

REMODELING URBAN FITNESS TRAILS TO ENGAGING AND HEALTHY PUBLIC
SPACES FOR ALL

BY

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THESIS

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Abstract

Unprecedented urban development has happened to China in the past several decades, generating countless skyscrapers and a much more compacted living environment for a majority of its people. During the same period, lifestyles changed accordingly. Physical inactivity, once an exotic term to most Chinese people, became one of the leading risk factors for mortality. To encourage more physical activities as a means to improve public health, the Chinese government proposed the National Fitness Program and put it into practice. One significant approach applied by the program is to build “fitness trails” in available public spaces for nearby residents. However, these trails, consisting a limited amount of exercise equipment, are often obsolete and abandoned places risking the health and safety of nearby residents. This leaves us a big challenge in planning and design. To what extent can we use research, knowledge, and systematic design thinking from landscape architecture to flip existing fitness trails over into engaging health enhancements for the wellbeing of all?

This thesis examined current conditions of 30 different urban fitness trails in the city of Guangzhou and conducted an in-depth analysis of two typical urban fitness trail cases in Liuyun community. By research and analysis, a set of design guidelines was created and prepared for future practices. In response to design strategies provided, a comprehensive fitness trail design in Liuyun community was made for illustration.

Through investigation, it is apparent that many of the urban fitness trails were unwisely built in locations and poorly considered in design components. By a more inclusive understanding of health, various health-promoting factors including mental health, social wellbeing, and healthy food were brought into design rather than physical activity only. In the illustrative design chapter, constructive design ideas and solutions were made and explained, with hope to set up the stage for related practitioners.

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Chapter 1: Introduction

Urban fitness trails are free “fitness clubs” located around residential communities in many Chinese cities. These fitness trails offer free opportunities for people to engage in physical activity close to home. Fitness trails include exercise equipment in outdoor spaces. The trails, however, support only limited use because they provide only a narrow range of exercise activities. They are often dark and barren, poorly maintained, and feel disconnected from the surrounding neighborhood. The tragedy of this situation is that the Chinese people have invested considerable sums into trails that are intended to promote the health and wellbeing of Chinese citizens.

But these urban fitness trails are so poorly designed that it is unlikely for them to meet one-tenth of their potential health benefits. Worse, no current study has provided solid suggestions in design. At a minimum, urban fitness trails in China should be designed to attract nearby neighbors to them, provide a wide variety of opportunities for people of different ages, skills, and levels of fitness to participate, feel safe and connected to the urban fabric, and provide neighbors opportunities to socialize.

In this thesis, I work to address these goals. I begin by providing a brief historical review of the development of urban fitness trails in China and review the literature regarding the kind of health benefits that we might expect to achieve from such trails. I then provide an in depth analysis of two existing urban fitness trails and describe in detail its shortcomings with respect to the various dimensions of health benefits, and an overall analysis of 30 fitness trails with research results. Next, I identify several design guidelines for addressing these shortcomings and present a landscape design solution for the same two sites. Before concluding, I evaluate the design and consider the extent to which it might meet the health

goals established above. Finally, I provide several recommendations for retrofitting urban fitness trails in China.

Chapter 2: Topical Background for Urban Fitness Trails in China

Chinese urban fitness trails are formed by the National Fitness Program (NFP), which is aimed at promoting the health and wellbeing of the Chinese populace. To explore more on this topic, an investigation about NFP was conducted in understanding the urban fitness trails and their objectives.

2.1 NFP: A Transition from Medal Mania to the Public Health

Established in 1995, NFP is a well funded national program that greatly shaped China's living environment since it was launched. It has shifted the government's view from Medal Mania to enhancing public health. China has long been recognized in optimizing its resources to support the athletes who are capable of bringing honor to the country. Its training system, inherited from the Soviet Union (Moore, 2011), selects the young and talented children, then brings them into intensive training until they become competitive in Olympic Games. At the same time, however, fewer resources were invested in public sports facilities, which limited public access to recreational facilities and threatened public health. In 1996, for instance, it was estimated that the Beijing municipal government has invested 84.5% of its sports resource in funding 1,000 professional athletes within its jurisdiction, which left only 15.5% of its funding to feed the public's needs. Indeed, China was seemingly competitive in sports based on its 16 gold medals won in the 1996 Olympic Games, but a normal citizen in Beijing at that time was hardly able to afford public sport facilities since they were way too expensive (Quan & He, 2011).

Such inequity in access to public sport facilities soon attracted public awareness, and urged the government to adjust its distribution in sport resources. In 1995, the General

Administration of Sport of China (GASC) proposed the NFP to promote the health and wellbeing of the Chinese citizens. The program involved various approaches such as introducing healthy lifestyle in propaganda, organizing sports events among the residents, and increasing the number of public sports facilities (The State Council, 2015). To raise funds for the program, the government sought the assistance of the China Welfare Lottery (CWL), the only authorized gambling organization in mainland China. Until 2013, a total of ¥40,966,000,000 net income from CWL was invested in NFP (GSLC, 2015) to create public sports facilities. Based on the records, the number of accessible sports venues increased rapidly to 850,080 national wide, and the percentage of those who interested in the physical activities increased 11.4% from 1997 to 2014 (SAC, 2015). As expected, the NFP successfully increased public access to sports facilities and encouraged more Chinese citizens to enjoy physical activities.

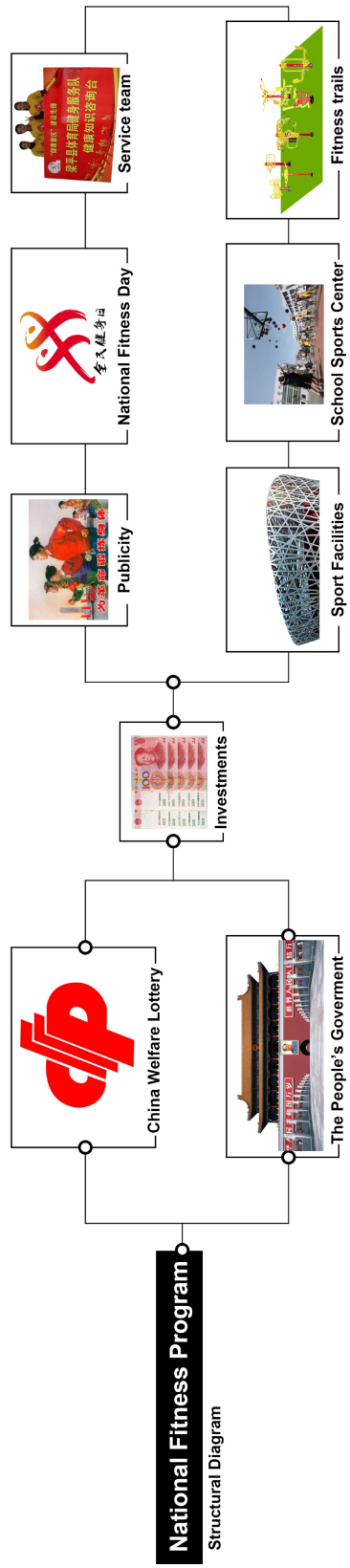


Figure 1: Structural diagram of resource distribution in the NFP

2.2 NFP and Urban Fitness Trails

Under the NFP structure, building urban fitness trails is a significant approach to increasing public access to recreational sport facilities (see Figure 1). It is an innovative and simple method established by Guangzhou Municipal Government by offering a wide range of outdoor fitness equipment inside communities and giving them free to the public. In 1996, the Guangzhou City constructed China's very first urban fitness trail on the east side of Tianhe Sports Center, which was the city's largest sports stadium at that time. Designed by the Guangzhou Sports Science Society, the trail was consisted of 10 different types of fitness equipment and was free to the public . Unlike basketball or tennis courts and soccer fields, which require a solid shape like a square, an urban fitness trail is more flexible in shape. So it is an ideal type of sport facilities to be built for the communities in high-density urban areas.

