in each neighborhood and were answered by one adult member of each household who is in target age group. Since this research focuses on social capital at the micro-level of a neighborhood, the content of questionnaires must be based on the information regarding the neighborhood. A number of scholars have proposed neighborhood models having seven major dimensions (Fischer, 1982; Krupat, 1985; Taylor, 1982; Schnell & Goldhaber, 2001). These seven dimensions group into three super dimensions relating to different modes of human experiential existence: spatiotemporal, social, and perceived (May, 1983). The spatiotemporal super dimension includes three secondary dimensions --territory, rootedness, and function. The social dimension refers both to institutionalizing the social control mechanisms and to social relations among the residents. The perception dimension refers to institutionalizing neighborhood identity and identification with this identity. Integrating this model with a literature review on related research on social capital and the characteristics of neighborhood open spaces, the questionnaire was proposed to operationalize three areas of socioeconomic characteristics, open spaces, and social capital (Table 3.2).

TABLE 3.2
Content of Questionnaire

Category	Content
Socioeconomic composition	• Gender • Age • Education • Employment • Living years • Marriage • Ownership • Number of friend
Neighborhood Open spaces	• the distance from living unit to open spaces • the extent of residents' perception of territories • the extend of satisfaction with open spaces
Social Capital	• Social participation in neighborhood activities • Social network • Trust • Belongingness • Security • Intimacy • Organization

The pilot questionnaire initially included 30 questions and after being tested by in another city, it was revised to the final version with twenty seven questions. Subjects could complete it within ten minutes without any difficulty. Then, the questionnaires were distributed to the chosen families according to three steps: 1). A brief pre-notice letter was sent by facility management to respondents on June 10, 2005, one day prior to sending the questionnaire; it noted that a questionnaire for an important survey would

arrive in a few days and the person's response would be greatly appreciated; 2) on June 11 and 12, 2005, questionnaires were distributed that includes a cover letter explaining research purpose and why a response was important; these two days were weekend days that guaranteed residents receiving the questionnaires; and 3) on June 18 and 19, 2005, the following weekend, questionnaires were retrieved by facility management staff.

3.4.2 Observation

Observation, in this research, was not only collected qualitative data, but also a method triangulating other two methods of questionnaire survey and interview. In the first stage, questionnaires reported general information about those two neighborhoods, such as social-economic status, the frequency of usage of outdoor public spaces, preference of those spaces, and so forth. The following stage qualitatively sought the relationship between public spaces and inhabitants' urban social identity. The data in relation to residents' behavioral patterns in public spaces, the relationship among various public spaces, and the distribution of human beings in those spaces were collected effectively by observation. Further, the research objective is to understand why people have few social interactions in public spaces, their attitude to the physical form and other people using the same space, why an area is chosen for some certain activities. Thus, observation was a good choice for my research.

Because of the ever-changing nature of human behavior, the data generated from observation are numerous. Effective observation, however, is necessary to see as possible as much in situations (DeWalt & DeWalt, 2002). DeWalt & DeWalt (2002) distinguished three general categories for observing: space, people, and activities. Spradley (1980) explains on this by noting that there are nine features for observation: space, object, actor, act, activity, event, time, goal, and feeling. Mapping in this study describes the layout of public spaces within the neighborhood, defines the geographical distribution of people in public spaces, categorizes people into various groups, delineates activity spaces, and records the event in different time slots. Thus, it not only records the researcher's observation, but also helps the researcher to focus the observation on specific targets. The initial observation was conducted before distributing questionnaires so that it was revised based on the data from the first stage of observation. During the period of the interview and initial analysis of questionnaire, observation deepened the understanding of questions and answers, and vice versa. During the observation, field notes were taken and inputted in computer soon after, and add reflections.

3.4.3 Semi-structured Interview

In this study, the in-depth, semi-structured interviews were conducted with ten interviewees (five in each neighborhood) who were selected from each of five age groups;

and who had shown apparent opinion on open spaces, or social capital, or both of them. Semi-structured interviews, as Schensul *et al.* (1999) demonstrate, "combine the flexibility of the unstructured, open-ended interview with the directionality and agenda of the survey instrument to produce focused, qualitative, and textual data at the factor level." Interviews were started two weeks after observation and collecting questionnaires from subjects. By this way, residents' behavior pattern, their interaction in open spaces, and their perception of neighborhood open spaces can be understood.

Observation provided a context for interviews questions(see Appendix B), which were generated from the literature review and revised based on the data from questionnaires. The answers to these questions were open-ended and were fully expanded at the discretion of the interviewer and interviewee through various probes, such as the silent probe, the echo probe, the tell-me-more probe, and so forth (Schelsul *et al*., 1999). Interviews were focused on social network and social relationship, identification of open spaces, and residents' satisfaction to neighborhood open spaces.

Interviews were conducted at the pace of two interviews everyday, which prevented investigator from exhaustion, gave more time to initially analyze interviews and to improve the questions and techniques for future interviews so as to attain high quality data. During the interviews, a voice recorder was used to tape conversations for proofreading, make up field notes, and transcribe them right after.

3.5 VARIABLES FOR QUANTITATIVE ANALYSIS

3.5.1 Dependent Variables

In the section of quantitative analysis, the dependent variables are the degree of social capital and the degree of satisfaction with neighborhood open spaces in each of two neighborhoods. The degree of interpersonal level of social capital was analyzed in terms of five social factors. The degree of environmental satisfaction was analyzed based on the satisfaction with eight physical aspects of neighborhood open spaces.

3.5.2 Independent Variables

The independent variables are grouped into two categories: social variables and environmental variables of open space. The category of social factors includes seven items: social engagement**,** social network**,** trust**,** belongingness**,** security**,** intimacy**,** and the number of organizations in neighborhood. The usage of open spaces is illustrated by the time spending into open space, the frequency of using open spaces, and the likelihood of visiting open spaces. The physical aspects related to open spaces include: the level of unit, the distance from living unit to open spaces, and eight aspects related to open spaces. Table 3.3 and Table 3.4 illustrate all the independent variables.

TABLE 3.3
Description of Social Variables

Code	Variable Description	Category
Social Capital	Overall social capital in neighborhood	DV
ENG	Residents' engagement in social activities	IV
TRT	I can trust my neighbors	IV
BEL	I belong to this neighborhood	IV
SEC	How safe residents feel within neighborhood	IV
NET	The scale of social network	IV

DV refers to dependent variable; IV refers to independent variable

TABLE 3.4
Description of Environmental Variables

Code	Variable Description	Category
ENVIRONMENTAL SATISFACTION	the degree of satisfaction with neighborhood open spaces	DV
P1	Size of open space	IV
P2	Location of open space	IV
P3	Landscape of open space	IV
P4	Noise	IV
P5	Traffic	IV
P6	Air pollution	IV
P7	Space for exercises	IV
P8	Number of seats	IV

DV refers to dependent variable; IV refers to independent variable.

3.5.3 Socio-economic-demographic Variables

In this study, residents' perception of their social environment and the physical environment is the basis for analyzing the relationship between social capital and neighborhood open spaces. Subjects' social, economic, ad demographic characteristics may influence their perception and the relationship. Thus, in this questionnaire, eight items included: gender**,** age**,** education**,** employment**,** length of residency**,** marital status**,** ownership**,** and the number of friends (Table 3.5).

TABLE 3.5
Description of Socio-economic-demographic Variables

Code	Variable Description	Category
GEN	Resident gender	IV
AGE	Age	IV
EDU	Education attainment	IV
EMP	Employment status	IV
LEN	Length of residency	IV
MAR	Marital status	IV
OWN	Type of ownership	IV

IV refers to independent variable.

3.6 METHODS OF ANALYSES

3.6.1 Methods of Survey Data Analysis

Since the degree of social capital is determined by multiple categorical variables and there is no existing formula to define the relationship between the degree of social capital and these variables, a logistic regression analysis is applied for testing the difference in the degree of social capital between Tongde Garden and Lingnan Garden. Comparisons of each variable were tested firstly, and then comparisons of age groups were conducted. Finally, the overall degree of social capital was compared.

The Chi-Square test was used to explore the relationship between the distance between residents' flats and neighborhood open spaces and the use of these open spaces. The Chi-Square test is good for finding whether correlate between two categorical variables. There were three sub-hypotheses that were tested by two-way contingency table analyses. Scatterplot was also used for detecting the relationships between these two variables visually.

Based on the frequency of visiting neighborhood open spaces and the staying time in open spaces during work day and weekend, the relationship between the usage of open spaces and the degree of social capital within one neighborhood was tested. Logistic regression analyses were used for testing these three sub-hypotheses and the value of the parameter determines the difference between various groups.

Residents' satisfaction with neighborhood open spaces is determined by the combination of variables of DIST, USAGE, and PHYSICAL. Variable USAGE is determined by two factors and variable PHYSICAL was determined by eight factors. Since this hypothesis was tested within same one neighborhood, every respondent has the same context. To simplify the test, scores were assigned to choices and each factor has the same statistical weight. Thus, the degree of satisfaction can be calculated based on the sum of the scores of three variables. Then, logistic regression analyses were applied for testing Hypothesis 4 (Table 3.6).

TABLE 3.6
Hypotheses and Statistical Tests

Hypotheses	Variable		Statistical Test
	Dependent	Independent	
Hypothesis 1: Those adults and the elderly who live in a neighborhood with plenty of open spaces have developed a higher level of social capital than those who live in a neighborhood lacking of open spaces	Social Capital	ENG, NET TRT, BEL SEC, INT ORG	Logistic regression analysis
Hypothesis 2: The shorter the distance between residents' flats and neighborhood open spaces, the more often the residents will use these open spaces.	Frequency of visiting open spaces	DIST	Chi-Square test

TABLE 3.6 (Continued)

Hypotheses	Variable		Statistical Test
	Dependent	Independent	
Hypothesis 3: Within a neighborhood, those residents who use the open spaces frequently have developed a higher level of social capital than those who do not use open spaces frequently.	Social Capital	Frequency of visiting open spaces	Logistic regression analysis
Hypothesis 4: Those residents with a higher degree of satisfaction with neighborhood open spaces have developed a higher level of social capital than those residents who are not satisfied with neighborhood open spaces.	Social Capital	Satisfaction with open spaces	Logistic regression analysis

3.6.2 Method of Qualitative Analysis

Qualitative analysis of this study was based on the data collected from interviews and observation. The domain analysis strategy was applied for exploring relations between categories and concepts. Since the data for qualitative analysis was based on the text of field notes generated from observation and transcripts from semi-structured interviews, identifying themes and coding the texts will be the hart of the analysis.

Both deductive and inductive coding will be employed to identify themes and items, as Williams et al (1990) and Miles & Huberman suggested (1994). This is a

synthesis not only providing general themes and directions for overall endeavor, but also guiding the researcher to explore detailed items emerging from texts. Based on the literature review on previous research and theories, data was coded into three domains: open spaces, social capital, and residential satisfaction to open spaces. Application of inductive coding from the bottom up will identify factors, sub-factors and items by using Lofland' structure of activities approach (Lofland & Lofland, 1984; LeCompte & Schensul, 1999b). Data were categorized into four groups, acts and actors, activities, settings, and ways of participating, so as to identify individual actors in a particular public places, the acts and activities in which they are involved, as well as the patterns and ways they participating in public places. After completing these four categories, a systematic search for relations of people to settings and meanings that people attach to their activities, relationships, and ways of participating was conducted. Finally, when items were identified, they were coded respectively and grouped into each of four domains in order to be reread and generalized for research results and research findings.

3.7 TRUSTWORTHY

Since this research was studying realistic, context-based environments within which uncontrolled, multiple relationships exist among factors, seeking correlations between variables may be more reasonable than one-to-one causal relations. Instead of using criteria in conventional paradigm of internal validity, external validity, reliability, and objectivity, criteria consistent with Naturalistic paradigm (Lincoln & Guba, 1985) were utilized: (1) 'truth value': credible to the constructions of the original multiple realities; (2) applicability: transferability depending on the degree of similarity between sending and receiving context; (3) consistency: dependability substituting criteria for reliability; (4) neutrality: emphasize the 'confirmability' of the data themselves instead of investigator. Therefore, "credibility", "transferability", "dependability", and "confirmability" were used as the criteria for evaluating trustworthy in the research.

3.7.1 Credibility

Even naturalistic inquiry is different from conventional inquiry in terms of viewing the world, the threats proposed by Campbell and Stanley (1963) still can be utilized: history, maturation, testing, instrumentation, statistical regression, differential selection, experimental mortality, and selection-maturation interaction. Among the eight threats, instrumentation is more likely in naturalistic studies because human instruments

were tensely applied in this study.

Investigator is assumed not value free, cannot escape from context, and must be interactive with respondents and surroundings. Accordingly, this may lead to "instrumental" distortion (Lincoln & Guba, 1985). In this study, credibility will be established based on activities that overcome instrumental distortion and increase the probability that credible findings will be produced. Firstly, prolonged engagement was used for achieving sufficient understanding of local culture, testing information attained either of investigator or respondents. Investigator of this study spent 45 days in these two target neighborhoods and spent at least four hours a day in each of them. The frequent and long-term appearance and extensive communication with residents effectively decreased the distortion of investigator as a stranger. In addition, introduced by neighborhood facility management, the investigator attained a certain degree of trust from residents, which was extremely crucial in conducting interviews. The second activity was persistent observation that lasted throughout the entire field work. Persistent observation provided depth rather than prolonged engagement provided the scope. The repetitive observation in regard to same one place at various time during a day and a week unveiled residents' certain behavior patterns or how likely the place was used. The third activity to improve credibility is triangulation. Triangulation in this study is not only using multiple research methods, but also using different information sources to

collect data: questionnaire, observation, and interview. Furthermore, during the period of understanding the context of neighborhoods, several interviews were conducted with the vice president of a real estate company that developed these two neighborhoods, a facility manager who is in charge of Lingnan Garden and was in charge of Tongde Garden, and a journalist who is working for the news channel of Guangzhou TV and produced a serial report of the sub-district in which the target neighborhoods are located.

3.7.2 Transferability

The establishment of transferability is different from the external validity in conventional inquiry. Even though four hypotheses were proposed and were tested by statistical methods, in general, this study is a naturalistic inquiry so that it is impossible to strictly define and control extern validity. Rather, these hypotheses only act as a part of the whole inquiry and must work together with a description of their context and time.

The transferability of this study (as the sender) to the future possible studies in the same area (as the receiver) is dependent on the thick description. The description includes delineation of housing situation in Guangzhou, the context of the sub-district, the development of the neighborhood, and detailed field notes generated in observation and interview.

3.7.3 Dependability and Confirmability

Dependability and confirmability of the study depends on the inquiry audit. My committee members will be the audit examiners of the process of the entire research, including examining collected data, field notes, tapes, and cognition maps. Dr. Robin Abrams, my committee chair, visited the city of Guangzhou and the two target neighborhoods in June, 2005, the same period during which this case study was being conducted. Moreover, Dr. Chang-Shan Huang, a Chinese professor and one of my committee members, is familiar with China and Guangzhou very well. Both of them can audit the whole study from the very beginning of collecting data. My other committee members are auditing the theory framework, process, methodology, and analysis.

3.8 SUMMARY

Among hundreds of cities in China, city of Guangzhou was selected as the target city for this study was firstly due to its large population-7.25 million-and its land area-7,434 square kilometers, which provided a diverse and inclusive context; it also was the earliest province to housing reform in China and thus has a whole history of housing from 1949; people in Guangzhou are focused more on their daily life and the city is famous for its relaxed lifestyle; lastly, its climate is suitable for outdoor activities.

In Tongdewei area, a low- and lower-middle income sub-district located in the

northwest section of Guangzhou, two neighborhoods, Tongde Garden and Lingnan Garden, were chosen as the study fields. These two neighborhoods are developed by same one real estate company and only separated by a highway, which have a similar scale in terms of land area, housing development, and population. The obvious difference between them is their physical environments: row housing, monotonous landscape and inadequate open spaces in Tongde Garden, whereas clustered housing with courtyard, abundant landscape, and a number of open spaces for various activities in Lingnan Garden.

Research population was adults and the elderly in two neighborhoods, which were further categorized into five age groups: the young adults who are between 25 and 30 years-old and from 31 to 40 years-old; the middle aged adults who are between 41 and 50 years-old and 51 to 60 years-old; and the elderly who are 61 and up years-old. Then, based on the formula introduced by Bernard (2002), the sample size was determined as five hundred subjects in total and two hundred and fifty subjects in each neighborhood. According to the characteristics of the layouts of the two neighborhoods, samples were drawn approximately evenly in terms of the geographic position of units. Questionnaires were distributed to two hundred and fifty residents in five buildings in Tongde Garden and two hundred and fifty in five clusters in Lingnan Garden. Following by questionnaire survey, semi-structured interviews were conducted with five residents in

each neighborhood. Meanwhile, observation was the third method of collecting data that was conducted during the whole case study.

For quantitative analysis, dependent variables and independent variables were defined. The degree of resident social capital was the dependent variable and five interpersonal factors were independent variables that included network, trust, belonging, safety, and engagement. People's environment satisfaction with open spaces was another dependent variable that was evaluated by eight independent variables, which included size, location, landscape, noise, traffic, air pollution, spaces for exercise, and the number of seats. In addition, there were seven socio-demographic variables: gender, age, education attainment, marital status, employment, length of residency, and ownership.

Data collected from questionnaires were analyzed by statistical methods. Descriptive statistical methods were used to compare residents' socio-demographic characteristics between two neighborhoods. Four hypotheses were tested by Chi-square test, logistic regression analysis and scatterplot. Interview transcriptions were analyzed by domain analysis strategy in combination of inductive and deductive methods. Observations recorded actors, activities, settings, and ways of participating in activities in open spaces.

CHAPTER IV

DATA ANALYSES

4.1 INTRODUCTION

In this chapter, data collected by questionnaires, semi-structured interviews, and observation were analyzed by statistical methods, domain analysis strategy, and behavior mapping. Since the data collected from questionnaires and interviews were people's self-report perceptions and opinions, the first step of analyses was to describe and compare the socio-economic-demographic characteristics of respondents from two neighborhoods. The second step was to explore the influence of the respondents' demographic characteristics on social capital in each neighborhood. Lastly, the relationships between open spaces and residents' social capital were explored.

The four hypotheses, which were proposed based on literature review and investigator's long-term experience of living in China's urban neighborhoods, were tested by statistical methods. Furthermore, in the qualitative analysis section, data generated from semi-structured interviews provided more detailed information on perceptions and opinions regarding open spaces and resident social life. Finally, the observation in research fields provided third party evidence allowing the researcher to triangulate the previous two investigations.

4.2 DESCRIPTION OF SURVEY RESPONDENTS

In this section, the characteristics of respondents were described in detail. Most of data collected from questionnaires and interviews were individuals' personal perceptions and opinions about open space and their social life, which are normally affected by socio-economic-demographic dimensions (Robert, 1998; Kahana *et al*, 2003; Kim & Kaplan, 2004). To compare two groups of residents' social capital and satisfaction with neighborhood open spaces, the prerequisite is that two groups of respondents' other characteristics are similar or under control.

Housing price is a good index to evaluate the income of a household. Since these two neighborhoods are located nearby one another in the same sub-district (Tongdewei) and both housing prices belong to lower-middle range, residents in these two neighborhoods were assumed to have approximately the same income.

In each neighborhood, 250 questionnaires were randomly distributed to 250 households and answered by one adult per household. In Tongde Garden, 188 of 250 questionnaires were returned (75.2% response rate), 94 by females and 94 by males. In Lingnan Garden, 190 of 250 questionnaires (76% response rate) were answered by 80 females (42.10% of respondents) and 110 males (57.90% of respondents) (Figure 4.1).

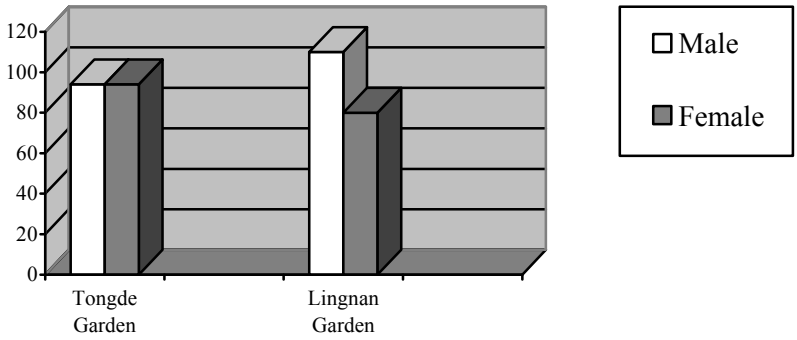


Figure 4.1: Gender of Respondents

The distributions of respondents' ages were different in the two neighborhoods. In Tongde Garden, the average age was around 40 years-old and 71 respondents belonged to the age group of 31 to 40 years-old that made up 37.77% of 188 respondents (Figure 4.2). The average age of Lingnan Garden respondents was around 37 years-old and likewise, the age group of 31 to 40 years-old, including 78 respondents that equaled 41.05% of entire respondents, dominated the whole distribution (Figure 4.3).

