

Faculty of Built Environment

The Evaluation and Improvement of Children Friendliness in Urban Village Space in Foshan

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The Evaluation and Improvement of Children Friendliness in Urban Village Space in Foshan

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DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.



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ABSTRACT

This study aims to evaluate child friendliness in urban village spaces and propose strategies for improvement. There are approximately 116 urban villages in Foshan, where urban villages serve as an important spatial carrier for children's growth and life. The friendliness of the space environment for children has significant implications for their growth. This study starts from the perspective of child-friendliness and, through a literature review, points out that the human settlement discipline in various countries has increasingly attached importance to the child population, and the research trend has shown a vigorous interdisciplinary development. Researchers have systematically studied the planning and environmental design of children's spaces, but research on the child-friendly environment of urban villages is still insufficient. In recent years, the research scope and methods have been updated to provide a foundation for child-friendly residential environment research. This study conducted a spatial environment survey of 18 urban villages from March to May 2023, including alleys, outdoor spaces, and children's activities, using field observation to record children's behaviors and spatial features. Five key villages were selected for a survey of children's activity characteristics, and data were collected through field observation, questionnaires, and interviews. Based on the indicators proposed by Meng Xue (2020), a five-point scale was used to collect parents' opinions and analyze the child-friendliness. The outdoor space environmental elements were analyzed using spatial analysis tools, and the interview and questionnaire data were sorted and charted using Excel 2019. Through on-site investigation and analysis, key findings indicate that safety hazards, limited facilities, and inadequate green spaces constrain the child-friendliness of urban villages. The study, based on the investigation findings, proposed the following improvement suggestions based on the investigation results: (1) Enhancing the safety and suitability of road space: establishing safe

road space, setting up suitable pedestrian systems and continuous school pathways, partitioning restrictions on vehicle access, conducting safety knowledge education, and utilizing electronic monitoring to ensure safety. (2) Increasing green space area and creating high-quality playgrounds: concentrating on building parking buildings to release space, differentiating park green space configuration to allocate game facilities, and utilizing scattered plots to build point-shaped small parks. In the end, the article combined the child-friendly space construction guidelines to propose the following design strategies to enhance the child-friendliness of the urban village space environment: (1) Solving vehicle parking problems; (2) transforming road cross-section; (3) planning children's commuting routes; (4) child-friendly transformation of roads; (5) adding children's service facilities; (6) child-friendly transformation of green space; (7) utilizing marginal spaces. This research applies child-friendly design principles to urban villages, a setting that has been previously underexplored. The findings align with biophilia theory, emphasizing children's need for natural and engaging spaces. Future research should incorporate children's perspectives and expand other urban settings.

Keywords: Foshan, urban village, child-friendly, child-friendly city, space environment

Penilaian dan Peningkatan Keramahan Kanak-kanak di Ruang Kampung Bandar di Foshan

ABSTRAK

Kajian ini bertujuan untuk menilai kesesuaian ruang perkampungan bandar untuk kanak-kanak dan mencadangkan strategi penambahbaikan. Terdapat kira-kira 116 kampung bandar di Foshan. Sebagai pembawa ruang yang penting untuk pertumbuhan dan kehidupan kanak-kanak, perkampungan bandar adalah sangat penting untuk pertumbuhan kanak-kanak sama ada persekitaran ruang mereka mesra kanak-kanak. Dari perspektif mesra kanak-kanak, penyelidikan menunjukkan melalui tinjauan bahawa disiplin persekitaran penempatan manusia di pelbagai negara memberi perhatian yang semakin meningkat kepada kumpulan kanak-kanak, dan penyelidikan menunjukkan trend interdisipliner yang kuat; Para sarjana penyelidikan secara sistematik mengkaji perancangan ruang kanak-kanak dan reka bentuk alam sekitar, tetapi penyelidikan mengenai persekitaran mesra kanak-kanak di kampung-kampung bandar masih tidak mencukupi; Dalam tahun-tahun kebelakangan ini, skop penyelidikan dan kemas kini kaedah telah menyediakan asas untuk penyelidikan persekitaran penempatan mesra kanak-kanak. Kajian itu menjalankan tinjauan persekitaran spatial di 18 kampung bandar dari Mac hingga Mei 2023, termasuk jalan dan lorong, ruang luar dan aktiviti kanak-kanak, dan menggunakan kaedah pemerhatian lapangan untuk merekodkan tingkah laku dan ciri spatial kanak-kanak. Lima kampung utama dipilih untuk menyiasat ciri-ciri aktiviti kanak-kanak berumur 0-14 tahun, dan data dikumpulkan menggunakan pemerhatian lapangan, soal selidik dan wawancara. Berdasarkan penunjuk Meng Xue (2020), skala lima peringkat digunakan untuk mengumpul pendapat ibu bapa dan menganalisis kemesraan kanak-kanak. Menggunakan alat analisis ruang untuk menganalisis elemen persekitaran ruang luar, dan Excel 2019 digunakan untuk

menyusun data temu bual dan soal selidik dan membuat carta. Melalui penyiasatan dan analisis lapangan, penemuan utama menunjukkan bahawa bahaya keselamatan, kemudahan yang terhad, dan kekurangan ruang hijau menghalang kesesuaian perkampungan bandar untuk kanak-kanak. Berdasarkan kesimpulan tinjauan, kajian ini mengemukakan cadangan penambahbaikan berdasarkan hasil tinjauan: (1) Meningkatkan keselamatan dan kesesuaian ruang jalan: mewujudkan ruang jalan yang selamat, menyediakan sistem berjalan kaki yang sesuai dan laluan pembelajaran berterusan, menyekat kemasukan kenderaan melalui zon, dan menjalankan Pendidikan pengetahuan keselamatan dan penggunaan pemantauan elektronik untuk memastikan keselamatan. (2) Meningkatkan kawasan ruang hijau dan mewujudkan taman permainan berkualiti tinggi: fokus pada pembinaan bangunan tempat letak kereta untuk membebaskan ruang, membezakan dan mengubah ruang hijau taman untuk memperuntukkan kemudahan permainan, dan menggunakan plot sporadis untuk membina taman kecil berbentuk titik. Akhirnya, artikel ini digabungkan dengan garis panduan pembinaan ruang mesra kanak-kanak, dan mencadangkan strategi reka bentuk berikut untuk meningkatkan keramahan kanak-kanak persekitaran ruang kampung bandar: (1) Menyelesaikan tempat letak kenderaan; (2) Pembinaan semula bahagian jalan; (3) Merancang laluan sekolah umum kanak-kanak; (4) Transformasi jalan sesuai untuk kanak-kanak; (5) Menambah kemudahan perkhidmatan kanak-kanak; (6) Transformasi ruang hijau yang sesuai untuk kanak-kanak; (7) Gunakan ruang sudut. Kajian ini menerapkan prinsip reka bentuk mesra kanak-kanak kepada perkampungan bandar, suatu persekitaran yang sebelum ini kurang diterokai. Penemuan kajian selari dengan teori biofilia, yang menekankan keperluan kanak-kanak terhadap ruang semula jadi dan interaktif. Penyelidikan masa depan harus menggabungkan perspektif kanak-kanak dan memperluaskan kajian ke persekitaran bandar lain.

Kata kunci: *Foshan, kampung bandar, mesra kanak-kanak, bandar mesra kanak-kanak, ruang persekitaran*

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Children are the future of a country and the hope of a nation. Promoting the healthy growth of children can provide valuable resources and inexhaustible driving force for the sustainable development of the country, which is an inevitable requirement for building a socialist modernized country and realizing the dream of the rejuvenation of the Chinese nation.

At present, China has approximately 253 million children, who are aged from 0 to 14 years old, which is the largest group of children in the world. Among them, just over half of the total number of children, or approximately 146 million children, live in high-density urban environments.

As such, in the outline of the Development Plan for the Development of Children in China (2021-2030), it clearly stated the crucial need to actively and innovatively carry out the creation of child friendly cities and communities.

Creating a suitable urban spatial living environment, is undoubtedly the most crucial factor for ensuring the healthy growth and development of children, who are the future force and talent of the nation. Having proper and conducive living space is an important aspect of life, thus, it is a serious issue worthy of the attention of the whole society, government and the leadership hierarchy in ensuring the future generation remain physically fit and mentally strong and spiritually driven with strong aspirations for the motherland and country.

1.2 Study Background

In recent years, the health level of children in China has shown a downward trend, and the proportion of children infected with some high-risk factors and related diseases has increased. According to the 2016 Report on Nutrition and Health of Chinese Children and Adolescents, the obesity rate of school-age children in China has significantly increased over the past 30 years, and the risk of chronic diseases has also escalated (Liu, 2016). The rate of visual impairment among urban students continues to increase, and it is obvious that age of the children sufferers is getting younger and younger(Liu, 2016). Moreover, statistics have also shown that between 1985 and 2005, the exercise routine of children in China has significantly decreased year to year and getting narrower and narrower (Tomkinson et al., 2012).

The factors contributing to this decline, or modern day phenomenon are multifaceted, including:

i. Changes in travel modes - The travel mode of people today have achieved the state of convenience. The urban environment suitable is much more conducive for driving, and with more families owning a car, this have changed the daily way families travel (Zhu, 2009). Parents also are more cautious today and tend to limit the possibility of their children traveling independently.

ii. Changes in children's gaming methods - Modern lifestyle and entertainment methods such as television and online games have gradually replaced traditional outdoor children's games and activities. The games and activities are more static today, leveraging on convenient technology such as computers and handphones. Hence, this affects the daily activity volume of children today (Hunana, 2014).

iii. Compact urban environmental - In high-density urban location, the environment has become more restrictive. The spatial arrangement of urban living infrastructure and conditions present a constrained availability of spaces with natural resources. This not only make up for the lack of playgrounds for the children but also lack of natural environment for physical outdoor activity space.

iv. The lack of children's activity time - Parents today are overly concerned about their children’s education, meaning children’s school performance, tuition and homework are given much higher priority than their the children's independent activity time, neglecting the importance of leisure and play for their children. This is detrimental to their behavioral and psychological needs.

v. Other factors - In additional, factors such as dietary habits, educational concepts, and social media effects have all have impacts to the way of life and attitude of people young and small today (Zhang, 2006).

1.2.1 Lack of Children's Natural Outlook and Psychological Problems

People are born with an extraordinary sense of closeness to the natural environment, and psychologists use the term 'biophilia' to refer to this instinctive human emotion towards life and nature. For children, nature is not only an objective physical environment, but also a catalyst for promoting well-being activities. Experimenting and experiencing nature will become an indispensable part of their growth process. It is known that children's contact with nature in the early ages, will help develop their emotions towards the natural world, as well as their future ways of viewing their living environment surrounding (White et al.,1998).

Adequate contact between children and nature in the early stages will help develop their emotions towards the natural world (Child, 2017). However, with the expansion of

cities and the continuous increase in urban density, natural resources in urban environments are gradually scarce, and children living in them lack opportunities to interact with the natural environment. This problem is particularly prominent in urban villages. The external objective environment invisibly shapes the ecological concepts of urban children and influences their attitudes towards nature (Turner et al., 2004). There are studies showing that sufficient exposure and experience of nature will have a positive impact on children's environmental awareness and the establishment of a natural view, while children who lack relevant experiences have lower awareness of protecting nature (Kals et al., 2003). The alienation of children from the natural environment leads to a lack of emotional connection between them and nature, resulting in a decrease in their sense of identity with nature and even the decline of future societal views on nature.

In fact, the alienation from nature not only leads to children's indifference to nature, but also affects their physical and mental health development. Richard Louv pointed out that in modern society, children lack natural contact and connection, and being away from nature becomes a potential cause of psychological and behavioral problems in children, leading to Nature Deficit Disorder (Richard, 2005). In the results of a domestic sampling survey conducted showed that 12.4% of urban children in China have a tendency towards natural deficit disorder, with symptoms such as lack of concentration and weak emotional regulation. This directly reflected the reduction in opportunities for contact with nature will restricts the healthy growth of children in modern society (China, 2013).

1.2.2 A Poorly Synthesized Playing & Growing Environment

With the progress of time and new settings, there is currently an excessive “marketization” phenomenon in children's activity venues, which tend to be synthetic and

this deprives children of opportunities for independent natural growth development (Ding, 2007). Take for example commercialized amusement facilities. They have mushroomed and gradually replaced traditional children's open space playgrounds. They are not only confined in nature but also restricting children's freedom of movement. In addition, in the amusement parks, children need to be accompanied by their parents, making up for the lack natural of autonomy in self-play and peer play aspects which are critical to develop a child's pro-social behavior. Furthermore, the targeted game design, or gaming facilities are specific, as they tend to be restrictive too as they further confines the children ability to a single functional type, which limits the children's open creativity, so much so that some scholars pointed out that commercial amusement parks are actually trying to train children to become consumers at an early stage. They do not bring about the learning of life skills (Tan, 2008).

Secondly, due to the lack of urban design thinking from a children's perspective, the space suitable for children's activities in the current urban environment is in an unfit and fragmented distribution state. The unsystematic space for children's activities has to some extent limited their self-initiative and freedom of play, as well as being taken away from the nature, e.g. the birds and the bees. and this hinders in particular their curiosity, exploratory behavior and free-style movements towards activities. The free, natural and unrestricted games that were so critical and desired for a child's development, have now been detached from their lives and transformed into becoming independent life events that occur now in mutually isolated spaces (Zhou et al., 2018).

1.3 Research Topic Scope

1.3.1 Urban Villages

Urban village refers to a rural village that, in the process of urbanization, has lost or basically lost farmland within the urban built-up area, but still retain and implements village autonomy and rural collective ownership, or a residential area where most of the farmland has been requisitioned and farmers still reside in the original village after becoming residents, also known as the "urban village" (Xu, 2015).

Urban villages are a product of the urbanization process where villages are surrounded by urban expansion. In the past, villages located close to the edge of cities have been enveloped into central area of the city due to urban expansion. This has resulted them transforming into urban villages. That is to say, an urban village is equivalent to a residential community. Some urban villages still implement village autonomy and rural collective ownership, while others have most of their arable land converted from expropriated farmers to residents.

Foshan city is in one of the forefront positions of China's urban reform that is most rapid in transformation. According to relevant documents and data, there are about 100 "urban villages" in Foshan City, some of which have been transformed into better urban communities (Xie, 2017).

The lower living costs of urban villages have attracted a large number of migrant workers, i.e. from all walks of life and coming from all over the country, to settle down here. As a result, many urban villages are experiencing a high density of population. This has led to a diversified personnel structure in urban villages. At present, the age structure of indigenous people in urban villages can be basically divided into three major age groups:

middle-aged and elderly people, young people aged 15-35, and children aged 1-14. The floating population is mainly concentrated among young people aged 20-35, middle-aged people aged 35-59, and children (Zhang, 2015).

1.3.2 Children

The International “Convention on the Rights of the Child” defines children as anyone under the age of 18. Authoritative reports and censuses in China define children as between the ages of 0 and 14 (Meng, 2020). 0 to 3 years old are infants and young children, 3 to 6 years old are regarded as preschool children, and 6 to14 years old are school-age children. Therefore, in line with the definition of the Chinese government, the main research object is the children aged 0 to 14 years old.

1.3.3 Scope of the Study

This study focuses on 18 typical urban villages in Chancheng District and Nanhai District of Foshan City, with children aged 0-14 as the core research subjects. It explores the spatial and activity characteristics of urban villages from a child-friendly perspective, identifies the key factors influencing children's happiness and activity preferences, and assesses the child-friendliness of their public spaces. Based on field research and questionnaire survey data in 2023, the study analyzes from three aspects: road space, outdoor activity space, and children's service facilities. The improvement strategies focus on enhancing the safety and child-friendliness of road spaces, improving the quality of outdoor activity spaces, and providing suggestions for optimizing community management.

1.4 Research Problem and Hypothesis

Urban village spaces in Foshan significantly lack child-friendly attributes, which can be addressed through targeted spatial strategies.

The following are the three main questions regarding the research on the friendliness of the spatial environment in urban villages to children:

i. What factors affect the child friendly spatial environment of urban villages?

ii. How to scientifically evaluate the spatial environment for the growth of children in urban villages?

iii. How can effective guidance strategies be developed for child-friendly environment renovations in urban villages?

These are three key questions that need to be explored to foster positive and constructive development of urban facilities, i.e. not only current but for the future as well. The lack of standardized guidance for the construction of a friendly environment for children in urban villages need to be addressed and overcome if Children is to grow healthily. Answering these questions will also be the focus of this project's research.

Based on the review and analysis of existing research literature, this study evaluates the child-friendliness of urban villages in Foshan City and propose improvement measures based on the influencing factors of child-friendliness in urban villages. This study intends to use research methods such as questionnaire surveys and on-site observations to test the following hypotheses:

First hypothesis, the environment of children-friendly spaces in urban villages is significantly influenced by the availability of green spaces, the richness of recreational facilities, traffic safety, the accessibility of community facilities and the child-friendliness of the space.

Second hypothesis, a multi-criteria evaluation framework that integrates physical spatial indicators (e.g., green space availability, traffic safety, travel supportiveness), social factors (e.g., neighborhood atmosphere, neighborhood atmosphere), and children's behavioral patterns provides a more accurate and comprehensive assessment of the spatial environment for children’s growth in urban villages than single-dimensional methods.

Third hypothesis, the urban village space environment renovation strategies proposed based on the activity characteristics and needs of children can enhance the child-friendliness of urban villages. For instance, it can effectively improve children's safety in urban villages (e.g., planning children's school commuting routes, adapting roads for children) and increase outdoor activity spaces and facilities for children (e.g., making use of scattered corners to build children's outdoor activity playgrounds, adding children's service facilities), meeting the needs of children of different age groups.

These hypotheses are testable using mixed methods. The questionnaires will measure users’ perceptions(Refer to ’Investigation on the activity characteristics of children in urban villages’ and ‘Investigation on evaluation of children's friendliness in urban villages’, page33 to 36), while on-site observations and mapping will objectively record the presence or absence of facilities, traffic conditions, and the activity situation of children in these venues(Refer to ’Investigation of the space environment’, page 32). These combined tools allow for correlation analysis, providing evidence to support or reject each hypothesis.

1.5 Research Objectives

Urban villages are a typical residential area formed because of urban expansion and development. As an important spatial carrier for healthy children's growth and their life well-being, their quality of their spatial environmental needs to be taken seriously and provided

for, i.e. in order to foster positive and constructive development not only physically, but mentally and spiritually as well. Spatial environment is a crucial element in a child's growing up process.

However, in reality, there is a significant deviation between the spatial environment found in the of urban villages in China and the actual needs of the children. From the current research results, it is noted that the relevant research lacked strong theoretical foundation, and there is a lack of effective systematic results to guide design practices.

Based on this, this research study aims to provide a systematic evaluation technique for spatial environment development in urban village setting. The case investigated is based on the Foshan City setting. From the findings and results, this research aims to explores its improvement strategies from a scientific perspective of child's friendliness. Specifically, this research study has following objectives:

i. To explore the spatial and activity characteristics of urban villages from a child-friendly perspective, identifying key factors affecting children's well-being and activity preferences.

Starting from a child friendly perspective, analyze the spatial environment characteristics and children's activity characteristics of urban villages, understand the time characteristics and venue preferences of children's activities in urban villages, and obtain the child friendly influencing factors of spatial environment in Foshan's urban villages, providing reference for designing children's activity venues in urban villages.

ii. To evaluate the degree of child friendliness in urban villages scientifically from a child friendly perspective

Objective and scientific evaluation of the friendliness of urban village space from the perspective of child caregivers, using a quantitative evaluation index system to evaluate urban villages, clarifying the impact of a child-friendly spatial environment on children's satisfaction with relevant aspects of housing, can help clarify the specific performance of environmental indicators in various dimensions, identify key problems and improvement points, and provide scientific reference for proposing optimization design strategies.

iii. To formulate context-sensitive optimization strategies aimed at enhancing the safety, accessibility, and quality of child-friendly spaces in urban villages, contributing to practical urban planning and design.

Proposing specific optimization design strategies is a key step in applying research results to practice, and it is also the ultimate goal of the research. Based on the factors influencing child friendliness in the spatial environment of urban villages and the evaluation of child friendliness, combined with practical projects, systematic optimization design strategies are proposed to provide scientific guidance for design practice.

1.6 Significance of the Study

There are currently many research results on the design of child friendly spatial environments, and most of the existing results are focused on the design of children's activity spaces in urban parks and communities.

Urban villages are an important component of the city, with a more delicate spatial texture and higher building density compared to other urban areas. Their public space environment design is also subject to more restrictions.

At present, there are relatively few theoretical research results on children's activity spaces in urban villages. The existing results mainly focused on investigating the current situation of children's activity spaces in urban villages, and there is a lack of quantitative evaluation and research to justify the implementation, or even on the effectiveness of the strategies.

This research project will utilize existing spatial child friendliness evaluation tools to quantitatively evaluate child friendliness of urban villages in Foshan City. From the results, it will identify the main problems, and propose feasible and effective design strategies to enhance the children-friendliness of these public spaces, i.e. based on the site characteristics of urban villages. This no doubt can add to the theoretic background and foster more effective improvements and achievements in the design of outdoor activity venues, i.e. for special groups with intended constructive benefits.

1.7 Chapter Summary

Foshan City is currently in a period of rapid development, and building a child friendly city can help effectively improve the happiness index and sense of achievement of urban residents. The scale of urban villages in Foshan City is relatively large. According to statistics, there are about 116 urban villages with a population of about 1.1 million. In recent years, the efforts to renovate old villages in Foshan City have been continuously increasing, in view of the rapid development and demand, a large number of urban villages are urgently being renovated and upgraded. In this context of building a better and healthier environment, this research will help to emphasize and promote positive and constructive child friendly spatial environment design. It will also guide and provide, specific practical and feasible design methods to enhance the child friendliness of urban village spaces in a wholesome

manner, in which the rights and interests of children in urban villages are safeguarded. By fostering a healthy growth environment, this will ensure Foshan is a liveable city with a high-quality environment where the community are happy, healthy and spirited.