This idea was soon acknowledged by NFP and was promoted national wide. By the end of 2010, the program's expenditure reached ¥4.1 billion with a total of 164,658 fitness trails built in all kinds of places (Jia, 2011). In Guangzhou City alone, there are 2,639 urban fitness trails built in parks, public squares, and streets (DASG, 2012). Nowadays, most Chinese communities in cities contain at least one urban fitness trail and the effects of this idea is phenomenal.

Chapter 3: Current Conditions of Urban Fitness Trails in Guangzhou

With so many urban fitness trails being constructed, are they all comfortable places for neighbors to relax and exercise? Are they being actively used by nearby residents? What type of people would use them more often?

To answer these questions, 30 urban fitness trails located in 28 different communities in high-density urban areas of Guangzhou were analyzed and mapped (see Figure 2) in the summer of 2015. The study examined crucial factors which reflect the use of a trail including vacancy rate, fitness equipment type, trail location, accessibility, and maintenance condition. The findings showed that urban fitness trails are not always comfortable places for the residents. Many of them were left abandoned by neighbors. Also, several factors such as bad location, poor maintenance and lack of specialized design for children strongly reduced the willingness of doing exercises in urban fitness trails.

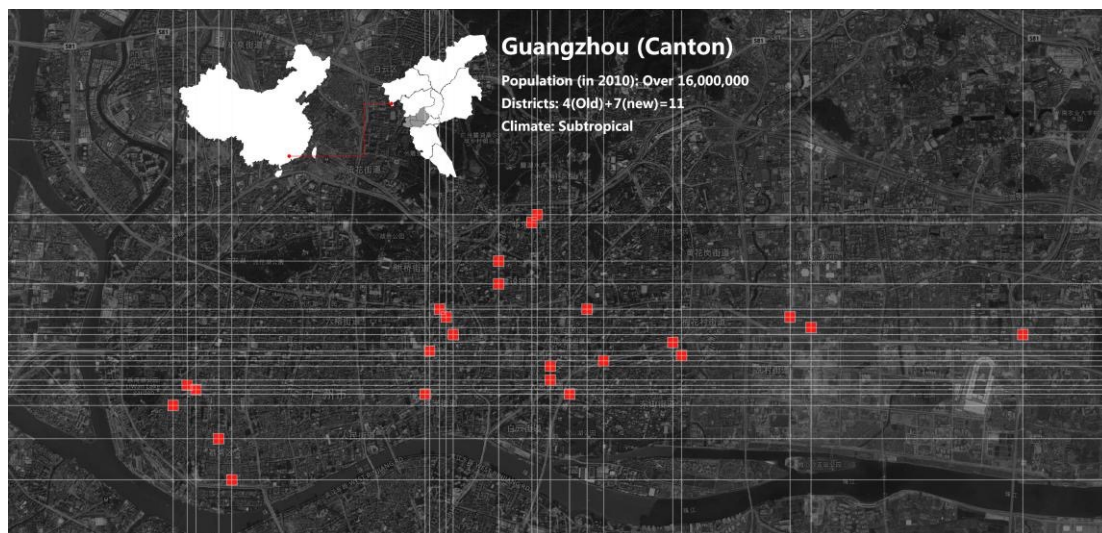


Figure 2: Locations of the urban fitness trails being investigated

3.1 Poor Location of Urban Fitness Trails

Most urban fitness trails observed were built in uninviting places, which reduced their availability to the residents. The two major locations of current urban fitness trails are squares

and streets. About 43% of urban fitness trails are situated in plazas and squares where nearby residents would come and engage in social and recreational activities (see Figure 3). This type of urban fitness trails took advantage of existing infrastructure such as ping-pong tables, seats, and trees. The rest 57% urban fitness trails are built along the streets (see Figure 4). Such locations are like dead spots. They are definitely not ideal places for urban fitness trails because streets are often limited in space. So the basic needs for neighbors to enjoy in a public realm such as comfort, relaxation, engagement, or gatherings (Carr, 1992), are often hard to satisfy. As observed, the vacancy rate of this trails is 60% higher compared to the urban fitness trails found in plazas and squares.



Figure 3: The urban fitness trail built with a plaza in Dadong community



Figure 4: The urban fitness trail built along the street in Railroad community

3.2 Unsupervised and Badly Maintained Equipment

Broken equipment and lack of supervision also weaken the use of a trail. During the investigation, 38% fitness trails were found to have broken equipment and none was marked for safety, bringing a high risk of injury. Also, no supervision was found in any urban fitness trail. As we all know, concerns about crime, danger from strangers, and equipment conditions are factors that influences residents' willingness to exercise or allow their children to play (Carver et al., 2008). Therefore, many urban fitness trails became abandoned places because of a lack of security. As the use of the urban fitness trails declined, some nearby restaurants or neighborhood retail stores took advantage of the available space by expanding their business area (see Figure 5). Some neighbors even filled trashes to the abandoned trails.



Figure 5: Retail business expanded into the urban fitness trail in Qingshuihao community (Left); The urban fitness trail in Haoxian community is buried by trash (Right)

3.3 Children's Needs Neglected in the Trail Design

To understand more about the current use of urban fitness trails, two observation studies were conducted in two popular urban fitness trails to identify who would engage more in such places. The first trail observed is located in a gated residential community called Railroad worker's community in Shuqian Road, Yuexiu District. The second trail observed is situated in an open residential community called Changgengmen community. This study documented every users and their age age, intention, and behavior in the two urban fitness trails. The users observed were divided into three different age groups: children (aged 0-14), adults (aged 15-64), and seniors (aged 65 or over). Based on observations made on both sites, children were found the major and most active users of the trails.



Figure 6: The urban fitness trail in Railroad worker’s community

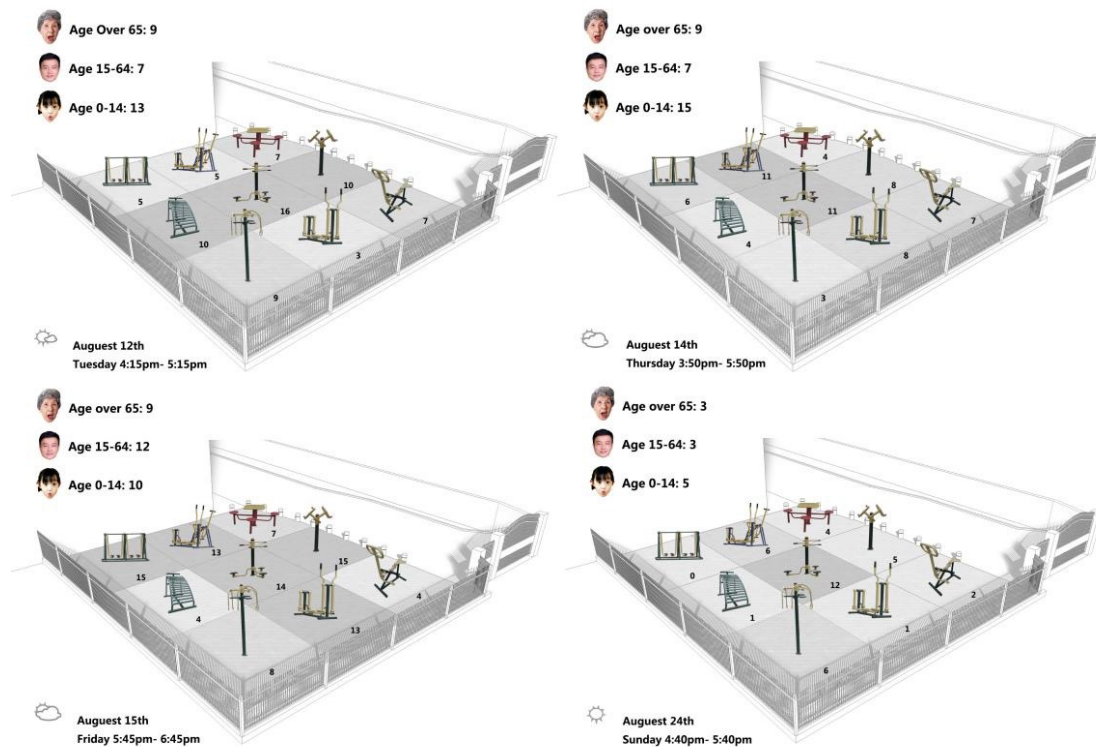


Figure 7: Observation notes for the urban fitness trail in Railroad worker’s community