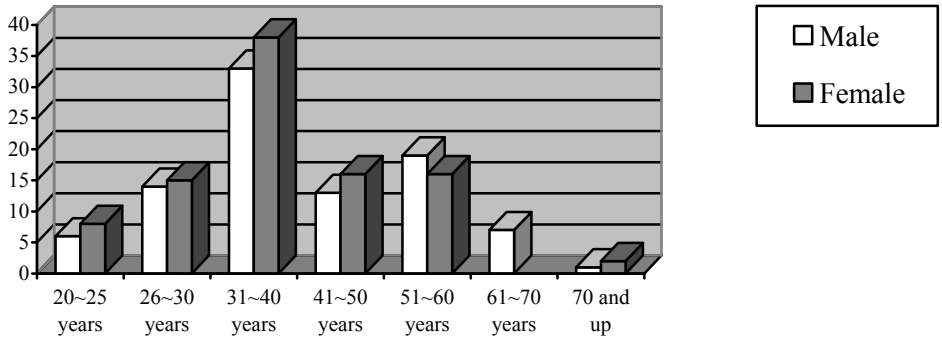


Figure 4.2: Respondent Age Distribution, Tongde Garden

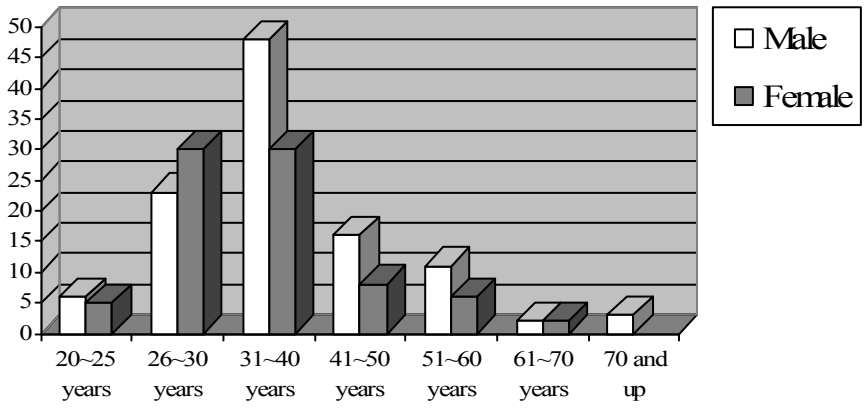


Figure 4.3: Respondent Age Distribution, Lingnan Garden

However, the age compositions of respondents in these two neighborhoods were still different in the age group of 26 to 30 years-old and age group of 51 to 60 years-old. There were 29 respondents belonging to 26 to 30 years-old group in Tongde Garden while there were 53 respondents in Lingnan Garden; regarding the age group of 51 to 60 years old, 35 in Tongde Garden and 17 in Lingnan Garden. Moreover, analyzing the composition of groups 31 to 40 years-old group in detail, it was found that in Tongde Garden, there were 30 individuals belong to the sub-group of 31~35 years-old and 41 individuals in 36~40 years-old group; in Lingnan Garden, there were 53 individuals in sub-group of 31~35 years-old and 25 individuals in 36~40 years-old. Via statistical test, it was proved that the age difference did exist and respondents from Lingnan Garden were younger than respondents from Tongde Garden (Table 4.1).

TABLE 4.1
t-test of the Mean of Ages

	Paired Differences					t	df	Sig. (2-tailed)
	mean	Std. dev	Std. error mean	95% CI of the difference Lower	Upper			
AGETD-AGELN	3.82	16.428	1.198	1.46	6.18	3.188	187	.002

Respondents from both neighborhoods had similar marital status: 159 (84.57%) respondents were married in Tongde Garden, while 172 (90.50%) were married in Lingnan Garden (Figure 4.4).

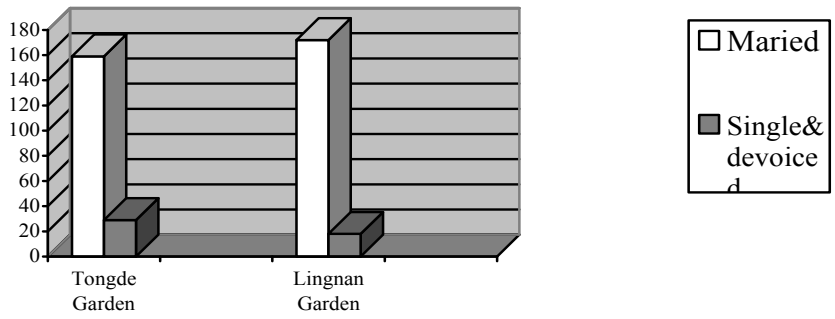


Figure 4.4: Marital Status

The employment status of respondents in Tongde Garden was different from their counterparts in Lingnan Garden (Figure 4.5). Comparatively, the employment rate of respondents in Tongde Garden (61.7%) was lower than that of Lingnan Garden (80.5%); the unemployment rate of Tongde Garden (18%) was higher than that of

Lingnan Garden (10.5%); there were more retired individuals in Tongde Garden (38 persons) than in Lingnan Garden (17 persons).

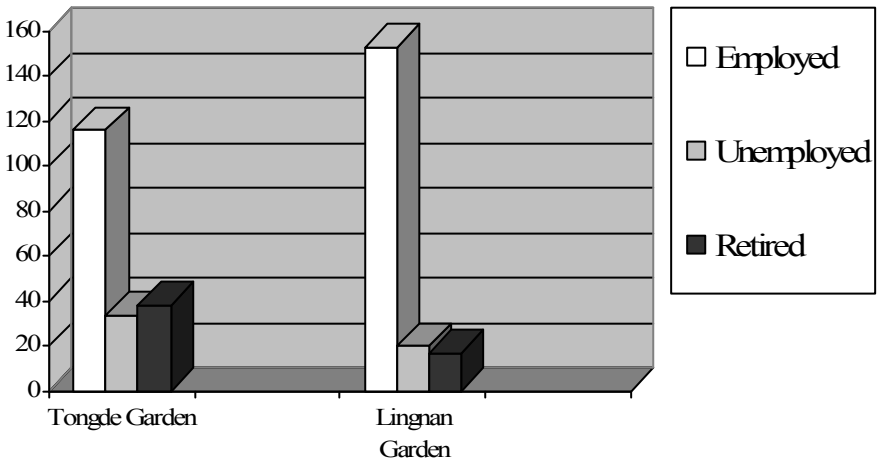


Figure 4.5: Employment Status

Ownership is a important element influencing individual's belongingness to a neighborhood (Hayward, 1991). In Tongde Garden, 160 of 188 respondents purchased their own flats and 28 respondents rented their living units. In Lingnan Garden, 178 of 190 respondents purchased their own flats and only 12 respondents rented their flats (Figure 4.6). A two-way contingency table was used to compare the difference between the ownership in these two neighborhoods. The calculated $\chi^2=8.35 > \chi^2_{1, 0.05}=3.84$, thus the ownership in Tongde Garden was statistically different from the ownership in Lingnan Garden, even though this difference was small.

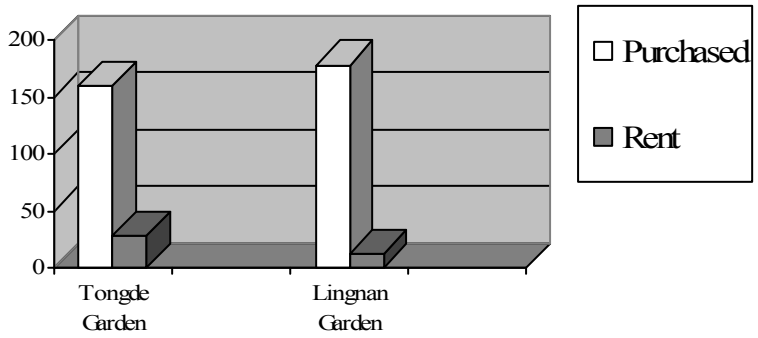


Figure 4.6: Ownership of Residence

Since Tongde Garden was built in 1995 and opened for living in 1997 while Lingnan Garden was ready for living in 2001, on average, respondents in Tongde Garden had longer residency histories than Lingnan people (Figure 4.7). In Tongde Garden, 84 individuals had lived there less than three years; 56 respondents had lived there for four or five years; and 48 respondents had lived there for six years or longer. While in Lingnan Garden, 46 respondents had just moved in within one year; 124 respondents had lived there for one to three years; and only 20 respondents had lived there for four years.

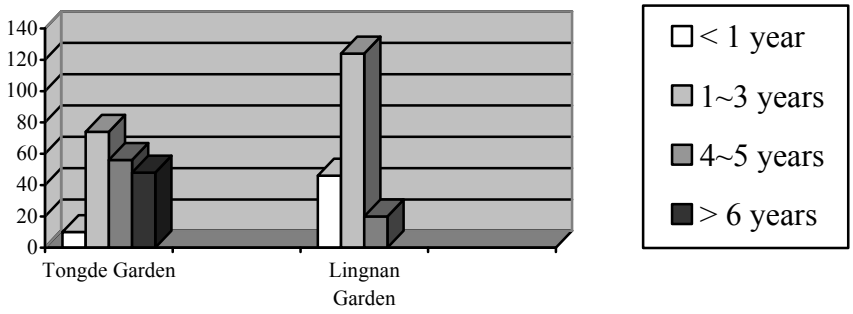


Figure 4.7: Length of Residency

The difference in education attainment between two groups of respondents was shown in high school level and undergraduate level (Figure 4.8). Only 33 respondents from Tongde Garden had received undergraduate degree whereas 70 respondents in Lingnan Garden held undergraduate degrees. Ninety-eight Tongde Garden respondents graduated from high school, which accounted for 52% of 188 respondents, whereas approximately 38% of Lingnan Garden respondents had high school degrees.

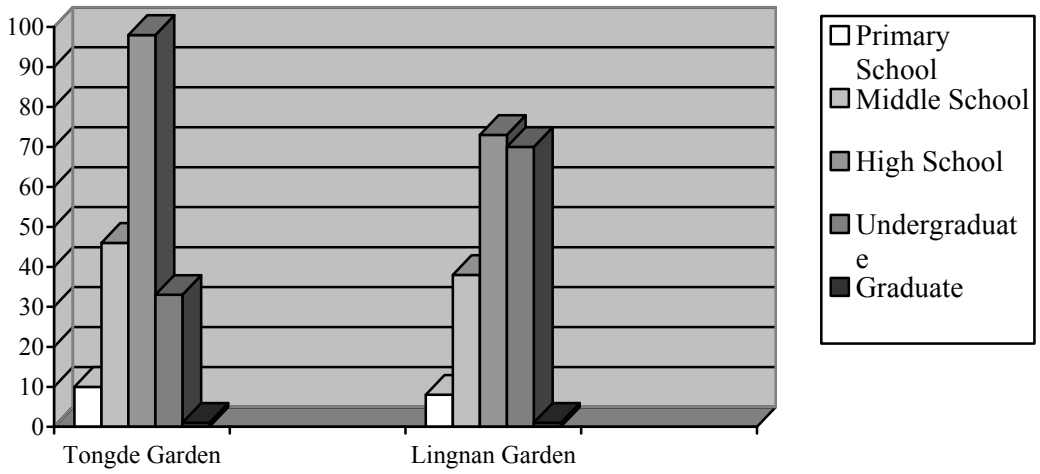


Figure 4.8: Education Attainment

4.3 EFFECTS OF DEMOGRAPHIC CHARACTERISTICS ON SOCIAL CAPITAL

One of the objectives of this study was to examine people's social capital in China, which was assumed to be a different context from western societies. As mentioned in previous sections, the social capital at intermediary association level is missing in China's urban neighborhoods, thus, the examination mainly focused on five interpersonal factors which define current resident social capital in target neighborhoods. The analyses were conducted based on the questionnaires for five factors: trust, belongingness, safety, network and engagement. In order to evaluate the degree of social capital, scores were assigned to choices: very satisfied=5, satisfied=4, neutral=3, dissatisfied=2 and very dissatisfied=1. The sum of these score was an individual's degree of social capital. Residents' social capital levels were examined in terms of gender, age, residency length, employment, education attainment, and ownership. Respondents were categorized into five groups: G1: 25~30 years-old, G2: 31~40 years-old, G3: 41~50 years-old, G4: 51 ~ 60 years-old and G5: 61 years-old and up.

4.3.1 Gender

First of all, the influence of gender on social capital was examined. In Tongde Garden, the mean of the overall social capital of female respondents was 14.64 and male respondents got 15.05. The comparison of overall social capital was shown in Figure 4.9,

the value of significance was 0.218 indicating that there was no difference between female's and male's degree of social capital.

Independent Samples Test

		Levene's Test for Equality of Variance		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
SCTD	Equal variances a	5.998	.015	-1.236	186	.218	-.41	.336	-1.077	.247
	Equal variances r assumed			-1.236	171.056	.218	-.41	.336	-1.077	.248

Figure 4.9: t-test of the Difference of Social Capital in Genders, Tongde Garden

Moreover, to explore whether differences in social capital existed in certain age groups, female and male respondents' degrees of social capital were compared respectively in each age group, The values of significance were all larger than threshold value of 0.05 (Table 4.2), which meant there was no difference.

TABLE 4.2

Tongde Garden: t-test of the Means of Social Capital in Terms of Gender and Age

		t-test for Equality of Means						
		Mean Difference	Std. Error	95% CI of the Difference		t	df	Sig.
				Lower	Upper			
	25~30 years-old	-.68	.661	-2.019	.649	-1.037	41	.306
Female	31~40 years-old	.53	.621	-.713	1.764	.847	69	.400
Vs.	41~50 years-old	-1.99	.714	-3.456	-.525	-2.786	27	.100
Male	51~60 years-old	-1.15	.719	-2.610	.314	-1.597	33	.120
	61& up years-old	.38	1.230	-2.462	3.212	.305	8	.768

In Lingnan Garden, the mean of female respondents' overall social capital was 15.73 and male respondents got 16.12. Once again, the difference of overall social capital between genders was not found (Figure 4.10).

Independent Samples Test

		Levene's Test for quality of Variance		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	ig. (2-tailed	Mean Difference	Std. Error Difference	Lower	Upper
SCLN	Equal variances as	.162	.688	-1.021	188	.309	-.39	.385	-1.153	.367
	Equal variances nc assumed			-1.024	172.335	.307	-.39	.384	-1.151	.365

Figure 4.10: t-test of the Difference of Social Capital in Genders, Lingnan Garden

As in Tongde Garden, further exploration for the difference in social capital between genders was conducted in terms of age. Table 4.3 illustrated the results of comparing the degrees of social capital between female and male in each age group. The significance values are all larger than 0.05, which means no difference was found.

TABLE 4.3
Lingnan Garden: t-test of the Means of Social Capital in Terms of Gender and Age

		t-test for Equality of Means						
		Mean Difference	Std. Error	95% CI of the Difference		t	df	Sig.
				Lower	Upper			
	25~30 years-old	-.63	.653	-1.939	.672	-.970	62	.336
Female	31~40 years-old	-.26	.618	-1.490	.973	-.418	76	.677
Vs.	41~50 years-old	-.75	1.099	-3.028	1.528	-.683	22	.502
Male	51~60 years-old	1.26	1.241	-1.388	3.904	1.013	15	.327
	61 years-old & up	.43	.276	-.442	1.422	1.221	5	.277

4.3.2 Age

It was found that in various life stages people developed different lifestyles (Brown & Trost, 2003) and the transition from single to life cycle of marriage also will expand individual's social network (Rindfuss, 1999), which can influence their social capital. In this study, residents' degree of social capital was also compared between several age groups to explore whether the difference of age caused the difference of social capital.

In Tongde Garden, through logistic regression tests, all the p-value were larger than 0.05, which indicated that the degrees of social capital between age groups were not significantly different from one another (Table 4.4).

TABLE 4.4
Tongde Garden: Comparisons of Respondents' Social Capital in Terms of Age

Logistic Regression Test	Analysis of Maximum Likelihood Estimates					
	Parameter	df	Estimate β	Standard Error	Wald Chi-Square	Pr > ChiSq
G2 *vs.* G1	group	1	0.1157	0.1590	0.5295	0.4668
G2 *vs.* G1	group	1	0.1157	0.1590	0.5295	0.4668
G3 *vs.* G1	group	1	-0.0662	0.0991	0.4464	0.5040
G4 *vs.* G1	group	1	-0.0180	0.0626	0.0831	0.7732
G5 *vs.* G1	group	1	-0.0603	0.0730	0.6834	0.4084
G3 *vs.* G2	group	1	0.0861	3.1978	0.0007	0.9785
G4 *vs.* G2	group	1	-0.0786	0.0843	0.8692	0.3512
G5 *vs.* G2	group	1	-1.7645	1.6321	1.1689	0.2796
G4 *vs.* G3	group	1	0.0682	0.2047	0.1111	0.7388
G5 *vs.* G3	group	1	-0.0363	0.1499	0.0585	0.8089
G5 *vs.* G4	group	1	-4.4072	5.2246	0.8118	0.3676

(1) $p < 0.05$; in tests, younger age group was set as the base line to conduct comparison.
(2) given P-value is significant, if $\beta>0$, then the degree of social capital in elder group is higher than that of in younger group, *vice versa*.

The same tests were conducted on respondents in Lingnan Garden (Table 4.5). Tests indicated that no difference existed among age group G1, G2, G3, and G4. However, the degree of social capital of age group 61 years-old and up was different from other four age groups in that the significance values of comparing G5 to other four groups were all smaller than 0.05. In addition, through examining the value of β, it was found that the degree of social capital of group G5 was higher than other four groups.

TABLE 4.5
Lingnan Garden: Comparisons of Respondents' Social Capital in Terms of Age

Logistic Regression Test	Analysis of Maximum Likelihood Estimates					
	Parameter	df	Estimate β	Standard Error	Wald Chi-Square	Pr > ChiSq
G2 *vs.* G1	group	1	0.1921	0.1385	1.9248	0.1653
G3 *vs.* G1	group	1	0.1001	0.0989	1.0236	0.3117
G4 *vs.* G1	group	1	0.0925	0.0752	1.5141	0.2185
G5 *vs.* G1	group	1	0.2174	0.0829	6.8718	0.0088
G3 *vs.* G2	group	1	-2.6231	3.4305	0.5846	0.4445
G4 *vs.* G2	group	1	0.0333	0.1103	0.0913	0.7625
G5 *vs.* G2	group	1	0.2153	0.1090	3.8981	0.0483
G4 *vs.* G3	group	1	3.0340	4.7690	0.4047	0.5246
G5 *vs.* G3	group	1	0.3620	0.1821	3.9533	0.0468
G5 *vs.* G4	group	1	0.6507	0.3791	2.9464	0.0461

(1) $p < 0.05$; in tests, younger age group was set as the base line to conduct comparison.
(2) given P-value is significant, if $\beta>0$, then the degree of social capital in elder group is higher than that of in younger group, *vice versa*.

4.3.3 Length of Residency

It has been reported that the levels of social capital are influenced by length of residence and neighborhood stability (Grange & Ming, 2000). Rootedness is closely associated with the length of residency. An individual may develop a strong emotional belonging and place attachment to a place or a community if he/she has an intense rootedness (Manzo, 2003) in that he/she can build up social network, provide and receive

mutual support, share common behavioral pattern and values, and so forth. However, is there a relationship between residents' social capital and the number of years they have lived in the target neighborhoods? Does duration of residence influence their social capital? Thus, correlation tests between residents' living years and social capital were conducted (Figure 4.11). However, the test demonstrated that no correlations were found between residents' residency length and their degrees of social capital in both neighborhoods.

Correlations

		SCTD	LYTD
SCTD	Pearson Correlation	1	.073
	Sig. (2-tailed)	.	.321
	N	188	188
LYTD	Pearson Correlation	.073	1
	Sig. (2-tailed)	.321	.
	N	188	188

Correlations

		SCLN	LYLN
SCLN	Pearson Correlation	1	-.017
	Sig. (2-tailed)	.	.818
	N	190	190
LYLN	Pearson Correlation	-.017	1
	Sig. (2-tailed)	.818	.
	N	190	190

SCTD: Resident social capital in Tongde Garden LYTD: Residents' living years in Tongde Garden
SCLN: Resident social capital in Lingnan Garden LYTD: Residents' living years in Lingnan Garden

Figure 4.11: Correlation Tests between Social Capital and Length of Residency

4.3.4 Employment Status

Employment status affects individuals' social life by influencing their time arrangement. Buttimer (1972) found that if men lost their jobs, they would retreat back from their social network and would tend to stay longer in their own residences. The reasons behind this phenomenon may be that an individual feels ashamed because

normally male is the one earning a living for the family. Compared with employed people, retired people have much more flexible time which can be spent in leisure activities and socialization. T-tests were conducted to explore whether residents' employment status affected their social capital. As shown in Table 4.6, all the values of significance were much larger than 0.05 so that respondents' education attainment did not affect their social capital.

TABLE 4.6
t-test of the Means of Social Capital in Terms of Employment Status

	t-test for Equality of Means						
	Mean Difference	Std. Error Difference	95% CI of the Difference		t	df	Sig. (2-tailed)
			Lower	Upper			
Tongde Garden							
Employed *vs.* Unemployed	.11	.467	-.812	1.034	.238	148	.812
Employed *vs.* Retired	.19	.396	-.589	.978	.491	152	.624
Unemployed *vs.* Retired	.08	.598	-1.109	1.311	.140	70	.889
Lingnan Garden							
Employed *vs.* Unemployed	.13	.617	-1.086	1.350	.214	171	.830
Employed *vs.* Retired	-.94	.641	-2.207	.324	-1.46	168	.365
Unemployed *vs.* Retired	-.72	1.012	-2.774	1.338	-.714	35	.483

4.3.5 Education Attainment

In China, people's educational background, to a great extent, influences his or

her economic and social status. In general, if people have higher educational attainments, they will have higher income and, correspondingly, higher social status. For example, an investigation in Beijing, 1998, identified scientist, professor, doctor, and engineer as the vocations with the highest reputation (Li, 2002); another investigation in 2004 indicated that the income of those who have graduate degrees is almost three times that of those who only complete a primary school education[1]. Thus, it is necessary to examine the relationship between residents' educational attainment and social capital. Based on the test results that were shown in Table 4.7, however, no obvious difference in social capital could be observed among various education levels in these two neighborhoods.