CHAPTER 2

LITERATURE REVIEW

2.1 Research on Child Friendly Cities

With the continuous acceleration of urbanization, people are paying more and more attention to the growth and development of children in cities. The concept of child friendly cities was therefore proposed, and in 1996, UNICEF and UN-Habitat jointly launched the initiative to build child friendly cities (Hague, 2004).

A child-friendly city is a city, town, community or any system of local governance committed to improving the lives of children within their jurisdiction by realizing their rights as articulated in the UN Convention on the Rights of the Child.

Specifically, the "Child-Friendly Cities Initiative" was defined according to nine requirements for a child-friendly city to be interpreted and incorporated into different social and physical environments (Jansson et al., 2022).

Broadly speaking, it is a city, town or community where children (accessed, 2021):

i. Are protected from exploitation, violence and abuse.

ii. Have a good start in life and grow up healthy and cared for.

iii. Have access to quality social services.

iv. Experience quality, inclusive and participatory education and skills development.

v. Express their opinions and influence decisions that affect them.

vi. Participate in family, cultural, city/community and social life.

vii. Live in a safe secure and clean environment with access to green spaces.

viii. Meet friends and have places to play and enjoy themselves.

ix. Have a fair chance in life regardless of their ethnic origin, religion, income, gender or ability.

After the proposal of the Child Friendly City Initiative, the United Nations Children's Fund (UNICEF) released a series of official documents in the following 20 years to guide the implementation of specific actions. In the past 20 years, research on the construction of child friendly cities has also emerged (Zhang & Su, 2022). Scientific research on the concept of child friendly cities has focused on its historical and theoretical dimensions (Brown et al., 2019; Cors, 2002; Van & Karsten, 2015), practices of child friendly cities in different countries (Woolcock et al., 2010; Yao & Xiao, 2017; Agarwa et al., 2021), and views on the essence of child friendly cities (Agarwa et al., 2021; Gökmen & Tasci, 2016; Racelis et al., 2002; Sapsaglam & Eryilmaz, 2024).

Indian scholar Chatterjee (2005) believes that child friendly cities can be decomposed into a large number of child friendly places, and proposes the concept of place friendship to express the emotional connection between children and places. Chatterjee believes that all six characteristics of child friendly places are: Mutual emotions and personal respect; Common interests and activities; Commitment; Loyalty; Self disclosure and mutual understanding; and Level (Chatterjee, 2005). Schulze, S described in the study a list of key elements of a child friendly city determined by the Secretariat in consultation with a wide range of partners (Schulze & Moneti, 2007). Schicketanz et al. (2018) studied the index of child friendliness in the urban environment of Berlin and found that factors such as distance from parks and playgrounds, access to private gardens or courtyards, transportation

conditions, social environment, and spatial accessibility have significant impacts on the level of child friendliness in activities. Vidal DG et al. proposed a children's green infrastructure model aimed at promoting children's rights with nature and cities. This model consists of four key components: naturalized cities, child friendly green infrastructure, children's participation, and children's rights (Vidal & Castro, 2022). Sapsaglam et al. used exploratory factor analysis (EFA) to develop a child friendly city scale - Children's Form, which includes eight dimensions: housing and living areas, basic services, safety and security, governance and participation, providing financial and economic support, ecology and recovery, emotional commitment, and urban and environmental characteristics (Sapsaglam & Eryilmaz, 2024). Karen Witten et al. explored the impact of urban inclusivity on children's health. Diversity in urban streets can broaden children's perspectives and help them better adapt to society, but groups such as homeless and sex workers in urban streets may make children feel uneasy and affect their health (Karen et al., 2015).

Some researchers have conducted research on child friendly cities from the perspective of urban management. Fang Nan conducted research on policy innovation for child friendly cities using four cities (Shanghai, Changsha, and Gu'an County) as cases, including policy formulation, implementation, promotion, budget allocation, and cross departmental cooperation (Fang, 2020).

Most studies focus on a specific type of space (playgrounds, heritage sites, transit zones, public spaces, etc.), and use one of the original frameworks to build upon (Jansson et al., 2022). Meanwhile, research on child friendly cities involves multiple fields such as children's environment, urban planning, and urban design, combining interdisciplinary studies such as landscape planning, child psychology, and nutrition (Yang et al., 2023).

These studies include specifying terms, such as child friendly cities, spaces, communities, urban environments, neighborhood, play spaces, integrated public spaces, routes, planning, tourism environments, and high density environments or neighborhood. Correspondingly, the vast majority of studied examples were public spaces at both the city, neighborhood, or community scale (Jansson et al., 2022).

2.2 Research on Child Friendly Community Space and Its Environmental Evaluation

As a spatial carrier for children's growth and life, residential communities have received a lot of attention. Urban villages are a type of residential community. Understanding the community space and environmental evaluation based on child friendly cities can provide an important foundation for exploring the spatial environment of urban villages from a child friendly perspective (Han & Kim, 2018). A good environment suitable for children is a place where they can freely move and interact with the environment through various activities. The healthy development of children depends on whether the environment and community are admitted to serve children (Villanueva et al., 2016).

Some researchers have studied the characteristics of child friendliness at the community level. For example, British scholars Woolcock and Steele (2008) have summarized the relevant research and practice of child friendly communities and extracted six key indicators, including economy, environment, social happiness, sustainability, health and quality of life (Woolcock & Steele, 2008). The UNICEF UK office measures the level of community friendliness towards children through indicators such as health and safety, education, interpersonal relationships, and subjective well-being (UNICEF, 2018); The child friendly South Australia project believes that the child friendly characteristics of the environment are mainly reflected in six aspects: active participation, safety, health, and a

sense of belonging (UNICEF, 2018). Pei, et al. (2019) used Boston as an example to describe and evaluate spatial data at the neighborhood community scale from five dimensions: children's education, environment, safety, children's accessibility, and health facilities. Their results showed that environmental quality and children's accessibility have a significant positive impact on children's health. Chu et al. (2024) believe that in a community environment, the community should pay attention to social order and safety, and establish good community relationships.

The research on child friendly communities involves multiple aspects, including economy, environment, social happiness, sustainability, health, and quality of life. There are many studies focused on community public spaces, community children's travel, and other aspects.

2.2.1 Community public spaces under the concept of child friendliness

Public open spaces are important places for children to participate in outdoor activities and social life (Meng & Wang, 2022). Free outdoor play at home and around the community is very beneficial to children's health and development benefits, including increased physical activity, environmental and social abilities, creativity, and spatial skills (Loebach et al., 2021).

Researchers conducted a study on the relationship between public spaces and children's mental health. Alderton et al. investigated the relationship between children's mental health and community public open spaces in eight capital cities in Australia and found a significant positive correlation between children's mental health and public open spaces, especially for families with children, where the quality of public open spaces is more important. Public open spaces play an important role in promoting children's mental health

and require joint efforts from the government and various sectors of society to provide better public open spaces for children. Many scholars have also demonstrated that attractive public open spaces can effectively encourage children to participate more in sports and play activities, promote their ability to interact with peers, and play a positive role in improving attention, language, cognition, and general abilities (Dunton et al., 2014; Veitch et al., 2007; Taylor et al., 1998; Dadvand et al., 2015; and Ahmed et al,2022).

Researchers explored what factors affect the level of child friendliness in public spaces. Dunton, G.F., and others used accelerometers, Global Positioning System (GPS), Geographic Information System (GIS), and self-report methods to evaluate park availability, perceived proximity, and usage for children. The results showed that park availability and perceived proximity have a significant impact on the frequency and duration of children's use of parks, and the degree of park greening and facilities are also related to the frequency of children's use of parks (Dunton et al., 2014). Qu Chen et al. explored the availability of urban neighborhood environment for children's outdoor physical activities and found that the current situation of neighborhood environment provided relatively the most utilized availability for children's outdoor physical activities, with the ground and plants providing the most; In terms of the availability of outdoor physical activities for children in their ideal neighborhood environment, sports facilities and amusement facilities provide relatively the most availability (Qu & Han, 2015). What are the characteristics of child friendly public spaces? Ramezani S et al. used an urban community in Shiraz, Iran as an example to investigate how children perceive and value outdoor environments. Discovering the potential availability of natural elements, functional opportunities, and the environment, as well as being close to home, is a highly recommended attribute for children as a child friendly place (Ramezani & Said, 2013). Jansson et al. (2016) pointed out that unmanaged areas are useful

for exploring, playing possibilities, and giving children a sense of belonging. Zhang et al. (2023) studied the impact of urban community pocket parks on children's activities and found that the child friendliness of pocket parks is influenced by various factors, including facility accessibility, openness, walkability, environmental quality, and surface green space area of the park.

The researchers also constructed a specific evaluation system to quantitatively evaluate the friendliness of the community environment. For example, Meng and Li (2022) used a combination of scale development and factor analysis to construct a child friendly evaluation system for urban residential space environment from the perspective of child caregivers. The elements of this system include recreational availability, travel comfort, service availability, travel support, neighborhood safety, and neighborhood atmosphere, which reflect the needs and experiences of children in the residential space environment. Pang et al. (2022) studied how to construct community public spaces suitable for preschool children in the context of wireless communication and artificial intelligence technology. They proposed a multi-dimensional perspective based evaluation system for the friendliness of preschool children in community public spaces, including safety principles, inclusiveness principles, naturalness principles, diversity principles, and functional mixing principles.

When studying relevant papers, it was found that safety is the most important indicator for parents, and it is also the main reason for limiting children's outdoor activity time and independent activities (Veitch et al., 2008; Brussoni et al., 2020; Mitra et al., 2014; Boxberger & Reimers, 2019; Cooklin et al., 2020). Parents may worry about accidents or injuries to their children (Veitch et al., 2008; Cooklin et al., 2020; Veitch et al., 2006; O'Connor & Brown, 2013; Trayers et al., 2006), strangers (Veitch et al., 2008; O'Connor &

Brown, 2013) as well as antisocial behavior or bullying from other teenagers (Veitch et al., 2008; & Trayers et al., 2006).

2.2.2 Research on the Safety of Community Children's Travel

Travel safety is an important aspect of child safety within the framework of child friendly cities (UNICEF, 2018; UNICEF, 2004; UNICEF, 2017), often associated with the term "independent travel" and focusing on transportation safety (Xu et al., 2020). Many researchers have evaluated the safety of children's travel in community environments, including road safety, activities such as walking/cycling, and their environment, as well as other children's travel destinations (Rosenberg et al., 2009; Buck et al., 2014).

Children's independent mobility is a widely concerned issue. Zhou et al. (2022) used two residential areas in Nanjing (closed residential area A and open residential area B) as examples to study the characteristics, influencing factors, and relationship with the environment of children's independent activities in urban residential areas in China. The results showed that in closed residential area A, the proportion of children's independent activities was higher, and the behavior, scope, and location of children's independent activities were closely related to factors such as age, activity facilities, and management level. Children's independent mobility is the free activity of children in the neighborhood environment without parental supervision (Janssen et al., 2016)., and safety is its most important influencing factor, usually including social safety and traffic safety (Carver et al., 2014). Some studies also emphasize walking safety (Ghekiere et al., 2017). Attacks, harassment, bullying, and antisocial behavior from strangers are also social safety factors that affect children's independent travel (Schoeppe et al., 2013; Veitch et al., 2017; Crawford, 2017). "Lighting" is a factor worth exploring that increases the perception of nighttime travel safety (Cordovil et al., 2015; Bhosale et al., 2017).

The research on the path of children's education also focuses on safety factors, covering many social and physical environmental factors, such as neighborhood relationships, threats from strangers, walking facilities (including traffic lights, pedestrian crossings, number of trails, etc.), motor vehicle traffic volume, number of motor vehicle parking on the street, and road continuity (Xu et al., 2020).

Many countries have also developed safe travel plans for children, such as the Dutch concept of living courtyards and children's travel routes, which are established to ensure that children can travel freely and safely independently. There are also "Green Light Project" in Port Philip, Melbourne, Australia, "We Study Alone" program in Italy, and "Walking School Bus" programs in countries such as the United States, Australia, and New Zealand (Wei et al., 2008; Meng et al., 2019).

2.2.3 Child Friendly Research on Urban Villages and Special Residential Areas

As a form of residential area, the level of child friendliness in villages or special residential areas is also the focus of researchers.

Chinese researchers mainly focus on the impact of the special environmental space of urban villages on children's outdoor activities. Wang et al. (2012) used urban villages in Beijing as an example to investigate and analyze the perception of outdoor activity environment and ideal neighborhood environment intentions of children aged 6-12. Poor hygiene conditions and the sharp increase in the number of cars are negative environmental factors that weaken children's perception of outdoor physical activity opportunities; Games and sports facilities, water features, trees and flowers, soft paving, and seats constitute positive environmental factors that promote children's perception of outdoor physical activity opportunities (Wang & Han, 2012); Han et al. (2013) conducted a survey and research on outdoor physical activities and activity spaces for children in Beijing's hutong

community, exploring the impact mechanism of the outdoor environment on children's physical activities in hutong. They believe that spacious, flat, with trees, bright colors, and playable facilities are the ideal elements of outdoor activity spaces for children in hutong communities (Han et al., 2013). Chen et al. (2016) used the methods of drawing perception maps, participatory observation, and in-depth interviews to study and found that the positive perception spaces of migrant children in urban villages include: homes with parents, street family comprehensive service centers, parks, communities equipped with children's playground facilities, community shopping places, small flat land and playgrounds in urban villages (Chen & Zhu, 2016); Fang, et al. studied the game territory of children in urban villages and modern residential areas in Beijing, and found that regardless of whether they are in urban villages or modern residential areas, children will create or control certain territories. The study also found that children prefer to hide in small caves and play home under tables. However, for children in modern residential areas, private territories and group territories are both considered game spaces, while for children in urban villages, private territories are more of a refuge for expressing emotions (Fang et al., 2017). Xiao et al. (2019) took urban villages in Shenzhen as the research object and believed that using existing abandoned homesteads to create more children's activity space, increasing playable public art installations and seats, and increasing flower and grass planting and three-dimensional greening in outdoor spaces will all help increase children's outdoor physical activity opportunities (Xiao & Han, 2019). Liao (2021) conducted a survey and research on rural areas in Changsha City and constructed a fuzzy comprehensive evaluation model based on Analytic Hierarchy Process and Semantic Difference Analysis. He proposed improvement strategies at the material space level, including increasing the supply of multi-functional indoor public activity spaces for children, building a safe and continuous rural children's

education travel space environment, creating a natural, open, and safe children's play space, and spatial planning and design suitable for children's scale and activity characteristics (Liao, 2021).

Many foreign researchers have also paid attention to the activities of children in low-income residential areas, such as Weir (2006), who pointed out through their research on low-income residential areas in urban areas and high-income residential areas in suburbs that parents in low-income residential areas may limit their children's outdoor physical activities due to concerns about the safety of the residential areas, while parents in high-income communities in suburbs do not have such concerns; Castonguay et al. (2009) found through asking children in low-income residential areas to take photos of their favorite interactive spaces and conduct interviews that their favorite activity space is the area next to acquaintances' homes, and they least like spaces that pose a security threat (Castonguay & Jutras, 2009). Sharareh et al. (2015) studied the child friendly environment in impoverished communities in Tehran and found that playgrounds and natural environments are children's favorite playgrounds. Children prefer to play in places away from home or near their friends' homes, which often have indirect control and safety; Parks and playgrounds, houses, streets and alleys, people, toys and playthings, animals and other subcategories are frequently mentioned; Alleys, sea pits, parks, playgrounds, and gentle slopes are all their favorite places (Sharareh et al., 2015). Jansson, et al. studied the use and participation of children in urban villages in green spaces, as well as their views and management of green spaces. They found that children prefer multifunctional green spaces, such as parks and green spaces, which can provide various activities and social opportunities. Children have also shown interest in abandoned places, which can provide opportunities for exploration and play (Sharareh et al., 2015).

2.3 Chapter Summary

The emphasis on children in the field of human settlements and environmental sciences in various countries is increasing, and both theoretical research and practical exploration are showing a vigorous development trend (Racelis et al., 2002; Woolcock et al., 2010; Gökmen & Tasci, 2016; Yao & Xiao, 2017; Agarwa et al., 2021; Agarwa et al., 2021; Sapsaglam & Eryilmaz, 2024). The relevant research results have formed a systematic and refined research system, and have developed from a single discipline to interdisciplinary collaboration and development such as architecture, urban planning, geography, psychology, sociology, etc (Karen et al, 2015; Sapsaglam & Eryilmaz, 2024).

A large number of researchers have conducted systematic research on spatial planning and environmental design related to children. The research subjects involve residential neighborhood environment, urban green space, urban public activity space, etc(Dunton et al., 2014; Wang & Han, 2012; Dadvand et al., 2015; Ahmed et al., 2022). The research methods include children's perception maps, questionnaire surveys, interviews, behavioral observations, GPS trajectory analysis, etc; The research results, including fundamental theoretical research, theoretical model construction, empirical investigation and research, literature review, etc., provide important support for the further in-depth and detailed development of research in this field.

Although numerous research achievements have been made in recent years, studies on the child-friendliness of the spatial environment in urban villages remain insufficient. There is a lack of research centered on children's needs, particularly their visual perception. Moreover, no systematic studies have explored urban village spaces from a child-friendly perspective. Key questions remain unaddressed, such as which factors in the urban village

spatial environment influence children's activities, how the transportation system can ensure children's safety in daily activities, and how to design activity spaces and facilities that support children's growth. These issues have not been thoroughly examined. In Foshan City, there are almost no relevant studies on the child-friendliness of urban village spaces for reference.

In recent years, the expansion of research scope and the updating of research methods have provided an important foundation for exploring the spatial environment of residential areas from a child friendly perspective. While Meng (2020) provides a foundational framework for evaluating child-friendliness, it is limited to urban residential areas and excludes urban villages. This research expands the framework to urban village settings to address this gap. The existing research results in various fields at home and abroad have also provided opportunities for in-depth research in this field. This study can effectively supplement this field.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Framework

This study adopts a mixed research method, combining quantitative analysis (questionnaire survey) and qualitative analysis (such as behavioral observation and interviews), taking a typical urban village in Foshan City as a case, to assess the child-friendliness of its public spaces (including safety, accessibility, diversity and inclusiveness), and based on the theory of child-friendly cities and environmental behavior theory, proposes optimization strategies, aiming to provide scientific basis and practical guidance for the optimization of children's spaces in high-density urban environments.

3.2 Overview of the Research Site

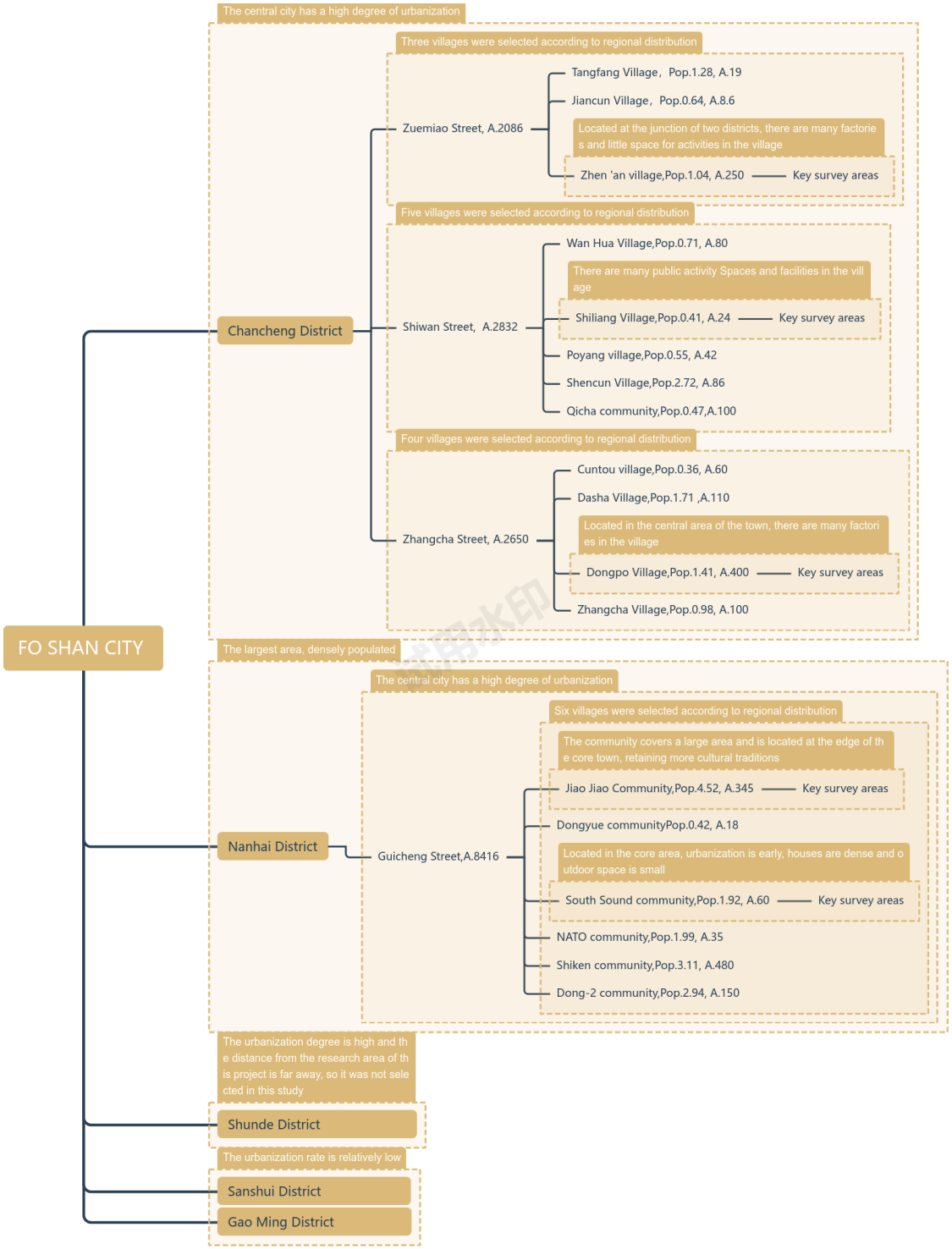
Foshan is an important node city in the Guangdong Hong Kong Macao Greater Bay Area, the the Pearl River Xijiang Economic Belt, the "Guangzhou Foshan Zhaoming Economic Circle" and the "Guangzhou Metropolitan Circle", and one of the most developed private economies in China. Foshan City has five districts, among which Chancheng District and Guicheng Street in Nanhai District are the central urban areas of Foshan City. They are the economic, cultural, and political centers of Foshan City, as well as the gathering places for residents' residential life. They are the most significant areas of Foshan City that have undergone changes with the development of economy and culture. As a relatively unique urban spatial community, urban villages in Foshan have the characteristics of large number and wide distribution.This project plans to focus on the urban villages in Guicheng and Chancheng districts as the key research objects. Firstly, the distribution of urban villages in Foshan city will be analyzed through Baidu satellite map. Based on location, spatial

characteristics, etc,and selected 18 urban villages in Chancheng and Guicheng as the research objects (see Figure 3.1). The 18 villages are Diejiao, Shiken, Nanyue, Poyang, Qicha, Dong'er, Dongyue, NATO, Tangfang, Zhen'an, Zhangcha Village, Jiancun, Shencun, Wanhua, Shiliang, Dongpo, Chancheng Cuntou Village, Dasha Village, etc. Please refer to Appendix 1 for details. The spatial environment information of these urban villages was obtained through satellite maps and field surveys. The surveyed villages include administrative villages as well as villages that were converted into communities earlier, such as Nanyue and Dongyue. Based on the spatial environmental characteristics and urbanization level of urban villages, five urban villages (Diejiao, Nanyue Community, Dongpo Village, Zhen'an Village, and Shiliang Village) were selected as key survey points.