However, as the major users on urban fitness trails, children’s need had not been wellly considered in design. In the first site, not a single fitness equipment was designated for children (see Figure 6). Children had no other option but to convert the trail as their playground where they chased, climbed, and created their own ways of play. Meanwhile, adults and seniors were passively engage in the trail. Most of them simply came and sit in a corner of the site while watching their children played. Based on different age groups, 42% participants were children, 29.5% were seniors, and adults were 28.5% (see Figure 7).

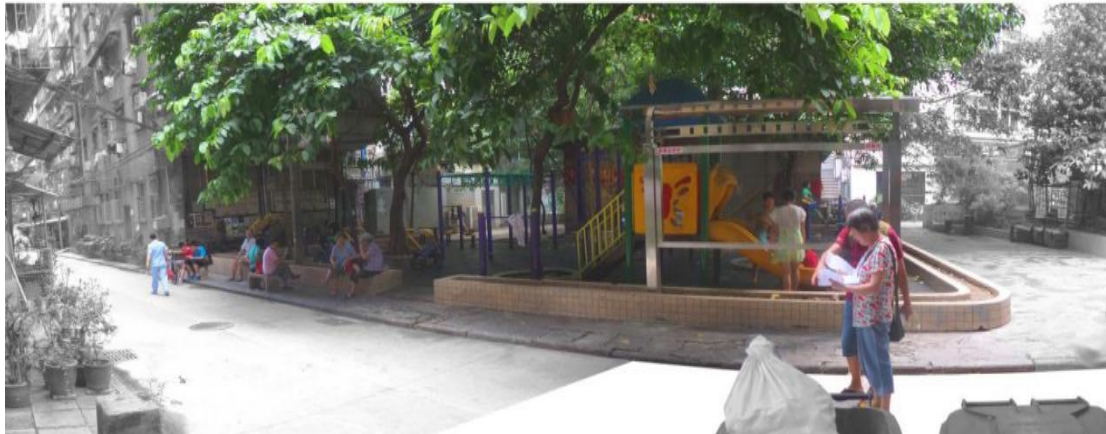


Figure 8: The urban fitness trail built with a children’s playground in Changgengmen community

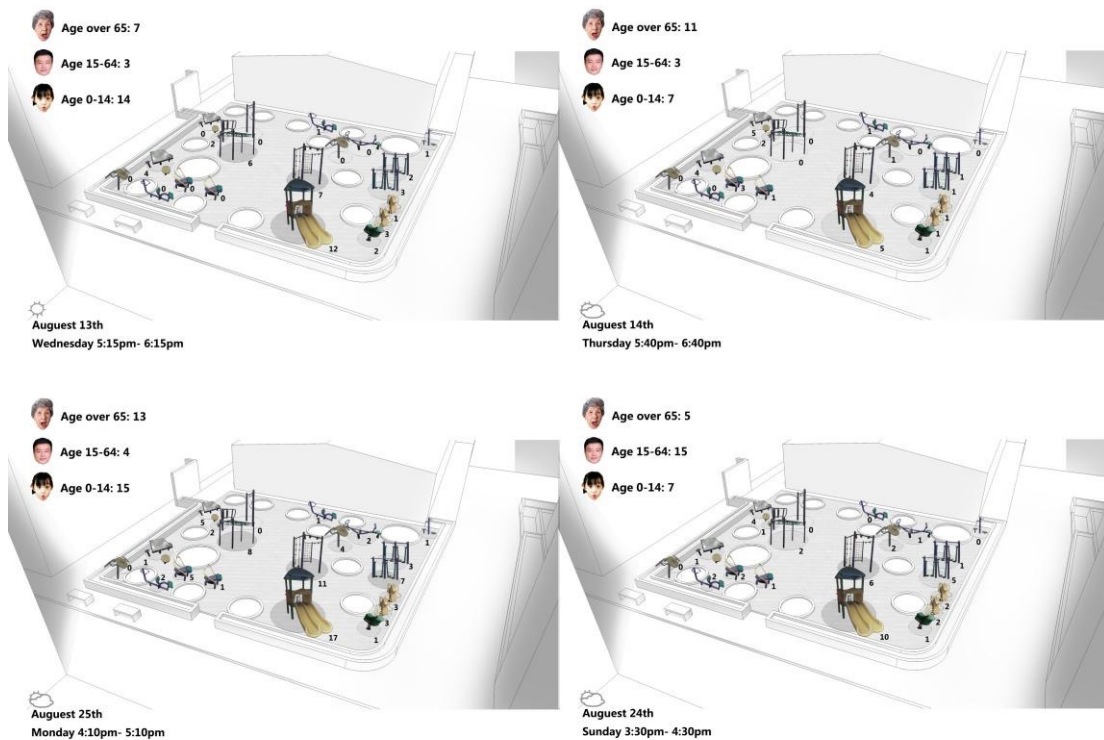


Figure 9: Observation notes for the urban fitness trail in Changgengmen community

Compared to the first site, the urban fitness trail in Changgengmen community is more considerate to children where well-shaded trees and a small playground for children were found. The small playground included a slide, a seesaw, a monkey bar, and three spring rockers (see Figure 8). It is a more actively used urban fitness trail. For adults and seniors,

behavior patterns similar as the first site like seating and talking were observed. Based on age differences, 41.5% users were children, 34.5% were seniors, while 24% were adults (see Figure 9). Overall, children remained the major and most active users of both sites.

Although children were found the major and most active users of both urban fitness trails as results shown above, their needs were being largely neglected in design. Out of the 30 urban fitness trails studied, only three had play equipment specific for children installed. Also, and two of them applied rubber mulch pavement, a type of energy-absorbing material to reduce injuries by fall (PPSH 2015, p.9), showcasing the fact that current urban fitness trails are so poorly in designed.

Simply put, offering outdoor fitness equipment to neighbors for free does not equally mean growth in physical activities and improvements in public health. To fulfill the goals from NFP, an urban fitness trail needs to be properly designed to attract different types of users, provide various kinds of health benefits, and fit in with the place.

Chapter 4: Analysis of Urban Fitness Trails in Liuyun Community

In this chapter, two urban fitness trails in the Liuyun community were selected for an in-depth systematic analysis in answering following questions:

1. Why children and seniors are the major users of urban fitness trails than adults?
2. Besides physical activities, what other health benefits could be achieved by urban fitness trails through design?