TABLE 4.7
t-test of the Means of Social Capital in Terms of Education Level

	t-test for Equality of Means						
	Mean Difference	Std. Error Difference	95% CI of the Difference		t	df	Sig. (2-tailed)
			Lower	Upper			
Tongde Garden							
Primary *vs.* Middle school	-1.31	.834	-2.981	.363	-1.57	53	.122
Middle *vs.* High School	.23	.433	-.628	1.085	.527	143	.599
High Sch *vs.* Undergraduate	.09	.460	-.817	1.004	.204	131	.839
Lingnan Garden							
Primary *vs.* Middle school	-.26	1.139	-2.552	2.039	-.225	44	.823
Middle *vs.* High School	.52	.553	-.580	1.610	.932	109	.353
High Sch *vs.* Undergraduate	-.59	.421	-1.428	.238	-1.41	142	.160

4.3.6 Home Ownership

Rohe and Stewart (1996) suggest that home ownership will lead to greater social interaction within a neighborhood. Home owners are more likely to participate in community organizations, more likely to become acquainted with their neighbors, and more likely to develop a sense of community. DiPasquale and Glaeser (1999) pointed out that home ownership encourages investment in local amenities and social capital because individuals are stimulated to improve their community and decrease mobility. Further, property ownership significantly affects human relationships and belongingness (Hayward, 1991). Nevertheless, Grange and Ming (2000) found that the significance of property ownership to social capital was greatly reduced when other variables, such as age, identity, income and foreign abode right were controlled. In this study, the examination of the social capital of those residents who own their own residence versus those who rented their residence indicated that the ownership of property was not considered as a factor causing differences of residents' social capital (Table 4.8).

TABLE 4.8
t-test of the Means of Social Capital in Terms of Ownership

	t-test for Equality of Means						
	Mean Difference	Std. Error Difference	95% CI of the Difference		t	df	Sig. (2-tailed)
			Lower	Upper			
Tongde: Rent *vs.* Owned	-.04	.364	-.755	.682	-.100	186	.921
Lingnan: Rent *vs.* Owned	-.1.21	.849	-2.886	.464	-1.43	188	.156

4.4 HYPOTHESES TESTING

In this section, four hypotheses were tested based on the data collected from questionnaires. These four hypotheses were generated for exploring whether the neighborhood open spaces in target neighborhoods impacted residents' social capital.

4.4.1 Test of Hypothesis One

Hypothesis: Those residents who live in a neighborhood with a large number of neighborhood open spaces have developed a higher level of social capital than those who live in a neighborhood lacking neighborhood open spaces.

This hypothesis was analyzed based on the responses to five questions about five interpersonal factors, which were defined to evaluate the degree of social capital in this study: trust, belonging, security/safety, intimacy, and engagement (Table 4.9)

TABLE 4.9
Response to Questions about Five Interpersonal Factors

	Tongde Garden					Lingnan Garden				
Choice	TRT	BEL	SEC	NET	ENG	TRT	BEL	SEC	NET	ENG
1	12	12	23	11	1	23	36	36	21	1
2	92	69	82	21	8	108	85	99	44	8
3	57	73	52	88	33	41	60	30	98	43
4	23	29	23	45	73	17	9	21	22	59
5	4	5	8	23	73	1	0	4	5	79

1- very satisfied 2-satisfied 3-neutral 4-dissatisfied 5-very dissatisfied

Logistic regression tests were used to compare each of five factors between Tongde Garden and Lingnan Garden. Therefore, five sub-hypotheses were generated in relation to these five factors. Logistic regression tests indicated that regarding trust, belonging and security, the difference between respondents from two neighborhoods were significant in that *p*-values were 0.0027, <0.0001, and 0.0034 respectively. Further, respondents in Lingnan Garden had higher degrees of trust, belonging and security than respondents' degrees of these three factors in Tongde Garden because the values of β in these three tests were positive. Meanwhile, logistic regression tests did not show any significant difference in intimacy and engagement between these two groups of respondents: both of *p*-values were larger than 0.05 (Table 4.10).

TABLE 4.10
Comparison of Five Interpersonal Factors between Target Neighborhoods

Logistic Regression Test	Analysis of Maximum Likelihood Estimates					
	Parameter	DF	Estimate β	Standard Error	Wald Chi-Square	Pr > ChiSq
Network	district	1	1.0794	0.2015	28.6896	<0.0001
Trust	district	1	0.5941	0.1983	8.9756	0.0027
Belonging	district	1	1.0010	0.1966	25.9236	<0.0001
Security	district	1	0.5656	0.1932	8.5735	0.0034
Engagement	district	1	0.0234	0.1895	0.0152	0.9019

(1) $p < 0.05$, H0: the value of parameter of district equal to 0.
(2) in tests, Tongde Garden was set as the base line to conduct comparison. The value of β indicates the difference of social capital between these two neighborhoods: if β>0, then the degree of social capital in Lingnan Garden is higher than that of in Tongde Garden, *vice versa*.

To evaluate the overall social capital, relationships among these five factors were firstly analyzed. To begin with, correlation analyses were conducted. Results of the tests indicated that, in Tongde Garden, the correlations among network, trust, belonging, and security were rather strong, while engagement had no correlation to other four factors; in Lingnan Garden, trust, belonging, security, network, and engagement showed strong correlates to one another (Table 4.11).

TABLE 4.11
Correlations among Five Interpersonal Factors

		TRT	BEL	SEC	NET	ENG
Tongde Garden	TRT		.190**	.282**	.402**	-.081
	BEL	.190**		.038	.399**	.088
	SEC	.282**	.038		.244**	-.049
	NET	.402**	.399**	.244**		.016
	ENG	-.081	.088	-.049	.016	
Lingnan Garden	TRT		.241**	.279**	.235**	.148*
	BEL	.241**		.194**	.399**	.293**
	SEC	.279**	.194**		.193**	.147*
	NET	.235**	.399**	.193**		.220**
	ENG	.148*	.293**	.147*	.220**	

*. Correlation is significant at the .005 level (2-tailed).

**. Correlation is significant at the .001 level.

The next step was to examine whether interactions between factors exist in the overall logistic regression model for evaluating the difference of social capital between two neighborhoods. A variety of examinations on interactions include two-way,

three-way, four-way, and five-way tests. According to the test results in Table 4.12, no interactions were observed as statistically significant or occurred among these five interpersonal factors. Therefore, the overall logistic regression model for testing the difference of social capital between Tongde Garden and Lingnan Garden was simplified as the relationship between residents' social capital and the effect of district including two neighborhoods and the factor including five interpersonal factors:

$$\text{Logit } [\pi (X)] = \alpha + \beta_1 \times \text{neighborhood} + \beta_2 \times \text{Factor}$$

TABLE 4.12
Logistic Regression Tests of Factor Interaction

Effect	-2 Log likelihood of Reduced Model	Chi-square	df	Sig.
Two-way Likelihood Ration Test				
TRT*BEL	674.190	477.493	285	.061
TRT*SEC	643.871	.	300	.
TRT*NET	654.164	.	285	.
TRT*ENG	700.179	.	300	.
BEL*SEC	716.359	.	315	.
BEL*NET	678.635	.	315	.
BEL*ENG	680.613	.	270	.
SEC*NET	694.178	.	300	.
SEC*ENG	694.598	.	270	.
Three-way Likelihood Ration Test				
TRT*BEL*SEC	1755.905	.	1005	.
TRT*BEL*NET	1755.905	.	945	.
TRT*BEL*ENG	1755.905	.	900	.
TRT*SEC*NET	1755.905	.	975	.
TRT*SEC*ENG	1755.905	.	975	.
TRT*NET*ENG	1755.905	.	885	.

TABLE 4.12 (Continued)

Effect	-2 Log likelihood of Reduced Model	Chi-square	df	Sig.
BEL*SEC*NET	1755.905	.	975	.
BEL*SEC*ENG	1755.905	.	975	.
BEL*NET*ENG	1755.905	.	855	.
SEC*NET*ENG	1755.905	.	930	.
Four-way Likelihood Ration Test				
TRT*BEL*SEC*NET	1755.905	.	2085	.
TRT*BEL*SEC*ENG	1755.905	.	2055	.
TRT*BEL*NET*ENG	1755.905	.	1890	.
TRT*SEC*NET*ENG	1755.905	.	2070	.
BEL*SEC*NET*ENG	1755.905	.	2070	.
Five-way Likelihood Ration Test				
TRT*BEL*SEC*NET*ENG	1755.905	.	3240	.

Furthermore, in line with this formula, tests examined the difference in social capital between two neighborhoods in terms of age and gender respectively. Table 4.13 showed that the difference of social capital existed in both of genders. The difference was quite small (β=0.2663 in female and β=0.4503 in male), but as considering the longer period of residence and the elder average age in Tongde Garden, it was significant that the residents' degree of social capital in Lingnan Garden was higher than residents' social capital in Tongde Garden (p-value=0.0356 in female and p-value=0.0001 in male). The same comparisons were conducted regarding each of five age groups in these two neighborhoods. The results (Table 4.13) indicated that every age group in Lingnan Garden showed a higher level of social capital than that of in Tongde Garden.

The last step of testing hypothesis 1 was to examine the differences in the overall social capital between residents in these two neighborhoods. Once again, residents' in Lingnan Garden were proved to have a higher degree of social capital than residents in Tongde Garden in that β was a positive value, 0.4461 and the p-value was less than 0.0001 (Table 4.13).

TABLE 4.13
Comparison of the Degree of Social Capital in Target Neighborhoods

Type	Logistic Regression Test	Analysis of Maximum Likelihood Estimates					
		Parameter	df	Estimate β	Standard Error	Wald ChiSq	Pr > ChiSq
Gender	Female	district	1	0.2663	0.1267	4.4176	.0356
	Male	district	1	0.4503	0.1169	14.8433	.0001
Age	25~30 years old	district	1	0.2908	0.1630	3.1838	.0444
	31~40 years old	district	1	0.3623	0.1348	7.2218	.0072
	41~50 years old	district	1	0.6357	0.2307	7.5934	.0059
	51~60 years old	district	1	0.6219	0.2468	6.3482	.0118
	61~75 years old	district	1	1.2908	0.4228	9.3212	.0023
Overall Social Capital		district	1	0.4461	0.0850	27.5419	<.0001

(1) $p < 0.05$, H_0: the value of parameter of district equal to 0.
(2) in tests, Tongde Garden was set as the base line to conduct comparison. The value of β indicates the difference of social capital between these two neighborhoods: if β>0, then the degree of social capital in Lingnan Garden is higher than that of in Tongde Garden, *vice versa*.

4.4.2 Test of Hypothesis Two

Hypothesis: The shorter the distance between residents' flats and neighborhood open spaces, the more often the residents will use these open spaces.

The distance between respondents' living flats and neighborhood open spaces was measured by residents' self-reported walking time and categorized into four groups: T1-less than five minutes, T2-between five minutes and ten minute, T3-between ten minutes and fifteen minutes, and T4-longer than fifteen minutes. Tests compared residents' degree of social capital between different walking time groups. As indicated in Table 4.14, no evident difference of social capital was observed between various distances in both neighborhoods.

TABLE 4.14
The Difference of Social Capital in Terms of Distance

Logistic Regression Test		Analysis of Maximum Likelihood Estimates					
		Parameter	df	Estimate β	Standard Error	Wald ChiSq	Pr> ChiSq
Tongde Garden	T2 *vs.* T1	distance	1	0.5419	0.3117	3.0225	0.0821
	T3 *vs.* T2	distance	1	0.3796	0.5965	0.4050	0.5245
	T4 *vs.* T3	distance	1	-0.1835	0.7581	0.0586	0.8087
Lingnan Garden	T2 *vs.* T1	distance	1	-0.2338	0.3371	0.4810	0.4880
	T3 *vs.* T2	distance	1	-1.4276	0.6926	0.2487	0.0905
	T4 *vs.* T3	distance	1	-12.0849	23.06	0.0027	0.9582

4.4.3 Test of Hypothesis Three

Hypothesis: In a neighborhood, the residents who use open spaces frequently have developed higher levels of social capital than those who use open spaces less.

The extent of individuals using neighborhood open spaces was measured by FREQ--the frequency that they visit neighborhood open spaces in a week, STAY1--the length of staying in neighborhood open spaces daily during work days--from Monday to Friday, and STAY2--the length of staying in neighborhood open spaces daily during weekend-Saturday and Sunday. Therefore, six sub-hypotheses were generated to examine the relationship between residents' usage of neighborhood open spaces and their social capital degree in two neighborhoods respectively. The results (Table 4.15) indicated that, in both neighborhoods, there were significant correlates among residents' social capital and their visit frequency and staying time in neighborhood open spaces.

TABLE 4.15
Correlation between Social Capital and the Usage of Open Spaces

Neighborhood	Factor	Pearson Correlation	Sig. (2-tailed)	N
Tongde Garden	Social Capital*FREQ	.184*	.011	188
	Social Capital*STAY1	.224**	.002	188
	Social Capital*STAY2	.188**	.010	188
Lingnan Garden	Social Capital*FREQ	.232**	.001	190
	Social Capital*STAY1	.279**	.000	188
	Social Capital*STAY2	.297**	.000	190

*. Correlation is significant at the .005 level (2-tailed).

**. Correlation is significant at the .001 level.

Further, since it is possible that the overall significant correlation may include non-correlate existing in one gender, tests were conducted in terms of female and male respondents in order to avoid the bias due to gender difference. Thus, twelve sub-hypotheses were tested. According to statistical analyses shown in Table 4.16, once again, significant correlations were found existing between residents' usage of neighborhood open spaces and their social capital, regardless of gender.

TABLE 4.16
Correlation between Social Capital and Genders' Usage of Neighborhood Open Spaces

Neighborhood	Gender	Factor	Pearson Correlation	Sig. (2-tailed)	N
Tongde Garden	Female	Social Capital*FREQ	.355**	.000	94
		Social Capital*STAY1	.330**	.001	94
		Social Capital*STAY2	.259*	.012	94
	Male	Social Capital*FREQ	.226*	.029	94
		Social Capital*STAY1	.257*	.012	94
		Social Capital*STAY2	.231*	.025	94
Lingnan Garden	Female	Social Capital*FREQ	.297**	.008	80
		Social Capital*STAY1	.286*	.010	80
		Social Capital*STAY2	.381**	.000	80
	Male	Social Capital*FREQ	.203*	.046	110
		Social Capital*STAY1	.285**	.003	110
		Social Capital*STAY2	.246**	.009	110

*. Correlation is significant at the .005 level (2-tailed).

**. Correlation is significant at the .001 level.

4.4.4 Test of Hypothesis Four

Hypothesis: Those residents with a higher degree of satisfaction with neighborhood open spaces have developed a higher level of social capital than those residents who are not satisfied with neighborhood open spaces.

The rationale of this hypothesis is if residents are satisfied with neighborhood open spaces, they will visit these spaces more often and stay longer. According to Hypothesis 3, individuals' usage of neighborhood open spaces will improve their degree of social capital. Hence, people's environmental satisfaction was assumed to be correlated with their social capital. In this study, the environmental satisfaction of neighborhood open space was evaluated by eight variables: P1-the size/scale of open spaces, P2-the location of open spaces, P3-the landscape inside open spaces, P4-noise, P5- traffic, P6-air pollution, P7-space for exercise, and P8-the number of seats. Analyses were based on respondents' responses to these variables (Table 4.17).

TABLE 4.17
Questionnaire Response to Variables of Environmental Satisfaction

Loci	Response	P1	P2	P3	P4	P5	P6	P7	P8
Tongde Garden	1	22	17	26	9	15	10	11	10
	2	82	81	96	39	44	38	52	39
	3	40	48	33	37	49	54	38	41
	4	41	37	29	67	55	55	76	80
	5	3	5	4	36	35	31	11	18
Lingnan Garden	1	58	49	84	44	49	41	55	33
	2	95	101	92	67	70	62	87	75

TABLE 4.17 (Continued)

Loci	Response	P1	P2	P3	P4	P5	P6	P7	P8
	3	20	24	12	27	30	42	21	32
	4	16	14	2	36	29	34	22	42
	5	1	2	0	16	12	11	5	8

1-very satisfied 2-satisfied 3-neutral 4-dissatisfied 5-very dissatisfied

The correlate test between respondents' environmental satisfaction and usage of open spaces indicated that, in both neighborhoods, the correlations were found to be statistically significant (Table 4.18 and4.19). Further, the values of Pearson Correlation and scatter plots (Figure 4.12) indicated the correlation between residents' environmental satisfaction with open spaces and their social capital was obviously strong.

TABLE 4.18
Correlation between Environmental Satisfaction, Usage of Open Spaces and Social Capital in Tongde Garden

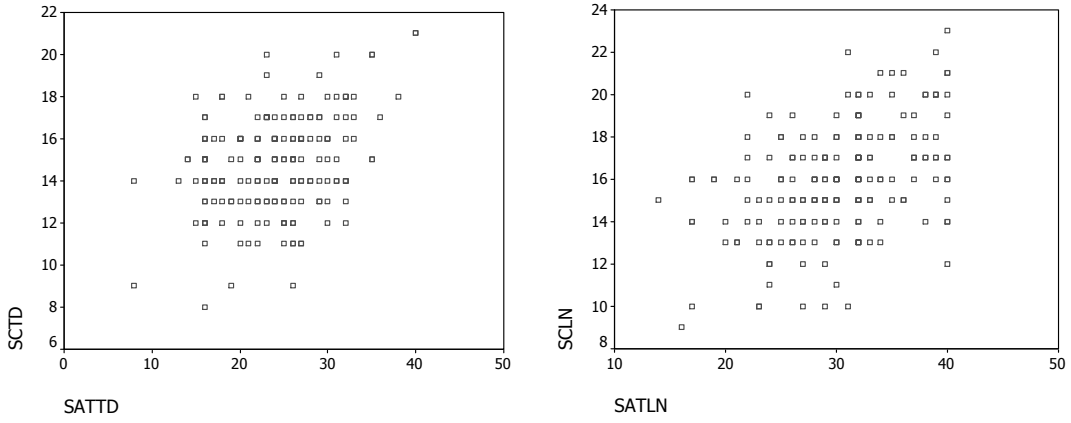
1		SAT	FRQ
	SAT Pearson Correlation	1	.308**
	Sig. (2-tailed)	.	.000
	N	188	188
2		SAT	STAY1
	SAT Pearson Correlation	1	.266**
	Sig. (2-tailed)	.	.000
	N	188	188
3		SAT	STAY2
	SAT Pearson Correlation	1	.345**
	Sig. (2-tailed)	.	.000
	N	188	188
4		SAT	SC
	SAT Pearson Correlation	1	.350**
	Sig. (2-tailed)	.	.000
	N	188	188

*- significant at the .05 level (2-tailed); **-significant at the .001 level

TABLE 4.19
Correlation between Environmental Satisfaction, Usage of Open Spaces and Social Capital in Lingnan Garden

1		SAT	FRQ
	SAT Pearson Correlation	1	.257**
	Sig. (2-tailed)	.	.000
	N	190	190
2		SAT	STAY1
	SAT Pearson Correlation	1	.165*
	Sig. (2-tailed)	.	.023
	N	190	190
3		SAT	STAY2
	SAT Pearson Correlation	1	.283**
	Sig. (2-tailed)	.	.000
	N	190	190
4		SAT	SC
	SAT Pearson Correlation	1	.441**
	Sig. (2-tailed)	.	.000
	N	190	190

*- significant at the .05 level (2-tailed); **-significant at the .001 level



(1) Environmental Satisfaction and Social Capital, Tongde Garden

(2) Environmental Satisfaction and Social Capital, Lingnan Garden

Figure 4.12: Scatterplots of Correlation Tests

4.5 INTERVIEW ANALYSIS

Through testing hypotheses, the relationships between neighborhood open spaces and inhabitants' social capital were explored statistically. However, statistical tests demonstrate the kinds of relations exist but do not explain why these relationships exist. To investigate the reasons explaining those relationships, data collected from semi-structured interviews were qualitatively analyzed in this section. The qualitative analysis was conducted from bottom up by using domain analysis strategy to identify items and the relationships among items. Domains and sub-domains are categories of distinct things, ideas, or events that exist at the same level of abstraction and are related to each other in some way (Spradley, 1979). During the analyses, items were categorized into five domains: the reasons of purchasing residence, social interaction, activities in neighborhood open spaces, neighborhood open spaces, and social capital.

4.5.1 The Reasons for Purchasing Residence in Target Neighborhoods

Except for the limited number of residents who were passively moved from the inner city into Tongdewei area because of the redevelopment of the central area[2], four sub-domains were generalized to explain why people selected these two neighborhoods as their residence (Table 4.20).

The emotional bond to the Tongdewi area affected some residents' decisions

regarding purchasing housing. Two interviewees said that when they wanted to purchase a new flat, they chose still staying in Tongdewei because they had very intimate relatives living in the same area, and they did not want to lose this unique family tie. Three interviewees said that they had rented a flat for several years in Tongdewei before purchasing their own residence, at which point they had already become familiar with the area and had a sense of rootedness.