Figure 3.1: Research location

(self-drawn based on Baidu Maps and Gaode Maps)



Pop: Population (inhabitants) A: Area (ha)

Figure 3.2: Selection Process of Survey Respondents

3.3 Research Contents

The research design will consists of three main parts:

i. Through literature review, on-site observations, photo observations, and interviews, the current spatial environment characteristics of urban villages in Foshan City, the areas where children can engage in outdoor activities, and the general characteristics of children's activities will be gathered, summarized and investigated.

At the same time, through questionnaires and interviews with child guardians, the perceived preferences of children and parents, the patterns of children's daily activities, and the main spatial environment problems faced by the parents and children will also be gathered for analysis at the early stage.This part of the research content will correspond to the objective 1 goal and adopt qualitative methods to obtain data.Discuss implications of findings for urban planning, such as how safety and green spaces influence children's cognitive and physical development.

ii. Based on literature review and undertaking situational investigations, an appropriate evaluation system will be selected to assess the level of child friendliness of urban village spatial environment. The data collected will be quantitatively analyzed. Their impact paths and effects will be used to provide scientific basis evidences, for the research and work in optimizing the environment of urban villages. This part of the research content will correspond to the objective 2 goal and obtain data using quantitative methods.

iii. Strategies for optimizing the spatial environment of urban villages based on child friendly design concepts, will be applied to improve the situations and conditions. Based on the core indicators determined from the literature research work, a child friendliness evaluation system will be applied and the results of the impact effect will be assessed, before a universal optimization design strategy will be proposed to

provide design guidance for the updating and construction of the child friendly urban village spatial environment. This part of the research content will correspond to the objective 3 goal and provide strategies using qualitative methods.

3.4 Research Method

This study adopts a hybrid research method that combines quantitative and qualitative research, and conducts systematic research with reference to the research issues. The main research methods involved in the research process are as follows:

i. Literature analysis

By combing and analyzing literatures related to this topic, the purpose is to grasp domestic and foreign research trends and summarize child-related spatial environment elements. By collecting and sorting existing literatures on residential space environment, children's behavior activities and child-friendly environment design, the author can understand domestic and foreign research trends and provide a solid foundation for this study. In this part, the research method of narrative review is adopted, and the existing literature is summarized by searching the research results in related fields. On the other hand, the spatial environment factors related to children were obtained through literature review, and the spatial environment factors related to children in urban settlements were preliminarily obtained. Based on the results of literature review, appropriate evaluation indicators were selected to evaluate the spatial friendliness of children in urban villages.

This study analyzes the limitations of child-friendly Spaces in the Guidelines for the Construction of Urban Child-friendly Spaces (Trial), as well as relevant data such as specific spatial points and elements of children's healthy development. Based on previous studies, the child-friendliness evaluation system of urban residential spatial environment constructed

by Meng Xue et al. (Meng&Li,2022) based on the perspective of child caregivers was selected to evaluate and test the friendliness of urban villages. The evaluation index mainly takes six aspects of recreation availability, travel comfort, travel support, service availability, neighborhood atmosphere and neighborhood security as the first-level rating index of the evaluation model.The child-friendliness evaluation system of urban residential spatial environment constructed will be the evaluation method for Target 2.

ii. Field investigation

a. Investigation of the space environment

The survey scope for each village is mainly focused on the core settlement area. From March to May 2023, a comprehensive survey will be conducted on the streets, alleys, and outdoor spaces of 18 villages, mainly investigating the road space, outdoor activity space, and children's activity situation in different environments of 18 urban villages.These spatial environment survey data will serve as the data source for analyzing the factors influencing the environmental friendliness of children in urban villages as targeted in Objective 1.

Survey period: From March to May 2023, prioritizing weekends and holidays with clear or non-rainy weather that are suitable for travel. Each village selects the time from 8:00 to 19:30 to observe and record the behavior of children.

Selection of observation subjects: Randomly select children who are active in the study areas such as village parks, roads, and alleys as the observation subjects. During the investigation, avoid taking clear frontal images of the children.

Survey method: Field observation method is used to conduct a survey, visually observing and taking photos of road space, outdoor activity space, personnel activities, etc.

Record the spatial and environmental characteristics of urban villages, the child friendly level of road spaces, and the activity status of children in different environments. Record the number and condition of children's service facilities (kindergartens, primary schools, secondary schools, etc.), outdoor activity venues and facilities (parks, sports fields, amusement parks, etc.) to analyze the factors that affect children's activities in urban villages. Using Baidu Satellite Maps, measure the area of each village park using size tools, and calculate the coverage of each village park based on its location in the village with a service radius of 400 meters.

b. Investigation on the activity characteristics of children in urban villages

Based on a comprehensive survey, five key villages were selected according to their location and overall layout characteristics to investigate the characteristics of children's activities. Data on the characteristics of children's activities will also provide a basis for the analysis of Goal 1.

i. Survey time: During April and May 2023, prioritize weekends and holidays with clear or non-rainy weather that are suitable for travel.

ii. Survey method:

Field observation method: Children aged 0-14 were selected as the research subjects and divided into three age groups: preschool children (under 3 years old), preschool children (3-6 years old), and school aged children (7-14 years old) for analysis and research. Taking the central green space of the village as the main observation site, the behavior annotation method needs to record objective information including the number, content, type, number of accompanying persons, and flow rate of children's activities in each space at different time periods and age groups. Select multiple sample spaces in the green space (covering as many

space types, facilities and physical elements as possible), record the facilities and physical elements in the sample space, and continuously observe children's behaviors on weekends in normal weather (not bad weather such as storm rainstorm), with the observation time set at 10-11 a.m. and 4-6 p.m. During the continuous observation process, take one photo every 20 minutes to further record the behavior (if the venue is large or there are many people, a single photo cannot show the full view of the venue and the behavior of children, then take multiple photos at the same time to record the behavior of children).

Questionnaire survey method: Considering the significant differences in understanding and cognitive levels among children of different age groups, and the fact that parents are close participants in children's daily lives, they can truly perceive the positive or negative impact of the external environment on children (Meng & Li, 2022). Therefore, this study selected parents as the target respondents for the questionnaire survey and conducted the survey among parents who were caring for their children at children's activity venues in the village.The questionnaire survey was conducted through on-site random sampling. The sampling locations were areas where children gather, such as streets and alleys, small parks, and squares in urban villages, which are outdoor activity venues. The target population was the guardians (parents or grandparents) who were looking after children engaged in outdoor activities in urban villages. Before conducting the questionnaire survey, inform the respondents of the purpose of using the data and obtain their consent before proceeding with the survey of the questionnaire content. The specific informed consent content is set on the first page of the questionnaire. For details, please refer to Appendix D. The questionnaire did not record names or specific addresses.Finally, anonymize all the data. A questionnaire survey was conducted among caregivers (parents) of children, including the locations and types of outdoor recreational activities, independent activities of children over 6 years old,

and caregiver evaluations of environmental facilities and child friendliness. A total of 115 questionnaires were collected, of which 98 were valid. The specific content of the questionnaire is detailed in Appendix 4.

Interview survey method: During the questionnaire survey, five parents were randomly selected for interviews. The content of the interviews included the content and typical activity characteristics of children's daily neighborhood recreational activities, what environmental factors parents believed had an impact on children's neighborhood activities, and the existing problems in the living environment.

c. Investigation on evaluation of children's friendliness in urban villages

Based on the literature review and the previous research, the index constructed by Meng (2020) in the evaluation of the spatial environment of urban residential areas for children is selected as the evaluation index of this project, which takes child-friendly spatial environment elements of residential areas into account in a more comprehensive way (Meng & Li, 2022) .The evaluation indicators include recreational availability, travel comfort, travel support, service availability, neighborhood atmosphere, neighborhood security, etc. The weights of each indicator are detailed in Table 6 of Chapter 4.

Survey time: During April and May 2023, prioritize weekends and holidays with clear or non-rainy weather that are suitable for travel.

Survey method: Using five key villages as survey sites, parents of children were selected as the objects of the child friendliness evaluation questionnaire survey. The evaluation was conducted using a five level scale method, and the evaluation scale was divided into 5 levels: "1 point for strongly disagree, 2 points for disagree, 3 points for general/difficult to say, 4 points for relatively agree, and 5 points for strongly agree". Parents

were asked to evaluate and score based on the child friendliness level of their village. A total of 115 questionnaires were collected, of which 98 were valid. Due to the wariness of some respondents, they were rather vague in answering the questions or failed to fully cooperate in completing the entire questionnaire, resulting in 14.78% of invalid questionnaires. The specific proportions of valid and invalid questionnaires are shown in Table 3.1. The specific content of the questionnaires can be found in Appendix 4. Collect and organize the final valid questionnaire data for comprehensive evaluation. Based on the survey results and the spatial environment characteristics of the five key villages mentioned earlier, analyze the degree of parental recognition of each element and its corresponding child friendliness from six indicator elements.The assessment of child friendliness in the five key villages will provide the basis for object 3.

Table 3.1: Questionnaires Distribution

Village Name	Total Number of Questionnaires	Proportion of Valid Questionnaires	Proportion of Valid Questionnaires	Invalid Questionnaires	Proportion of Invalid Questionnaires
Diejiao	18	15	15.31%	3	16.67%
Nanyue	21	18	18.37%	3	14.29%
Zhen'an Village	37	32	32.65%	5	13.51%
Shiliang Village	17	13	13.27%	4	23.53%
Dongpo Village	22	20	20.41%	2	9.09%

iii. Statistical analysis

All the spatial environment data are based on the first-hand data obtained from on-site investigations and questionnaires.

The statistical analysis of the factors affecting the outdoor space environment is mainly based on on-site photos and Baidu maps, and the spatial structure of urban villages is made and analyzed by AutoCAD, Photoshop and other drawing software.

Data statistics and arrangement of interviews and questionnaires were analyzed and charts were made in Excel 2019. This study conducts descriptive statistics on the questionnaire survey data through quantitative analysis to identify the key influencing factors of child-friendliness; uses the child-friendliness evaluation model to conduct statistical analysis on the data; and employs qualitative analysis to categorize and organize the behavioral observation and interview data and conduct descriptive statistics to reveal the correlation between children's activity characteristics and spatial design. Ultimately, by integrating the quantitative and qualitative results, it proposes scientific and operational optimization strategies.

3.5 Technology Roadmap

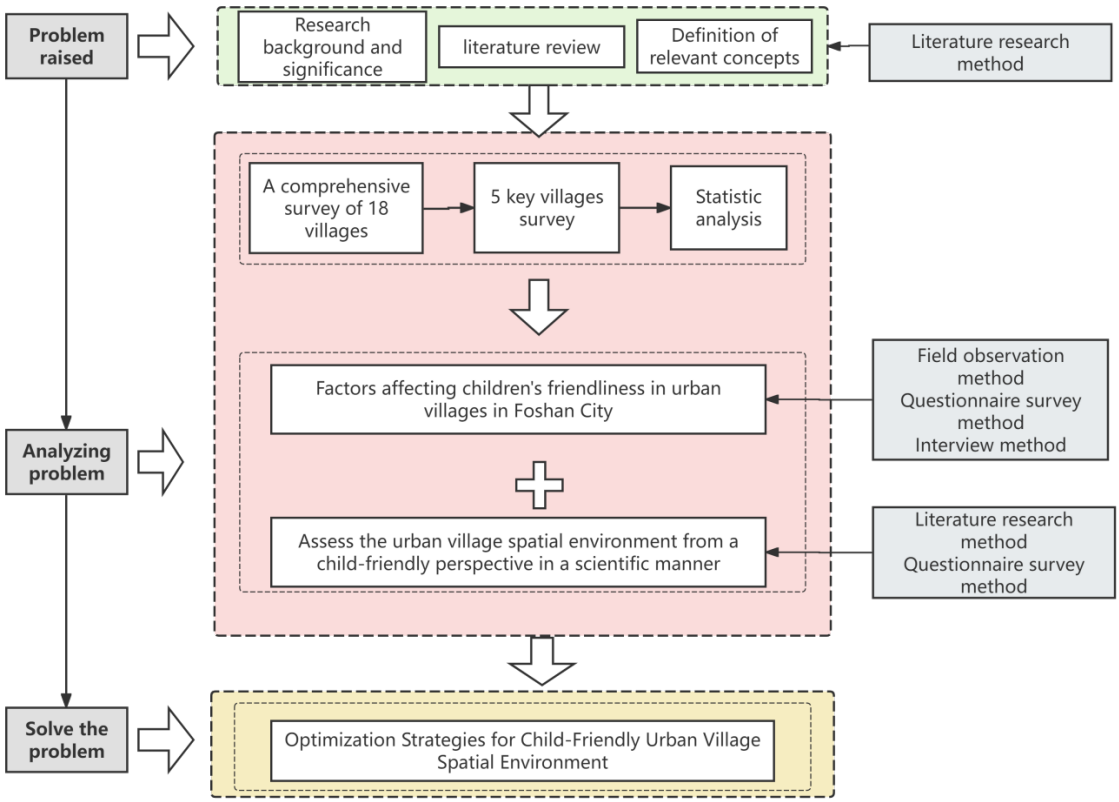


Figure 3.3: Technical roadmap

Through the literature research method, this paper sorts out the relevant concepts and research progress of children-friendly cities and the spatial characteristics of urban villages, and clarifies the research gaps and innovation points. Through a preliminary investigation of 18 urban villages in Foshan, five typical villages were selected for in-depth analysis.

Path for Objective 3: Record children's activity patterns in the urban village space through behavioral observation, analyze the relationship between their behaviors and the urban village space environment, and identify the main factors influencing the friendliness of the urban village for children through qualitative analysis.

Path for Objective 2: Design questionnaires to collect residents' (especially parents') evaluations and demands regarding the friendliness of the environment for children, and

scientifically assess the spatial environment of urban villages from a child-friendly perspective.

Path for Objective 3: Based on the assessment results, by integrating literature research and questionnaire survey data, propose child-friendly optimization strategies from the perspectives of safety, child-friendliness, and diversity for aspects such as road space and children's outdoor activity spaces in urban villages.

CHAPTER 4

RESULTS AND DISCUSSION

The contents of 4.1 and 4.2 in this chapter will discuss the research objective 1, and the contents of 4.3 will discuss the research objective 2.

4.1 Characteristics of Spatial Environment in Urban Villages

As for the characteristics of the spatial environment of urban villages, data and analysis are mainly obtained through field observation and photo observation, and the elements corresponding to the key points of urban child-friendly space construction at the community level in the Guidelines for the Construction of Urban Child-friendly Space (Trial) (Draft for Comment) are combined in the investigation process. The contents of the field investigation include the overall spatial layout, road space, outdoor activity space, children's service facilities and so on.

4.1.1 Overall Layout

Among the 18 urban villages, the smallest one is Dongyue Community, with an area of only 18 hectares, while the largest one is Shiken Community, with an area of 480 hectares. Some urban villages are located near the city center in terms of space, such as Diejiao Township, Shiken Community, Nanyue Community, etc. The surrounding areas are surrounded by various urban elements such as residential areas, public buildings, and urban roads. The periphery has convenient transportation, superior geographical location, and urban resources. Many functions such as commerce, transportation, and landscape in the city gradually penetrate into the urban villages. This has naturally formed a unique way of life and rich street and alley spatial texture within the village.

Most of the houses in the 18 villages are arranged neatly, resembling a formation. The streets in the villages are straight and intersect at right angles, resembling a chessboard, as shown in Figure 4.1. Some villages have houses arranged along the river, but the overall layout is also relatively orderly. The center of a village is mostly a public space, where villagers engage in various activities and exchanges, including public buildings (community centers, ancestral halls, etc.), streets and alleys, water wells, ponds, parks, and squares. Surrounding the public space are residential areas, which is consistent with the traditional village layout but differs significantly from the current mainstream residential community layout in Foshan.

The traditional houses in urban villages are mainly 3 to 4 story buildings, with newly built houses reaching up to 8 floors in a chessboard layout. Streets, alleys, and buildings occupy a large amount of land area, while public outdoor activity spaces are relatively limited.

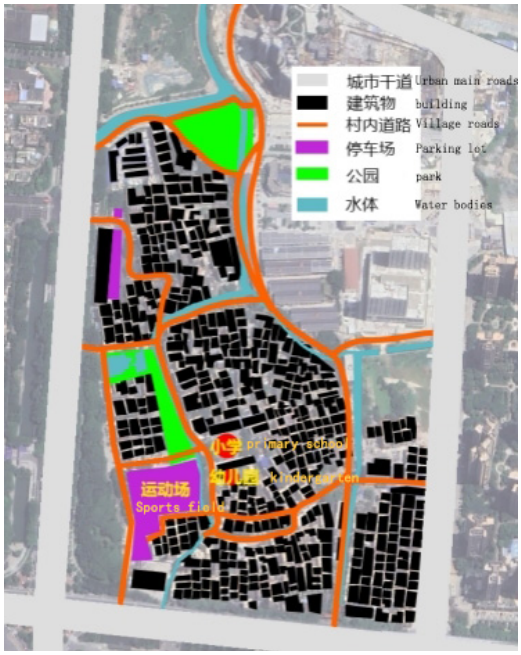


Figure 4.1: Layout of roads, parks, and water bodies in urban villages (Poyang Village)

4.1.2 Road space

From the map, urban villages are located within the urban planning scope and even near bustling areas or industrial areas. The surrounding areas are all main urban roads with high traffic volume (see Figure 4.2). Villages are generally secondary roads that do not participate in urban public transportation and are mainly used by villagers. Most villages have checkpoints at the entrance to restrict traffic flow.

The main roads in the village are mostly 1-2 lanes wide, and cars are parked on one or both sides of the road. Most streets do not have sidewalks, and pedestrians walk alongside cars on these streets (see Figure 4.2).



Figure 4.2: Street conditions

Most villages in the city have primary schools or kindergartens. Based on field investigations, schools in the village are connected to residential areas through village roads, which often lack sidewalks. The space for school paths in urban villages is mostly village roads, with narrow roads and no sidewalks. This leads to pedestrians having to compete with motor and non-motor vehicles, which poses a great safety hazard. With the peak period of going to and from school, the traffic flow in front of the school gate increases, filled with motor vehicles and non-motor vehicles to pick up and drop off children. This greatly increases the probability of accidents occurring. The gate space of most schools is not very

large, and there are not many waiting areas or parking lots for parents. As shown in Figure 4.3, a parking space is designated in front of a daycare center in Shiken.



Figure 4.3: Traffic conditions in front of daycare institutions (Poyang, Shi (Shiken))

At present, the number of cars has greatly increased. In addition to congested streets and safety hazards caused by parking, many outdoor spaces in urban villages have been used as parking lots. In some villages, basketball courts and badminton courts have even been used as parking lots, such as Poyang Village and Shenzhen Village, as shown in Appendix B.

According to the results of on-site inspection, the relationship between the house and the road in the urban village is drawn as shown in Figure 4.4. The main road of urban villages is directly connected to the urban main road, and the entrances and exits are open. 55.6% of urban villages have set up parking gates as the basis for parking fees. Any vehicle can directly enter the village streets from the urban main road, resulting in a reduced sense of security. The transportation mode of "house alley street" (see Figure 4.4) means that the residence is directly connected to the streets and alleys, and the entrance to the house is the street and alleys. Children need to walk directly through the lanes to enter the village's public areas, and the streets and alleys are also the outdoor activity spaces that children can quickly

enter (see Figure 4.5). The streets and alleys in urban villages are relatively narrow, and the main roads in the village are mostly 1-2 lanes wide, with cars parked on one or both sides of the road. 44.4% of the main streets in urban villages have sidewalks or shoulder roads, while 55.6% of the streets in urban villages do not have sidewalks. People and vehicles run parallel on the streets, resulting in low travel safety (Figure 4.6). Many street facing buildings have opened shops, and there are often merchants who randomly place and occupy road space, which affects pedestrian traffic. The width of the alleyway ranges from 1 to 3 meters, and the wider alleyways have also become parking spaces. The narrower alleyways provide a place for residents or younger children to socialize or engage in outdoor activities without motor vehicles entering, but these alleyways are often narrow and lack sufficient lighting. 17 out of 18 urban villages have primary schools or kindergartens within the survey area, 58.8% of urban villages have no pedestrian crossing facilities such as zebra crossings in front of their learning gates, and 100% of urban village schools lack interesting signs in front of their gates.