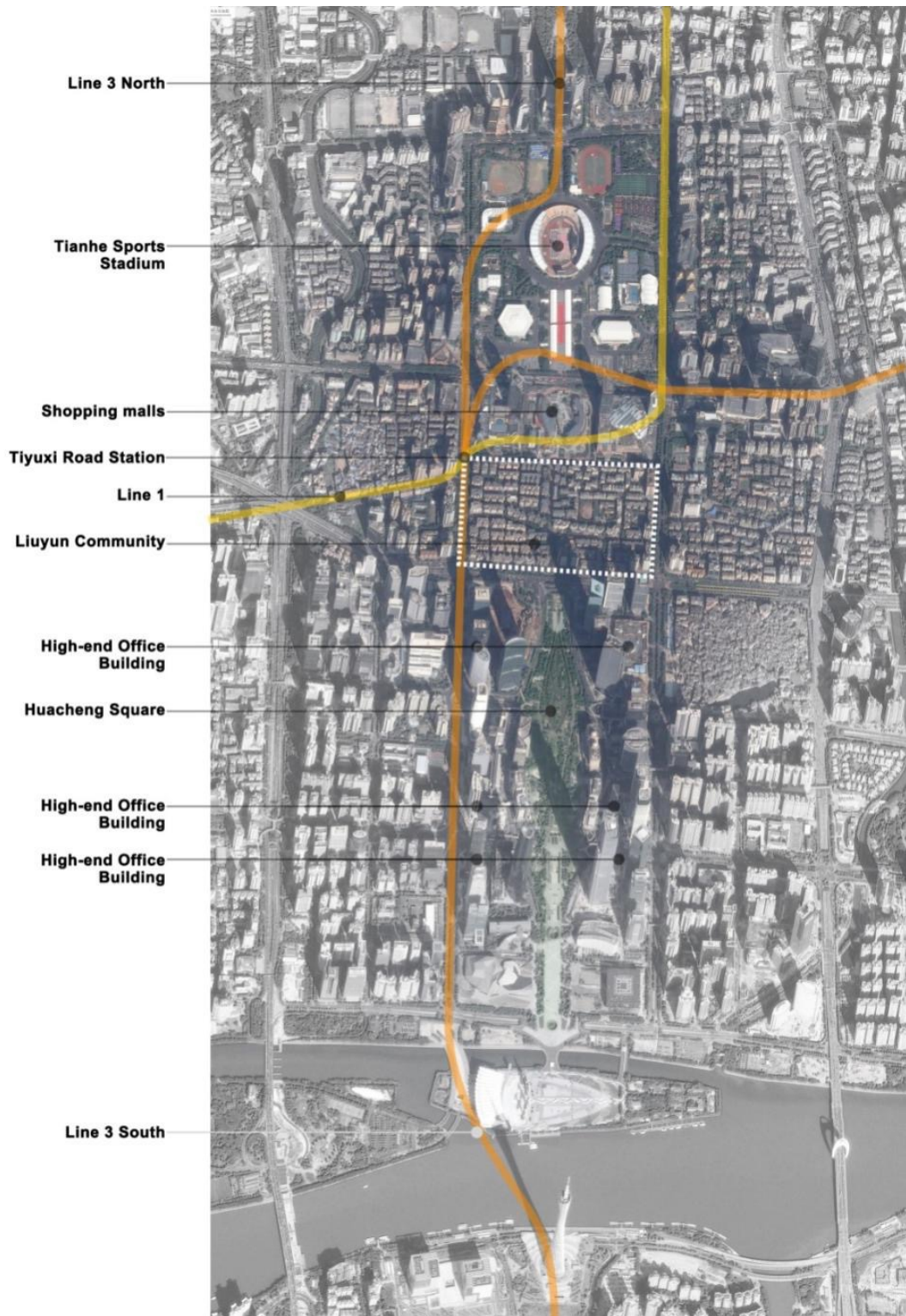


Figure 10: Liuyun community map

Situated in Guangzhou City's central business district, Liuyun community is a walking oriented mixed-use community densely surrounded by high-end retail centers and office buildings. Three notable shopping malls are in the north side of the community while several high-end office buildings are in the south (see Figure 10). Under the rapid development of the city, nowadays, the 22.5-ha community is one of the most expensive community in property value as a result of fine location and well-developed public transportation system. Many people moved into the community and its population density rose substantially to 9,600 people per square kilometer (Busch 2015, p.23).

Business opportunities hugely shaped the community especially after 2009, when the "Guangzhou 'Asian Games Town' Action Plan" was launched. The action plan renovated all the building facades and public spaces in communities around the city center as a preparation of the 2010 Asian Games. During the same period of time, all ground floor units in Liuyun community were altered for commercial use while the upper floors remained as residences (Busch 2015, p.23). All the buildings were refurbished, which helped attract business. These efforts brought astonishing results, currently, there are 94 restaurants, cafes, and bars running in the community (see Figure 11). To manage a big volume of pedestrians in a daily basis, car control policies were applied inside the community. And a pedestrian boulevard was constructed from north to south in the center of the community for a more walkable living environment (see Figure 12).

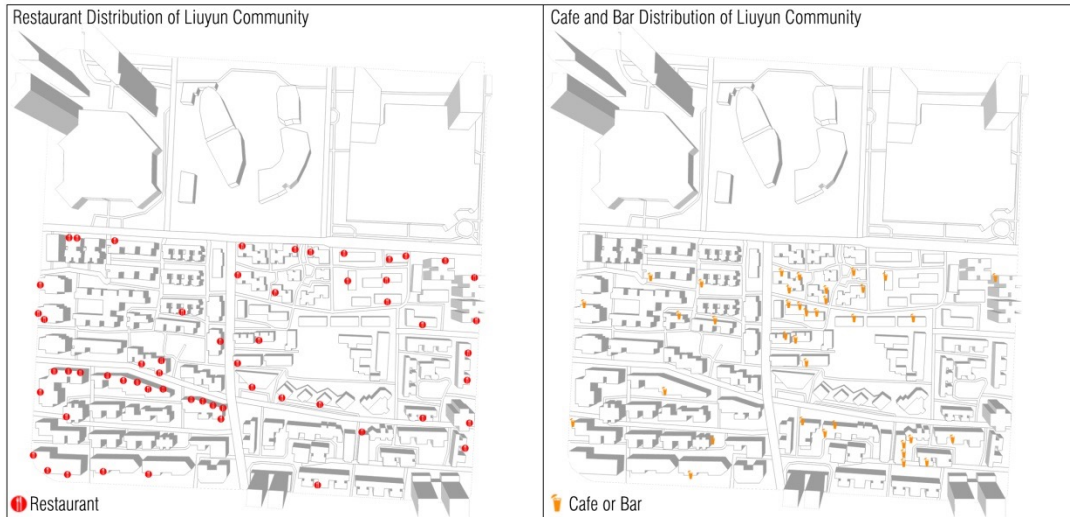


Figure 11: Access to restaurant, cafe, and bar in Liuyun community



Figure 12: Pedestrian boulevard in Liuyun community (Huang, 2016)

The metro system of Guangzhou vertically extended Liuyun community and brought more visitors to the place. About 10-ft underground, three major subway lanes intervened in the northwest corner of the community. As the only interchange spot for subway lines 1 and line 3, Tiyuxi Subway Station hosts over 0.46 million passengers in a daily basis (see Figure 13). Apart from those passengers who came for transit purpose, countless visitors walked into

the community for shopping and dining. As a result, substantial uplift in land value was recorded by time (Busch 2015, p. 26).



Figure 13: Crowds inside Tiyuxi subway station (Wan, 2015)

The down side of the business prosperity of Liuyun community is the compacted living environment for its residents. Green spaces were away from sufficient and bike lanes were disconnected. To increase the public access to recreational sport facilities, local governors decided to create two fitness trails in the community in 2010. One (Site A) was built in an existing plaza where residents used to gathered and play games like Chinese chess, mahjong, and poker. The other one (Site B) was built right next to a parking lot in the east part of the community. Each urban fitness trail is consist of five to six outdoor fitness equipment, including “fitness strider,” “double surfboard,” “tai chi pusher” and so on (see Figure 14). Based on long period of observations, both of them were not actively used by nearby residents. Participants observed in site A were mainly focusing on mind games like Mahjong and Chinese Chess, while the number of participants in site B was recorded 0. The result showcased the strong reluctance of neighbors to participate in physical activities in both of the sites.