TABLE 4.20
The Domain Analysis of the Reasons for Purchasing Residence

DOMAIN	SUBDOMAIN	ITEM	
		TONGDE GARDEN	LINGNAN GARDEN
Reasons of purchasing residence	• Emotional concerns	• long term of residency • relatives live in this area	• long term of residency • relatives live in this area
	• Economic concerns	• subjects or family members work in the same area or nearby areas • the price was relatively low to its quality in this area when it was opened in 1997	• subjects or family members work in the same area or nearby areas • the price was relatively low to its quality when it was opened in 2001
	• Physical environment	• the physical environment was better than other neighborhoods then	• the physical environment is the best in this area • plenty of open spaces • endemic landscape and building style
	• Housing quality	• built and managed by a reputable developer	• built and managed by a reputable developer • reasonable flat layout

The second factor impacting people's decisions to purchase a residence was the economic concern. Since the transportation in the Tongdewei area is not developed very well, individuals who work in this area have to consider the economic cost if they live outside of this area. There is only one road connecting Tongdewei area to other districts of Guangzhou, the traffic is heavy, which means there is a long commute and less time available to spend at home with one's family. One interviewee, who works outside of Tongdewei area, said that she normally spends four hours daily in buses and had to leave home at 6:00 a.m. and didn't return home until around 9:00 p.m. In addition, the monthly RMB120 for bus pass is expensive relative to her income. Further, the low housing price in Tongdewei area is another important reason motivating residential purchases. In 2001, the average housing price in Guangzhou was RMB4, 183 per square meter, but the housing price of Lingnan Garden was RMB3, 600 per square meter in 2002.[3]

Although the housing price is lower than Guangzhou's average housing price, the physical environments in these two neighborhoods are quite good. All five interviewees from Tongde Garden said one of important reasons for purchasing a residence was the environment, which was the most beautiful one in Tongdewei area in 1997. Interviewees from Lingnan Garden expressed the same opinion as well. Furthermore, three of them said they liked Lingnan Garden's extensive open spaces and its Cantonese style of landscape[4] and building layout and details.

Both Tongde Garden and Lingnan Garden were developed by Guangzhou City Construction Co. Ltd, the largest state-owned real estate firm in Guangzhou which has an excellent reputation[5]. The objectives of developing these two neighborhoods, explained by Mr. Huang, Weigang who is the vice president of Guangzhou City Construction Co. Ltd, stated that the company could not only for profit, but more importantly for establishing a standard of low-income housing for other developers. Meanwhile, the developer is responsible for the continued facility management of these two neighborhoods. Therefore, the housing quality including design, construction, and maintenance, is guaranteed. All interviewees said it was safer to purchase a residence from such a company.

4.5.2 Social Interaction

Under the domain of social interaction, there were three sub-domains including the foundation of socialization, the ways of knowing others, and factors impeding social interaction (Table 4.21).

The first foundation of social interaction was identified as having common interests. Two interviewees said that they knew their friends through their children: children play together initially and then their parents became acquainted. Another interviewee said she made some friends during the period of decorating her newly

purchased flat when they passed by and visited and gave her some suggestions. The second foundation for building a relationship was similar age, which meant they could more easily share similar life experiences. Almost all interviewees made friends with those in similar age groups. Familiarity was reported as the third foundation. One interviewee in Lingnan Garden said he knew his friends because they frequently encountered one another and gradually became friends.

TABLE 4.21
The Domain Analysis of Social Interaction

DOMAIN	SUBDOMAIN	ITEM	
		TONGDE GARDEN	LINGNAN GARDEN
Social Interaction	• Foundation	• common interest • similar age • familiarity	• common interest • similar age • familiarity
	• The ways of knowing others	• greetings • through children • morning exercise	• greetings • through children • exercise • dancing • taking a work • playing in open spaces
	• Factors impeding socialization	• too busy to have time • different lifestyle • do not know others' background • different time schedule no place for activities	• too tired to go out • too busy to have time • no suitable facilities

There were three similar ways of becoming acquainted with other residents in both neighborhoods: greeting, knowing through children, and morning exercise. Besides, interviewees from Lingnan Garden had more opportunities of knowing others than interviewees from Tongde Garden: they knew their neighbors through group activities in open spaces, such as dancing or playing together.

Some factors impeding social interaction were also identified from conversations with interviewees. Interviewees from both neighborhoods reported common impediments to socialization: too busy to have time; too tired after work; some residents worried about making friends with neighbors because they did not know neighbors' background; some residents did not like to socialize with others because their lifestyle were different; some could not meet together frequently due to different time schedule. Furthermore, interviewees expressed different concerns regarding their own neighborhood. Interviewees from Tongde Garden especially complained about lacking places for knowing their neighbors through group activities or social interactions:

> I'd like to exercise, play, or take part in some activities with other neighbors, but there is no such kind of places. It's boring or silly to stay outside just walking back and forth along streets. So, we just stay at home and do not have opportunity to know others—an interviewee from Tongde Garden

Even though most of the residents in Lingnan Garden were satisfied with their neighborhood, two interviewees (one is 28 years old and another is 33 years old) said the current exercise or entertainment facilities in open spaces were mainly for children and

the elderly, and few were appropriate facilities for young adults. Young adults felt bored going to these spaces, which were supposed to be the best place to meet their neighbors.

4.5.3 Activities in Neighborhood Open Spaces

In both neighborhoods, similar types of passive activities--people without the intention of participating in mutual or group activities--were reported by interviewees (Table 4.22). In Tongde Garden, interviewees said they sometimes went out by themselves or with families for a walking after dinner, or just sat outside. They also observed that many elderly sat alone in Phase I and walked alone in Phase II. In Lingnan Garden, although passive activities were also reported, only a few residents stayed outside by themselves.

TABLE 4.22
The Domain Analysis of Activities in Open Spaces

DOMAIN	SUBDOMAIN	ITEM	
		TONGDE GARDEN	TONGDE GARDEN
Activities in neighborhood open spaces	• Passive activities	• sitting • viewing • walking	• sitting • viewing • walking
	• Active activities	• conversation • exercises • playing	• conversation • exercises • playing • group playing • meeting

Active activities in Tongde Garden were rather limited. Most of residents just say hello to others when they encountered, and even the conversation between those people who knew each other were superficial; it was said that only around twenty people exercised together in a dead-end street beside a kindergarten; in Phase I and III, there were no places for children play, and in Phase II, children played on the street around a small park. On the contrary, there were a variety of active activities in Lingnan Garden. An interviewee said she took part in a dancing group twice a week, from 7:30 p.m. to 9:00 p.m.; another interviewee said he often played Jianqiu, a game with a small feather ball, with others at the end of Third Lingnan Street. In the morning, some residents practiced Cantonese Opera near a small stage beside Cluster IX; while others exercised in various locations in the neighborhood. One interviewee said she liked to meet and chat with her friends in a place just beside the entrance of Cluster IV. On rainy days, people played badminton in the corridor of Second Lingnan Street; even at night, some residents liked to use the facilities in Third Lingnan Street for exercise.

4.5.4 Neighborhood Open Spaces

Just like the obvious difference existing between the physical patterns of the row housing in Tongde Garden and courtyard housing in Lingnan Garden, interviewees' perception of open spaces in two neighborhoods were different as well (Table 4.23).

Most of interviewees from Tongde Garden did not have a comprehensive picture of their neighborhood. A lady living in Phase I had never visited Phase III; another interviewee living in Phase III only knew something close to the entrance of Phase I. Except for their own residence, interviewees from Tongde Garden did not feel other places belonged to them. In contrast, interviewees from Lingnan Garden could clearly describe the structure of the neighborhood: the characteristics of each cluster and streets, or activities took place in which area. In addition, their territoriality was strong: each of them often used "our" in reference to their own cluster and "their" to describe other clusters; they could recognize which area belonged to them and which areas did not. One interviewee said "…I seldom visit other courtyards and also do not like residents from other clusters to visit our courtyard because I feel they disturb my life…"

TABLE 4.23

The Domain Analysis of Neighborhood Open Spaces

DOMAIN	SUBDOMAIN	ITEM	
		TONGDE GARDEN	LINGNAN GARDEN
Neighborhood Open Spaces	• Territoriality	• quite weak • vague mental map of entire neighborhood	• strong territoriality • clear structure of entire neighborhood
	• Aspects they specially like	• the location of neighborhood open space in phase two	• water • plant • traffic free
	• Aspects they do not like especially	• noise • a limited number of seats • small size • air pollution • not traffic free • no enough lights at night	• the location of seats • the size of courtyard • the location of some facilities

All interviewees shared their favorite aspects of neighborhood open spaces. In Tongde Garden, interviewees were satisfied with the location of the neighborhood park in Phase II. This park was located in the center of and clustered by the buildings of Phase II, and adjacent to a neighborhood security station (see Appendix C). Therefore, all residents in Phase II share convenient access, and children could play outside under their parents' easy surveillance. Regarding all aspects of open spaces in Lingnan Garden, interviewees' first favorite was the element of water. When asked which courtyard was the best one, the answer was the courtyard in Cluster V because there was a small pond with many golden fish; the mini-rivers along Second Lingnan Street were another favorite place. The planting in Lingnan Garden were the interviewees' second favorite aspect of open spaces. In order to reduce noise, air pollution, and adjust local-weather, seventy-eight types of plants were applied in Lingnan Garden (Liu, 2002), which simultaneously created an impressive landscape. The last favorite aspect interviewees mentioned was the freedom of pedestrian/traffic conflicts in open spaces: all motorcycles were assigned to enter only from the main entrance located in the south and stored in the basement of Cluster I and V; all other automobiles could not be driven into the neighborhood and stored in the basement under Cluster II. Therefore, there is no traffic threatening those residents staying or playing in the most of open spaces and let residents feel much safer, especially those children and their parents.

As shown in Table 4.23, interviewees in Togndе Garden showed their dissatisfaction with many aspects of their neighborhood open spaces: (1) the main road of Tongdewei area passed by the main open space in Phase I and a highway was just adjoining to the south side of the open space in Phase III, which brought loud noise and toxic exhaust into these two spaces; (2) the sizes of open spaces were too small to contain a group of people to do exercise or children play games together; (3) the number of seats was far from enough and the layout was not suitable for conversation; (4) vehicles in open spaces threatened pedestrians; (5) open spaces were too dark at night to let people feel safe. In Lingnan Garden, interviewees did not like three aspects of open spaces: (1) the size of courtyard was somewhat small so that some residents felt their privacy was intruded; (2) although there were many seats in open spaces, interviewees still felt the lack of seats because seats were placed away from the frequently used areas; and (3) some facilities were placed in an improper location that annoyed residents. For example, a facility for children was placed in the area between Cluster II and III and when children play, residents living nearby had to close all windows to reduce noise.

4.5.5 Social Capital

The last domain identified from interviews was social capital that included five sub-domains and items affecting them (Table 4.24).

TABLE 4.24
The Domain Analysis of Social Capital

DOMAIN	SUBDOMAIN	ITEM	
		TONGDE GARDEN	LINGNAN GARDEN
Social Capital	• Network	• through children	• through children • participate in activities • other
	• Trust	• familiarity	• familiarity • mutual support
	• Belonging	• residency	• residency • friendly neighbors • participating in community activities
	• Safety & Security	• crime • traffic • security staff • entrance control	• outsiders • people in open spaces (especially at night) • security staff • entrance control
	• engagement	• group exercises	• group exercises • group playing • decision making • community events

The social networks of interviewees in Tongde Garden were averagely maintained at small scales and superficial. Many of them knew their neighbors through their children. Except for chatting to each other during the time when their children are playing, they had no further contact. Interviewees in Lingnan Garden had more ways to expand their social networks besides becoming acquainted through their kids: they made

friends with one another during group exercises or playing in open spaces; one interviewee said she met one of her good friends in this neighborhood when they had a facial together in a salon located in Second Lingnan Street.

In both neighborhoods, trust was first built upon familiarity by knowing one another's background. Trust was also generated from mutual support. One interviewee said "I always like to help other neighbors, if they need any help that I can do, I will do my best to help; so, I believe if I need help, they will…"; another old man who often assisted management staff to help neighbors expressed a similar thought "if you help you neighbors then they certainly will trust you!"

The extent of belonging was somewhat determined by the duration of residence; the longer they lived in a neighborhood the stronger they felt that they belonged to the place. Some interviewees from Lingnan Garden thought the friendly atmosphere among neighbors strengthened one's belongingness. Moreover, those who often took part into various neighborhood activities felt that they had very strong ties to their neighborhood.

Regarding safety and security, interviewees from Tongde Garden thought security staff in neighborhood gave them a sense of security. But, they concerned several things threatening to their life: the entrance only controlled vehicles but not pedestrians so that criminals could easily enter into neighborhood; some crimes happened, including burglary and stolen bike; and the vehicles traversing open spaces. In Lingnan Garden,

interviewees identified things which made them feel safe: the security staff which patrolled the neighborhood 24 hours a day; the fact that during most of the day and night, there are lots of people in open spaces; and the traffic-free open spaces. Meanwhile, they also concerned the issue of safety in that the neighborhood was not totally gated. Even though vehicles were not allowed to enter, people who are not living in this neighborhood still had chances to enter into clusters.

The extent of engagement in Tongde Garden was rather low, which was not only indicated by the data from questionnaire but also reported by each interviewee in Tongde Garden. It was said that there was no organized neighborhood activities or events; residents had never been invited to participate in the management of the neighborhood; and, because of the lack of suitable open spaces, residents had few chances to exercise and play together. In the contrary, although questionnaires also showed the extent of engagement was not high, interviewees from Lingnan Garden expressed some degree of engagement. Residents in Lingnan Garden had opportunities to participate in various collective activities. They were somewhat involved in managing the neighborhood. There was a residents' association, although just established, negotiating with the facility management company on behalf of all the residents. The majority of individuals regarded the neighborhood as their own home and thus often submitted suggestions to the management department to help improve the neighborhood.

4.6 OBSERVATION

"Observation is always filtered through the researcher's interpretive frames" (Schensul *et al*, 1999). Based on the theoretical framework of this study, observation focused on four categories: acts, actor, activities, and settings (Lofland, 1971; Lofland and Lofland, 1984). Therefore, observation recorded actors (residents) in acts or activities in settings (open spaces).

4.6.1 Tongde Garden

The activities of the elderly were concentrated in three places in Tongde Garden as shown in Figure 4.13. In the whole neighborhood, the only seats were in Place A. In Place A, there were seven hard and cold concrete benches that were placed sparsely and linearly along the street. Some elderly sat there and viewed others. However, those hard and uncomfortable benches did not allow people sit for a long time, and further, the linear mode of these seats was not idea for conversation. Therefore, the elderly only stayed for a while. Place B was another place where the elderly like to visit. Its landscape is the best one in the whole neighborhood. Compared with the other two small parks in Phase I and Phase III, it was quieter and had less air pollution because it was far from roads and surrounded by buildings. Some elderly went there for a walk, or accompanied their grandchildren, or sat on the curb for a short-time. Place C was the only place for

residents' morning exercise. It was a short street which was separated from residences by a kindergarten. There was an iron gate at its south end and sever metal bars on the ground which prevented all hard and cold concrete vehicles from coming in. Thus, it was a safe place for exercises and won't disturb other residents.

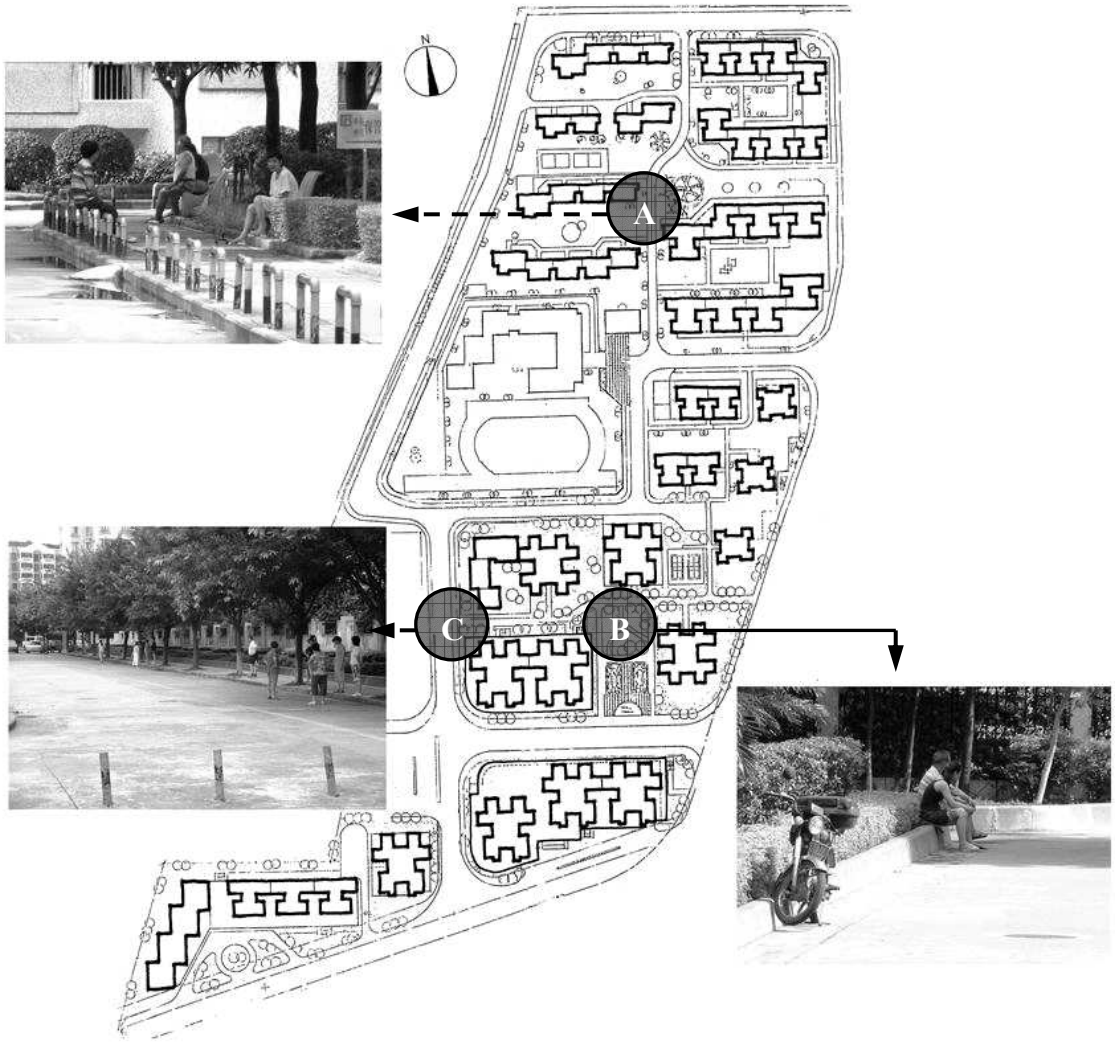


Figure 4.13: Places for the Elderly in Tongde Garden

The small park in Phase II, shown as Place A in Figure 4.14, was only one place where children were found to stay and play often. The size of this space is approximate 40 meters wide and 60 meters long, which provides children a relatively large space for games. In addition, as mentioned previously, due to its relatively quiet, low air pollution, and easy surveillance, children were often brought here to play with others.

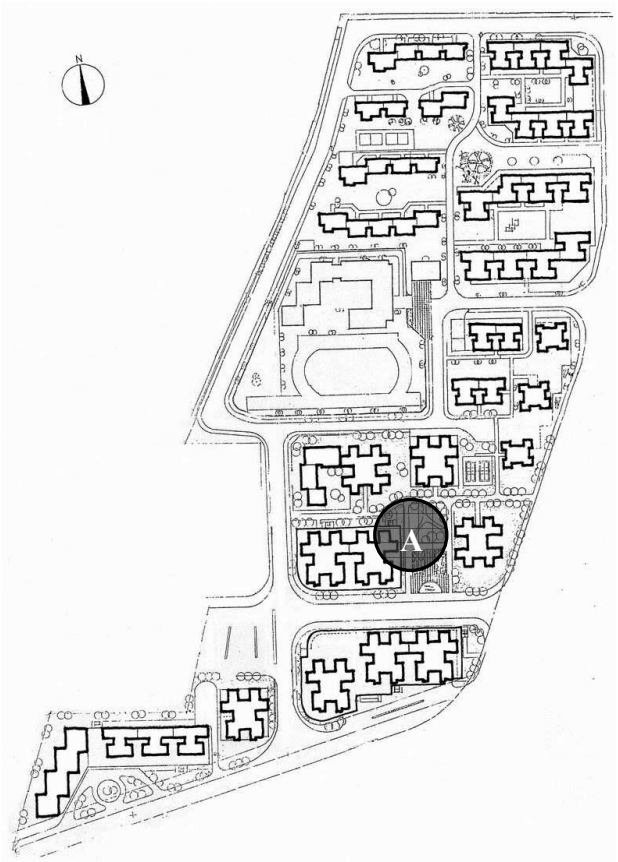


Figure 4.14: Places for Children in Tongde Garden

In Tongde Garden, adults' activities in open spaces were found mainly in four areas (Figure 4.15). Place A is a small area in front of a small store and a small restaurant where adults like to eat, drink tea, or play cards with friends. In Place B, adults mainly were found to walk after dinner or accompany their kids. Place C is the place for exercise. The dashed line represents an adult jogging route.