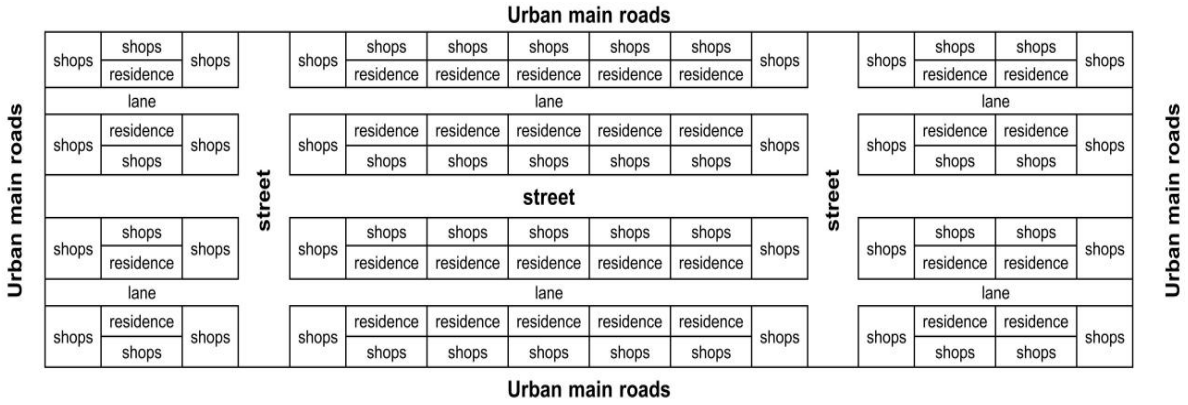


Figure 4.4: The road space model of 'house-alley-street' in urban villages



(a) (b) (c) (d)

Figure 4.5: Group diagram of children's activities in streets and alleys of urban villages

(a. Children ride an electric amusement equipment on the street; b. Children play play badminton on the street; c. Children watch the water at the waterspout; d. Children play water on the street)



Figure 4.6: The situation of people and vehicles running parallel on roads in urban villages

From the perspective of the layout and current use of urban village roads, the factors that affect the child friendliness of urban village road space mainly include the following two factors: 1) Safety factors: Measures to divert unmanned vehicles and restrict external vehicles in urban villages pose safety hazards; There is a lack of planning for pedestrian facilities in urban villages, and sidewalks and crosswalks are missing, making it impossible to form a safe and continuous walking path for children in residential areas. 2) Factors related to child suitability: Children's educational path is through village roads, but the path lacks child guidance and interest.

4.1.3 Outdoor Activity Space

i. Overall overview

The center of urban villages is mostly an important outdoor activity space for the entire village, mostly consisting of public buildings, ponds, parks, and squares. After urban transformation, most villages have parks and green spaces for children to play with. However, during the investigation, it was found that there are no parks and green spaces in Tangfang Village, and most of the houses in the village are factories and family workshops.

Parks and green spaces are one of the main activity areas for children. Parks or squares in urban villages are mostly composed of hard pavement, and some newly renovated parks have facilities such as children's slides, such as NATO and Shiliang (see Figure 4.7). Some parks only have a limited number of amusement facilities for children, and some parks have outdated and poorly maintained amusement facilities, such as Wanhua Park. Some village parks are only for people's leisure, such as the activity square inside Jian Village, which only has simple leisure trails, plant planting belts, and recreational facilities. The hierarchy of plants is mainly composed of trees and ground cover, with a relatively single hierarchy. Most trees grow in tree ponds, and there are fewer natural elements available for children to explore in the park.



Figure 4.7: Children's playground facilities in urban villages

Some urban villages have rivers passing through and have good landscape resources, such as Diejiao, Shiken, Wanhua, etc. Some villages use these resources to set up platforms along the river for villagers to rest and relax (see Figure 4.8). Rivers are also a carrier for villagers to inherit culture, such as the dragon boat competition in Diejiao, which can provide good folk cultural education materials for children.



Figure 4.8: People resting on the riverbank

Sports are a good way to improve children's physical fitness. Most urban villages have basketball or badminton courts (see Figure 4.9), and some courts are set up within neighborhood committees, such as the basketball courts in Dong'er and Shencun. However, some village sports fields are occupied as parking lots.



Figure 4.9: Sports Ground

ii. Analysis of influencing factors of outdoor space

From the inspection results, it can be seen that children's outdoor activity areas mainly include village parks, doorsteps, village sports fields, and scattered small green spaces (see Tables 4.1 and 4.2). The village park is a concentrated outdoor activity venue for

children in urban villages, with the smallest green area of about 550m^2 and the largest of about 7,560m^2. 78% of the park area is less than 5,000m^2, and the larger parks mainly include feng shui ponds. Considering the walking ability of children, measured with a radius of 400 meters around the village park (Moblasser, 2007; Han et al., 2011), 72% of urban village parks can cover the core residential area of the entire village. There are many hard pavements in the village park, mainly including tree pools, large trees, and fixed tables and chairs (see Table 4.2). Some newly renovated parks have facilities such as children's slides and plastic paving. 50% of the village parks do not have amusement facilities for children, and only 22% of the children's activity areas in the village parks have soft paving. Sports are a good way to improve children's physical fitness. 67% of urban villages have basketball courts, badminton courts, or table tennis tables placed in parks, but some village sports fields are occupied as parking lots.

Table 4.1: Allocation of outdoor activity spaces for children in 18 urban villages

Project	Concentrated green space area (m^2)			Coverage of park service radius (400m)		Children play facilities		Soft pavement		Sports field		
	<1000	1000-5000	>5000	Full coverage	Partial coverage	Have	Nothing	Have	Nothing	Have	Nothing	Occupied
Number	5	9	4	13	5	9	9	4	14	12	3	3

Table 4.2: Types of outdoor activity venues for children in urban villages

Main activity venues	Classification	Landscape content	Children's activity methods
Village Park	Facilities	Slide, combination slide, plastic spring rocking horse, adult fitness facilities	Playing game equipment or fitness equipment
	Paved Square	Hard flooring, tree pools, large trees, fixed tables and chairs, granite stone chairs, steps	Walking, running, chasing, playing games, playing soccer, cycling, skateboarding, interacting with caregivers
	Landscape Elements	Cultural corridors, pavilions, flower racks, and scenic walls	Rest, run, chase, play games
	Natural Elements	Plants in feng shui ponds, rivers, large trees, flower beds, and neatly trimmed shrubs	Watching water and activities under the shade of trees
Doorway	Doorway	Concrete alleyways or streets, shops, seats	Walking, chasing, play badminton, interacting with caregivers
Village Sports Ground	Sports Field	Basketball court, badminton court, table tennis table	Running, Chasing, Sports
Scattered Small Green Spaces	Small Green Space	Tree pond, large tree, fixed tables and chairs, pavilion	Walking, playing games, interacting with caregivers



(a) (b) (c) (d)

(e) (f) (g)

Figure 4.10: Observation on the recreation situation of children in urban villages

(a. Playing toys together; b. Playing by fixed tables and chairs; c. Sliding slides; d. Climbing to adult fitness facilities; e. Riding bicycles and balancing bikes; f. Playing ball on the square; g. Playing basketball)

From the perspective of the layout and current use of outdoor activity spaces for children in urban villages, the factors that affect the child friendliness of outdoor activity spaces in urban villages mainly include the following four aspects. 1) The area of green space: Although most village parks can cover the core residential area, the area of most urban village parks is relatively small and cannot meet the needs of children's activities. 2) Availability of facilities: 50% of the village parks have no children's game facilities, the villages with game facilities only have slides on the platform, and 17% of the villages have no playground or are occupied. Children play play badminton on the street and play football on the park platform (see Group 4.5and 4.10). The facilities available for children's amusement and sports are insufficient and of a single type. 3) Facility quality: Most of the facilities lack soft paving, have single functions, and some facilities lack maintenance, are outdated and damaged, unable to meet the recreational needs of children of different ages.

4) Explorability of the venue: Flat and hard paving, tree pools, large trees, fixed tables and chairs, and plants surrounded by trimmed hedges are the main components of the village park. The facilities for children's activities are mainly slides placed in the square, and the game space is dull and boring, lacking elements for children to explore and high-quality children's play areas.

4.1.4 Children's Service Facilities

Each village has basic supporting facilities such as kindergartens, and most villages have primary schools, which extend to the entire urban village (see Appendix 3). The primary schools, kindergartens, and parks in the village are mostly located in close proximity, in the center of the village, making it easy for school-age children to enter and play after school. However, most of the three lack a suitable communication path for children. Some villages have libraries and other facilities, but some are only open during working hours and cannot be used by eligible children, or the books are outdated and lack management, with fewer children reading them.

4.1.5 Summary

Similarly, in this survey, it was found that the streets and alleys in urban villages are essential areas for children to go to school and engage in outdoor activities, as well as places for children to play. Village parks, open spaces below homes, and sports fields in the village are also important venues for children's outdoor activities.

In terms of road space, most urban villages are mainly composed of low rise and multi-story buildings, and the roads within the community are mainly streets and alleys. The main street is narrow, and most of them have parking spaces on one side without sidewalks, leaving only one lane wide for vehicles and pedestrians to pass. The road conditions are

complex and the safety is insufficient. Children need to intersperse between vehicles and even walk onto the motor vehicle lane while walking. Children are much shorter in height than regular vehicles, which leads to poor visibility when walking between vehicles and is prone to traffic accidents. Although some villages have sidewalks and low traffic, smaller sidewalks cannot accommodate a large number of parents and children during peak school hours. The alleyway directly connects to the residential entrance, and some alleyways are also used as parking spaces. Most outdoor spaces in the village have been transformed into parking lots, and some sports facilities such as basketball courts have also been occupied as parking lots.

In terms of outdoor activity space, the village park is the main place for children's activities, but most of them are small in size, and 50% of the parks lack children's play facilities. Insufficient green space, single types of facilities, and poor maintenance have led to a lack of attractiveness and exploratory space for children's activities. Children's activity facilities are mainly concentrated in hard paved areas such as square slides, lacking diversity and fun. the outdoor activity areas suitable for children to play in the village are small and scattered, with insufficient recreational resources or lack of management and outdated facilities, which cannot meet the recreational needs of children of different age groups. The green spaces in the village are mainly hard landscapes with fewer plants, and the trees in the village are often cut down. Children have limited access to the natural environment in the village, resulting in natural deficiencies.

In terms of children's service facilities, most villages have supporting primary schools and kindergartens, but there is a lack of access to children's education, and the separation of people and vehicles has not been achieved. The suitability of facilities such as

community comprehensive service stations, health service stations, and cultural stations for children is insufficient, and there are also few supporting facilities such as children's reading areas and after-school self-study classrooms. The quality of related supporting facilities is relatively low, and even damage is very common.

From the survey results, it can be seen that the road conditions in urban villages are complex, with limited space and facilities for children's outdoor activities, incomplete community supporting facilities, and low levels of child suitability.Safety factors and suitability for children are the main factors affecting the child friendliness of road spaces in urban villages; The area of green space, availability of facilities, quality of facilities, and explorability of the site are the main factors affecting the friendliness of outdoor activity space for children in urban villages

4.2 Analysis of Children's Activities in Urban Villages

Based on the spatial environment characteristics and urbanization level of urban villages, five key villages were selected for a survey on children's activities, including Diejiao, Nanyue, Poyang Village, Zhen'an Village, Shiliang Village, etc. Behavioral annotation method, questionnaire survey, interview and other methods were used to collect data to obtain the spatiotemporal characteristics of children's activities

4.2.1 Sample Overview

Based on the previous research results, distribute questionnaires to parents of children. The main purpose of the questionnaire is to obtain the activity patterns of children with a larger sample size. The paper questionnaire was distributed from April to May 2023, and a total of 115 questionnaires were collected; 98 were deemed valid after initial screening.

The specific content of the questionnaire can be found in Appendix 4. Please refer to Table 4.3 for specific sample information.

Table 4.3: Basic information of survey samples

Project		Percentage	Project		Percentage
Child age	0-3 Years Old	28.36%	Duration of residence in the village	Since birth, I have been	35.00%
	≧3-6	35.82%		over 10 years	15.00%
	≥ 6 Years Old	35.82%		Over 5 years	35.00%
Child Gender	Male	60.00%		Over 1 year	10.00%
	Female	40.00%		Less than 1 year	5.00%
Parental identity	Dad	19.05%	Number of private cars	not have	24.14%
	Mom	46.03%		1 vehicle	62.07%
	Grandfather	11.11%		≥ 2 vehicles	13.79%
	Grandma	19.05%	Parental profession	Government agencies or public institutions	3.45%
	Other Identities	4.76%		enterprise	10.34%
Family composition	Nuclear Family	43.90%		Professional and technical professions (teachers, doctors, etc.)	10.34%
	Atavism Family	4.88%		Individual business	34.48%
	Three Generations Living Together	51.22%		Full time at home/retired	24.14%
Educational Level	Junior High School And Below	29.03%		other	17.24%

Table 4.3 continued

	High School/Vocational School/Technical School	38.71%	Per capita housing area of households	≤30 ㎡	20.69%
	Diploma Or Undergraduate	29.03%		30~50 ㎡	20.69%
	Postgraduate	3.23%		＞50 ㎡	58.62%
Members	Villagers Of This Village	43.59%			
	Tenant	53.85%			
	Other	2.56%			

The parent identity of the survey sample is mainly that of children, with a significantly higher proportion of female parents; Research on parental parenting involves different age groups, with a higher proportion of school-age children; In terms of child gender, boys make up a relatively large proportion; In terms of family composition, the proportion of nuclear families is the largest; In terms of personnel composition, the proportion of tenants is slightly higher than that of local villagers; In terms of living time in the village, the proportion of people who have been living in the village since birth is equivalent to those who have lived for more than 5 years; In terms of the number of private cars, most samples have more than one car.

Overall, there are significant differences in the age of children, family composition, and residential area types among the survey samples, and most of the samples have lived in villages for more than 5 years, which can be considered representative. In addition, due to the significantly larger proportion of high school aged children (≥ 6 years old) in the sample,

when analyzing the activity characteristics of children in different age groups in the future, the main focus will be on the selection percentage within each age group to avoid analysis bias caused by differences in sample size

4.2.2 Environmental perception and preference analysis of child caregivers

During the preliminary investigation, this project conducted a simple random interview with the child guardians in the village. The basic information is shown in Table 4.4. Through the interview, the specific situation of the children in the village was understood. From the perspective of the guardians, the existing urban village space was observed to identify existing problems and determine the relationship between spatial form and children.

This visit interviewed a total of 5 child guardians, using keyword shorthand. After conducting free interviews with parents, the information they described was classified, summarized, and organized. According to the interview results, the most frequently mentioned words by parents include phrases such as "accidental injury" and "stranger safety", which can be summarized as "safety". In addition, there are other words such as "insufficient amusement facilities" and "unfriendly equipment to children".

In addition, during the investigation, it was found that what guardians say about children of different age groups is also different. At the age of 0-3, young children do not yet have sufficient activity ability, and their activity methods can only rely on the embrace of their guardians or strollers for transportation. The main focus is on leisure walks, and most parents tend to focus on visual or overall environmental perception, such as "environmental color, environmental temperature perception". Preschool children, namely children aged 3-6 years old, have certain activity abilities and are curious about their surroundings. At this

stage, the most talked about by parents of children is safety, as children often chase and play around, followed by fun and value children's playground facilities. Children aged 6-14 already have cognitive abilities, and parents will also pay attention to educational information in addition to the aforementioned words. For example, taking children to the library, bookstore, etc. At the same time, attention will also be paid to the cultivation of sports skills.

By summarizing the visit results, we can conclude that parents have five environmental factors for their children's activity environment needs: safety, fun, education, convenient transportation, and facilities that are suitable for children.

Table 4.4: Basic Information of Respondents

Serial Number	Parents Identity	Age (Year)	Career	Child Age (Years)
1	Dad	38	Engineer	6
2	Mom	32	Teacher	8
3	Dad	40	Engineer	10
4	Grandma	58	Retire	3
5	Mom	28	Not Have	2

4.2.3 Analysis of spatiotemporal characteristics of children's activities

4.2.3.1 Types and contents of children's recreational activities

The survey results of this project on the activity types of children of different ages are shown in Figure 4.11and 4.12. The highest choice was the run-jump chase option, followed by the play-your-own-toy option. Other common leisure activities include running, walking, chatting, resting, etc., and watching others play or spectate. Relatively speaking, the selection ratio of playing game equipment, fitness equipment and jumping grid, hide and

seek and other activities is low. There is also a significant difference in the types of activities of children of different ages. Children aged 0-3 basically do not participate in ball games, skateboarding and other activities, while children aged 3-6 prefer to chase and play with their peers. With the increase of age, the types of activities can be more widely selected. In addition, a certain number of people choose to play with sand, jump in sand pits, play in water, or observe plants and animals. The results of the questionnaire survey are similar to the field observation results. The area of the playing field is limited, and the types of outdoor activities of children in urban villages are limited to a certain extent. At the same time, the needs of other types of activities also have a certain proportion, so the design should be based on meeting the needs of the main types of activities, and appropriately increase the types of activities, so that children with different preferences can find their favorite activities.

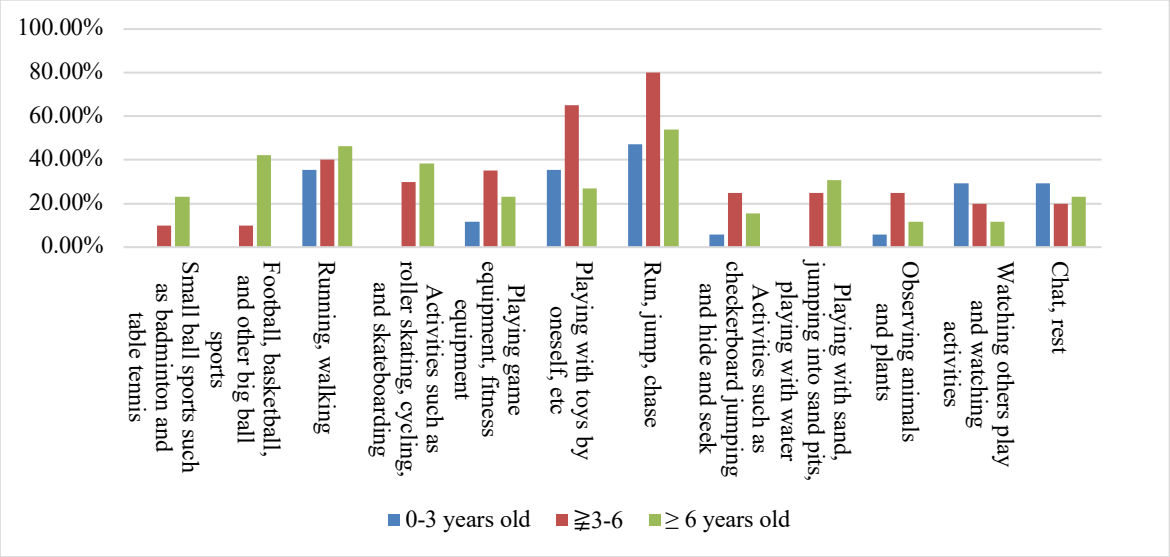


Figure 4.11: Bar chart of survey data on outdoor activities engaged by children of different age groups

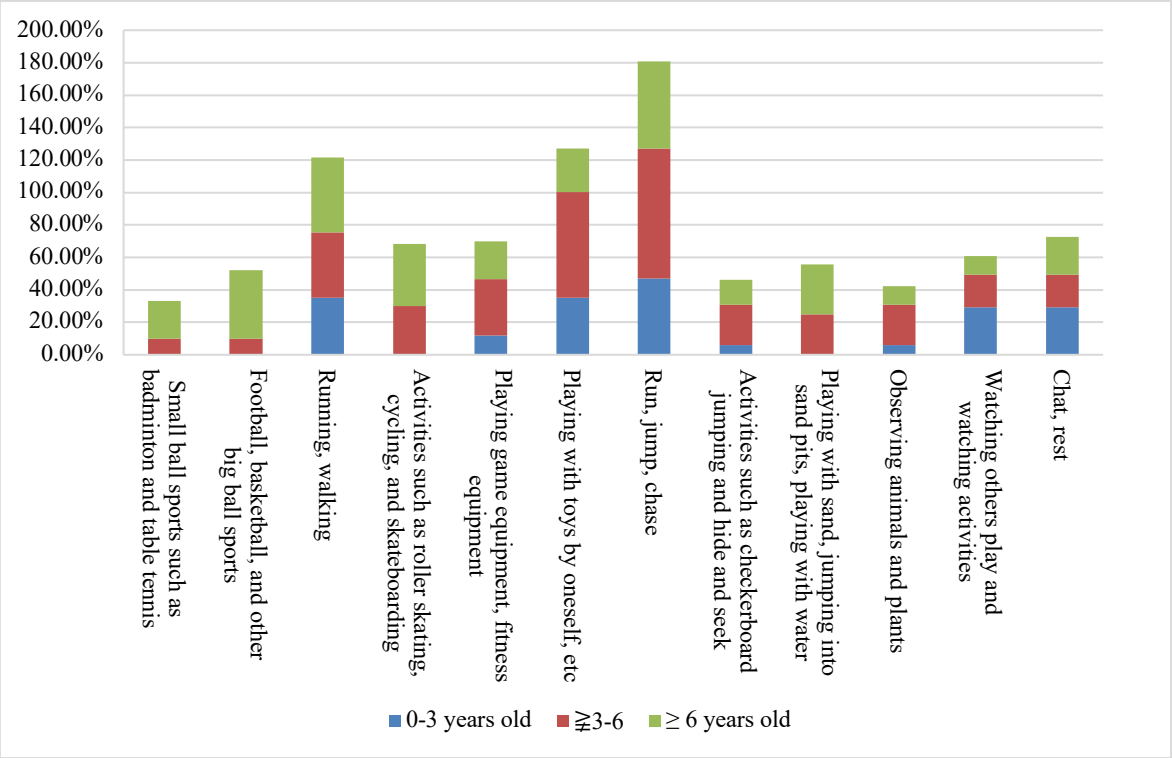


Figure 4.12: Accumulated bar chart of survey data on outdoor activities engaged by children of different age groups



Figure 4.13: Observing water bodies and playing with toys



Figure 4.14: Playing Game Equipment



Figure 4.15: Riding a Bicycle



Figure 4.16: Parents accompany their children to chat, rest, or play with electric amusement facilities



Figure 4.17: Big Ball Sports

4.2.3.2 Time characteristics of children's recreational activities

i. Time characteristics of children's recreational activities on weekdays

This project conducted a survey on the leisure activity time, frequency, and duration of children of different age groups on weekdays. The survey results are shown in the following figure.