Figure 14: Site photos of the two urban fitness trails in Liuyun community

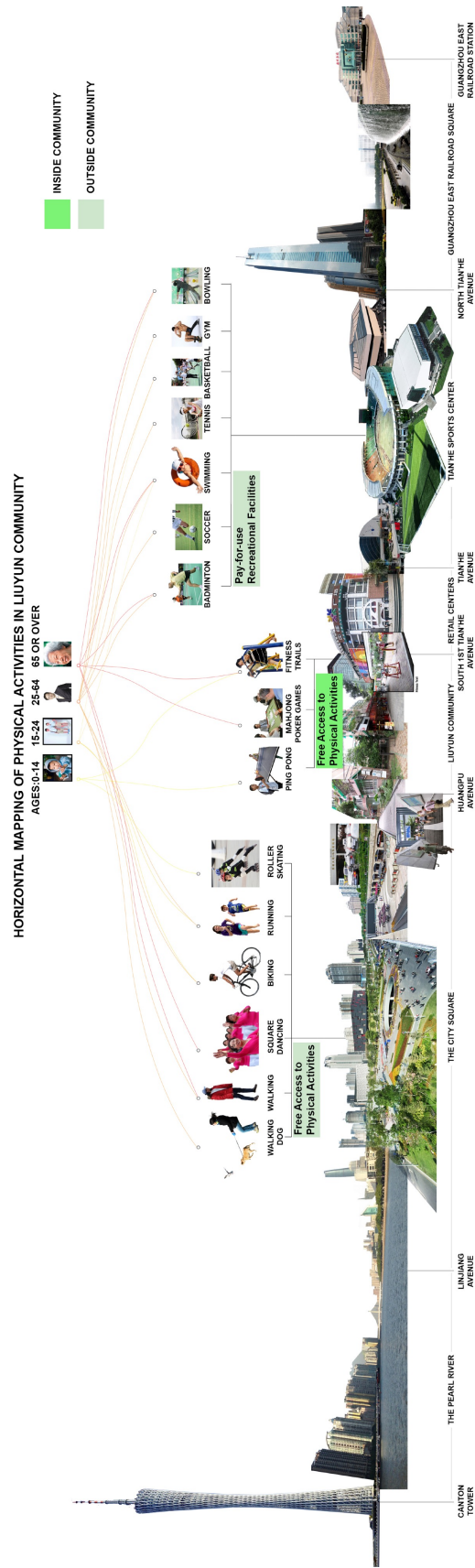


Figure 15: Horizontal mapping study of physical activities in Liuyun community

After mapping all physical activities occurred in and around Liuyun community, the study found that children and seniors were the main users of urban fitness trails simply because they had limited access to recreational sport facilities outside the community. As shown above in the horizontal mapping of physical activities in Liuyun community and surrounding areas (see Figure 15), Lots of adults were found in Huacheng Plaza, running, biking, or doing roller skating. Meanwhile, many neighbors were found playing badminton and soccer in the sports facilities located in Tianhe Sports Centre Stadium. Because children and seniors were limited in the access to recreational facilities in a broader range for financial or physical reasons, the two fitness trails inside Liuyun community became attractive spots for them to attend.

The study also found that the needed disconnection between two urban fitness trails was missing. This weakened their use and diminished their potentials. As observed, no connection could link users from one site to another, so potential health benefits such as more walking, biking, and exploring were not encouraged by design.

Chapter 5: Potential Health Benefits and Design Enhancements

Base on solid observation, mapping studies, and systematic analysis to current urban fitness trails in Guangzhou, a number of questions were raised in exploring constructive design guidances to improve urban fitness trails in China.

1. What if more design interventions targeted on children and seniors were made in urban fitness trails?

2. What if isolated urban fitness trails were linked for potential health benefits?

3. What if social, mental, and environmental health benefits were fully sought in design?

Below are 12 design guidelines identified with evidences to address shortcomings of current urban fitness trails in Guangzhou.

5.1 Potential Health Benefits

5.1.1 Provide Opportunities for Social Health

Most urban fitness trails observed do not have enough space for events or social gathering, which denied potential social health benefits. As researchers pointed out that a public space dedicated for socializing, gathering, or other group activities is a necessity for the community's social life (Mean et al., 2005), space for community events and social gathering is a must in urban fitness trail design. It allows residents to get together and promote social bonds, which is beneficial to maintain a healthy community. In design, space for social well-being could be realized through various design approaches like, convert available lands around the site into plaza or square to support gathering and group activities (see Figure 16), or encourage cafes and bars to provide outdoor seatings for social interactions.



Figure 16: Square dance held in Liwan park in Guangzhou (Yong, 2015)

5.1.2 Develop Community Garden for Healthy Food

Community garden is an ideal component to construct a better urban fitness trail. It supplies neighbors with home-grown fresh foods through the means of gardening, which has long been recognized as the best activity for seniors to engage (Casperson et al., 1991). Generally speaking, the exist of a community garden could increase nearby property values (Bremer et al., 2003). Thus, It is essential to bring community garden in the design of urban fitness trail.

Through sustainable design approaches, the needed water for irrigation could be attained by facilities such as detention pond, bio-swale, and cisterns. When these facilities are properly applied and utilized, the new productive garden in the community wound turn into an education base near home for children to learn the importance of environment protection and ways to do so.

5.1.3 Provide Mind Games for Mental Health

Opportunities for mind games such as mahjong, poker, and Chinese chess could make urban fitness trails more inviting to both adults and seniors. They are also incentive games for seniors to maintain mental health (Verghese et al., 2009). As observed, the exist of a game spot would invite neighbors to come in a daily basis and tremendously increased the number of participants in a trail (see Figure 17). Previous designs in urban fitness trails have shown some design intentions on this point, but more could be achieved by design such as sufficient seats, and shade for comfort.



Figure 17: Adults and seniors were playing Chinese chess in site A

5.1.4 Provide Play Opportunities for Children to Enhance Physical Health

As discussed in the previous chapter, children are the major and most active users of urban fitness trails in Guangzhou. They are in the position where access to community playgrounds or sport facilities are limited. So urban fitness trails are key places for them to play. So, a children's playground with a variety of play apparatus and play materials like sand, stone, and wood should be offered to children and let the children play.

5.1.5 Offer “Free Play” Opportunities for Health Development among Children

Unstructured play or "free play" opportunities should be explored for health development among children (Barker et al., 2014). Urban fitness trails are potential places for unstructured play opportunities to take place. Recent research shows that it is highly beneficial for children to take the call on what to play, how to play and whom to play with. The necessary problem-solving and negotiating process within “free play” would eventually help children in building up their physical, social, and emotional well-being (Brussoni et al., 2015). Through the practice of “free play”, they would learn how to make friends, practice self control, and be creative. Thus, other than play apparatus that are fixed in the types of play, unstructured play opportunities should also be provided to children.

5.1.6 Establish a Green Setting for Comfort and Environmental Health

Guangzhou is known for its long period of hot summer. Unfortunately, most current urban fitness trails still used asphalt as their paving material, which made them too hot to be use in summer. Setting up a green setting in urban fitness trail could effectively reduce the heat and bring comfort to users. For example, we could apply soft paving materials like gravel and grass to replace existing hard paving, grow more trees for shade and better air quality, and carefully select tree species as well as composition for higher surface temperature reduction (Leuzinger, 2010).

Environmental health benefit like rainwater collection could also be achieved by establishing a green setting in urban fitness trail. Guangzhou city experiences high volume of rainfall in a yearly basis especially in summer. By growing more trees in urban fitness trails, higher volume of rainfall would be retained on site, which reduces stormwater discharge, and so the risk of flood.

5.2 Potential Design Enhancements

5.2.1 Higher Accessibility

As previous analysis showed, urban fitness trails should be built in spots where seats, tree shade, and space for gathering are adequate. Because these are the vital factors affecting the use of a trail. Wisely chosen locations for urban fitness trails like the one in Dadong community are more preferable in design.