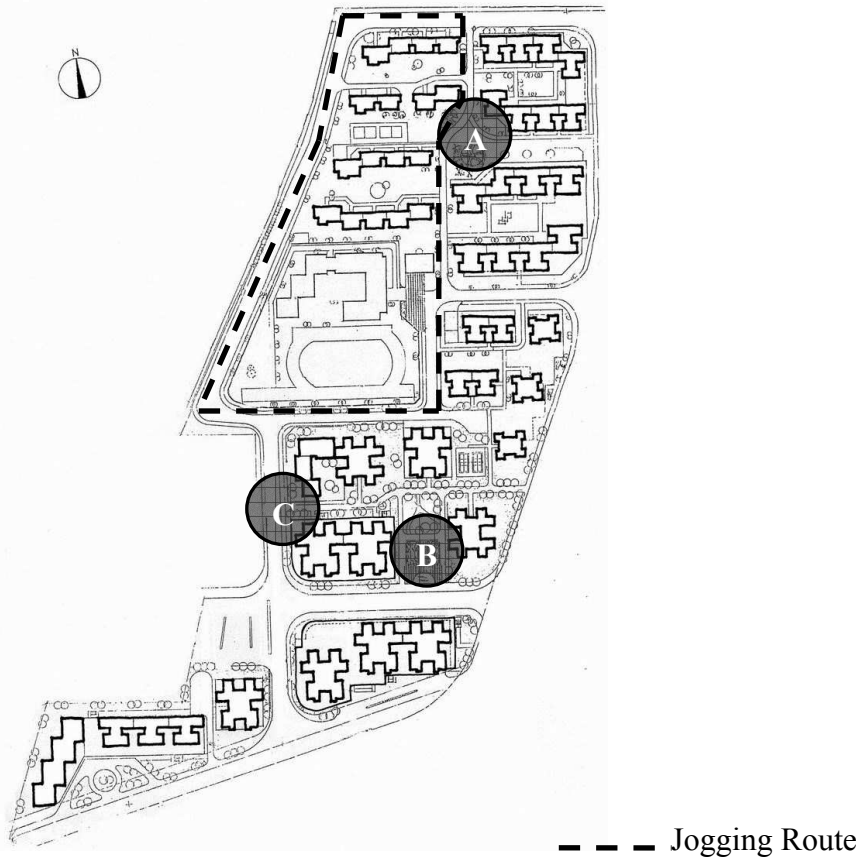


Figure 4.15: Places for Adults in Tongde Garden

4.6.2 Lingnan Garden

The elderly in Lingnan Garden have more choices of using open spaces than the elderly in Tongde Garden (Figure 4.16). First Lingnan Street (Place A) is used mainly as a fire lane so for a short-time it is a quiet street. Also, it is immediately adjacent to a primary school where many residents' children are educated. Old people like to sit there and observe for a short-time for a short-time those children, maybe their grandchildren. Second Lingnan Street (Place B) is a commercial street with wide corridors providing wonderful shade and many small shops, such as a mini-supermarket, a tea pot collection, and so forth, which provide active scenarios. Moreover, many wood benches were placed in corridors. Mini-river runs beside the corridors, which create an attractive place for sitting and viewing. Third Lingnan Street (Place C) is the place designed especially for exercise in that there are a variety of facilities suitable for the elderly and children. Many elderly brought their grandchildren there to have fun and meet other kids; some elderly used facilities for exercises, which provided them opportunities to meet and chat with others. Place D is a small area beside 3rd Lingnan Street with a small stage and big curve concrete step for sitting. Firstly, old people used this space for practicing traditional Cantonese Opera, and then the elderly gradually concentrated here for morning exercises or other activities. The courtyards, such as Place E, in all nine clusters with trees and many other plants are quiet, cool, and more convenient for old people.

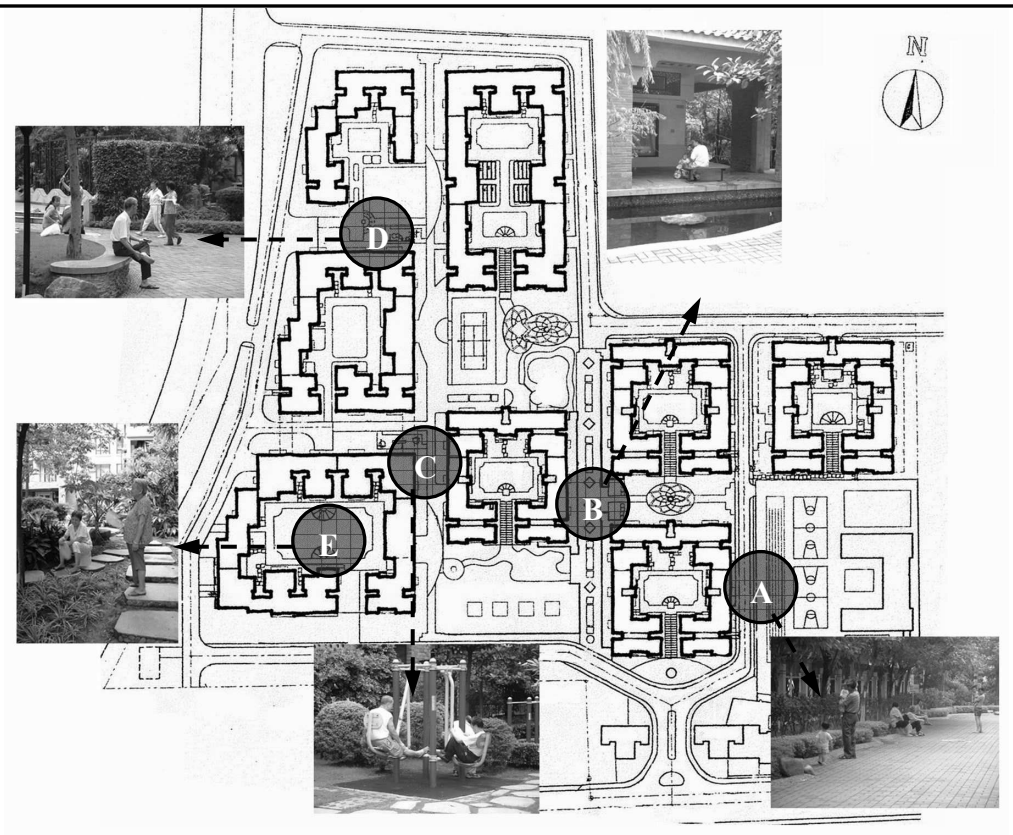


Figure 4.16: Places for the Elderly in Lingnan Garden

Observations found children mainly used five places (Figure 4.17). Place A and E are two small playgrounds where playing complexes were provided. Second Lingnan Street (Place B) attracts children to play because it is traffic free; a security station in the north end of the street protected all children, even without parents' surveillance; and the water beside corridors is always children's favorite. Place C has a swimming pool and a badminton court that was often used for group games. On summer days, children play in swimming pool, especially after dinner accompanied by their parents. Third Lingnan Street (Place D) was equipped with facilities for children's exercise and play.

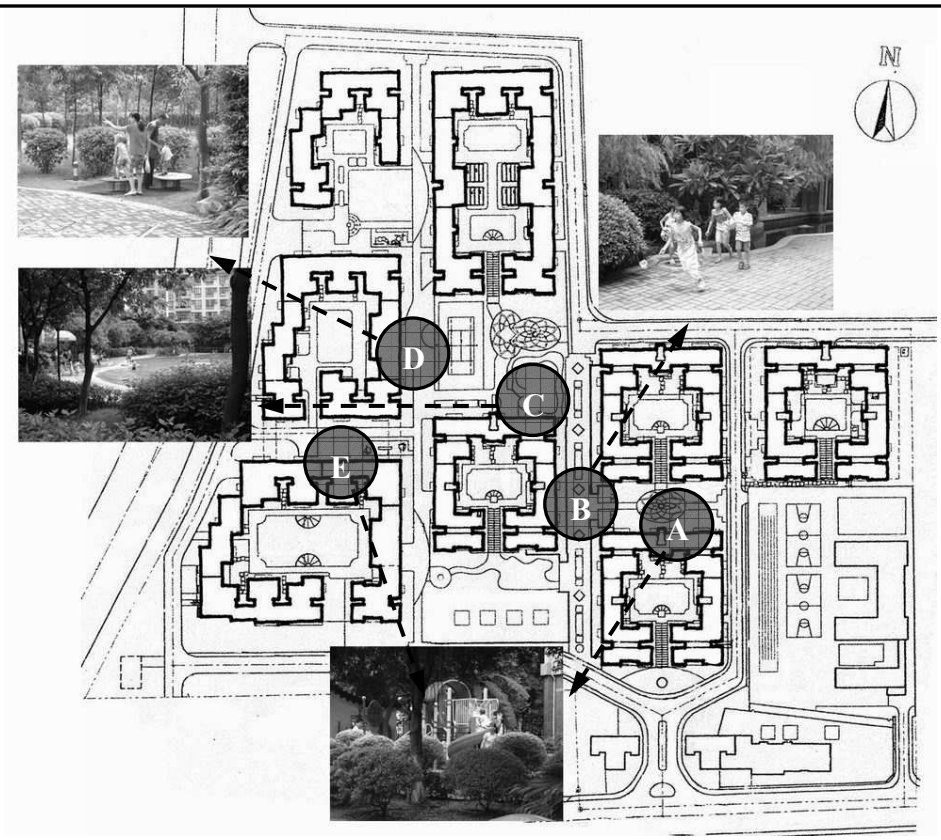


Figure 4.17: Places for Children in Lingnan Garden

In Lingnan Garden, adult activities were concentrated in six places (Figure 4.18). The commercial function of Second Lingnan Street (Place A) attracts many adults in their leisure time. Adults also like a small area in front of Cluster 4 (Place B), which has two sets of stone tables and seats and in combination to surrounded woods to create a quiet place for sitting. On the north side of the swimming pool, a small flat area was used for morning exercises. Another place for adults' exercise is Third Lingnan Garden (Place D). Two places were used for adult recreation. Place E is the end of Third Lingnan Street

where a group of people used to play Jianqiu. In Place F, there was a group of adults who regularly danced here. This area is the further end of the street so that there were few people who went there and disturb their dancing; this street is about twelve meters wide that provides enough space; there is enough lighting at night. Finally, the dashed line represents streets that were used as adults' jogging route.

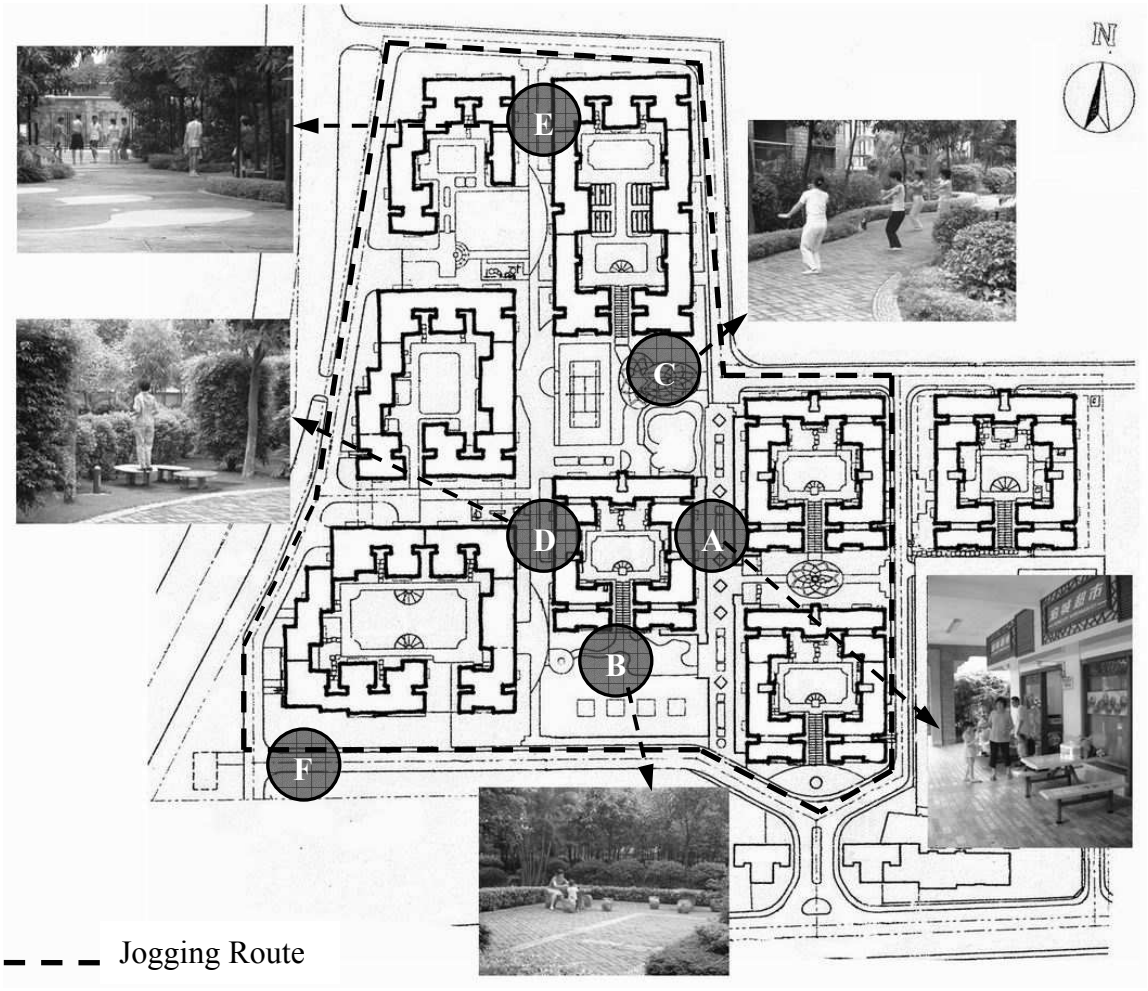


Figure 4.18: Places for Adults in Lingnan Garden

4.7 SUMMARY

In the first section of data analyses, the respondents of questionnaires in each neighborhood were described and compared in terms of their gender, age distribution and difference, marital status, employment status, ownership of residence, living years in neighborhood, and education attainment. Based on comparisons, regarding respondents' gender, marital status, and ownership, there was no statistically significant difference; the difference was shown in age, employment, years in residence, and education attainment: (1) the average age of respondents from Lingnan Garden was younger than respondents from Tongde Garden; (2) respondents from Tongde Garden had higher retirement percentage and lower employment percentage than that of Lingnan Garden; (3) respondents in Lingnan Garden had shorter living years; (4) Lingnan Garden's respondents had a higher education level than Tongde Garden's respondents.

The second section of analyses examined the influence of respondents' demographic characteristics on the degree of social capital. According to statistical examinations, there was no difference in social capital existing between male and female in each age group; age difference did not affect respondents' social capital in Tongde Garden, but in Lingnan Garden the degree of social capital of age group 61 and up year-old was found to be higher than other four age groups; regarding the length of residency, it was found that no correlations existed between residents' residency length

and their degree of social capital in either neighborhood. Respondents' education attainment was not found to affect their social capital; finally, it was not found that respondents' ownership of residence affected their social capital.

Four hypotheses generated based on literature review were statistically tested to explore the relationship between social capital and residents' use of neighborhood open spaces. The test of Hypothesis 1 proved that those residents who live in Lingnan Garden with several neighborhood open spaces had developed a higher level of social capital than residents who live in Tongde Garden which lacked neighborhood open spaces. The result of testing Hypothesis 2 rejected the assumption that a relationship existed between the distance between residents' flats and neighborhood open spaces and the frequency of using open spaces. Hypothesis 3 was proved that, within a neighborhood, those residents who used the open spaces more frequently had developed a higher level of social capital than those who seldom used open spaces. Through the test of the last hypothesis, those residents with a higher degree of satisfaction with neighborhood open spaces were proved to develop a higher level of social capital than those residents who were not satisfied with neighborhood open spaces.

In qualitative analyses, the domain analysis strategy was utilized to analyze semi-structured interviews and identified five principal domains. The first domain was why residents purchased their residences in target neighborhoods and four reasons were

identified as emotional concerns, economic concerns, physical environment, and housing quality. The second domain was about social interaction and included three aspects: the foundation of social interaction, the ways of knowing other and the factors impeding social interaction. In the third domain included residents' activities in neighborhood open spaces. Both passive activities, such as sitting and viewing, and active activities, such as group exercise, were identified and compared between two neighborhoods. The fourth domain was identified as residents' perception about their open spaces, which included people's territoriality, the aspects of open spaces they especially like, and the aspects of open spaces they do not like. The last domain identified a variety of items in each neighborhood which affect each of five interpersonal factors of social capital.

Investigator's observation of research fields recorded that residents belonging to various age groups used different areas in open spaces for a variety of activities. In Tongde Garden, residents, regardless of age, had few options to use neighborhood open spaces and all of their activities were concentrated in four areas. Comparatively, residents in Lingnan Garden had many more choices when staying outside. There were multiple types of open spaces or sub-areas in open spaces, which were suitable for various age groups and different kinds of activities. In addition, there were many exercise and entertainment facilities provided in open spaces which attracted residents visiting and using open spaces as well.

NOTES:

1. Source cited from http://society.people.com.cn/GB/1063/3183007.html, December 02, 2005.
2. In 1997, in city of Guangzhou, some old residential districts in inner city have been redeveloped as museum, office buildings and malls. The residents who originally lived in these districts were emigrated by governments or developers. As compensation, each resident was assigned a flat that was normally located in peripheral areas, such as Tongde Garden.
3. Source cited from http://njbbs.soufun.com/2113376_2113376.html
4. Cantonese style of landscape mainly refers to the *Lingnan* garden culture of Guangzhou, Shunde, Foshan and Zhaoqing. This region is endowed with a unique subtropical climate, and its own language, theatre, music, painting and arts and crafts. A garden emphasizes the natural characters of the site and the layout is mapped out strict according to a well-defined concept. Instead of deep courtyards and zigzagging paths, gardens are as a rule straightforward and open for all to see. A large number of local plants are applied to create multiple layers, bright-colored landscape, such as in combination of tall trees like Ficus *microcarpa*, Ficus *religiosa*, and Magnolia *grandiflora*, and brushes like Michelia *figo*, Murraya *exotica*, and so forth. Buildings are erected at carefully chosen sites, and their designs are succinct and simple and in cheerful colors. Graceful and fluent are the words for the style of *Lingnan* gardens,

which are neither as splendid as northern gardens and nor as delicate and elegant as gardens in the lower Yangtze valley.

5. Since established in 1982, this company have completed forty large-scale housing development in Guangzhou and obtained many provincial and national awards, such as in 2002, they were awarded “China National Housing Award” that is issued to two companies in each year; in 2004, “Top Ten Brands of China Real Estate”, “Top Ten Most Competitive Real Estate Company in Guangdong Province”.

CHAPTER V
RESEARCH FINDINGS AND CONCLUSIONS

The research findings of data analyses are summarized in this chapter. Then, conclusions are drawn based on these findings. In addition, research limitations are explained. The final section includes recommendations for future studies and recommendations for the physical design of neighborhood open spaces.

5.1 SUMMARY OF RESEARCH FINDINGS

5.1.1 Research Findings from Questionnaires

A. The Examination of Residents' Demographic Characteristics

Based on the questionnaires retrieve from respondents, data describing respondents' socio-demographic characteristics were examined and summarized.

(1) Due to facility management departments' assistance, the response rates were high: 75.2% in Tongde Garden and 76% in Lingnan Garden.

(2) The gender compositions of respondents were similar: females and males in Tongde Garden accounted for 50% respectively; and in Lingnan Garden, females accounted for 42.10% and males accounted for 57.90%.

(3) On average, residents in Lingnan Garden were approximately three years younger than residents in Tongde Garden.

(4) Residents had similar marriage rates in both neighborhoods: 84.57% in Tongde Garden and 90.50% in Lingnan Garden.

(5) Compared with the residents in Tongde Garden, residents in Lingnan Garden had a higher employment: 80.5% versus 61.70%; and a lower retirement rate: 10.50% versus 18%.

(6) 93.68% of residents in Lingnan Garden purchased their own residences, which was higher than the percentage in Tongde Garden, which was 85.11%.

(7) On average, residents had lived in Tongde Garden for 4.44 years, which was longer than the average length of residency of residents in Lingnan Garden, which was 1.83 years.

(8) In general, residents in Lingnan Garden had more education than residents in Tongde Garden, in that 36.84% of residents in Lingnan Garden held undergraduate degrees and 38% of residents finished their high school education, whereas in Tongde Garden, 17.55% of residents had undergraduate degree and 52% completed high school.

B. Effects of Residents' Demographic Characteristics on Social Capital

One of the objectives of this study is to examine the degree of social capital in China's urban context. In China's neighborhoods, individuals' social capital is mainly determined by interpersonal factors, and therefore, the influence of demographic characteristics on social capital was examined.

(1) Gender

In Tongde Garden, the mean of female respondents' overall social capital was 14.64 and male respondents received 15.05, which proved to be statistically equal to one another as the value of significance was 0.218. Further, to avoid bias of age, the tests of gender difference in social capital were conducted regarding five age groups, and obtained significance values from 0.100 to 0.768. In Lingnan Garden, the mean of female respondents' overall social capital was 15.73 and male respondents received 16.12, and the significance was 0.309; the significance values from tests on age groups ranged from 0.227 to 0.677. Thus, gender difference did not affect resident social capital.

(2) Age

People belonging to different age groups and life stages have different lifestyles that may affect their social capital (Rindfuss, 1999; Brown and Trost, 2003). In this study, residents' social capital was compared between five age groups. In Tongde Garden, the smallest p-value was 0.2796 and the largest p-value was 0.9785, which indicated that the difference of age did not cause the difference in social capital. In Lingnan Garden, among age groups 25~30 years-old, 31~40 years-old, 41~50 years-old, and 51 ~ 60 years-old, the difference in social capital was not found; all p-values of the tests on these factors were larger than 0.05. However, the social capital of age group 61 years-old and up was found to be higher than other four groups; yet even though Tongde Garden has

more elderly, its social capital is less than that of Lingnan Garden.

(3) Length of residency

Since people's social capital may be influenced by the period of living in a place (Grange & Ming, 2000; Manzo, 2003), this study examined the effects of respondents' length of residency on social capital using correlation tests. According to the results of the survey, however, no correlations were found between residents' residency length and their social capital in both neighborhoods.

(4) Employment Status

Employment influences how people distribute their spare time, stay in home or take part in activities outside to some extent; this may affect their social life and social capital eventually. Through examination, all significance values were much larger than 0.05 so that respondents' employment status was not found to affect their social capital.