In terms of activity time, the proportion of children aged 3-6 choosing "16:00-18:00" is the highest, mostly engaging in recreational activities after school; The proportion of children aged 0-3 choosing "10:00-12:00" is the highest, and they mainly rest at home in the afternoon, with some children also going outdoors for activities in the afternoon. The survey results meet the needs of children's daily routines and education. Some parents have reported that due to the distance between their homes and the village park, children aged 6 and above have fewer working days to play in the village park.

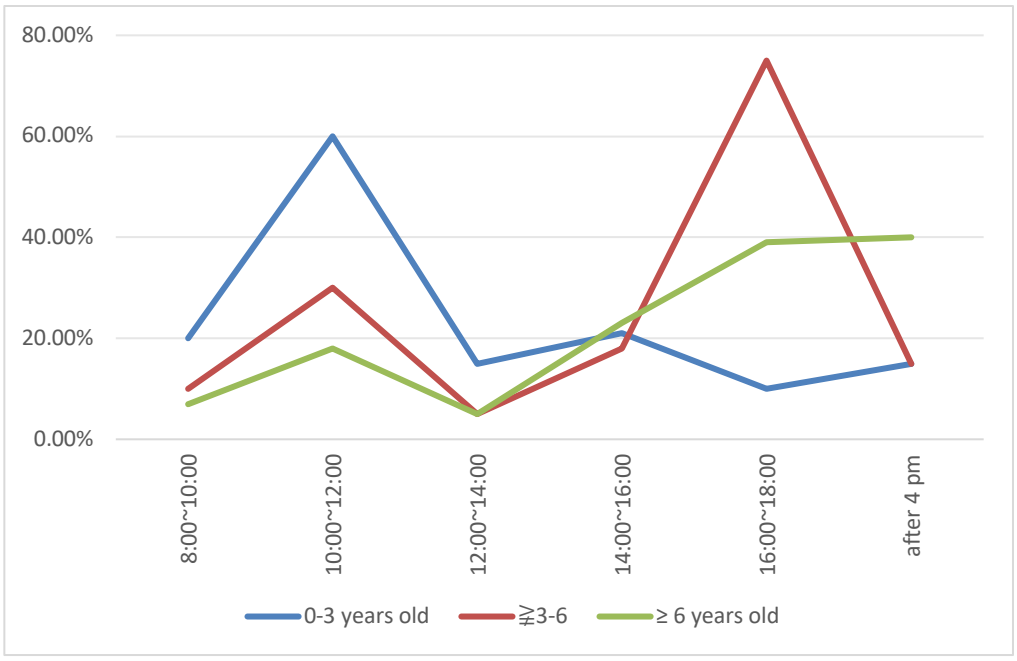


Figure 4.18: Survey results of activity time periods for children of different age groups engaged in outdoor recreational activities on weekdays

In terms of activity duration, the option of "approximately 1 hour" was chosen the most, followed by the option of "approximately 1.5 hours"; The proportion of options selected for "2 hours or more" and "approximately 30 minutes" followed closely. It can be seen that most children spend more than an hour outdoors for leisure.

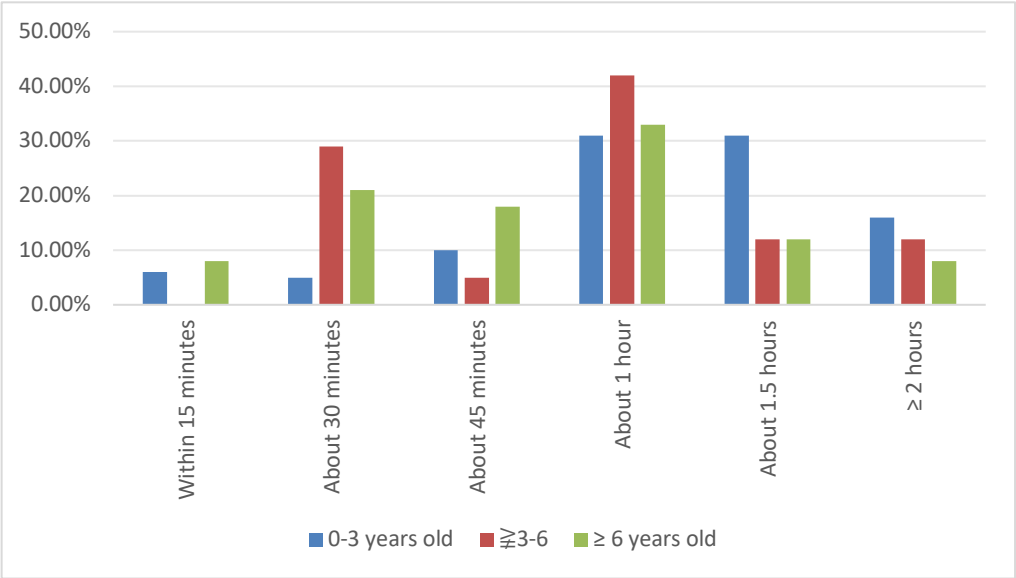


Figure 4.19: Survey results on the activity duration of outdoor recreational activities among children of different age groups on weekdays

In terms of activity frequency, choosing "4-5 times a week" accounts for the highest proportion, followed by "2-3 times a week", and the two together account for the vast majority. This indicates that children generally use outdoor recreational spaces more frequently on weekdays, and also reflects the importance of outdoor recreational space design from one side.

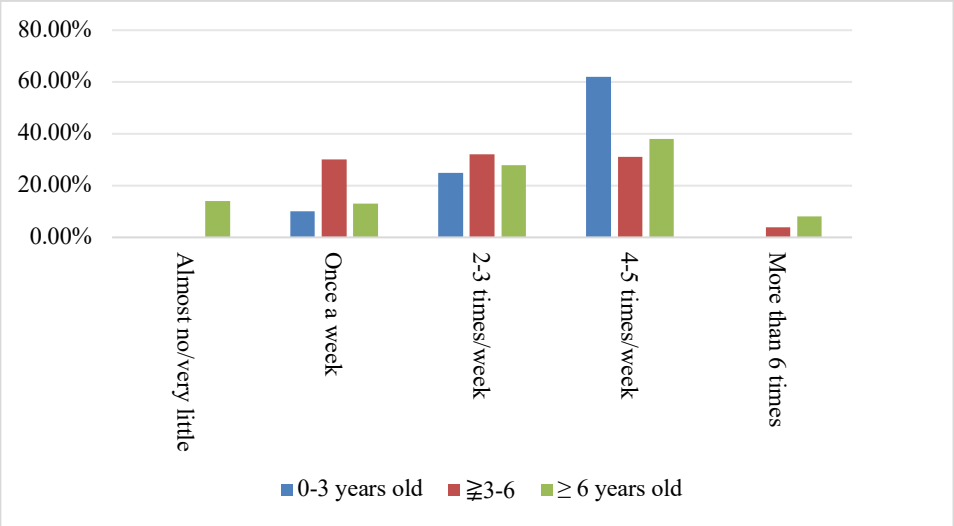


Figure 4.20: Survey results on the frequency of outdoor recreational activities among children of different age groups on weekdays

ii. Time characteristics of children's recreational activities on rest days

This study further investigated the leisure activity time, frequency, and duration of children of different age groups on rest days. The survey results are shown in the following figure.

In terms of activity time periods, the 10:00-12:00 activity time period received the highest proportion of choices, followed by 14:00-16:00 and 16:00-18:00, and 8:00-10:00 also had a higher proportion. The proportion of choices from 12:00 to 14:00 is the lowest, which is the time when children eat or rest, so there are fewer recreational activities.

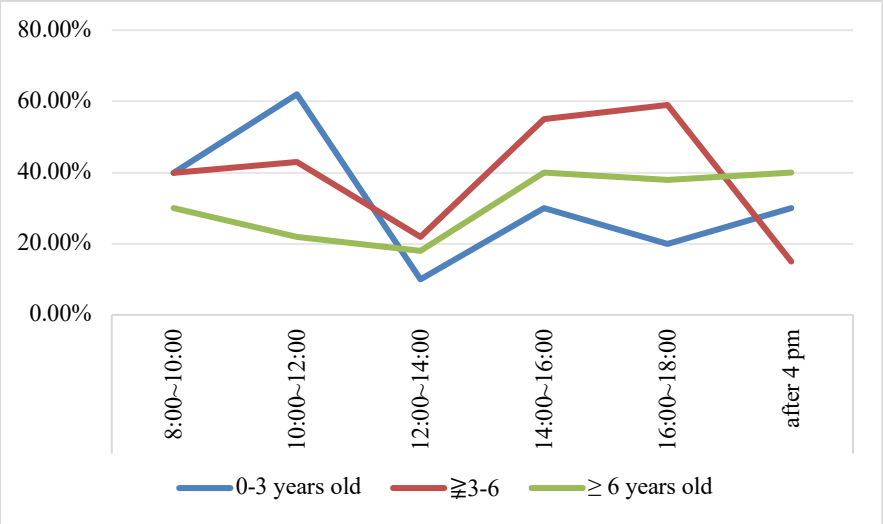


Figure 4.21: Survey results of activity time periods for children of different age groups engaged in outdoor recreational activities on rest days

In terms of activity frequency, the majority choose 2-3 times a week. Next is "once a week", and there are also a few people who choose "six or more times a week", all of whom are infants and young children aged 0-3.

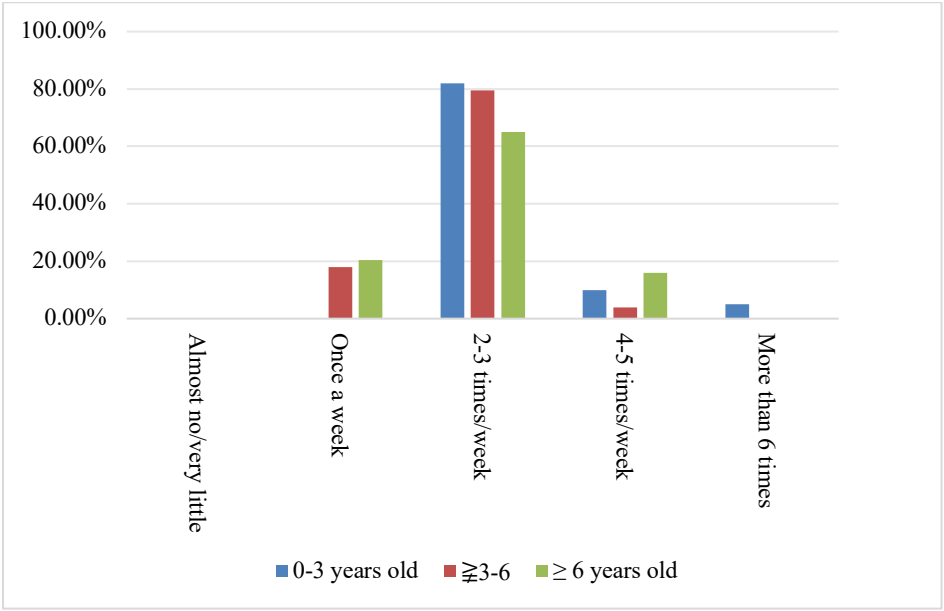


Figure 4.22: Survey results on the frequency of outdoor recreational activities among children of different age groups on rest days

In terms of activity duration, approximately 1 hour of activity duration is chosen the most frequently; The frequency of selecting activity duration of approximately 1.5 hours and ⩾ 2 hours is closely followed and also accounts for a higher proportion. It can be seen that most people choose activities with longer duration, exceeding 1 hour, and children's activities on rest days are extended compared to workdays.

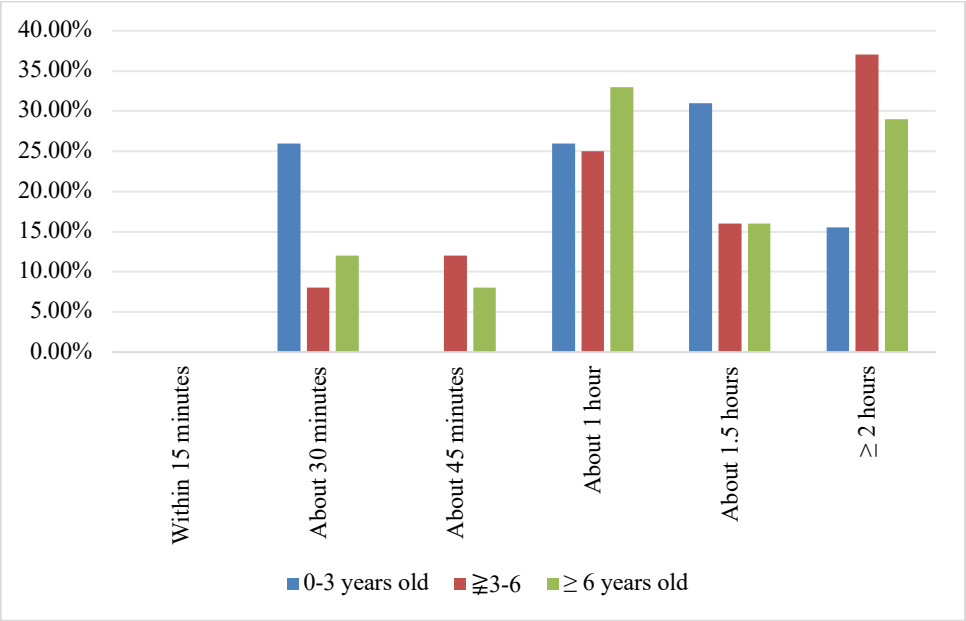


Figure 4.23: Survey results on the activity duration of outdoor recreational activities among children of different age groups on rest days

4.2.3.3 Children's activity and care situation and partner situation

In this project, we also conducted a survey on the care and partner situation of children during outdoor activities. In terms of accompanying people, the parents are the ones who accompany their children the most, followed by grandparents and maternal grandparents, with the majority being the two. For children aged 3-6 and above, a higher proportion go out on their own or with playmates.

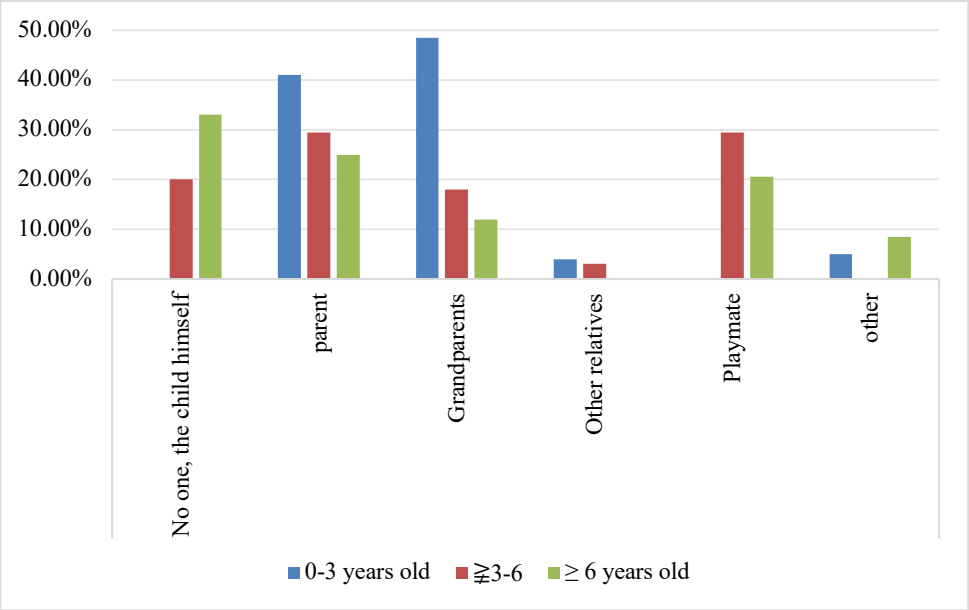


Figure 4.24: Survey results of accompanying individuals engaged in outdoor recreational activities among children of different age groups on weekdays

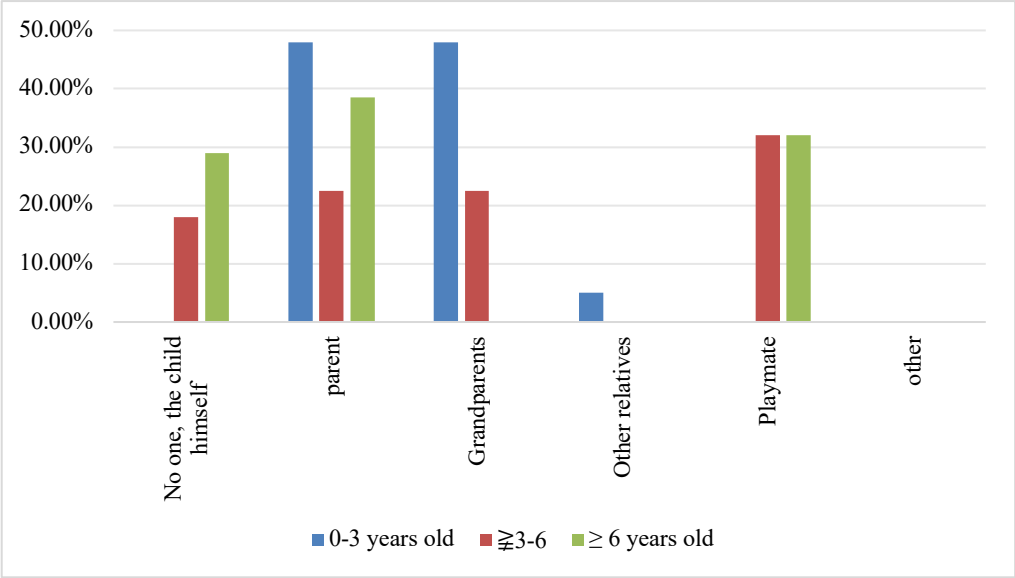


Figure 4.25: Survey results on the situation of companions engaged in outdoor recreational activities among children of different age groups on rest days

Children being allowed to have independent activities in residential areas means that the caregivers recognize the safety of the environment (Zhou et al., 2022; Zeng & Cai, 2018).

Figure 4.26 shows that most caregivers do not agree with the independent activities of children over 6 years old in the village. Although the proportion of independent activities of children over 6 years old is relatively high, it is far lower than the level of independent activities of children in residential areas (Meng, 2020).

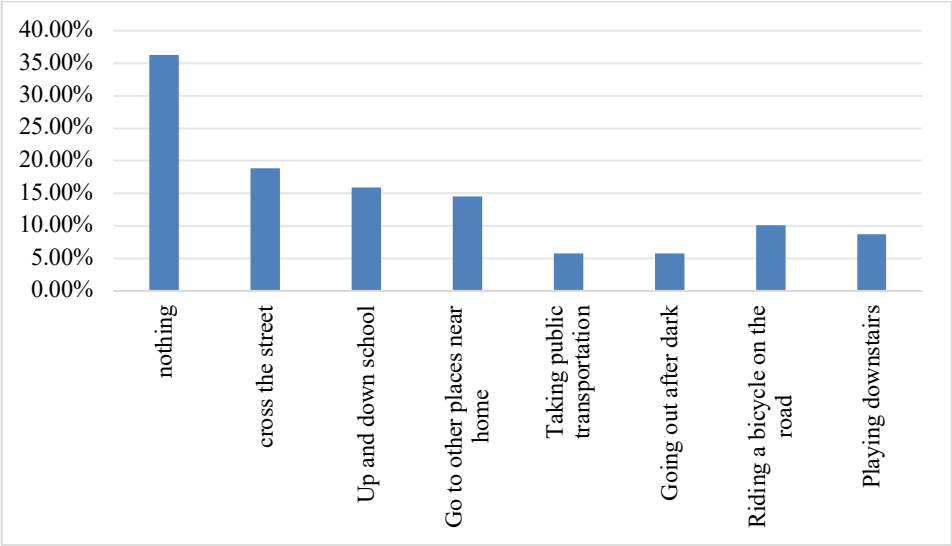


Figure 4.26: Results of a survey on children's independent outdoor behavior allowed by parents in village



Figure 4.27: Parental Care



Figure 4.28: Big children return home together after school

4.2.3.4 Children's recreational activity locations

This study conducted a survey on outdoor recreational activity locations for children of different age groups, and the survey results are shown in the following figure. According to the data table, it can be concluded that the children's activity locations are mainly in the village park and the vacant land below the house. Therefore, a centralized design of the village center park is very necessary. In addition, the design of green spaces and recreational areas next to houses is also a relatively weak link in the current urban villages. The surrounding parks and village sports fields also account for a high proportion. The proportion of surrounding sports venues/swimming pools and street open spaces is relatively low. Therefore, the park and sports field in the village are the main places for children's activities, and the empty space downstairs and surrounding parks are also popular.

According to statistical results, children often visit various types of destinations near their homes, including commercial facilities and medical facilities. Among them, the selection ratio of various types of commercial service facilities is relatively high (such as large supermarkets, shopping malls, convenience stores, etc.). At the same time, a certain proportion of children will visit non-public places such as relatives, friends, and libraries.