Also, there are ways to expand the access of urban fitness trails. For instance, isolated fitness trails could be linked by a pedestrian pathway or a bike path to increase people's awareness of their existences. We could also encourage more walking and exploration through the arrange of play equipment in different sites. Theses approaches would expand the site boundary and bring us a true meaning of "trail", which could generate more physical activities (Emmons et al., 1999).

5.2.2 Supportive Infrastructure

The duration of exercise in an urban fitness trail is highly associated with what supportive infrastructure is provided. For instance, adequate seating, water fountain, and bike rack could help supporting longer period of time in exercise (see Figure 18).



Figure 18: Water fountain added in an outdoor exercise playground on the greenbelt of Reedy Creek (KG, 2016)

5.2.3 Vertical Green

Applying vertical green elements like green wall and high shrubs in urban fitness trails is another approach to provide comforts to all users. They could effectively reduce noise and temperature (Veisten et al., 2012), which provides a more relaxed atmosphere for exercise. As observed, current urban fitness trails are heavily exposed to noises from running cars to bike bells. In design perspective, shrubs could be properly arranged around fitness equipment for a sense of enclosure and privacy, and green wall could be built around the edge of a site for noise reduction. These strategies could build up a functioning yet aesthetic appealing background for all participants in urban fitness trails.

5.2.4 Lighting System

Having adequate lighting at night in urban fitness trails is very important to embrace more users and to feel safe. So, installing an appealing and creative lighting system is a big plus for urban fitness trail design. Currently, no urban fitness trail observed is in good lighting condition at night. As a result, residents rarely come to the trails after dark. As previous research points out that good lighting condition at night is associated with a higher level of physical activity (Cohen et al., 2006), lighting system is definitely beneficial to all users. It also opens up a design challenge to incorporate fitness efforts into lighting system (see Figure 19).



Figure 19: Outdoor fitness equipment that turns calories into electricity, Hull City, UK

5.2.5 Measurement of Progress in Fitness Equipment

Outdoor fitness equipment in urban fitness trails should provide measurement of progress where users could track down their calorie burn. Current fitness equipment in urban fitness trails do not provide any measurement of progress. So users are not able to know their efforts made in exercises. Researchers points out that knowing the efforts made in exercise

tend to have a promising effect on increased amount of physical activity (Conroy et al., 2010). Moreover, when measurement of progress is provided, users could easily set up their goals and apply different exercise strategies base on their own needs, which helps them to escalate physical activity (Shilts et al., 2004). Therefore, to provide measurement of progress in fitness equipment could level up urban fitness trails in promoting physical health.

5.2.6 Water-sensitive Urban Design (WSUD) Approaches

The application of water-sensitive urban design approaches in urban fitness trails are essential for stormwater management and rain water collection. As discussed above, flooding happens so frequently in Guangzhou that the city ranks No.1 in risk of damaging floods in the world (Hallegatte et al., 2013). The core of WSUD is to retain certain amount of stormwater by the use of a functional hydrological landscape. Design strategies encouraged by WSUD include but not limited to rainwater tank, cistern, and detention pond. They collect rainwater to reduce the runoff to drainage system, which lowers the risk of flood. The water retained would be re-used in community garden, laundry, and toilets flushing. Therefore, the application of WSUD method in urban fitness trail design would not only helps the city to reduce the risk of flood, but also benefits the community by saving water.

5.3 Design Checklist

As a conclusion for the discussions above, a design checklist for an advanced urban fitness trail was compiled (see Figure 20). This checklist contains 12 design guidelines that focus on dynamic health benefits and potential design enhancements. By using the checklist in the urban fitness trail design, a designer would gain a better understanding of potential goals to accomplish and needs to satisfy.

CHECKLIST- URBAN FITNESS TRAIL DESIGN

DESIGN GUIDELINE		DESIGN APPROACH
1	Provide opportunities for social health	
2	Develop community garden for healthy food	
3	Provide mind games for mental health	
4	Provide play opportunities for children to enhance physical health	
5	Offer “free play” opportunities for health development among children	
6	Establish a green setting for comfort and environmental health	
7	Higher accessibility	
8	Supportive infrastructure	
9	Vertical green	
10	Lighting system	
11	Measurement of progress in fitness equipment	
12	Apply Water-sensitive urban design (WSUD) approaches	

Figure 20: Design checklist for urban fitness trails in China

Chapter 6: Illustrative Design

The existing shortcomings founded in urban fitness trails offer an opportunity to explore design potentials for a more dynamic health-promoting trail. This chapter seeks to employ an imaginary design example to illustrate the use of design guidelines discussed in the previous chapter and to visualize potential health benefits that could be achieved. In the end of this chapter, proposed design approaches are concluded in a table format, corresponding to the proposed design checklist in the previous chapter (see Figure 33).

6.1 From Isolated Spots to a Health-promoting Urban Fitness Trail

As concluded in Chapter 4, the two existing urban fitness trails in Liuyun community are highly isolated, mismanaged, and underutilized. By analyzing the pedestrian flow driven by intentions such as grocery shopping, dining, and going to school (see Figure 21), the design proposed a landscape “loop” to connect two existing urban fitness trails for a variety of purposes. This approach turns the two isolated spots into a real “trail”, which tremendously enlarges the site boundary and increased the accessibility of the trail (see Figure 22).