(5) Education Attainment

In China, individuals' education background greatly influences their economic and social status, which led to examine the effects of education attainment on social capital. Based on test results, in both neighborhoods, the significance were larger than 0.05 so that respondents' education attainments were proved not to affect social capital.

(6) Home Ownership

There is a debate regarding whether or not property ownership affects social

capital. Some researchers found that home ownership will lead to greater social interaction within a neighborhood, improve individuals' belonging and rootedness, and enhance social capital (Hayward, 1991; DiPasquale & Glaeser, 1999; Rohe & Stewart's, 1996). But, a researcher in Hong Kong agued that home ownership did not affect social capital (Grange and Ming, 2000). In this study, through comparing social capital between residents who purchased residence and residents who rented for residence, it was found that home ownership was not a factor influencing social capital.

C. Hypotheses Testing

The difference in socio-economic-demographic characteristics between two groups of residents did not lead to obvious difference in social capital. Thus, the effects of difference in neighborhood open spaces relative to social capital were explored by testing four hypotheses, which were proposed based on the literature review.

(1) Hypothesis 1: Those residents who live in a neighborhood with a large number of neighborhood open spaces have developed a higher level of social capital than those who live in a neighborhood lacking neighborhood open spaces.

Seven sub-hypotheses were tested to examine the relationships between the existence of open spaces and social capital, which were summarized in Table 5.1.

TABLE 5.1
Research Findings of Hypothesis 1

Hypothesis	Results
Sub-Hypothesis 1-1: Those female residents who live in a neighborhood with a large number of neighborhood open spaces have developed a higher level of social capital than those female who live in a neighborhood lacking neighborhood open spaces.	Null hypothesis could not be rejected
Sub-Hypothesis 1-2: Those male residents who live in a neighborhood with a large number of neighborhood open spaces have developed a higher level of social capital than those male who live in a neighborhood lacking neighborhood open spaces.	Null hypothesis could not be rejected
Sub-Hypothesis 1-3: In age group 25-30 years-old, those residents who live in a neighborhood with a large number of neighborhood open spaces have developed a higher level of social capital than those who live in a neighborhood lacking neighborhood open spaces.	Null hypothesis could not be rejected
Sub-Hypothesis 1-4: In age group 31-40 years-old, those residents who live in a neighborhood with a large number of neighborhood open spaces have developed a higher level of social capital than those who live in a neighborhood lacking neighborhood open spaces.	Null hypothesis could not be rejected
Sub-Hypothesis 1-5: In age group 41-50 years-old, those residents who live in a neighborhood with a large number of neighborhood open spaces have developed a higher level of social capital than those who live in a neighborhood lacking neighborhood open spaces.	Null hypothesis could not be rejected

TABLE 5.1 (Continued)

Hypothesis	Results
Sub-Hypothesis 1-6: In age group 51-60 years-old, those residents who live in a neighborhood with a large number of neighborhood open spaces have developed a higher level of social capital than those who live in a neighborhood lacking neighborhood open spaces.	Null hypothesis could not be rejected
Sub-Hypothesis 1-7: In age group 61 years-old and up, those residents who live in a neighborhood with a large number of open spaces have developed a higher level of social capital than those who live in a neighborhood lacking neighborhood open spaces.	Null hypothesis could not be rejected

(2) Hypothesis 2: The shorter the distance between residents' flats and neighborhood open spaces, the more often the residents will use these open spaces.

Six sub-hypotheses were proposed and examined (Table 5.2). Here, T1 means less than five minutes walking distance; T2 means between five minutes and ten minute walking distance; T3 means between ten minutes and fifteen minutes walking distance; and T4 means longer than fifteen minutes walking distance.

TABLE 5.2
Research Findings of Hypothesis 2

Hypothesis	Results
Sub-Hypothesis 2-1: In Tongde Garden, residents belonging to T1 have the same social capital as residents belonging to T2.	Null hypothesis could not be rejected
Sub-Hypothesis 2-2: In Tongde Garden, residents belonging to T2 have the same social capital as residents belonging to T3.	Null hypothesis could not be rejected
Sub-Hypothesis 2-3: In Tongde Garden, residents belonging to T3 have the same social capital as residents belonging to T4.	Null hypothesis could not be rejected
Sub-Hypothesis 2-4: In Lingnan Garden, residents belonging to T1 have the same social capital as residents belonging to T2.	Null hypothesis could not be rejected
Sub-Hypothesis 2-5: In Lingnan Garden, residents belonging to T2 have the same social capital as residents belonging to T3.	Null hypothesis could not be rejected
Sub-Hypothesis 2-6: In Lingnan Garden, residents belonging to T3 have the same social capital as residents belonging to T4.	Null hypothesis could not be rejected

(3) Hypothesis 3: In a neighborhood, the residents who use open spaces often have developed higher levels of social capital than those who use open spaces less.

Six sub-hypotheses were generated and tested to examine the relationship between residents' using open spaces and their social capital (Table 5.3).

TABLE 5.3
Research Findings of Hypothesis 3

Hypothesis	Results
Sub-Hypothesis 3-1: In Tongde Garden, the more often residents visit open spaces, the higher social capital they have.	Null hypothesis could not be rejected
Sub-Hypothesis 3-2: In Tongde Garden, the longer residents who stay in open spaces during work days, the higher level of social capital they have.	Null hypothesis could not be rejected
Sub-Hypothesis 3-2: In Tongde Garden, the longer residents who stay in open spaces during weekend, the higher level of social capital they have.	Null hypothesis could not be rejected
Sub-Hypothesis 3-4: In Lingnan Garden, the more often residents visit open spaces, the higher social capital they have.	Null hypothesis could not be rejected
Sub-Hypothesis 3-5: In Lingnan Garden, the longer residents who stay in open spaces during work days, the higher level of social capital they have.	Null hypothesis could not be rejected
Sub-Hypothesis 3-6: In Lingnan Garden, the longer residents who stay in open spaces during weekend, the higher level of social capital they have.	Null hypothesis could not be rejected

(4) Hypothesis 4: Those residents with a higher degree of satisfaction with neighborhood open spaces have developed a higher level of social capital than those

residents who are not satisfied with neighborhood open spaces.

There were eight sub-hypotheses were generated regarding the relationship between residents' environmental satisfaction and social capital (Table 5.4).

TABLE 5.4
Research Findings of Hypothesis 4

Hypothesis	Results
Sub-Hypothesis 4-1: In Tongde Garden, the more residents are satisfied with neighborhood open spaces, the more often they visit open spaces.	Null hypothesis could not be rejected
Sub-Hypothesis 4-2: In Tongde Garden, the more residents are satisfied with neighborhood open spaces, the longer they stay in open spaces during work days.	Null hypothesis could not be rejected
Sub-Hypothesis 4-3: In Tongde Garden, the more residents are satisfied with neighborhood open spaces, the longer they stay in open spaces during weekend.	Null hypothesis could not be rejected
Sub-Hypothesis 4-4: In Tongde Garden, the more residents are satisfied with neighborhood open spaces, the higher degree of social capital they have.	Null hypothesis could not be rejected
Sub-Hypothesis 4-5: In Lingnan Garden, the more residents are satisfied with neighborhood open spaces, the more often they visit open spaces.	Null hypothesis could not be rejected

TABLE 5.4 (Continued)

Hypothesis	Results
Sub-Hypothesis 4-6: In Lingnan Garden, the more residents are satisfied with neighborhood open spaces, the longer they stay in open spaces during work days.	Null hypothesis could not be rejected
Sub-Hypothesis 4-7: In Lingnan Garden, the more residents are satisfied with neighborhood open spaces, the longer they stay in open spaces during weekend.	Null hypothesis could not be rejected
Sub-Hypothesis 4-8: In Lingnan Garden, the more residents are satisfied with neighborhood open spaces, the higher degree of social capital they have.	Null hypothesis could not be rejected

5.1.2. Research Findings from Semi-structured Interview

Through statistical examinations, people's socio-economic-demographic characteristics were not found to cause obvious differences in social capital between the two target neighborhoods. The tests of four hypotheses, however, indicated that the neighborhood open spaces actually did affect residents' social capital: the more open spaces they had, the higher degree of social capital residents attained; the more they used open spaces, the higher degree of social capital they had; and the higher level of environmental satisfaction they held, the higher degree of social capital they had. Thus, semi-structured interviews were conducted to explore why and how neighborhood open

spaces affected individuals' social capital, which were further analyzed by domain analysis strategy to generate five principal domains, a variety of sub-domains, and items.

The first domain was the reasons why people chose the target neighborhood for their residences, which included four sub-domains: emotional concerns, economic concerns, housing quality and physical environment. The emotional bond was formed on the basis of a long period of living in Tongdewei and close family ties with relatives living in the same area. Economic concerns included the lower financial burden of living and working in this area and the relatively lower housing price. Good housing quality, including design, construction, and facility management, was another concern when purchasing a residence. These factors, however, could be found in most neighborhoods in this area except for, particularly good physical environments in selected two neighborhoods. Both Tongde Garden and Lingnan Garden, when they opened in 1997 and 2001 respectively, were regarded as highly desirable neighborhoods mainly due to their physical environments. In 1997, Tongde Garden had neighborhood parks inside that were highlights then. In 2001, besides the rich landscape in open spaces for visual pleasure, the open spaces, equipped with a large number of facilities, in Lingnan Garden were designed to accommodate various types of activities.

The second domain was about how social interactions in neighborhoods were affected by the provision of open spaces. The foundation of social interactions among

residents was eventually identified as having common interests and familiarity. The ways of getting acquainted with others in Tongde Garden were greeting in open spaces, chatting when children played in open spaces, and exercising; comparatively, residents in Lingnan Garden knew more neighbors in that, besides just mentioned three ways, they had more group activities in open spaces, such as dancing and playing Jianqiu. However, except for some personal reasons, such as being too busy, too tired, and different lifestyles, open spaces were also considered as the most critical physical factor impeding social interaction. For instance, the lack of open spaces in Tongde Garden was reported as the main reason why residents did not know their neighbors and had few social interactions with others; and in Lingnan Garden, young adults did not use open spaces often in that there were not suitable facilities for them.

The third domain was identified as differences in individuals' activities in neighborhood open spaces, which included passive activities and active activities. Based on interviews with people from Tongde Garden, passive activities, such as sitting, viewing, or walking by themselves, accounted for the main part of residents' activities in open spaces; active activities that took place among people and were beneficial to social interaction were limited, with only a small group of residents doing morning exercise in one place and children playing around neighborhood park in Phase II. In contrast, in Lingnan Garden, passive activities were seldom mentioned, and more active recreations

were reported as occurring in various open spaces, including conversations, children's play, exercises, dancing, the elderly singing Cantonese opera, and adult group playing. Hence, residents in Lingnan Garden had more opportunities to know others and enjoy social interactions than residents in Tongde Garden.

Since neighborhood open spaces were considered by respondents as an important catalyst for their social interactions, it was necessary to explore what aspects of open spaces attracted them and what aspects impeded them using and staying in these spaces. The spatial hierarchy of public-semipublic-semiprivate-private places the high frequency of using open spaces enabled residents in Lingnan Garden to have strong sense of territoriality and clear mental map of their neighborhood, whereas residents in Tongde Garden had a comparatively weak sense of territoriality due to vague spatial hierarchy and seldom visiting open spaces. Residents' favorite attributes of neighborhood open spaces included easy access, natural surveillance, traffic free, abundant landscape, and water. Aspects of open spaces in Tongde Garden that impeded residents' usage of them included noise and air pollution from roads, lacking seats and lights, small size, improper location of facilities, and automobiles in open spaces.

The last domain was factors in relation to social capital which indicated that neighborhood open spaces may function as a platform for impeding or improving social capital. Social network is the first factor. Typically, residents in Tongde Garden were

found to have smaller social networks than residents in Lingnan Garden (Figure 5.1); the main way of expanding social network in Tongde Garden was through children. However, in Lingnan Garden, respondents had more chance to know other through activities taking place in open spaces. Trust, as the second factor for social capital, depended mostly upon familiarity, which could be enhanced through social interaction in open spaces. The third factor was belonging. Although respondents said their sense of belonging came from longer term residency, the preceding statistical test indicated that residency did not affect social capital. Rather, the friendly atmosphere formed through social interactions and activities had a bigger impact. Safety and security, the fourth factor, was influenced by open spaces as well in that reasonably designed open spaces in Lingnan Garden attracted people even at night, which made them feel safer. Finally, open spaces provided a physical platform for community events, group activities that improved residents' engagement, the last interpersonal factor of social capital.

Independent Samples Test

		Levene's Test for quality of Variance		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	ig. (2-tailed	Mean Difference	Std. Error Difference	Lower	Upper
FRIENI	Equal variances as	5.212	.023	-2.106	376	.036	-1.16	.550	-2.240	-.077
	Equal variances no assumed			-2.109	354.215	.036	-1.16	.549	-2.239	-.078

Figure 5.1: t-test of the Means of the Number of Residents' Friends in Neighborhoods

5.1.3 Research Findings from Observation

As a complementary method to questionnaire survey and interviews in this study, the principal investigator observed and recorded residents' activities in open spaces and compared these findings with the statistical tests and the qualitative analysis of interviews.

In both neighborhoods, the majority of the activities of the elderly were static, including sitting, viewing, and conversation. They preferred the places where there were enough seats or something which can be used as seat, such as big rocks; where they could see children playing around; and where there were some attractive amenities, such as a pond with goldfish or other functions making the area more active, such as a grocery store. Besides, the elderly also had group exercises, such as playing Taiqi.

The majority of adult activities in open spaces were dynamic and more active, including taking a walk, jogging, group exercises and games. Consequently, they selected places where the size was big enough for a group of people's active actions; there was no traffic; and they would not disturb or be disturbed by other residents.

Even though children were not the subjects of this study, their activities were still recorded in that when they played in open spaces, most of them were accompanied by adults or the elderly, who were the subjects of the study. Children, whether in Tongde Garden or Lingnan Garden, were observed to play often in such areas where they were

under their parents' surveillance; there were no automobiles; and there were facilities set up for children.

Another important finding from observation was that those open spaces with a higher degree of the diversity for various functions and the compatibility for containing multiple activities in one space attracted and encouraged people's using them. Either in Tongde Garden or Lingnan Garden, residents were found to concentrate in the mini-park in Phase II of Tongde Garden and Third Lingnan Street. The common characteristic of these two places was that they provided multiple possibilities for various age groups of resident activities.

5.2 DISCUSSION AND CONCLUSION

5.2.1 Discussion

Through comparing socio-economic-demographic characteristics between residents in the two neighborhoods, it was found that there were three obvious differences: residents in Lingnan Garden were typically three years younger than residents in Tongde Garden; residents in Lingnan Garden had a higher employment and a lower retirement rate than the residents in Tongde Garden; and residents of Lingnan Garden had lived there for shorter period than residents of Tongde Garden. The further examinations demonstrate that the difference in these aspects did not lead to the

difference in social capital between two groups of residents. The results of hypotheses tests indicated that residents in Lingnan Garden with a large number of open spaces had higher levels of social capital than Tongde residents who had less open spaces; in same one neighborhood, people who used open spaces frequently showed higher social capital than those who seldom used open spaces; and there was a positive correlate between environmental satisfaction with open spaces and the degree of social capital.

According to an investigation conducted in China's three big cities (Wang, 2003), younger residents spent the majority of their leisure time obtaining new knowledge or using the internet and computer, and the elderly spent a lot of leisure time in exercises or other activities in outdoor spaces. Unemployed and retired residents have more leisure time than employed residents, which means that residents in Tongde Garden should have more leisure time than residents in Lingnan Garden. This investigation also revealed that social interaction and physical exercise had become the main forms of leisure, which means that the more leisure time residents have the higher degree of social capital they may attain. In addition, several researchers (Grange & Ming, 2000; Manzo, 2003) also found that the length of residency was positively correlated to resident social capital. However, the test of Hypothesis 1, that residents in Lingnan Garden had higher degree of social capital than residents in Tongde Garden, was contrary to the preceding assumptions. The reasonable explanation for the difference in social capital between

these two groups of residents in the target neighborhoods, whose socio-economic-demographic characteristics were almost same, was the difference in neighborhood open space provision in these two neighborhoods. The open spaces in Tongde Garden neither had adequate quantity nor function well as a platform for improving people's social interaction, belonging, trust, safety and security, and engagement; rather, neighborhood open spaces in Lingnan Garden-like amenities attracted residents to socialize with each other.

Retired residents were expected to have a higher degree of social capital in that they had more time to take part in social activities. Based on statistical examinations, this assumption was proved to be true in Lingnan Garden. Nevertheless, those residents in Tongde Garden whose ages were 61 years-old and up, that is, most of whom were retired as the custom in China, did not show higher degree of social capita than other age groups. This further implies the important effect of neighborhood open spaces on social capital in that, even though retired people in Tongde Garden had more time for socialization, they did not have places and opportunities to get together.

Residents in Lingnan Garden had higher degrees of the four interpersonal factors of social capital, social network, trust, belonging, safety and security, than residents in Tongde Garden except for engagement, in which there was no difference between the two neighborhoods. In China's urban neighborhoods, residents have few

opportunities to engage in the decision-making processes and other neighborhood organizations protecting resident rights, because these organizations are not yet developed well. In some neighborhoods, resident committees or resident associations were established, such as the resident association in Lingnan Garden, but they are still supervised by the local government unit, which greatly limits the involvement of the majority of residents. Therefore, in both neighborhoods, individuals' engagement was at a low level.

Based on their investigation, Putnam (2000) and Monti *et al*. (2003) argued that Americans had experienced the transition of socializing forms. At the neighborhood level, the socializing form has been changed from visit neighbors more frequently before to the current situation that individuals visit more their friends who are not living in the same neighborhood. This trend was also demonstrated by Guest and Wierzbicki (1999) who observed people's preference to hang out with their friends rather than their neighbors. Furthermore, they found the types of individuals getting integrated were not in terms of socializing activities but the types of organizations they join. People are more linked to unions, ancestral groups, professional associations, and other formal organizations, and becoming far from church, veteran's groups, or farm groups. It is obvious that Americans stay longer with those who are somehow similar to themselves and those who they are accustomed to seeing in the organizations. In contrast, the residents in China urban

neighborhoods participate few formal organization and are involved more in informal social activities. The major participants of these informal social activities are the elderly and children. Chinese elderly traditionally are willing to live with their adult children and enjoy taking care of their grandchildren, which result in the elderly have few connection with outsiders, especially after they retired, and have not much time to socialize with those people living in other neighborhoods. This situation is more common in low- and lower-middle income families because the elderly not only take care of grandchildren can that reduces their children's economic burden of daycare, but also enable adults to save the time and energy spent in housework. Consequently, the neighborhood becomes the center of the aged people's life.

5.2.2 Conclusions

By far, in western societies, social capital has been considered to be enhanced mainly by improving individuals' 'soft' environment that includes various types of civilian organizations, social supports, government assistance, and so forth. Because China's urban residents currently have little access to 'soft' environment, the effects of their physical environment on social capital were explored in this study. The results indicated that, on the one hand, neighborhood open spaces could improve the development of social capital if residents have a large number of well-designed open

spaces, if they take part in social activities frequently, and if they are satisfied with these open spaces; on the other hand, neighborhood open spaces could impede, or at least not be beneficial to, the development of social capital if residents feel bored or, even worse, unsafe when in these spaces.

According to Wang and his colleagues (2003), the leisure time that Chinese urban residents spend outside of home has been increased from forty-five minutes daily to ninety minutes daily, which included socializing, exercising, shopping, entertaining, continuing education, and so forth; however, it was found that high cost was a critical factor impeding people from going out for entertainment. Therefore, neighborhood open spaces are especially crucial to low- and low-middle income families in that they can easily access these spaces for free. Moreover, well-designed open spaces, which take into account various residents needs and are equipped with a number of facilities suitable for various age groups, will greatly attract residents to get together and act as a physical catalyst for expanding their social network, strengthening mutual trust, improving belongingness, enhancing safety and security, and developing engagement.

In general, in current China's urban area, the accelerating economic transition and the rapid urbanization have triggered off the critical changes in all aspects of people's life, including ideology, culture, lifestyle, housing provision, and so forth. Regarding the micro-environment at the neighborhood level, the changes in population

composition and physical environment greatly impaired the effectiveness of the traditional means to form and maintain relationships between neighbors. Therefore, in order to develop communities by re-constructing and improving resident social capital, it is of great urgency to develop neighborhood open spaces not only for aesthetic pleasure, but more importantly for people's practical use.

5.3 LIMITATIONS OF THE STUDY

Several types of limitations of the study emerged during the process of the research. The first limitation is related to the geographic locations of the two target neighborhoods. Since this study was conducted in only one sub-district of the city of Guangzhou, which just had 2.5% of the entire population of Guangzhou, results cannot be generalized to other districts of the city. Results also cannot be generalized to other cities, especially cities in North China, due to the culture differences between other provinces and Canton province, as well as the huge climate difference between the north and the south. The limitation is related to typology. This research was conducted regarding multi-storey housing and there are obvious differences in behavior patterns between multi-storey housing and high-rise housing. Therefore, results cannot be generalized directly to high-rise or villa neighborhoods. Research results cannot be applied to other income levels neighborhoods, such as high- and middle-income

communities, because the obvious economic gap may change the results of this study. The final type of limitation is related to research subjects. Because this study focused on the perception and activities of adults and the elderly, the results may not apply to teenagers and kids.