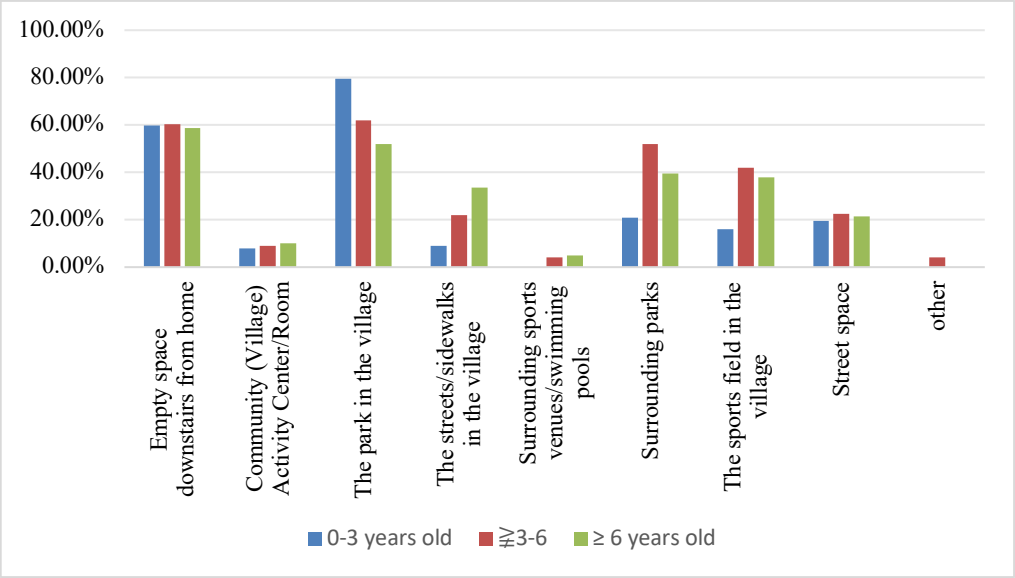


Figure 4.29: Survey results of recreational activity locations for children of different age groups

Classify children's neighborhood travel destinations based on their own needs and the characteristics of the destination they visit. According to whether the destination is accessible to the general public, it is divided into two categories: common and individual destinations, and further divided into functional categories based on the needs of children. Overall, in terms of common destinations, children's visiting destinations can be classified into four types - education, commerce, healthcare, and transportation. Children's education related destinations involve both public service facilities (such as primary schools and libraries) and extracurricular tutoring institutions; In terms of personalized destinations, travel destinations should mainly include relatives/children's friends' homes and parent units. From the perspective of selection ratio, in terms of children's education, libraries have a relatively high proportion of selection, with nearly 30% of children using libraries as their regular visiting places. At the same time, from the selection of different age groups, it can be seen that as children grow older, the proportion of children choosing various types of educational destinations increases accordingly, reflecting changes in their learning and

development stages as well as the increasing emphasis of parents on children's education. In terms of children's commercial services, in addition to convenience stores, large supermarkets and other shopping service places, bookstores are also a common destination for children, reflecting the special needs of children in commercial services. Meanwhile, as the age group of children increases, the proportion of choosing bookstores as destinations also significantly increases. Among school-age children, nearly 40% of them frequently visit bookstores. Compared to other medical destinations, children visit them less frequently.

4.2.3.5 Children's travel methods

Children's daily travel patterns exhibit diverse characteristics and are closely related to their own behavioral abilities. Children aged 0-3 who are in the infancy stage do not yet have the ability to walk, so they often take strollers, simple hand carts, or parents holding them for transportation; For preschool children aged 3-6, they have the skills to perform fine and rough movements, have a certain degree of walking ability, and can try cycling. Their physical activity level has increased, and they generally adopt the independent travel mode of children accompanied by parents; For school-age children aged 6-12, their physical strength and motor skills have significantly improved. As they age, they gradually acquire the ability to go out independently (without an adult accompanying them), and the options for travel are also more diverse.



(a)



(b)



(c)



(d)

Figure 4.30: Different ways of transportation for children

4.2.4 Summary

According to the survey results, it was found through interviews with 5 child guardians that parents' concerns include safety, amusement facilities, education, convenient transportation, and child friendly facilities.

There are significant differences in the types of activities for children of different age groups in urban villages in Foshan. Children aged 0-3 mainly engage in leisure walking, while children aged 3-6 enjoy chasing and playing. Children aged 6-14 have a wider range of activities, including sports and educational activities. The time period for children's activities basically conforms to the daily habits of children of different ages. During weekdays, children aged 0-3 years old have more activities in community parks with the company of caregivers. Some children aged 3-6 years old will stay and play in community parks after school, while children over 6 years old will stay less in community parks. During

weekends, children aged 3-6 are the most active in community parks, and there are also more children aged 6 and above.

From the perspective of recreation duration and frequency, most children spend more than 1 hour outdoors, with a frequency of 4-5 times per week. Therefore, the design of children's activity venues should consider designing sufficient area and game facilities to meet the needs of children's recreational time.

In terms of children's activity care and companionship, parents are the main companions, and children aged 3-6 and above have more opportunities to go out on their own or with playmates. Most caregivers do not agree to allow children aged 6 and above to engage in independent activities in the village.In terms of children's recreational activities, the main locations for children's activities are the village park and the open space below the house. The design of the village center park is important, and the design of green spaces and recreational areas next to houses needs to be strengthened. Children often visit places such as commercial, medical, educational, and transportation facilities, with libraries and bookstores being popular educational destinations.

Overall, children's activity time is comparable to that of general residential communities. However, in terms of children's age group, children over 6 years old rarely visit community parks after school, mainly due to factors such as road conditions, small area of community parks, limited facilities, and service radius. Most urban villages have convenient transportation and are located within the service radius of urban parks. The surrounding facilities are mature, so parents of urban villages choose to accompany their children to use district level and city level supporting facilities such as urban parks or libraries on weekends.

4.3 Evaluation of spatial friendliness for children in urban villages

Based on literature review and previous research, the indicator constructed by Meng Xue (2020) in the evaluation of child friendliness in urban residential space environment was selected as the evaluation indicator for this project. This system comprehensively considers the elements of child friendly residential space environment (Meng & Li ,2022).

The evaluation survey on the spatial friendliness of children in urban villages was conducted from April to May, with 5 key villages as the survey sites, as shown in Table 4.5. A total of 115 questionnaires were collected, of which 98 were valid. The specific content of the questionnaire can be found in Appendix 4. Please refer to Table 1 for specific sample information. Use Excel to organize and analyze the obtained questionnaire data, and draw data charts.

Based on the survey results and combined with the spatial environment characteristics of the five key villages mentioned earlier, analyze the recognition level of parents towards each element and the corresponding child friendliness from six indicator elements.

Table 4.5: Location and Supporting Facilities of Five Major Urban Villages

Village Name	Diejiao
Type	Community
Overview	Build a village by the river and live by the water. There are a large number of historical buildings such as ancestral temples, which are known as the "hometown of dragon boat drifting". The survey area includes electronic factories and hardware factories.
Area	4.23 square kilometers
Population Size	The total population of local residents is over 18000, with approximately 24000 outsiders

Table 4.5 continued

Relevant Supporting Facilities	Middle School 1; Primary School 2; Kindergarten 4; Park 3
Village Name	Nanyue
Type	Community
Overview	Located in the central area of Guicheng, with Qiandeng Lake Park to the north and Vanke Square to the east, the survey area is mainly composed of residential buildings. It was established as a demonstration village for rural governance in Guangdong Province in 2021.
Area	0.43 square kilometers
Population Size	Approximately 2400 villagers and 16000 migrants
Relevant Supporting Facilities	Primary School 1; Kindergarten 2; Park 1
Village Name	Zhen'an Village
Type	Administrative Village
Overview	Located in the central area of Foshan, on the west side of Nanhai Avenue, there is a clothing factory in the surveyed area.
Area	2.5 square kilometers
Population Size	2684 permanent residents and over 9000 migrants
Relevant Supporting Facilities	Primary School 1, Kindergarten 1, Park 1, and Sports Ground 1 are located within the neighborhood committee
Village Name	Shiliang Village
Type	Administrative Village
Overview	Located south of Kuiqi Road, the survey area includes logistics centers, hardware factories, and family workshops.
Area	0.24 square kilometers
Population Size	More than 980 permanent residents and approximately 3100 migrants
Relevant Supporting Facilities	Kindergarten 1; Park 4; Sports Ground 1

Table 4.5 continued

Village Name	Dongpo Village
Type	Administrative Village
Overview	Located on the west side of Foshan Avenue, there are factories and wholesale markets in the surveyed area.
Area	4 square kilometers
Population Size	There are over 2100 permanent residents and over 10000 non local residents.
Relevant Supporting Facilities	Primary School 1; Kindergarten 2; Park 2

4.3.1 Evaluation Model

The indicator system for evaluating the spatial friendliness of children in urban villages in this project includes six first level indicators, including recreational availability, travel comfort, travel support, service availability, neighborhood atmosphere, neighborhood security, and other aspects; There are 23 sub items in the secondary indicators, marked with 5 levels including "strongly disagree, strongly disagree, average/difficult to say, somewhat agree, strongly agree". The weights of each indicator are detailed in Table 4.6.

Table 4.6: Child friendliness evaluation index system and weight coefficients

Primary Indicators		**Secondary Indicators**			
Indicator Name	**Weight the target layer**	**Indicator Name**		**Weight of primary indicators**	**Weight the target layer**
A - Recreation Availability	0.198	A1	Diverse recreational areas	0.159	0.032

Table 4.6 continued

		A2	Age appropriate gaming facilities	0.164	0.033
		A3	Diverse gaming facilities	0.163	0.032
		A4	The site is well paved	0.168	0.033
		A5	Well maintained environment	0.170	0.034
		A6	Leisure facilities supply	0.175	0.035
B - Travel Comfort	0.193	B1	Complete pedestrian facilities	0.214	0.041
		B2	Assisting in street crossing improvement	0.196	0.038
		B3	Good street greening	0.187	0.036
		B4	The sidewalk is well maintained	0.219	0.042
		B5	Neat street environment	0.184	0.036
C - Travel Support	0.163	C1	Slow street speed	0.257	0.042
		C2	The street traffic is not busy	0.301	0.049
		C3	Walking without obstacles	0.442	0.072
D - Service Availability	0.182	D1	Convenient commercial facilities	0.248	0.045
		D2	Convenient medical facilities	0.202	0.037

Table 4.6 continued

		D3	Service facilities accessible	0.297	0.054
		D4	Complete service facilities	0.252	0.046
E - Neighborhood Atmosphere	0.115	E1	Neighborhood interaction and communication	0.388	0.045
		E2	Neighborhood familiarity	0.298	0.034
		E3	Common resident activities	0.314	0.036
F - Neighborhood Security	0.149	F1	Traffic perception safety	0.497	0.074
		F2	Public security perception and safety	0.503	0.075

4.3.2 Evaluation Results

4.3.2.1 Element Performance

Based on the data obtained from the survey questionnaire, the recognition of parents towards different measurement items in the scale can be used to obtain the performance levels of different environmental indicators in the evaluation system. Using the average score of each indicator as the evaluation result of parents on the performance of the elements, the performance levels of the elements in 5 urban villages were calculated separately. The results are shown in Figure 4.31.

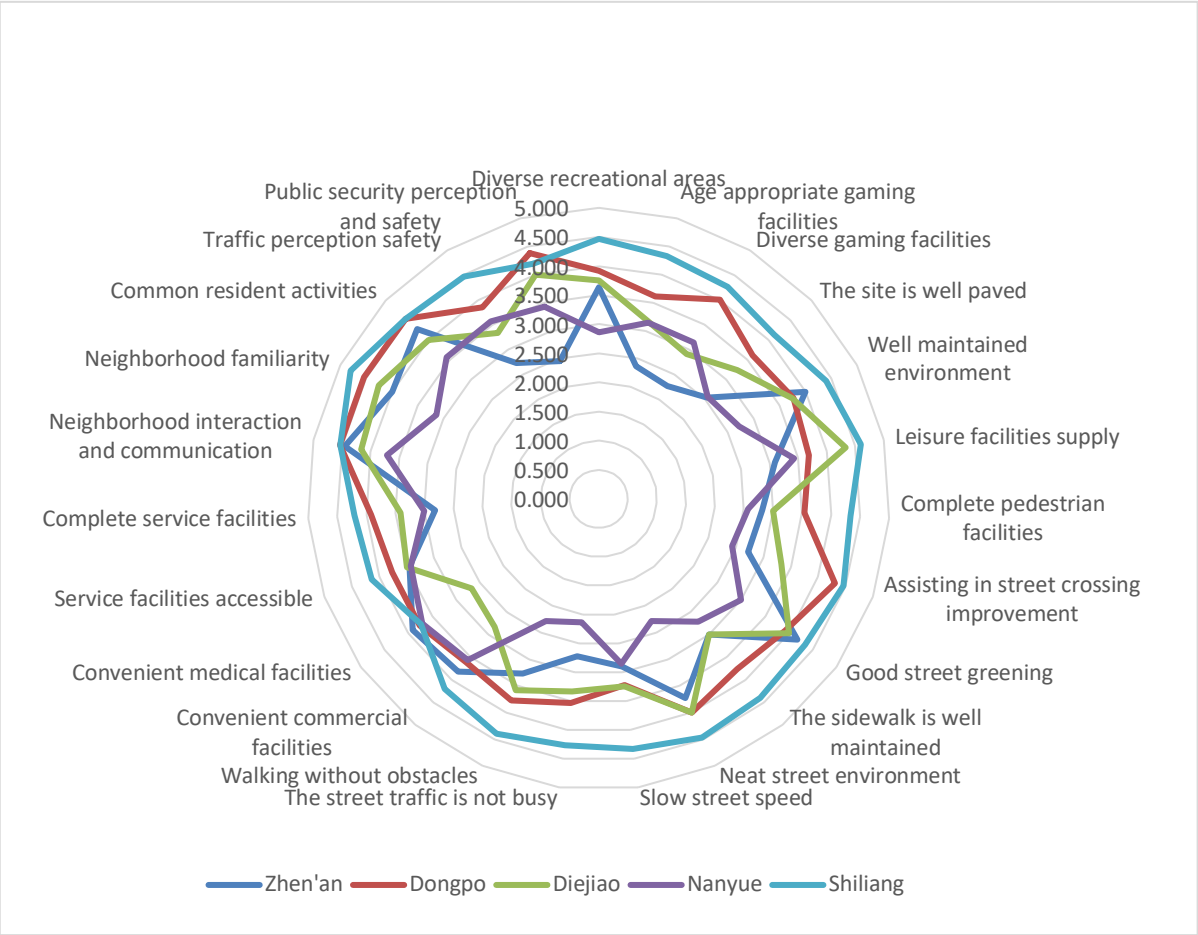


Figure 4.31: Element representation of 5 urban villages

From the perspective of factor performance level, the comprehensive evaluation scores of the five urban villages are 3.23, 3.90, 3.52, 3.03, and 4.35, respectively.

In terms of common characteristics, the scores of most environmental factors are relatively balanced and mostly higher than the average, while individual factors such as complete service facilities, accessible service facilities, complete pedestrian facilities, and good site paving are relatively low; The performance level of some environmental factors is higher than the average, such as convenience of commercial facilities, supply of leisure facilities, public security perception, etc. The factors involved mainly focus on children's service facilities and perceived safety.

Comparing the spatial environmental elements of different villages horizontally, it can be found that there are significant differences in the performance of environmental elements.

Overall, Shiliang Village has a relatively high score in terms of factor performance, with parents evaluating it significantly higher than the other four villages in the vast majority of factor aspects. Except for the two factors of medical facility convenience and perceived security, which are lower than some villages, all other factors are higher than others. During the survey, it was also found that the majority of villagers were satisfied with the village environment.

The score of Nanyue in terms of element performance is relatively low, especially in terms of walking accessibility, less busy street traffic, clean street environment, complete pedestrian facilities, and auxiliary crossing. Nanyue is located in the city center, with many social vehicles passing through the streets, which affects community safety. The overall score of Zhen'an, which is located in the central area of the city, is relatively low, with lower scores in areas such as perceived security, age appropriate gaming facilities, diverse gaming facilities, traffic perceived safety, and improved service facilities. Neighborhood interaction scores are higher. The urban villages in the central areas of the two cities have low ratings and both have anxiety about traffic safety, reflecting some common issues for children's traffic safety in residential areas located in busy traffic areas.

4.3.2.2 Evaluation of child friendliness

Based on the performance level of environmental factors and corresponding indicator weights, calculate the performance scores of different dimensions of environmental factors and the evaluation results of child friendliness. In terms of the performance of environmental

factors in various dimensions, the scores of environmental factors and corresponding indicator weights are weighted, and the scores of environmental factors in the survey area are calculated separately. At the same time, to achieve comparability of different factor performance levels, the score ratios of each factor are further calculated, and based on this, the scores of each factor are obtained and compared horizontally (see Table 4.7).

Table 4.7: Performance of influencing factors in the research area

Research Area		Recreational Availability	Travel Comfort	Travel Support	Service Availability	Neighborhood atmosphere	Neighborhood security
Score Ratio	Zhen'an	59.5%	63.0%	49.1%	63.3%	49.0%	38.6%
	Dongpo	75.0%	75.2%	58.0%	68.6%	52.2%	61.3%
	Diejiao	70.4%	66.4%	55.8%	57.2%	47.6%	54.7%
	Nanyue	59.3%	50.2%	39.0%	62.1%	40.3%	52.1%
	Shiliang	86.9%	84.9%	70.8%	74.4%	53.0%	64.6%

The calculation results show that the five villages have a good performance level in terms of environmental factors such as recreational availability, travel comfort, and service availability (most of which reach the 60% level), with Shiliang Village having a better performance level than the other four villages; But in terms of environmental factors such as travel support and neighborhood atmosphere, the performance is poor, with scores mostly below 40%. Among them, the performance level is the lowest in the southern part of the central urban area, while the neighborhood safety score in Zhen'an is the lowest.

In terms of recreational availability, Shiliang Village scored significantly higher, which is consistent with the observed results (see Figures 4.32 and 4.33). Shiliang Village Park has a

large number and types of green spaces, which are evenly distributed in the village and mostly have a large area. The park is equipped with children's activity facilities suitable for children to play, and the facilities are relatively new and well maintained. Service facilities such as kindergartens and community activity centers are relatively complete. Shiliang Village is not large in scale, and there are many hardware factories and family workshops in the village. There is a certain amount of production noise in daily life. The main road in the village is wide, and there are trucks passing through. There are also many outsiders in the village. But its rating is still relatively high, which is related to the improvement of children's recreational facilities and park green space supporting facilities. The score ratio of Zhen'an and Nanyue is relatively low. The park green space area in both villages is small, and there are no supporting children's activity facilities in the park of Zhen'an Village. Most villagers play with children in the surrounding river green space.



Figure 4.32: The children's activity facilities in Shiliang Village (relatively new, well maintained, and the service facilities are relatively complete)



Figure 4.33: Shiliang Village has a variety of outdoor activity spaces

In terms of travel comfort, all five villages scored high, with Shiliang Village receiving the highest score and Nanyue receiving the lowest score. This is related to the width of roads within the village and interference from external vehicles in the surrounding area. Nanyue is located in the city center, with busy traffic in the surrounding area, which affects travel comfort. The differences in this regard are basically consistent with the observed situation.

In terms of travel support, Nanyue and Zhen'an have poor performance, mainly due to their location in the city center, heavy traffic, and fast speeds, resulting in lower scores.

In terms of service accessibility, the scores of the 5 villages are relatively average, with the lowest score in Diejiao. Diejiao is located in the northwest corner of Guicheng, adjacent to Chancheng, and is not a core area of the city. The village has a large area, and the distance to reach urban public service facilities is relatively long. The low score is also in line with observation. During the research process, villagers also reported that the external transportation facilities are not perfect, which is not conducive to travel.

The scores of the five villages in terms of neighborhood atmosphere and neighborhood security are relatively low, with Nanyue having the lowest score in neighborhood atmosphere and Zhen'an having the lowest score in neighborhood security. There is a large number of migrant population in urban villages, and due to the complex composition of personnel within the village, it is difficult to manage the village. Foreign migrant workers basically form alliances with their fellow villagers, and the original villagers in the village form a huge network of relatives with each other. In the surveyed sample, the proportion of tenants is higher, and some are residents who have lived for less than a year, resulting in a poor neighborhood atmosphere. Most urban village communities

are open and without walls, allowing anyone to directly reach their doorstep, which also leads to a lack of safety.

4.3.3 Summary

This study analyzed the degree of recognition of environmental indicators by parents in five urban villages through questionnaire survey data, and obtained the comprehensive evaluation scores of each village. Among them, Shiliang Village scored the highest and Nanyue Village scored the lowest. By combining the scores and weights of environmental factors, the performance levels of environmental factors in dimensions such as recreational availability, travel comfort, and service availability were calculated for each village. Shiliang Village performed the best in recreational availability, while Nanyue and Zhen'an performed poorly in travel support and neighborhood safety.From the survey results, it can be seen that the evaluation indicators of child friendly residential areas, including recreational availability, travel comfort, travel support, service availability, neighborhood atmosphere, and neighborhood security, are also applicable to the evaluation of the level of child friendliness in urban villages. Based on the analysis of the current situation survey, the scores of the reflected element indicators and the overall evaluation can basically reflect the level of child friendliness in the spatial environment of urban villages.

Most urban villages are located in the center of the city, with well-developed transportation and public service facilities. Generally, the villages are equipped with primary schools, kindergartens, community service centers, activity centers, parks, and other facilities, which basically meet the needs of community support. However, most villages lack outdoor activity space, children's playground facilities, entertainment or management, and have poor adaptability for children. At the same time, the road situation in each village

is complex, and the open management form leads to overall low safety, which is unfriendly to children.

Among the 5 villages, Shiliang Village received a high evaluation. It has a wide range of outdoor spaces, diverse types, and two combination slides and a sports field suitable for children to play. The paving is brightly colored and flexible, with high suitability for children. From the evaluation results, it can be seen that an appropriate number of park green spaces, child-friendly facilities, and paving are highly child friendly. Among the 5 villages, Nanyue, located in the central urban area, received lower evaluations. Due to busy surrounding traffic, there is anxiety about traffic safety, which reflects some common issues of children's traffic safety in residential areas located in busy traffic areas.