Site Analysis

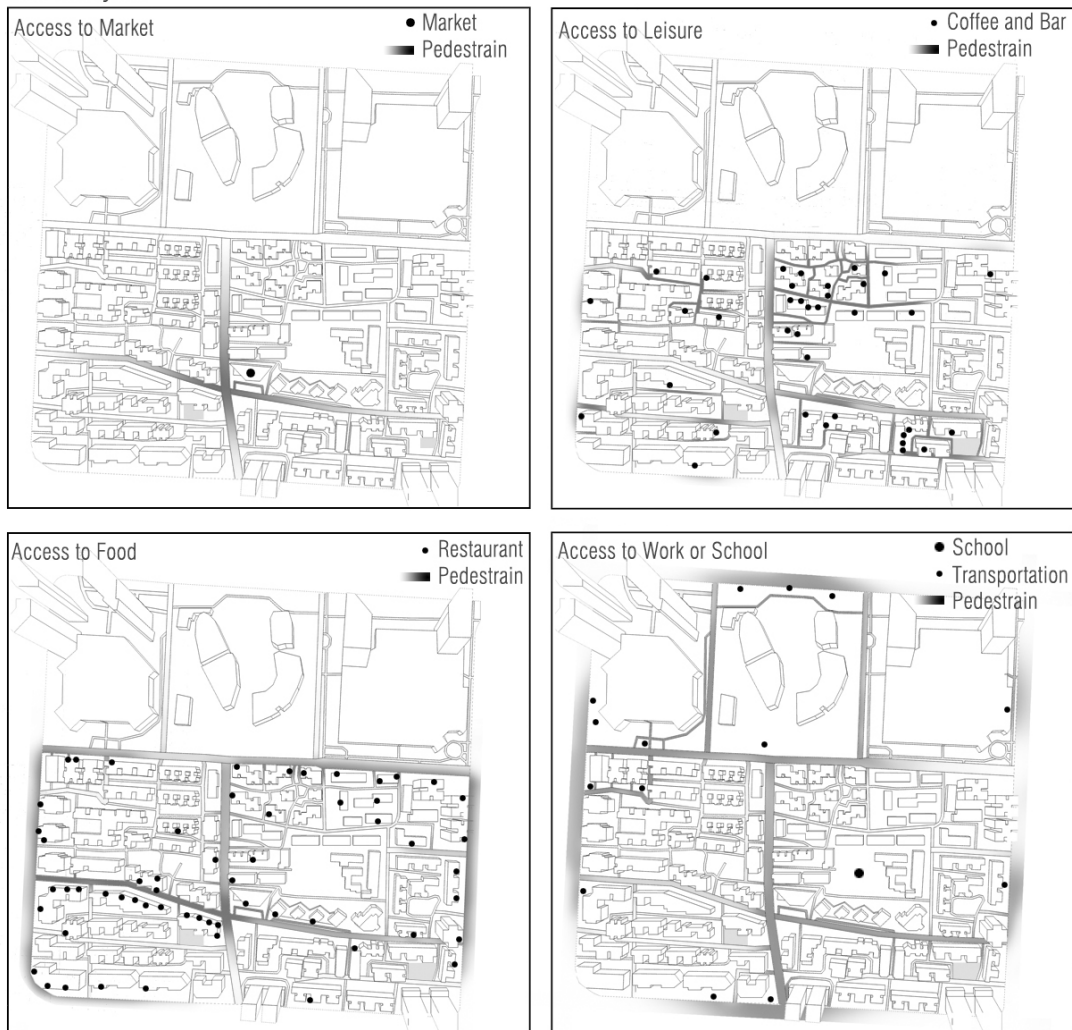


Figure 21: Analysis of pedestrian flow

Concept development



Figure 22: Design concept - Create new connections by a landscape "loop"

Next, a variety of health promoting facilities are arranged in a way to utilize existing conditions including land use, available open spaces, and vegetation. These provide venues for fun, social events, physical activities, gardening, and opportunities of retreat (see Figure 23). Users' interests are well considered in design. They divides the trail into different functioning landscapes to meet with diverse needs from residents.

Existing Conditions



Diagrammatic Masterplan

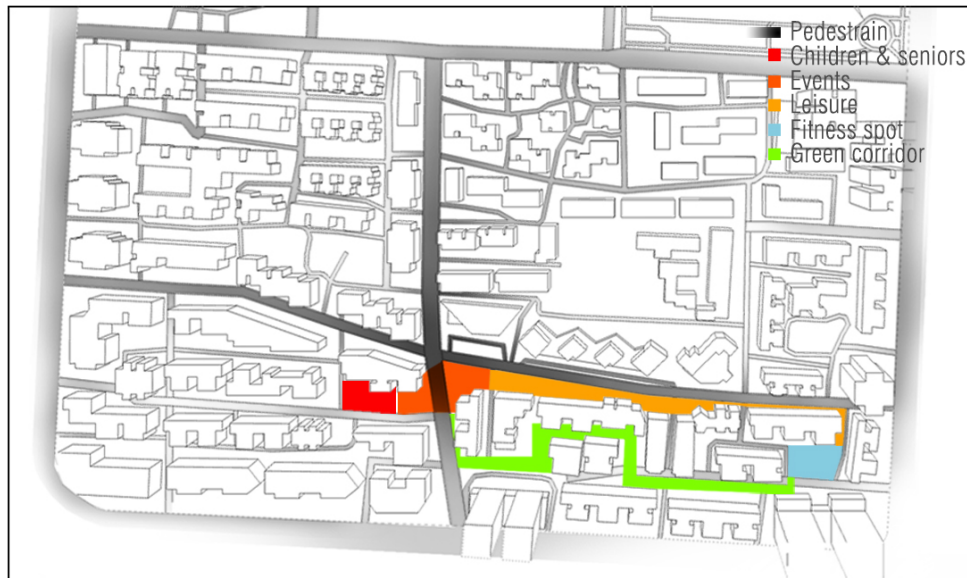


Figure 23: Existing conditions and proposed developments

Promoting diverse health benefits through design is the key. First, the design redefined Site A (existing urban fitness trail in the west) as a multi-generation play area. It consists of a pavilion for mental games, a small basketball court and a children's playground (see Figure 24, #1). Second, parking spaces along Yuleiyi Street are turned into outdoor seating areas for more social interactions and encounters (see Figure 25). Third, taking the advantage of available spaces in the pedestrian boulevard, the design proposed a plaza for social events and gathering (see Figure 24, #2). On the other hand, Site B would be converted into a community fitness hub where various exercise opportunities could be found, because it is more sheltered and quite for neighbors to work out. In addition to fitness equipment, a short running track is proposed around the site (see Figure 24, #3). Last but not least, a green corridor, accompanied with timber planting beds and neighborhood plazas is proposed to connect users from the multi-generation play area to the community fitness hub (see Figure 24, #4). Compared to the existing conditions, the new proposed trail is bigger in space, more diverse in health benefits and play opportunities, and more intended to different needs.



Figure 24: Site plan: a health-promoting urban fitness trail in Liuyun community

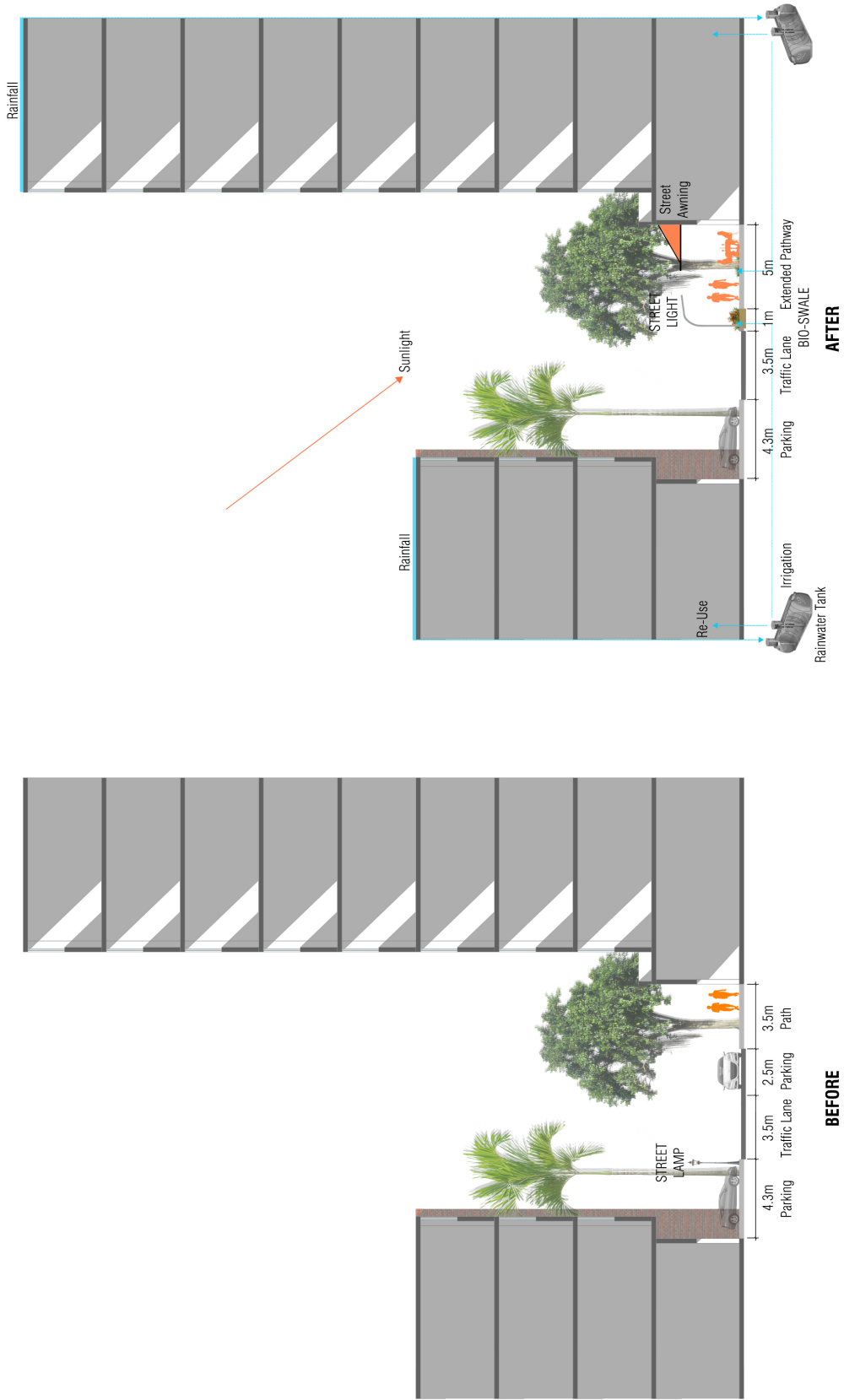


Figure 25: Yuleiyi streetscape modification

6.2 Design Illustrations

The multi-generation play area offers play opportunities and mind games for both children and seniors (see Figure 26). It creates a new vibrant scene compared to the old boring urban fitness trail. Here, children could play the slide, the swing, or the interesting terrain made by back fill. In addition, shaded seatings are arranged around children's playground for parents.