5.4 RECOMMENDATIONS

5.4.1 Recommendations for Future Study

The limitations, on the one hand, confine the application of research results. On the other hand, they imply potential directions for future studies. The first potential research direction is to expand the scale of investigation to a greater sector of the city and include all income levels of neighborhoods, which will greatly improve the generalization of the results. Next, it is possible to create a research network to cover more cities located in China's different regions so as to maximize the understanding of social capital and its relationships to physical environment. Exploring the relationships between physical environment and social capital in high-rise housing is another important research direction. As the urban population continues to increase, high-rise neighborhoods will inevitably be the main stream of urban housing. Within this type of neighborhood, residents' behavior pattern, mutual relationship and physical environment vary from living in low-rise housing. What will these variations influence inhabitants'

social capital? How to develop social capital in high-rise housing? These are critical topics for both the West and China.

In this study, intermediary associations and organizations were not found in target neighborhoods. Therefore, it was impossible to explore the relationships between the intermediary associations and organizations level of social capital and neighborhood open spaces. However, the development of intermediary associations and organizations in China's urban neighborhoods is an irreversible trend because residents are looking for them. As an interviewee in Lingnan Garden said:

> People need spirit communication! Neighborhood should be a big family for all of us, neighborhood should be a platform creating our own culture and providing opportunities to let us join various groups and organizations. Only by this way, we will be involved in this big family and feel this is my home. But now, I do not have that sense.

In addition, studies relative to social capital in western societies demonstrate that the development of intermediary associations and organizations have indeed improved social capital. Nevertheless, it is by no means fully understood whether a physical environment can affect the intermediary associations and organizations; and how the intermediary associations and organizations changes a physical environment.

5.4.2 Recommendation for the Future Design of Neighborhood Open Spaces

During interviews, respondents expressed opinions regarding neighborhood open spaces, which showed which open spaces they preferred, what aspects of open

spaces should be improved, and what kind of open spaces they were eager for. Observation also provided information about the physical features in the places where residents often visited. Hence, in combination with design guidelines for and researches on open spaces in the west, several design recommendations are proposed for the future physical design of China's neighborhood open spaces so as to improve social activities in open spaces, which are analyzed based on Tongde Garden and Lingnan Garden.

(1) Improve the spatial hierarchy of neighborhood open spaces by adding entry gardens to each housing cluster. Oscar Newman (1972, 1996) found that a complete spatial hierarchy could affect people's territoriality and the number of people an individual can recognize, which greatly influenced social interaction and belongingness. As he suggested, a complete spatial hierarchy should include public, semi-public, semi-private, and private spaces (Figure 5.2)

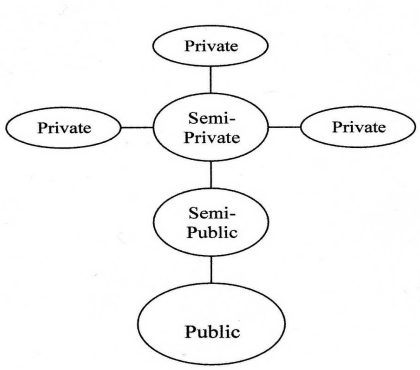


Figure 5.2: Spatial Hierarchy

The spatial hierarchy of Tongde Garden was not completely defined. For instance, the cluster shown in Figure 5.3 in which a road runs through and there was no difference in landscape between “inside” and “outside”. Its spatial hierarchy is public (roads)-semiprivate (the small space between buildings)-private (within buildings). The suggested solution is to close the west end of the road and add an entry garden at its east side to create a mini-neighborhood. The entry garden is a semi-public space and acts as a buffering zone between public roads and the space inside the cluster. In terms of function, semi-private spaces should be mainly for aesthetic use in that interviewees of this study did not like people staying longer or having conversations with others that either made noises or intruded others’ privacy. An entry garden not only provides pleasing image but also primarily focuses on improving residents’ activities. The main entry area was a favorite spot for the elderly sitting, viewing and chatting (Carstens, 1998). Thus, it is better to arrange seats close to pathways and facing attractive and pleasing landscape features, such as a pond.

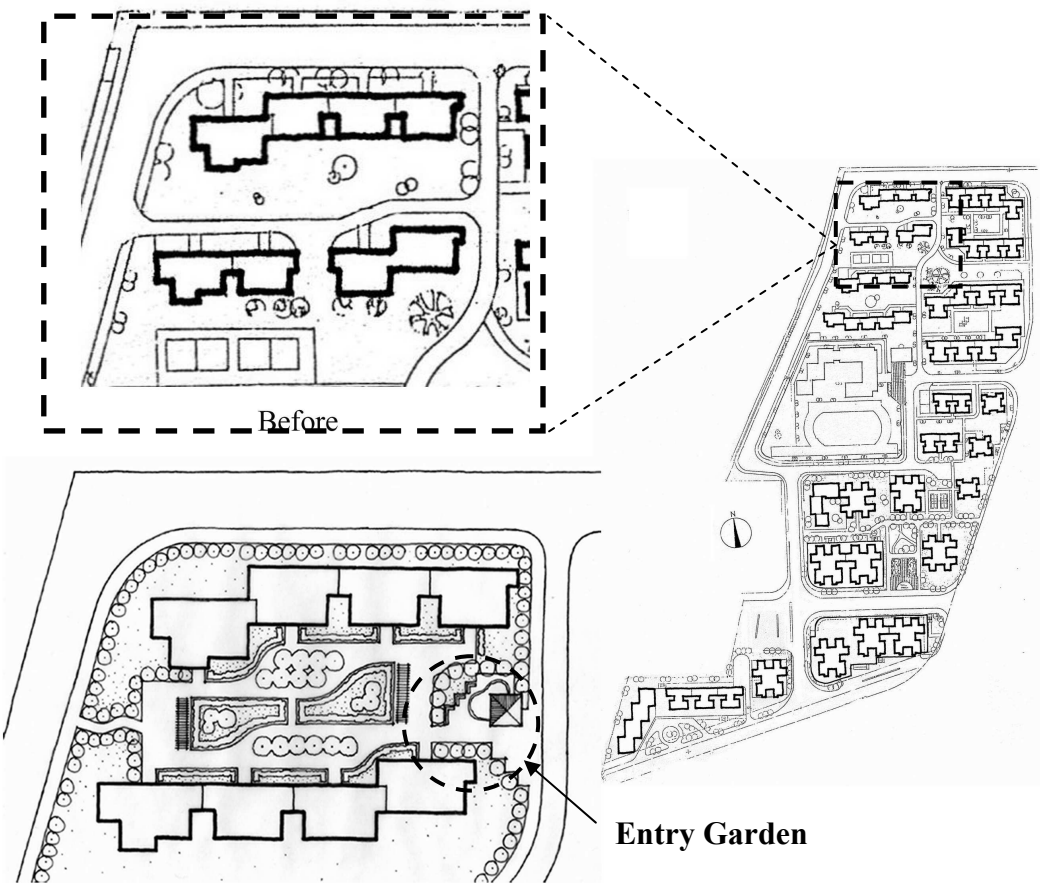


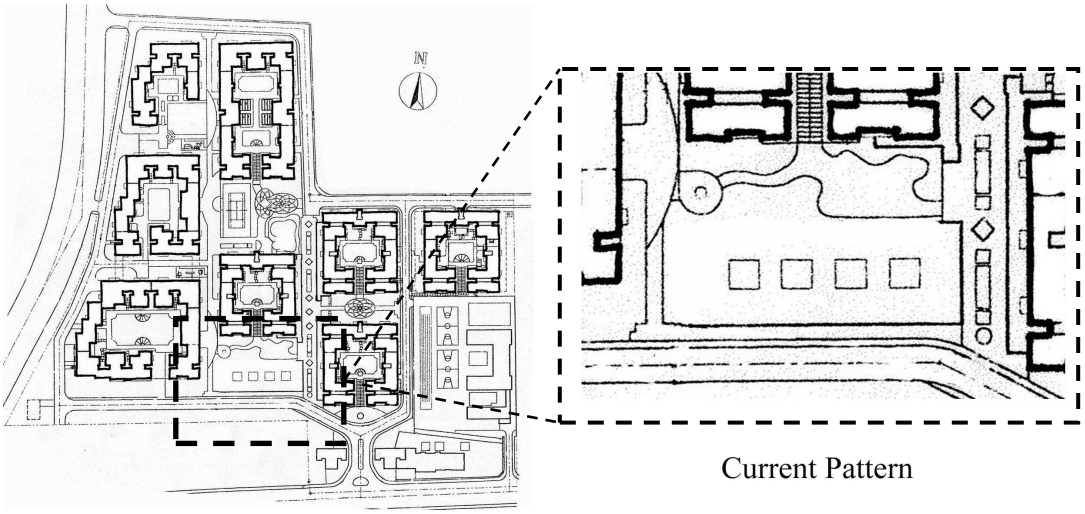
Figure 5.3: Concept Design of Entry Garden

(2) Create a focal space with the high degree of diversity and flexibility. A focal space in a neighborhood, on the one hand, dominates all other public spaces and enriches the spatial structure; on the other hand, it provides spaces for collective activities and gathering. An interviewee in Tongde Garden thought if a space allowed adults to play together while their children play nearby, she would go there frequently. Even though

there are a variety of open spaces in Lingnan Garden, a male adult living in Lingnan Garden said he was eager for spaces big enough for group sports,

> …as you saw, all these facilities and spaces are designed for individual activities, and not good for a group of people playing, such as play basketball. It is very silly to invite your friends to play horizontal bar in Sunday morning, isn't it?

Therefore, a place satisfying the needs of residents of various ages and providing multiple possibilities of activities will stimulate the people who use it and thereby improve social interaction. This space firstly should satisfy the needs of the elderly, such as seats and a quiet. Next, it should include a sports area for active adults and a chatting area for passive adults as well. Finally, since one of children's major categories of play is the social dimension that is the way children become more collaborative and cooperative when play with adults and with each other (Brett et al, 1993), a play ground should be integrated into this space, which enable children under their parents' surveillance and learn social skills from other age groups (Figure 5.4).



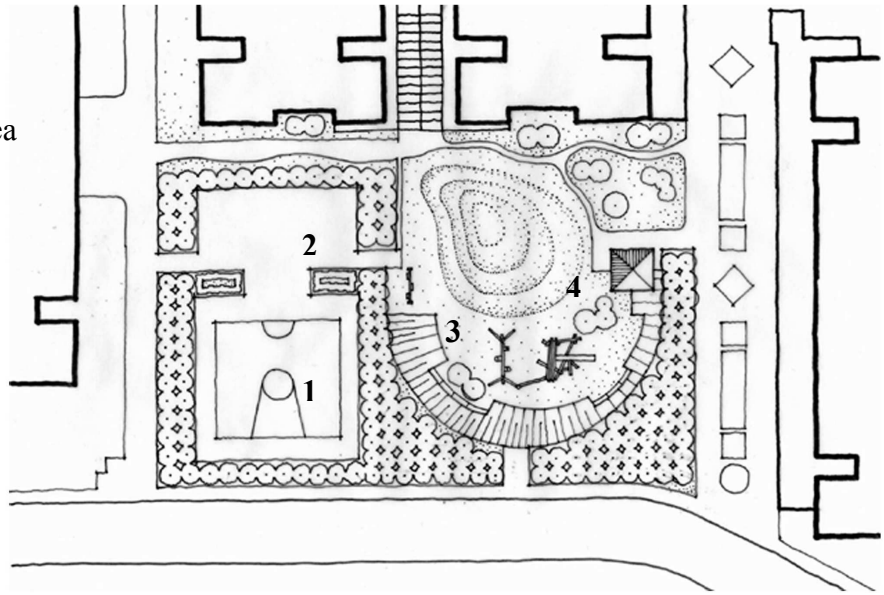
Current Pattern

1-Sports Area

2-Gathering Area

3-Playground

4-Rest Area



Concept Design of Focal Space

Figure 5.4: Concept Design of Focal Space

Following are more detail design recommendations of the focal space:

- The focal space should not be located closely beside residential space to avoid disturbing resident's rest, these spaces should be adjacent to the intersection of main

pedestrian paths so that it can be easily found and accessed.

- A playground should be designed in reference to "multizoned play environment" (Eriksen, 1985) in which different kinds of play will be provided for children of all age and combine a variety of materials, equipment, and surfaces into different areas.
- The area for adult active activities is better located when it adjoins the area of playground for older children, and place the area for the elderly should be close to the area of playground for young children.
- Place buffer zones between areas of different age groups, which should keep visual communication but maintain psychological separation.
- Provide a pavilion or other rest area facilities which provide a place for the age groups to come together.

(3) To locate open spaces away from the main municipal roads. Open spaces are suggested to be placed in the peripheral area of a neighborhood as the buffering zone to outside environment (Hanson & Hanson, 2005), like the small park in Phase I and open spaces in Phase III of Tongde Garden. These spaces, however, were not used often because of noise and automobile exhaust. Therefore, it is suggested that open spaces need to be placed away from the roads with heavy traffic, or at least separated from those roads by a buffering zone, such as a wooded area that minimizes intrusive noises and smells.

(4) Design internal neighborhood streets to reduce the risk from automobiles and

improve social activities. It is very difficult to keep all vehicles outside to get an absolute traffic-free neighborhood. In addition, normally, streets are the largest amount of open spaces in a neighborhood. Researchers found that changing the pattern of streets could improve social interactions and livability (Appleyard, 1980; Skjaeveland, 2001). For instance, *Woonerf*, "street for living" in Dutch, is a common space shared by pedestrians, bicyclists, and low-speed motor vehicles. They are usually streets raised to the same grade as curbs and sidewalks, and vehicles are slowed to the speed as slow as 5 km/hour by placing trees, planters, parking areas, and other obstacles in the street. Motorists are treated as intruders and must travel at walking speed.

5.4.3 Redesign of Tongde Garden

In regard to the problems observed during the field work and interviewees' opinion about Tongde Garden, a concept redesign of Tongde Garden is proposed according to the recommended design principles (Figure 5.5).

(1) Improve spatial hierarchy

The current spatial hierarchy is only three levels of public-semiprivate-private. The suggested design is to cluster buildings into three mini-neighborhoods and add entry gardens as the semipublic level. Within each mini-neighborhood, a courtyard is designed as semi-private spaces for esthetics appreciation and passive activities.

Figure 5.5: Redesign of Tongde Garden

(2) Redesign of neighborhood internal street structure and pattern

The current street structure caused the pedestrian-traffic conflict, which threatened residents in open spaces; the street between Phase II and III separated the whole neighborhood into isolated pieces that resulted in residents' incomplete mental picture of the neighborhood. The redesign creates a traffic-free environment: single one street for automotives runs along the north, west, and south sides of the site; and the main pedestrian entrance is located in the middle of the east side. Two parts of the street are designed as *Woonerf* that integrate the street with planting, play areas, and rest areas.

(3) Adjust the position of primary school

Another important adjustment is to change the position of primary school from located in the middle of the neighborhood to located in the south section of the neighborhood, which stands as a separated unit instead of mixing with other residential buildings that led to traffic inside neighborhood and the disturbance to residents caused by students from other neighborhoods.

(4) Add amenities

The suggested redesign proposes adding other amenities to improve the living quality. A community center provides indoor activities for residents, such as table tennis, library, chess, and so forth. Separated parking lots are designed close to mini-neighborhoods to avoid parking on street. Along the east side adjoin to the main

local road, commercial buildings are designed at the ground floor that both can maintain active street life and can prevent noises and smells from entering the neighborhood.

(5) Redesign of open spaces

In suggested redesign, the majority of index will maintain same as before or just slightly changed (Table 5.5). However, the greenery rate will be increased from 26.14% to 29.49%, which will be achieved by decreasing the area of automotive roads. The increased area will be used for landscape construction and open spaces. The redesign suggests a focal space including sports space, gathering space, playground, and rest area. Further, within each court yard, the landscape is to be designed according to residents' favorites, such as water.

TABLE 5.5
General Index of Redesigned Tongde Garden

		Original	Redesign
Overall Land Area	m^2	89,500	89,500
Overall Building Area	m^2	163,785	163,400
Housing Area	m^2	148,765	148,380
Commercial Building Area	m^2	3,500	3,500
Municipal Facility	m^2	3,720	3,720
Education Facility	m^2	7,800	7,800
Number of Units	-	1,638	1,635
Population	Person	5,500	5,490
Floor-area Rate	-	1.83	1.826
Building Density	%	23.46	23.41
Greenery Rate	%	26.14	29.49

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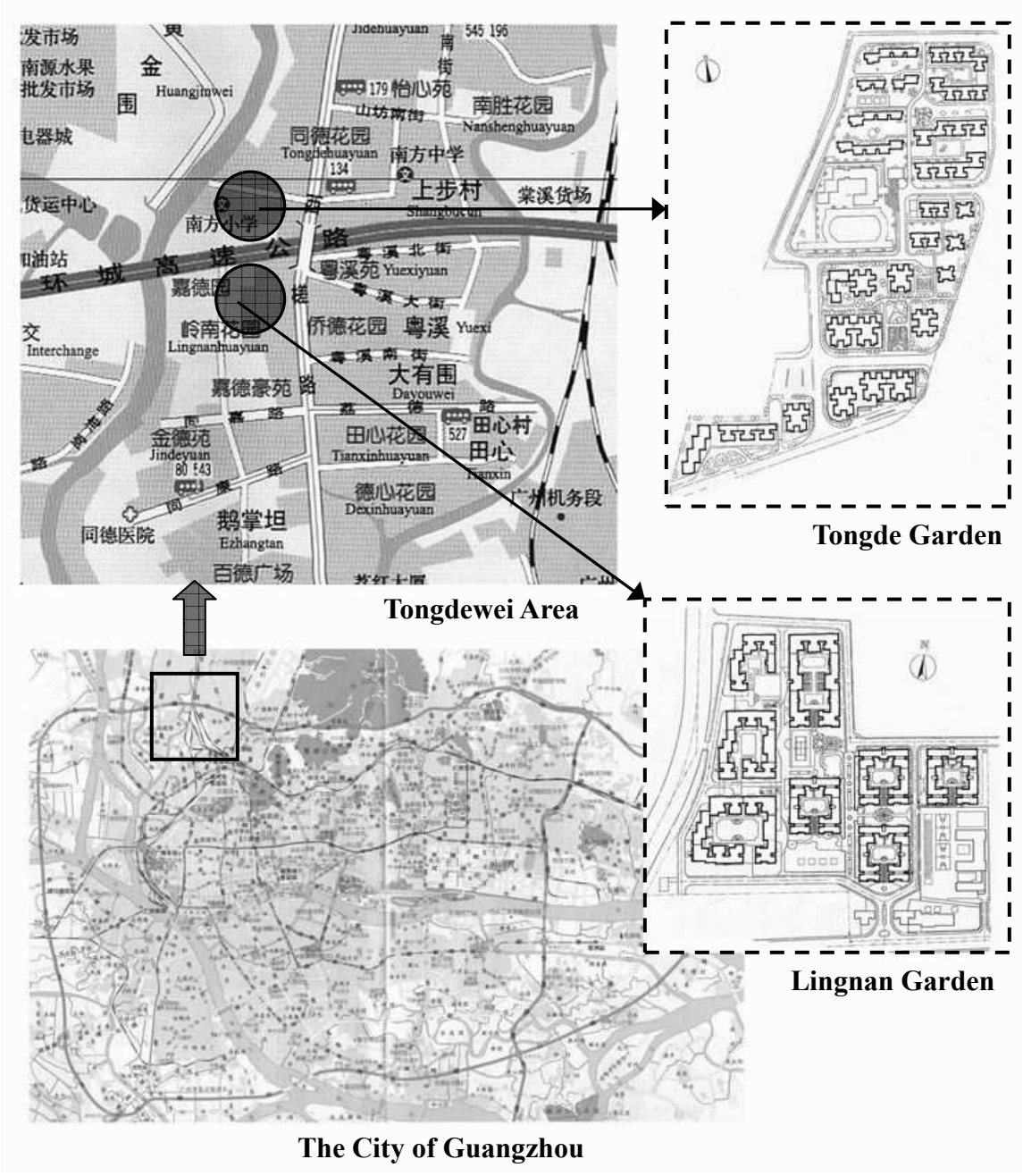
APPENDICES