4.4 Major Findings

The following major findings have been drawn from this study:

(1) The findings corroborate Chatterjee's (2005) concept of 'place-friendship," where mutual respect and engagement with the environment enhance children's spatial attachment. In this survey, it was found that streets and alleys are necessary areas for children to go to school and go out for activities, as well as places for children to play. However, there are safety factors and low levels of child friendliness in streets and alleys in urban villages, which affect their child friendliness.

(2) Unrestricted outdoor play at home and within the community is highly beneficial for children's health and development (Loebach et al., 2021; & Alderton et al., 2022). Attractive public open spaces can effectively encourage children to engage more in sports and play activities (Dunton et al., 2014; & Ahmed et al., 2022). The village park, empty space under

the house, and the sports field in the village are important outdoor activities for children. From the perspective of caregivers, running, jumping, chasing, or playing with toys are the main outdoor activities for children. However, the area of concentrated green spaces in the village is small, and there are shortcomings in the availability and quality of facilities, as well as the exploratory nature of the site. There is a lack of high-quality gaming venues, which makes it difficult to meet the needs of children of different ages for activities.

(3) The safety of urban villages is the main negative factor affecting children's outdoor activities, limiting their range of activities and reducing their likelihood of independent exploration in residential areas.

(4) The time period for children's activities in urban villages in Foshan basically conforms to the daily habits of children of different age groups, and most children spend more than one hour outdoors for leisure.

(5) Children's activity time is similar to that of general residential communities, but from the perspective of children's age group, children aged 6 and above rarely visit community parks after school, mainly due to factors such as road conditions, small area of community parks, limited facilities, and service radius.

(6) Most urban villages are equipped with facilities such as primary schools, kindergartens, community service centers or activity centers, parks, etc., which basically meet the needs of child friendly community service facilities. But some facilities are not complete, such as libraries, but some are only open during working hours and cannot be used by eligible children, or the books are outdated and lack management, with fewer children reading them.

(7) The evaluation indicators for child friendly residential areas, including recreational availability, travel comfort, travel support, service availability, neighborhood atmosphere, and neighborhood security, are also applicable to the evaluation of the level of child friendliness in urban villages. Based on the analysis of the current situation survey, the scores of the reflected element indicators and the overall evaluation score can basically reflect the level of child friendliness in the spatial environment of urban villages.

(8) From the evaluation results of child friendliness, it can be seen that there are many outdoor spaces, diverse types, and suitable places for children to play. A higher level of child friendliness can obtain a higher evaluation. Anxiety in traffic safety is a major factor affecting caregivers' evaluation of the child friendliness of the urban village space environment.

CHAPTER 5

MAJOR FINDINGS

5.1 Introduction

This chapter proposes improvement suggestions for the spatial environment of urban villages based on the main problems identified in the previous section, such as street safety issues, insufficient outdoor activity venues, inadequate quality and quantity of facilities, and safety restrictions on children's activity areas. At the same time, design strategy analysis is conducted to enhance the child friendliness of the spatial environment in urban villages.This chapter will cover part of the content of proposing optimization strategies as put forward in Research Objective 3.

5.2 Improvement suggestions based on survey results

Suggestions for improvement:

5.2.1 Improve the safety and suitability of road spaces

The standard for an excellent child friendly city is that children can ride bicycles to reach anywhere (Kingston et al., 2007).Research from the Netherlands, Beijing, Shenzhen, and other domestic and foreign countries has shown that streets and roadside areas are the main places for children to engage in physical activities (Zeng & Cai, 2018; Wang & Han, 2012; Xiao & Han, 2019; Tjeerd et al., 2009). Weir et al. (2006) pointed out through their research on low-income residential areas in urban areas and high income residential areas in suburbs that parents in low-income residential areas may limit their children's outdoor physical activities due to concerns about the safety of the residential areas. Compared to enclosed communities, the safety factors of open urban village spaces not only include traffic

safety, but also the risk of getting lost is a safety factor that makes caregivers anxious, reducing the possibility of children exploring independently in residential areas. It is the right of children to walk alone and play with friends safely on the streets(UNICEF,2004), and improving the safety of roads frequently used by children is an important indicator of child friendly cities (Zeng & Cai, 2018). Due to factors such as building density and land use, the possibility of expanding the width of urban village streets is relatively low, making it difficult to increase sidewalks through expansion. Therefore, based on reference to domestic and foreign research and practical cases (Zeng & Cai, 2018; Tjeerd et al., 2009; Shenzhen, 2022), the following renovation suggestions are proposed.

i. Establishing relatively safe road spaces with sufficient lighting, clear road signs, and speed limits is a guarantee of child friendliness on roads (Zeng & Cai, 2018; Tjeerd et al., 2009). The speed of motor vehicles passing through urban villages should be less than 30km/h, and clear speed limit signs should be marked on the ground. Street facilities should avoid obstructing the line of sight of children and motor vehicle drivers as much as possible, and provide walking facilities that match the physical characteristics of children, such as a walking path width that allows two people to walk side by side; Accessible facilities for implementing baby strollers; Clear and eye-catching painted zebra crossings, etc. (Hui et al., 2021). Add brightly colored and interesting warning signs around the school and waiting areas to remind vehicles to slow down and pay attention to children.

ii. Suitable walking system and continuous learning path. Pedestrian walkways should be set up around children's main activity areas, schools, and kindergartens, and connected to alleyways that restrict motor vehicle traffic to form a continuous walking path. Continuous and interesting paving forms should be used to connect

residential and school roads, as well as common facilities and attractive locations for children, forming a linear outdoor space network for children.

iii. Zone restrictions on vehicle entry to improve safety at the doorstep. Divide the area into groups to restrict vehicle entry, or restrict vehicles from entering the core areas of children's activities during specific periods such as weekends or after school, providing children with space for free movement on the streets (Zhang & Dai, 2011).

iv. Regularly carry out safety education on travel safety, anti-fraud and anti-abduction measures in the community to enhance children's self-protection awareness and ability. At the same time, electronic monitoring systems in streets and communities are used to ensure the safety of residential areas, and areas with dense children's activities are covered without blind spots.

5.2.2 Increase green space to create a high-quality gaming field

From the evaluation of caregivers on the friendliness of children in urban villages, it can be seen that urban villages with more children's activity areas are more satisfied. The high-density horizontal development of low-rise buildings in urban villages has squeezed out the space for public facilities. According to the "Guidelines for the Construction of a Child Friendly Public Service System" in Shenzhen, it is recommended to install at least one children's playground with an area greater than 1200m^2 on residential land of more than 3 hectares (Shenzhen, 2022). The area of urban villages surveyed in this study is about 18-480 hectares, but 22% of village parks have an area of less than 1000m^2. The area of children's playgrounds is smaller, and scattered green spaces have basically no facilities for children to play. The increase in the number of cars has exacerbated the contradiction. During on-site investigations, it was found that most of the plots displayed on the map were used as parking lots, and sports fields were also used for parking. Playing in open spaces is a prerequisite for

the healthy development of young children (Zhang & Dai, 2011). Building beautiful and diverse children's playgrounds in urban villages is of great significance in enhancing child friendliness. Based on the results of this survey, the following renovation suggestions are proposed for the current situation of land use in urban villages.

i. In response to the situation where parking occupies most of the vacant land, parking buildings can be built in the village, making full use of underground and above ground spaces to organize vehicles for centralized parking, releasing more space for children's outdoor activities, and increasing the green space area of urban villages.

ii. Games and sports facilities, water features, trees and flowers, soft paving, and seats are positive environmental factors that promote children's perception of outdoor physical activity opportunities (Wang & Han, 2012). Based on the physical and mental characteristics of children, the green space in the village park is differentiated and transformed, equipped with facilities and components that can meet children's gaming needs such as swinging, rotating, climbing, bouncing, balancing, sliding, and crawling. Natural elements such as sand pits, small pools, and undulating terrain are added to create a high-quality gaming field.

iii. Utilize scattered plots of land in the village to construct small point shaped parks, forming a "pearl" site for the village, allowing children to enjoy a small activity space at their doorstep, increasing their happiness and happiness.

5.3 Analysis of design strategies that are conducive to improving the child friendliness of urban village spatial environment

Based on the research results on the spatial environment characteristics of urban villages in Foshan City, the characteristics of children's activities in urban villages, and the evaluation of child friendliness in residential areas, combined with the key points of

community level urban child friendly space construction in the "Guidelines for the Construction of Urban Child Friendly Spaces (Trial) (Draft for Comments)", the following design strategies are proposed to enhance the environmental friendliness of urban villages. The details are as follows:

i. Solve the problem of vehicle parking

Urban village is a relatively independent and complete residential community, with dense buildings and streets running through the village. The central area has public activity space, but there are relatively few green spaces in the village, and the area is small. The outdoor space in the village is mostly fragmented and distributed in the village. With the continuous increase of car ownership, streets, open spaces, and even sports fields in the village are used for parking, and there are very few outdoor activity spaces available. Parking buildings can be built in the village to fully utilize underground and above ground spaces to organize centralized parking of vehicles. Vehicles should be avoided on the main street as much as possible, reducing the disturbance of vehicle traffic to pedestrians and avoiding congestion in the village; The vehicles are parked behind the parking building, which can release more activity space in the village as outdoor activity space for children.

ii. Renovation of road section form

The main roads in urban villages are mostly open to traffic in both directions, but most of them do not have sidewalks. In response to the anxiety of parents about traffic safety found in the survey, the cross-sectional form of urban village roads was renovated, sidewalks and bicycle lanes were added, and combined with children's daily life trajectories, a safe and continuous road space was constructed. At the same time, children aged 0-3 often use carts

for transportation, with some children riding bicycles. The path to the park should be designed with accessibility to facilitate the entry of carts and children's bicycles.

iii. Planning a path for children's education

Research on children's commuting routes also emphasizes safety as a key factor (Wang et al., 2023). Encouraging children to adopt active travel modes, such as walking and cycling can effectively reduce traffic congestion around schools (Yan et al., 2023). Additionally, streets with higher connectivity are more suitable for children's walking (Zhang et al., 2005). In response to the insufficient safety of road space in the investigation, combined with the daily life trajectory of children, construct a safe and continuous road space. Building a safe school path space, connecting residential areas with campuses, childcare institutions, and forming a three point, one line approach can greatly reduce the risk of children getting lost and create a safe and smooth learning environment for children. The primary schools, kindergartens, and parks in urban villages are located in the central area of the village and are relatively close to each other. A children's education path is planned, connecting residential areas, schools, kindergartens, community parks, and other children's activity areas. A children's walking system is constructed to provide safe and interesting experiences for children to participate in community activities.

iv. Road suitability renovation

Fun design of directional signs from a children's perspective, such as using bright and eye-catching painted zebra crossings, can attract children's attention and vigilance. Add warning signs around the school to remind vehicles to slow down and pay attention to

children. Set up railings on the sidewalk to prevent children from rushing out of the motor vehicle lane while walking.

For peak school hours, when the waiting area for parents at the school gate is insufficient and the school gate is congested, manpower can be added to guide and direct traffic on important roads. Following the approach of Zhangcha Elementary School, flexibly utilize the road space in front of the school gate and the internal space of the school to set up parking lots, parent waiting areas, and student queuing areas.



(a) (b)

Figure 5.1: Comparison of with and without children's safe path

(a. Children's safe path simulation effect diagram; b. Current situation diagram without children's safe path)

v. Add children's service facilities and carry out child friendly transformation of existing children's service facilities

In response to the investigation, it was found that there are few and incomplete public service facilities in the village. Based on the characteristics of children's activities and growth needs, targeted improvements will be made to children's public service facilities. Encourage and call on enterprises to settle in the village, and build childcare and children's homes next to the school, making it convenient for children to use them nearby. Call on

villagers to donate children's books, reading materials, etc. to build a children's reading corner, cultivate children's reading habits, and guide exploration of knowledge.

Utilize existing space to add children's sports facilities, such as setting up small runways, playgrounds, and specialized sports venues in the village's open space. Building a safe, comfortable, and friendly campus environment for children is of utmost importance for educational facilities, and the internal construction of the campus should strictly follow national standards. Outside of school, utilize the remaining farmland in the village to build a children's labor and sports base, and promote the comprehensive development of children.



Figure 5.2: Labor Experience Base

vi. Adapt existing green spaces to children's needs

In response to the lack of recreational resources in the park green space, based on the physical and mental characteristics of children, differentiated and child friendly transformation will be carried out on the park green space in the village. Add a children's play area in the park, and supplement different amusement facilities according to the activity characteristics of children of different age groups. For example, for children aged 0-3, using tree species with large canopy and thick shade can provide a comfortable physical

environment, and configuring plants with different colors and flavors can further stimulate the sensory experience. For preschool children aged 3-6, utilizing the existing terrain of park green spaces, open natural spaces such as protrusions, slopes, and terraces are set up to encourage children to explore in the terrain and cultivate their exploration ability. For children aged 6-14, add children's playground facilities, use the walls and manhole covers in the park to build graffiti walls, cultivate children's aesthetic education abilities, and stimulate their imagination and creativity. There is also a need to add child friendly recreational facilities for caregivers to rest in the park, such as reducing the height of benches and setting up collision avoidance angles. Add a family bathroom in the park to facilitate caregivers to change diapers and use the toilet for children.

vii. Utilizing scattered corners to construct children's outdoor activity and gaming fields

The available outdoor land in urban villages is mostly scattered, and pocket parks can be built to create safe spaces in corners, which may be a space for children to rest.

5.4 Summary

Suggestions for improving the spatial environment of urban villages include enhancing the safety and suitability of road spaces, increasing green space to create high-quality playgrounds, and improving the child friendliness of urban village spatial environment from multiple aspects such as traffic management, safety management, and spatial environment design.

The design strategies to enhance the child friendly spatial environment in urban villages include solving the problem of vehicle parking, transforming road section forms, planning children's educational paths and road adaptation, adding children's service facilities, adapting existing green spaces to children's needs, and utilizing scattered corners

to build children's outdoor activity playgrounds. These measures aim to improve the safety and activity space of children in urban villages, meet the needs of children of different ages, and enhance the child friendliness of urban villages.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter mainly summarizes the entire text from the perspective of the research purpose, while pointing out the limitations of the study. It is suggested that future research should focus more on the perspective of children and comprehensively consider the needs and opinions of both children and residents.

6.2 Research Conclusion

6.2.1 Objective 1: To explore the spatial and activity characteristics of urban villages from a child-friendly perspective, identifying key factors affecting children's well-being and activity preferences

Through the analysis of the spatial environment characteristics and children's activity characteristics of urban villages, it was found that the road conditions in urban villages are complex, with limited space and facilities for children's outdoor activities, incomplete community supporting facilities, and low suitability for children. Safety factors and suitability for children are the main factors affecting the child friendliness of road spaces in urban villages; The area of green space, availability of facilities, quality of facilities, and explorability of the site are the main factors affecting the friendliness of outdoor activity space for children in urban villages.

6.2.2 Objective 2: Scientific evaluation of urban village spatial environment from a child friendly perspective

It is feasible to evaluate the child-friendliness of urban village spatial environment using indicators such as recreational availability, travel comfort, travel support, service

availability, neighborhood atmosphere, and neighborhood security. This can provide reliable support for quantitative analysis and objective evaluation of spatial environment quality and promote the construction of child friendly environment. From the evaluation results of child friendliness, it can be seen that there are many outdoor spaces with diverse types, and there are suitable places for children to play. A higher level of child friendliness can lead to a higher evaluation of child friendliness. Anxiety about traffic safety is a major factor affecting caregivers' evaluation of the child friendly spatial environment in urban villages. These factors provide scientific references for proposing optimization design strategies.

6.2.3 Objective 3: To evaluate the degree of child friendliness in urban villages scientifically from a child friendly perspective

Safety concerns, particularly vehicle congestion and the lack of pedestrian infrastructure, are the primary barriers to outdoor activities. Addressing these issues could significantly enhance children’s engagement with urban village spaces. Based on the factors affecting the child friendliness of urban villages and the evaluation results based on caregivers, improvement suggestions have been proposed to enhance the child friendliness of urban village spatial environment, including improving the safety and suitability of road space, increasing green space area, and creating high-quality playgrounds; The design strategies for improving the child friendly spatial environment in urban villages include solving vehicle parking problems, transforming road section forms, planning children's educational paths and road adaptation, adding children's service facilities, adapting existing green spaces to children's needs, and utilizing scattered corners to build children's outdoor activity playgrounds. These measures aim to enhance the safety and activity space of children in urban villages, meet the needs of children of different age groups, and enhance the child friendliness of urban villages.

6.3 Implications of the Findings

A good environment suitable for children is a place where they can freely move around and interact with the environment through various activities (Han & Kim, 2018). As a settlement where villagers spontaneously build individual units and gather in large numbers, villages have obvious self-organizing characteristics, and their spatial form is significantly different from the modern mainstream residential area form. With the spread and development of cities, some traditional villages are gradually surrounded by urban construction and become a part of the city. Unique residential areas occupy a certain area in the city, and in such an environment, the growth environment of children is particularly noteworthy. Exploring the factors influencing child friendly spatial environment in urban villages, scientifically evaluating the spatial environment of urban villages from a child friendly perspective, and proposing child friendly strategies for optimizing the spatial environment of urban villages are of great significance. Safety factors are the primary consideration for the spatial environment of child friendly urban villages. Optimizing road layout, setting up safe pedestrian and bicycle lanes, and ensuring smooth and safe traffic are important measures to enhance child friendliness. Secondly, the degree of greenery in the spatial environment of urban villages also has a significant impact on the growth of children. Increasing public green spaces and children's playgrounds can not only provide more outdoor activity space for children, but also improve the overall ecological environment of urban villages. By planting trees, establishing gardens and small parks, a more livable and nature friendly environment can be created for children.

6.4 Limitations and Future Directions of the Research

Urban villages are a unique form of residential area. This article analyzes the spatial environment influencing factors of 18 urban villages in Foshan City from a child friendly

perspective through satellite map analysis, field surveys, questionnaire surveys, and other methods. Combining with the characteristics of outdoor activities of children in key villages, the impact of these spatial environment influencing factors on children's activities is analyzed. At the same time, the spatial environment of urban villages is evaluated from the perspective of caregivers of children. Finally, based on the spatial environment influencing factors and evaluation results of urban villages, suggestions and design strategies for improving the child friendliness of urban villages are proposed. This article investigates the characteristics of children's outdoor activities and evaluates the child friendliness of spatial environments based on data obtained from the perspective of child caregivers, which has certain limitations.

The analysis in this thesis mainly describes the findings without delving deeper into why certain patterns or trends emerged. There is limited exploration of the social, cultural, or economic factors influencing child friendliness in urban villages. Further research should investigate questions such as: Why are safety concerns the primary limitation for outdoor activities? Factors such as traffic volume, lack of pedestrian infrastructure, or cultural attitudes toward child safety should be explored.

Meanwhile, in the future, more analysis should be conducted from the perspective of children to analyze the factors that affect their activities in urban villages. The child friendly transformation of urban villages needs to fully consider the needs and opinions of children and residents.

Note: The satellite images in the research report are from Baidu Maps, and the unmarked images are self-taken.

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APPENDICES

Appendix A: Overview of 18 Urban Villages

Villager	Population (10000)	Area (hectares)	Location	Surrounding Environment
Diejiao	4.52	345	Diejiao is located in the northwest of Guicheng, South China Sea, near the central Zen City of Foshan, between the two central axes of Foshan. North to Haiba Road, south to Nanhai Square commercial district	Parks: Qingyun Park, Fenjiang West Bank Park, Guiya Park; Community: Cuiting Xuan, Jiangnan Mingju, Chaji New Village, Mingyuan Community, Junya Garden, Heji Garden, Hongyu Jingyu Haoyuan, Liya Garden, Juncheng Garden, Vanke Golden City, Time Masterpieces, Minghui Jiayuan, Dongjian Wenhua Shangling, Rainbow New Village; Library: Haisan Road Primary School Library;

Appendix A continued

Shiken Community	3.11	480	Shiken Community is located at the southern end of Guicheng Street in Nanhai District, adjacent to Dongping Waterway to the east, Guilan Road to the west, and Jihua East Road to the north	Parks: Yihai Park and Banyue Island Wetland Park; Community: Vanke Shangdu Hui, Jindi Longyue Garden, Yicui Shijia Garden, Daji Community, Shidai Xianghai Bin'an, Jihua Jinpin, Poly Heyue Binjiang, Lijingyuan, Liri Century Jinding, Hesheng Yaju; Library: None;

Appendix A continued

Nanyue Community	1.92	60	Nanyue Community is located in the middle of Guicheng Street, Nanhai District, adjacent to Nanguidong Road to the south, Nanhai Avenue to the west, and Xiyue Community to the north	Park: Dongyue Park; Community: Guicheng Huayuan Square, Huayuan Community, NATO Community, Guinan Mingdu, Guihua Garden, Guinan Xingqing Mansion, Vanke Jinyu International, Nanhai Vanke Plaza Residential Area, Oriental Ginza, Mingdu International Apartments; Library: Nanhai Archives and Records Library;

Appendix A continued

Qicha Community	0.47	100	Qicha Village is located in the eastern part of Shiwan Town Street in Chancheng District, with Sanlongwan Avenue passing through it. It is adjacent to Pingzhou Waterway to the east and south, Guilan Road to the west, and Huaxiang Road to the north	Park: Banyue Island Wetland Park; Qicha Waterfront Park Community: Yiyun Shangcheng, Beyond the Sea of Fragrance, Zhuoyue Shallow Bay, Longguang Tianjing, Poly and Yuebin River; Library: Chancheng District United Library - Shiwan Town Street Library; Farmland: Yes

Appendix A continued

Dong'er Community	2.94	150	Dong'er Community is located in the southwest section of Guicheng Street, Nanhai District, adjacent to Pingxi Village to the east and facing Shiken Village across Foshan Waterway to the south	Park: Nanhai Cultural Park; Community: Dongyi Garden, Dongyi Mingyuan, Hongji Garden, Guinan Mingdu, Guihua Garden, Guihua Garden, Fuhao Garden, Vanke Jinyuhua Mansion, Guinan Xingqing Mansion, Guidong Garden, Mingdu International Apartment; Library: Nanhai Archives and Records Library;

Appendix A continued

Dongyue Community	0.42	18	Dongyue Community is located in Guicheng Street, Guicheng District, Nanhai District. It is adjacent to Huacui South Road to the east, Foshan Chong to the south, and Dongping Road to the north	Park: None; Community: Guihua Garden, Guinan Community, Huayuan Community, Nanyue Residential Area, Guidong Garden, Sixteen Block, Health Bureau Dormitory Community, Yuexiu Xinghui Yunjin, Guinan Xingqing Mansion, NATO Community, Danguiyuan, Wanshunyuan, Vanke Jinyu International Garden; Library: Xiaoxiao Reading Room, Nanhai Archives and Records Library, Nanhai District Library, Foshan United Library Guicheng Central Primary School Station;

Appendix A continued

NATO Community	1.99	35	The NATO community is located in the central area of Guicheng, South China Sea, with Guilan Road to the east, Leigang Park to the west, and Qiandeng Lake Park to the north	Parks: Yuangang Park, Nanhai Living Water Park, Maker Park; Community: Poly Ye Mansion, Hai'er Community, Nanhai Vanke Plaza Residential, Poly Yayuan, Nanyue Residential Area; Library: None;

Appendix A continued

Poyang Village	0.55	42	Poyang Village is located in the eastern part of Shiwan Town Street in Chancheng District, adjacent to Shishiken Village in Nanhai to the east, by the Dongping River to the south, Nanhai Avenue to the west, and Lvjing East Road to the north	Park: None; Community: Yiyun Shangcheng, Huayang Jiayuan, Zhuoyue Qianshui Bay, Taifeng Qianxi Bay, Jindi Jiulongbi, Jiajun Huayuan, and Yijing Garden; Library: Chancheng District United Library - Shiwan Town Street Library, Huaying School Self service Library;

Appendix A continued

Tangfang Village	1.28	19	Tangfang Village is located in the eastern part of Chao'an Community in Chancheng District, with Tongji East Road passing through the village	Park: None; Community: Jiuding International City, Hengfu New City, Datangchong Community, Dapan Hengyue Garden, Times Cloud Map, Pujun New City Huafu, Pujun New City Community, Yuexiu Lingnan Junting, Jihua Sixth Road Community, Zhongsanhua Xingyuan; Library: Zumiao Street Library, Chancheng District Children's Library, Foshan Disabled Persons Federation Blind Library;

Appendix A continued

Zhen'an Village	1.04	250	Zhen'an Village is located in the eastern part of Chancheng District, adjacent to Shiken Village in Guicheng Street, Nanhai District to the east, Jihua Road in Foshan to the south, and Guicheng Street, Nanhai District to the north. It is located in the central area of Foshan City	Park: Nanhai Cultural Park; Community: Zhongyi Community, Nanshi Community, Xinger Garden, Yinhao Flower Garden, Tianyou South Road Community, Guihua Garden, Tianfeng International, Times Cloud Map, Haojing Pavilion; Library: Zumiao Street Library;

Appendix A continued

Zhangcha Village	0.98	100	Zhangcha Village is located in the center of Zhangcha Street, Chancheng District, bordering Dongpo Village to the east, Dasha Village to the south, Baini Village to the west, and Fenjiang River to the north	Parks: Zhangcha Park, Hedong Park, Baini Yujing Park; Community: Zhangcha Township Community, Xinghui Shenghui Garden, Dexing Garden, Poly Champagne Garden, Huili Garden, Liri Garden, Lianyun Community, Zhongfa Garden, Dehui Garden, Chunyang Community, Lingnan Jinyuan; Library: None;

Appendix A continued

Shencun Village	2.72	86	Shencun Village is located in the core area of the southern central cluster of Foshan City, and is on the central axis of Chancheng District	Parks: Wenhua Park, Huijing Park, Changlang Park, Rose Park; Community: Mingshixuan, Yileju, Huafu International Mansion, Zhaoyangyu Garden, Rose Garden, Poly Tianxi, Huijingcheng, Tianxin Garden, Jinbi Garden, Liri Huating, Lvjing Huating, Huiyin City Garden, Hengji Garden, Pingyuan Flower Garden, Bicui Yaxuan, Huiya Garden, and Hongcheng Wenhua Garden; Library: Library of Shiwan Town Street Cultural Activity Center, Self service Library of Huijing Middle School, Library of Shiwan Town Street Cultural Activity Center;

Appendix A continued

Wanhua Village	0.71	80	Wanhua Village is located in the eastern part of Shiwan Town Street, Chancheng District, in the central core area of Xincheng District, Foshan City	Parks: Xihua Park, Wanhua Park, Dongping River Shiwan Wetland Park, and Vitality Park; Community: Yijing Liyuan, Longguang Junyue Huafu, Bird's-eye View of Beijing City, Zhonghai Wenhua Xi'an, Lijing Garden, Dongfang Waterfront, Kaide Hancheng, Haijing Blue Bay, Dexing Ju, Coastal Xinting, Ligang Sunshine, Times of Time, and Yaju Le Mankerton Mountain; Libraries: Wanhua Library, Miguo Self Service Library;

Appendix A continued

Shiliang Village	0.41	24	Shiliang Village is located south of Kuiqi Road in Chancheng District, at the intersection of Jinlan Road and Lingnan Avenue	Park: Shiliang Park; Community: Yiri Yaju, Liri Huating, Huibo Huating, Huiyin City Garden, Huiya Garden, Kaide City Mai, Huigang International, Dongjiang Huayuan, Huicuiju; Libraries: Chancheng 24-hour self-service library, Chancheng District digital library, Huijing Middle School self-service library, and Foke Experimental Primary School self-service library;

Appendix A continued

Dongpo Village	1.41	400	Dongpo Village is located at the east gate of Zhangcha Street Office in Chancheng District, adjacent to Foshan City to the east, Bitang Village and Foshan University to the south, Zhangcha Village to the west, and Jinsha New City to the north.	Park: Baiyan Park; Community: Zhangcha 4th Road Community, Dongjian Century Park, Dongpo Community, Jinsha New Town, Qinren West Road Community, the Pearl River Rome Xindu, Lvjiafangju, Baiyeyuan, Hengfuxinghui International Mansion, Huafa Four Seasons, Zhuojing Garden, Dongyan Yaju, Dehui Garden, Light Industry North Community; Library: None;

Appendix A continued

Dasha Village	1.71	110	Dasha Village is located in the eastern part of Zhangcha Street Office in Chancheng District, adjacent to Light Industry 3rd Road to the east, Wufeng 1-3 Road to the south, Chawan Road to the west, and Dasha Road to the north as the boundary to connect with the town's affiliated units	Parks: Zhangcha Park, Wufeng Park, Hedong Park; Community: Poly Champagne Garden, Huili Garden, Donghai Bay, Lianyun Community, Yujing Upper Courtyard, Liri Garden, and Hechengtianxia; Library: None

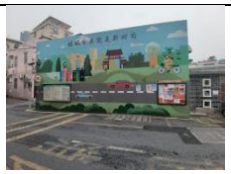
Appendix A continued

Cuntou Village	0.36	60	Cuntou Village is located in the western part of Zhangcha Street, Chancheng District, connected to Dafu Village to the southeast, adjacent to Shakou Sluice to the west, and facing Langsha Village across the river from Luocun Street to the north	Parks: Fuzhu Park, Village Head Middle District Fitness Park, Fuxi Park; Community: Evergrande Binjiang Huafu and Yifu Garden; Library: Liantang Village Self service Library

Jiancun Village	0.64	8.6	Jiancun Village is located on the west side of Fenjiang Middle Road in Chancheng District. It connects to Fenjiang Middle Road in the east, Tangyuan Road in the south, Tongfu Street in the west and Tongji West Road in the north.	Parks: Ji Hua Park, Chui Hong Park, Real Estate Park; Subdistricts: Baihe Garden, Tangyuan Subdistrict, Nanrong Garden, Tongfu Subdistrict, Poly Tongji Mansion, Huayuan Street Subdistrict, Rose Platinum Mansion, Xingtong Yuan, Yongli Garden, Hengqiang Triumphal Assembly, Huihua Mingyuan, Fuya Xuan, Xin Du Hui Yujing Haoting, Xinlan Yuan; Library: Chancheng District United Library Foshan Jinma Theatre self-service library; Farmland: None

Note: The data is sourced from Baidu Baike and Baidu Maps.

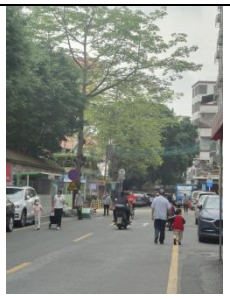
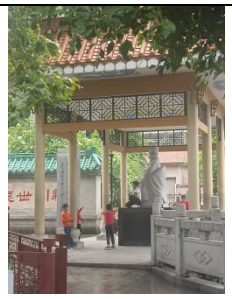
Appendix B: Spatial Status of 18 Urban Villages

Villager	Satellite Map	On Site Photos (Streets, Outdoor Spaces, Etc.)		
Diejiao				
		Street	Roadway	A Stream
Shiken Community				
		Street	Roadway	A Stream
Nanyue Community				
		Street	Roadway	Village Appearance
Qicha Community				
		Street	Roadway	Outdoor Space
Dong'er Community				
		Street	Roadway	Outdoor Space
Dongyue Community				
		Street	Roadway	Park

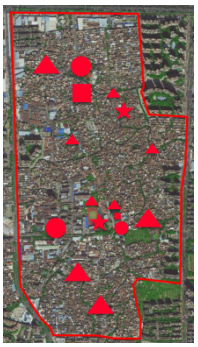
Appendix B continued

Nato Community				
		Street	Roadway	Outdoor Space
Poyang Village				
		Street/Parking Lot	Roadway	Park
Tangfang Village				
		Street	Roadway	Outdoor Space
Zhen'an Village				
		Street	Street	Park
Zhangcha Village				
		Street	Street	Park
Jiancun Village				
		Street	Roadway	Park
Shencun Village				
		Street	Roadway	Park

Appendix B continued

Wanhua Village				
		Street	Roadway	Park
Shiliang Village				
		Street	Roadway	Park
Dongpo Village				
		Street	Street	Park
Dasha Village				
		Street	Roadway	Outdoor Space
Village Head Village				
		Street	Roadway	Outdoor Space

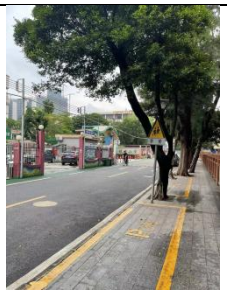
Appendix C: Children's Supporting Facilities in 19 Urban Villages

Villager	Main Facility Distribution	On Site Photos (Kindergarten, Primary And Secondary Schools, Sports Field, Etc.)		
Diejiao				
		Primary School	Sports Field	Park
Shiken Community				
		Kindergarten	Sports Field	Park
Nanyue Community				
		Kindergarten	Primary School	Park
Qicha Community				
		Community Center	Sports Field (Parking Lot)	Park

Appendix C continued

Dong'er Community				
		Kindergarten	Primary School	Park
Dongyue Community				
		Kindergarten	Primary School	Park
Nato Community				
		Kindergarten	Park	Park
Poyang Village				
		Kindergarten	Primary School	Sports Field (Parking Lot)
Tangfang Village				
		Primary School (Abandoned)	Public Green Spaces Outside The Village	

Appendix C continued

Zhen'an Village				
		Kindergarten	Primary School	Sports Field
Zhangcha Village				
		Kindergarten	Primary School	Park
Jiancun Village				
		Kindergarten	Primary School	Park
Shencun Village				
		Kindergarten	Primary School	Sports Field (Parking Lot)
Wanhua Village				
		Kindergarten/Primary School	Sports Field	Park

Appendix C continued

Shiliang Village				
		Kindergarten	Sports Field	Park
Dongpo Village				
		Kindergarten	Primary School	Park
Dasha Village				
		Kindergarten	Primary School	Village Committee
Village Head Village				
		Primary School	Park	Sports Field

■: Kindergarten; ●: Primary and secondary schools; ▲: Parks or outdoor spaces; ★: Sports field

Appendix D: Children's Supporting Facilities in 18 Urban Villages

Community questionnaire survey on child-friendly cities

Dear children and parents, hello!

I am a student at UNIMAS Malaysia, currently conducting a research project on child-friendly communities. The aim is to understand children's neighborhood activities and living conditions, as well as parents' views on the residential environment. Your feedback is crucial for us to gather relevant information and develop future improvement strategies.

We will strictly keep your answer confidential and only use it for statistical analysis in research projects.

Please do not have any concerns. Hope you can cooperate with us to complete this questionnaire. Thank you for your cooperation!

The following questions ask about your child's recreational activities near their home (within a 5-10 minute walk from home, including inside and outside the community). Recreational activities include children's games, sports and fitness, social interaction, etc.

1What are the leisure activities that your child usually engages in near home? (Multiple options available)	☐Small ball sports such as badminton and table tennis	☐Football, basketball, and other big ball sports	☐Running, walking	
	☐Activities such as roller skating, cycling, and skateboarding	☐Playing game equipment, fitness equipment	☐Playing with toys by oneself, etc	
	☐Run, jump, chase	☐Activities such as checkerboard jumping and hide and seek	☐Playing with sand, jumping into sand pits, playing with water	
	☐Observing animals and plants	☐Watching others play and watching activities	☐Chat, rest	☐other__
2Do your children have any friends with them during the event?		☐not have	☐have	
☐If there are, the number of partners is generally_____				
3On weekdays (Monday to Friday), the leisure activities of your child near home are as follows:：				
Activity frequency	☐_____Time/working day period			
Activity Time	☐8:00~10:00	☐10:00~12:00	☐	☐14:00~16:00	☐16:00~18:00	☐18:00 后

(Multiple Choice)			12:00~14:00			
Average activity duration	☐Within 15 minutes	☐About 30 minutes	☐About 45 minutes	☐About 1 hour	☐ Approximately 1.5 hours	☐⩾ 2 hours
In most cases, accompanying someone	☐No one, the child himself	☐father and mother	☐ Grandparents	☐other relatives	☐Friends I met	☐other _____
4What are the leisure activities of your child near home during the weekend:						
Activity frequency	☐_____During the next/weekend period					
Activity Time (Multiple Choice)	☐8:00~10:00	☐10:00~12:00	☐ 12:00~14:00	☐14:00~16:00	☐16:00~18:00	☐18: Post-00s
Average activity duration	☐Within 15 minutes	☐About 30 minutes	☐About 45 minutes	☐About 1 hour	☐ Approximately 1.5 hours	☐⩾ 2 hours
In most cases, accompanying someone	☐No one, the child himself	☐father and mother	☐ Grandparents	☐other relatives	☐Friends I met	☐other _____
5What are most of the children's activity locations? (Multiple options available)	☐Empty space downstairs from home		☐Community (Village) Activity Center/Room		☐The park in the village	
	☐The streets/sidewalks in the village		☐Surrounding sports venues/swimming pools		☐Surrounding parks	
	☐The sports field in the village		☐Street clearing		☐other_____	
6In addition to the above locations, which other places near your home will your child go? (Multiple options available)	☐ convenience store	☐Supermarket	☐ Restaurant	☐Large shopping malls	☐Integrated Market/Agricultural Market	
	☐ bookstore	☐Hospitals/Medical Service Stations	☐library	☐science and technology museum	☐art museum	☐museum
	☐ Children's Palace	☐Bank/Savings Office	☐ Relatives /Partner's Home	☐Parental unit	☐other_____	

7Based on your experience and feelings of taking care of your child or engaging in activities near your home (including inside and outside the community), do you agree with the following statement? Please check the option that suits you.

	attitude / state	Disagree	disagree	Fair/difficult to say	I quite agree	Strongly agree
hand over	a01 On the street near my home, most vehicles are traveling at a slower speed	☐	☐	☐	☐	☐

through Outbound line	a02 The traffic on the streets near my home is not very busy	□	□	□	□	□
	a03The street near my home has good night lighting	□	□	□	□	□
	a04When walking with children on the streets near home, the street environment is clean and orderly	□	□	□	□	□
	a05When walking with children on the streets near home, there are usually no obstacles on the sidewalk and the width is sufficient	□	□	□	□	□
	a06The greenery of the streets near my home is very good, providing shade and shade for pedestrians	□	□	□	□	□
	a07The distance between intersections near home is relatively close, making it convenient to take children across the road	□	□	□	□	□
	a08 The pedestrian facilities in the streets near my home are relatively complete, including accessible facilities (such as accessible slopes...), street seats, etc	□	□	□	□	□
	a09The auxiliary crossing facilities (pedestrian crossings/traffic lights...) in the streets near my home are well-equipped	□	□	□	□	□
	a10The maintenance of the sidewalk near my home is very good, and the ground is flat and undamaged	□	□	□	□	□
	a11There is no phenomenon of vehicles parked on the roadside in the streets near my home	□	□	□	□	□
Recreational activities	b01Starting from my home, it is convenient to walk to places suitable for children's play and leisure activities	□	□	□	□	□
	b02There are many places near home that are suitable for children's games and leisure activities (such as parks, sports venues...)	□	□	□	□	□
	b03There is a good green landscape near the home, and children have the opportunity to be exposed to the natural environment and observe animals and plants	□	□	□	□	□
	b04When taking children around the house, it is convenient to find auxiliary facilities such as a children's sink/mother and baby room/bathroom	□	□	□	□	□
	b05There are resources nearby that are suitable for children to participate in hands-on activities, such as clean sand pits, shallow water surfaces, climbing walls, etc	□	□	□	□	□
	b06When children are active near home, they can	□	□	□	□	□

	easily find suitable gaming equipment for their age group					
	b07There are various types of game equipment and activity facilities near our home that can attract our children to play	☐	☐	☐	☐	☐
	b08The game facilities near my home are well maintained and have no damage or safety hazards	☐	☐	☐	☐	☐
	b09The floor paving (plastic floor, barrier free gentle slope, etc.) is well configured and suitable for children to run and jump in activity areas that children often go to	☐	☐	☐	☐	☐
	b10The overall environment of the activity site where children often go is well maintained, clean and tidy	☐	☐	☐	☐	☐
	b11When a child is active near home, it is convenient to find a suitable resting place and chat seat facilities for them	☐	☐	☐	☐	☐

	attitude / state	Disagree	disagree	Fair/difficult to say	I quite agree	Strongly agree
Facilities supporting facilities	c01Starting from my home, children can easily walk to public transportation stations and take buses or subways	☐	☐	☐	☐	☐
	c02Starting from my home, the child can easily walk to the commercial facilities needed for their daily life	☐	☐	☐	☐	☐
	c03Starting from my home, the child can easily walk to children's medical facilities (such as community hospitals)	☐	☐	☐	☐	☐
	c04Starting from my home, children can easily walk to children's education and care facilities (such as primary schools, kindergartens...)	☐	☐	☐	☐	☐
	c05Overall, starting from my home, it is convenient to reach various living facilities required for children's daily lives	☐	☐	☐	☐	☐
	c06From the perspective of caring for children, I think the service facilities near my home are quite well-equipped	☐	☐	☐	☐	☐
Perception and preference	d01Near my home, I often see children playing and engaging in outdoor	☐	☐	☐	☐	☐

	activities					
	d02Near my home, I often see residents chatting and communicating with each other outside	☐	☐	☐	☐	☐
	d03The neighborhood atmosphere in my residential area is relatively good, with familiar and close neighbors	☐	☐	☐	☐	☐
	d04When I need it, I can seek help from my neighbors	☐	☐	☐	☐	☐
	d05Near my home, I often see residents taking outdoor walks and engaging in leisure activities	☐	☐	☐	☐	☐
	d06The traffic safety situation near my home is very good, and there haven't been many traffic accidents	☐	☐	☐	☐	☐
	d07The public security situation near my home is very good, and there have not been many public security issues	☐	☐	☐	☐	☐
	d08The overall environment of my residential area and surroundings is very child friendly and suitable for children to engage in various activities	☐	☐	☐	☐	☐
	d09I have a great experience when taking my child around the house for activities	☐	☐	☐	☐	☐
	d10From the perspective of caring for children, I am quite satisfied with the environment and facilities of my home and surrounding areas	☐	☐	☐	☐	☐
	d11Overall, I think my residential area is more suitable for children's living	☐	☐	☐	☐	☐

Please fill in your information						
8You are a child's	□dad	□Mom	□grandfather	□grandma	□other(Please Fill in)_____	
9Your age (years)	□≤29	□30~44	□45~59	□60 and above		
10Your child's age	_____year					
11Please check what you allow your child to do independently (without adult supervision) (multiple choices are allowed)	□cross the road	□Up and down school	□Go to other locations near home, such as shops/parks	□Taking public transportation traffic	□Going out after dark	□ Riding a bicycle on the road
12What is your child's gender	□boy	□girl				
13Your family's residence Housing situation	□Children live with their parents	□Children and grandparents/ Living with grandparents		□Three generations living together	□Other (please fill in)_____	
14You are	□Villagers of this village	□tenant	□other	Currently residing in the village □correct □deny		
15The time you lived in the village	□Since birth, I have been	□over 10 years	□Over 5 years	□Over 1 year	□Less than 1 year	
16Your profession is	□ governmental agencies Or public institutions	□enterprise	□Professional and technical professions (teachers/doctors, etc.)	□Individual business	□Full time at home/retired	□other
17Your educational level	□Junior high school and below	□High school/vocational school/technical school	□ Diploma or undergraduate	□ postgraduate		
18Your family's current per capita housing area is approximately	□≤30 ㎡	□30~50 ㎡	□>50 ㎡			
19Number of private cars owned by your family	□0	□1	□≥2			
The questionnaire is completed. Thank you for your cooperation! Wishing you a happy work and life!						

Floating population is a terminology used **to describe a group of people who reside in a given population for a certain amount of time.**