APPENDIX A

THE LOCATION OF THE CITY OF GUANGZHOU

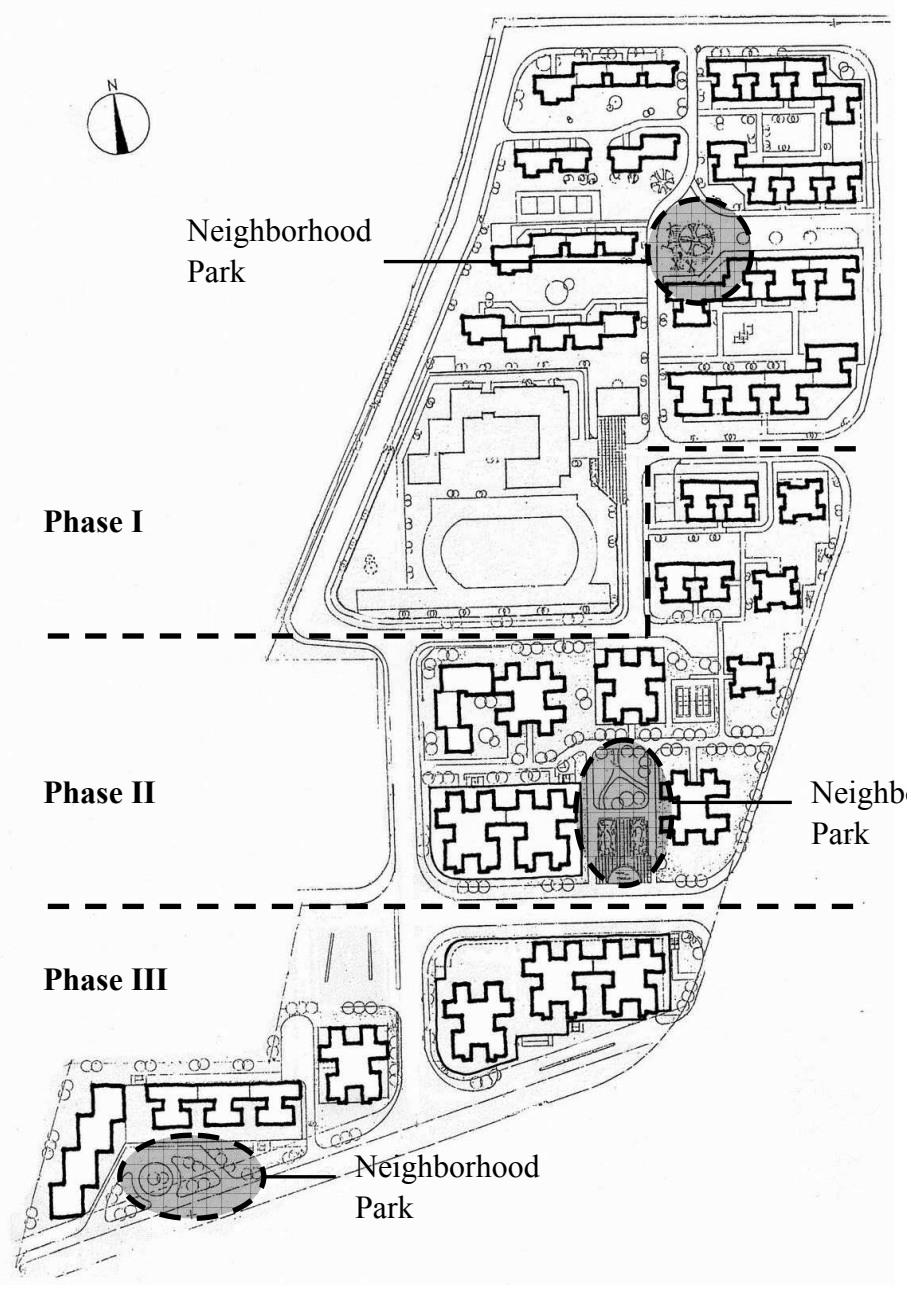
APPENDIX B

THE LOCATION OF RESEARCH FIELDS



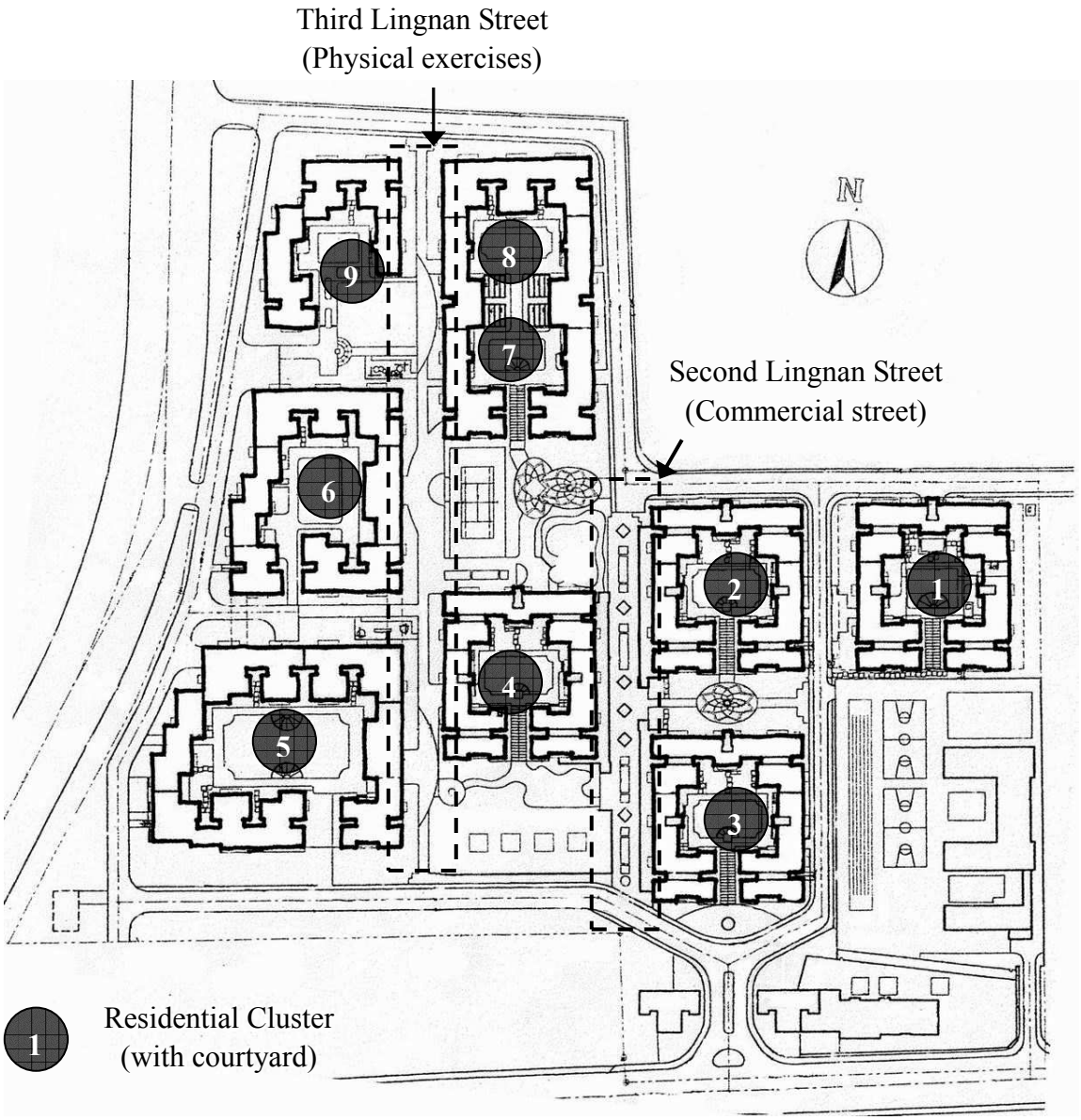
APPENDIX C

MASTER PLAN OF TONGDE GARDEN



APPENDIX D

MASTER PLAN OF LINGNAN GARDEN



APPENDIX E

OPEN SPACES IN TONGDE GARDEN

The Small Park in Phase I

The Small Park in Phase II

The Small Park in Phase III

Typical Space between Buildings

APPENDIX F

OPEN SPACES IN LINGNAN GARDEN

- Second Lingnan Street

- Third Lingnan Street

- Courtyards






- Open Spaces

APPENDIX G

SURVEY QESTIONNAIRE

Of Neighborhood Open Spaces and Residents' Social Life

SURVEY

BY TEXAS A & M UNIVERSITY

June 1, 2005

Dear Sir/Madam, I am a doctoral student in Department of Architecture at Texas A&M University and this is a part of a research of China's urban neighborhood. During the construction of new housing development in Chinese cities, we are re-establishing a new social network and neighborhood. This study tries to find answer how open spaces in neighborhood influence residents' social life. This questionnaire will ask you questions about open spaces, social life, and activities in open spaces. The completion of each question will be very helpful for my study. Your participation in this survey will be anonymous and you cannot be identified in any way. Please return the completed questionnaire in the self-addressed and stamped envelope with seven days. If you have any questions about this study, please call me at: (020) 8360 2688 or 001-979-8629216. Thank you very much for your cooperation and participation.

Best regards,

Bin Kang
Ph.D Candidate
Department of Architecture, Texas A&M University
College Station, Texas 77843-3137

All information provided by you will be for research purposes only and will be kept strictly confidential. Now, please answer all questions listed bellow.

1. Your gender is: ☐ Male ☐ Female

2. What is your marital status?
   ☐ Married
   ☐ Single
   ☐ Other (please explain)_____

3. What year were you born? ____

4. How many years have you lived in this neighborhood? ____ years.

5. Please indicate the ownership of the flat you are living in:
   ☐ Purchase ☐ Rent ☐ Other (please explain) _____

6. What best describes your current employment status?
   ☐ Employed
   ☐ Not employed
   ☐ Retired
   ☐ Other (please explain) _____

7. What best describes your education background?
   ☐ Primary school
   ☐ High school
   ☐ Undergraduate
   ☐ Post graduate

8. How many friends do you have in this neighborhood? (These people you feel at ease with, talk to about private matters, or call on for help.) Please list the number here_____

9. Among these people, how many do you know them through members of your household (exclude your children)? Please give number here _____

10. Among those people, how many do you know them through some of them? Please give number here _____

11. Do you have children? ☐ Yes ☐ No

12. If you have children, how many people you know them through your children? _____ (If you do not have children, please skip this question)

13. In this neighborhood, are you belonging to any groups or associations or organizations? This could be formally organized groups or groups of people who regularly get together to do an activity or talk about things.
☐ Yes ☐ No

14. If yes, how many groups/associations/organizations are you belong to? _____ (number)
If no, please skip to Question 15.

15. How likely is it that you stay with people from same one group/association/organization in open spaces?
(1) Very likely
(2) Somewhat likely
(3) Neither likely nor unlikely
(4) Somewhat unlikely
(5) Very unlikely

16. If there is a park in your neighborhood, how often do you stop by the park per week? (If there is no a neighborhood park, please skip this question):
(1) None
(2) 1 ~ 3 times
(3) 4 ~ 6 times
(4) 7 times or more

17. Normally, how much time do you spend in outdoor public spaces daily during Monday to Friday?
(1) Less than 30 minutes
(2) 31 minutes ~ 60 minutes
(3) 61 minutes ~ 90 minutes
(4) More than 90 minutes

18. Normally, how much time do you spend in outdoor public spaces in Saturday and Sunday?
(1) Less than 30 minutes
(2) 31 minutes ~ 60 minutes
(3) 61 minutes ~ 90 minutes
(4) More than 90 minutes

19. Are you satisfied with open spaces in your neighborhood?
(1) Very satisfied
(2) Somewhat satisfied
(3) Neither satisfied nor dissatisfied
(4) Somewhat dissatisfied
(5) Very dissatisfied

20. Regarding physical attributes of open space, I am satisfied with the:

	Strongly Disagree 1	2	3	4	Strongly Agree 5
(1) size of open spaces	☐	☐	☐	☐	☐
(2) location of open space	☐	☐	☐	☐	☐
(3) landscape in open space	☐	☐	☐	☐	☐
(4) free from noise	☐	☐	☐	☐	☐
(5) free from traffic	☐	☐	☐	☐	☐
(6) free from air pollution	☐	☐	☐	☐	☐
(7) plenty space for exercises	☐	☐	☐	☐	☐
(8) plenty places for sitting	☐	☐	☐	☐	☐

21. How long does it take to walk from your flat to the neighborhood park?
    (1) Less than 5 minutes
    (2) About 5 minutes to 10 minutes
    (3) About 10 minutes to 15 minutes
    (4) Longer than 15 minutes

22. Do you agree that most people in this neighborhood can be trusted?
    (1) Strongly agree
    (2) Somewhat agree
    (3) Neither agree nor disagree
    (4) Somewhat disagree
    (5) Strongly disagree

23. How likely is it that you feel that you are a part of the neighborhood?
    (1) Very likely
    (2) Somewhat likely
    (3) Neither likely nor unlikely
    (4) Somewhat unlikely
    (5) Very unlikely

24. In the past twelve months, have you worked with others in your neighborhood to do something that benefits the neighborhood?
    ☐ Yes ☐ No

25. In terms of crime, traffic threat, and air and water pollution, do you think your neighborhood is a safe place?
    (1) Totally agree
    (2) Somewhat agree
    (3) Neither agree nor disagree
    (4) Somewhat disagree
    (5) Totally disagree

26. Are you satisfied with your social network?
    (1) Very satisfied
    (2) Somewhat satisfied
    (3) Neither satisfied nor dissatisfied
    (4) Somewhat dissatisfied
    (5) Very dissatisfied

27. To what extent do you participate in public activities on the scale?
    (1) Very few
    (2) Somewhat few
    (3) Neither few nor frequently
    (4) Somewhat frequently
    (5) Very frequently

----------End of Questionnaire----------

APPENDIX H

INTERVIEW QUESTIONS

General Questions:

1. How old are you?
2. What is your occupation?
3. Do you live with any children or the elderly?
4. Do you own or rent this flat?
5. How long have you lived in this neighborhood?
6. Why did you choose this neighborhood to live?

Specific Questions:

1) Regarding social network and social relationship

- How many people do you know in this neighborhood? Among them, are there any your relatives or colleagues?
- Among your acquaintances, is there anyone you meet for the first time in open spaces?
- How do you maintain your social network in you daily life?
- Can you feel the economic difference between you and your neighbors? (Will you make friends with those residents economically different from you?)
- Do you think participating in activities in open spaces will expand and improve your social network and interactions?
- How do you describe the relationships between neighbors?
- Have you ever had a situation that your and your friends' usage of place was conflict with others? What was the situation? How did you do to deal with?

2) Regarding outdoor public places:

- Please draw a simple map of the neighborhood. (Where is the main road? Where is the neighborhood park, and so forth)
- Could you mark the locale of outdoor public places in which residents like to stay? (Show interviewee the master plan of the neighborhood)
- On the master plan of the neighborhood, Please mark the scope covering your daily life.
- Is there any outdoor public place in which you like to spend time? (If interviewee does not have, ask: could you tell me the reason why you do not have?)
- Could you describe that place? Such as how it looks like, what things are included in it, etc. (Ask interviewee to draw a map or layout of that place)
- Cloud you tell me the things in that place attracting you and the things you dislike? Why?

3) Regarding activities in open spaces:

- Normally, what time do you go to the park in a day?
- What do you do there? (Could you describe your usual activities when you go there? Then ask he or she the types of activities)

4) Other:

- Do you have the sense that the neighborhood is your own?
- Do you feel safe when you stay in open spaces? What factors

APPENDIX I

CONSENT FORM

Effects of open space on the interpersonal factors of residents' social capital:
A comparative case study of urban neighborhoods in Guangzhou, China

I have been asked to participate in a research study exploring the relationship between open spaces and people's social capital in my neighborhood. I was selected to be a possible participant because my name is on the resident list of this neighborhood and I am in the age range between 30 years old and 70 years old. A total of 1000 people have been asked to participate in this study. The purpose of this study tries to answer how the changes of physical pattern of neighborhoods lead to the changes of social capital in China's urban neighborhoods that are experiencing rapid and profound change, where traditional means of developing social networks are no longer valid. The objectives of this research are to identify the extent of residents' social capital; to identify the relationship between residents' usage of open spaces and social capital in neighborhoods; to identify the relationship between residents' satisfaction to open spaces and their usage of open spaces in neighborhoods; and to identify the physical attributes of open spaces facilitate or impede adults using open spaces. If I agree to be in this study, I will be asked to answer questions and the conversation will be audio taped by the investigator. However, I am told that if I do not agree to be audio taped, the investigator will just take a note. This study will be approximate 60 minutes long. I am told that there is no potential risk in this process and there is no personal benefit in participation. I will receive a small gift from the investigator as his thanks to me for participating this interview.

This study is anonymous because my name and address will not be recorded. The records of this study will be kept private. No identifiers linking me to the study will be included in any sort of report that might be published. Research records will be stored securely and only Dr. Abrams, F Robin and Mr. Kang, Bin will have access to the records. By the 24 months after this interview, the tape will be destroyed. My decision whether or not to participate will not affect my current or future relations with Texas A&M University. If I decide to participate, I am free to refuse to answer any of the questions that may make me uncomfortable. I can withdraw at any time without my job, benefits, etc., being affected. I can contact: Mr. Kang, Bin (Telephone: 1-979-8629216, Email:

kang_bin@tamu.edu, Mail address: 309 Ball St, Apt 2015, College Station, TX77843, United States) and Dr. Abrams, F Robin (Telephone: 1-979-8457050, Email: robin@archone.tamu.edu, Mail address: 415 Langford Building A, College Station, TX77843, United States) with any questions about this study.

This research study has been reviewed by the Institutional Review Board- Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subjects' rights, I can contact the institutional Review Board through Dr. Michael W. Buckley, Director of Research Compliance, Office of Vice President for Research at (979) 845-8585 (mwbuckley@tamu.edu).

I have read the above information. I have asked questions and have received answers to my satisfaction. I have been given a copy of this consent document for my records. By signing this document, I consent to participate in the study.

Signature: _____ Date: _____

Signature of Investigator: _____ Date: _____

APPENDIX J

APPROVAL FROM THE INSTITUTIONAL REVIEW BOARD

VPR
Office of the Vice President for Research
Texas A&M University

Office of Research Compliance

Academy for Advanced Telecommunication and Learning Technologies

Center for Information Assurance and Security

Comparative Medicine Program

Institute for Scientific Computation

Institute for Telecommunications and Information Technology

Integrative Center for Homeland Security

Microscopy Imaging Center

Office of Business Administration

Office of Distance Education

Office of Graduate Studies

Office of Organizational Development and Diversity

Office of Proposal Development

Office of Sponsored Projects

Professional Development Group

Technology Commercialization Center

Texas A&M University Research Park

Texas A&M University

1186 TAMU
1500 Research Parkway
Suite B 150
College Station, Texas
77843-1186

979.458.1467
FAX 979.862.3176

May 1, 2005

MEMORANDUM

To: Bin Kang
Architecture
MS 3137

From: Ms. Sharon Alderete, CIP
IRB Program Coordinator

Subject: IRB Request for Exemption

Protocol Number: 2005-0204

Title: The Effects of Open Spaces on Interpersonal Factors of Residents' Social Capital: A Comparative Case Study of Urban Neighborhood in Guangzhou, China

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The Institutional Review Board (IRB) has determined that the referenced protocol application meets the criteria for exemption and no further review is required. However, any amendments or modifications to the protocol must be reported to the IRB and reviewed before being implemented to ensure the protocol still meets the criteria for exemption.

This determination was based on the following Code of Federal Regulations:
(http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm)

☐ 46.101(b)(1)	☑ 46.101(b)(2)	☐ 46.101(b)(3)
☐ 46.101(b)(4)	☐ 46.101(b)(5)	☐ 46.101(b)(6)

If you have any questions regarding this protocol application or the review process, please contact the IRB office at (979)458-4067.

APPENDIX K

SAMPLE OF CONSENT FORM

同 意 书

室外公共空间对于居民社会资本之个体因素的影响：中国广州城市邻里比较案例研究

我应邀参与一项关于社区邻里公共空间和居民社会资本之间关系的调查研究。我之所以入选为参与者之一的原因是因为我的名字被列为该社区居民名单之上，且我的年龄介于 25 至 70 岁之间。共有 500 人次参与了这次调研。此次研究的目的在于探讨邻里的物理空间模式如何影响了中国城市居民的社会资本，当前中国城市居住小区正在经历飞速而深远的变化，发展居民社交关系的传统方式已不复有效。而该研究的目标在于确定居民社会资本的程度；确定居民对室外公共空间的使用和邻里社会资本之间的关系；确定居民对室外公共空间的满意度和使用之间的关系；确定室外公共空间的物理属性是促进或阻碍了成人对它的使用。如果我同意这项调查，我会被要求回答一些问题，对话将被调查者录音。我亦被告知如果我不同意被录音，调查者将采用笔录。这一调查将持续 60 分钟左右。我被告知这一过程中不会存在任何潜在的风险，我的参与亦不会为任何个人谋利。

该调查是匿名的，我的姓名和住址都不会被记录。调查记录都将被私密保存。所有与我相关的标识都不会出现在任何公开发表的报告上。调查记录将被安全地存放，并且只有 Abrams, F. Robin 博士和康彬先生有权接触这些记录。在此次调查后的 24 个月后，录音带将被销毁。我是否参与调查的决定不会影响我当前和今后与德州 A&M 大学的关系。如果我决定参加，我有权拒绝回答任何有可能引起我不快的问题。我可以在任何时间内退出调查，并且对我的工作，利益等等不会有任何影响。如果对此次调查有任何问题，我可以与康彬先生(电话: 1-979-8629216, Email: kang_bin@tamu.edu, 通信地址: 309 Ball St, Apt 2015, College Station, TX77843, United States)或 Abrams, F. Robin 博士(电话: 1-979-8457050, Email: robin@archone.tamu.edu, 通信地址: 415 Langford Building A, College Station, TX77843, United States)联系。

这项调查研究已被德州 A&M 大学人类学科研究评审委员会(IRB)审阅。关于研究对象的权力，与研究相关的问题，我可以通过 Michael W. Buckley 博士与 IRB 取得联系，联系电话(979) 845-8585 (mwbuckley@tamu.edu) 。

我已阅读以上资料信息。我已提出问题并取得了满意的答复。我将得到一份同意书的副本作为我的记录。通过签署这份文件我同意参与这项调查。

签名：朱金彪　　日期 2005.6.18

调查者签名：康彬 Kang Bin　　日期 06-18-2005

VITA

BIN KANG

9-308, Xuetian Nanyuan, Nantong, Jiangsu, China

EDUCATION

- Doctor of Philosophy in Architecture, May 2006
  College of Architecture, Texas A&M University, College Station, Texas.
- Master of Engineering in Architecture, March 1996
  Department of Architecture, Hunan University, Changsha, China.
- Bachelor of Engineering in Architecture, July 1993
  Department of Architecture, Hunan University, Changsha, China.

WORK EXPERIENCE

- Teaching Assistant. September 2003 to May 2006
  College of Architecture, Texas A&M University, College Station, Texas.
- Research Assistant. September 2002 to May 2003
  College of Architecture, Texas A&M University, College Station, Texas.
- Director. December 2001 to May 2002
  Center of Design and Construction, Jianyie Housing Group, Zhengzhou, China.
- Architect. March 1996 to November 2001
  Suzhou Industrial Park Design and Research Institute, Suzhou, China.