On the east side of the play area, a shaded pavilion would be a gathering place for adults and seniors who are fond of Mahjong, Chinese chess, or poker games. The pavilion maintains a reasonable distance to the children's playground for supervision. Moreover, to reduce noises generated from activities, a green wall is proposed between the site and the residential building on the north. It offers all users an aesthetic live background.



Figure 26: Design illustration of the play area for children and seniors

More design interventions are made into the scheme. One of them is “running light” as illustrated below (see Figure 27). The light color on the ground would switch accordingly once movement is sensed. The design intention is to encourage users to create their own ways of play through running to different spots.

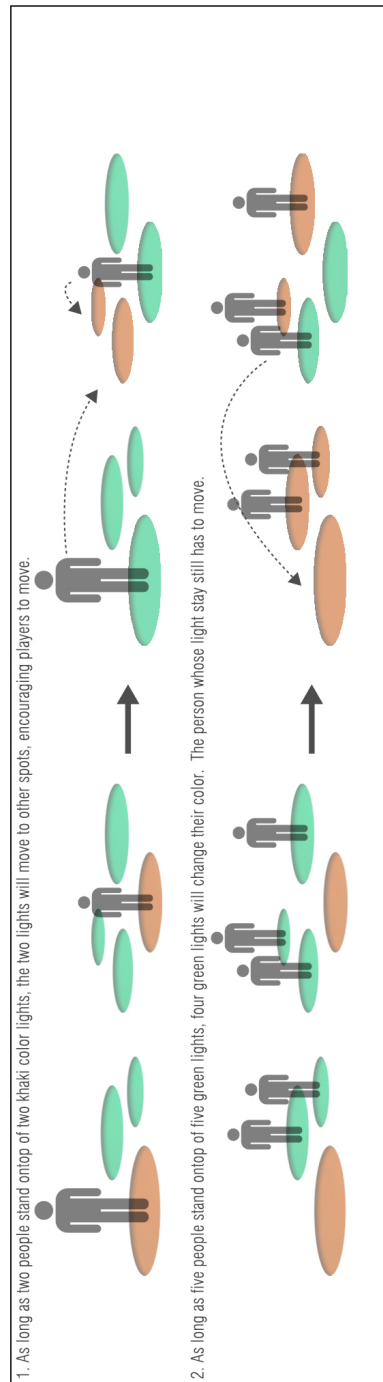


Figure 27: Running light

The existing pedestrian boulevard is the busiest street located in the center of the community. The design considers it as part of the trail system as a strategy to invite more users. Design enhancements are proposed to the boulevard including bike racks, enlarged planting area with seats, and a plaza for community events. The plaza is equipped with outdoor movie screen, which set the stage for events like community movie night, square dance, and public meeting (see Figure 28). In addition, the design create a unified lighting system for a perfect atmosphere and extended uses at night (see Figures 29).

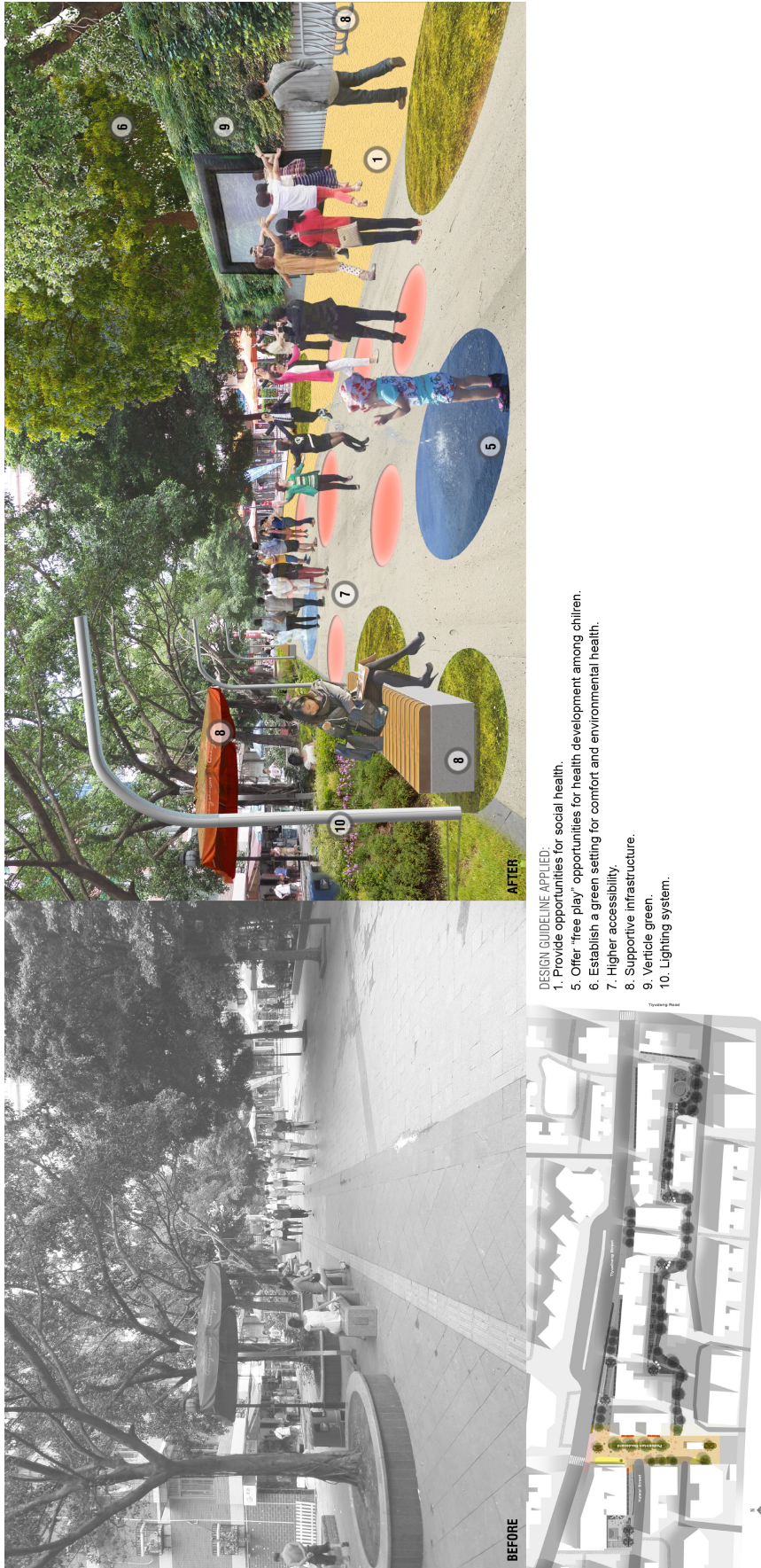


Figure 28: Design Illustration of the Pedestrian Boulevard

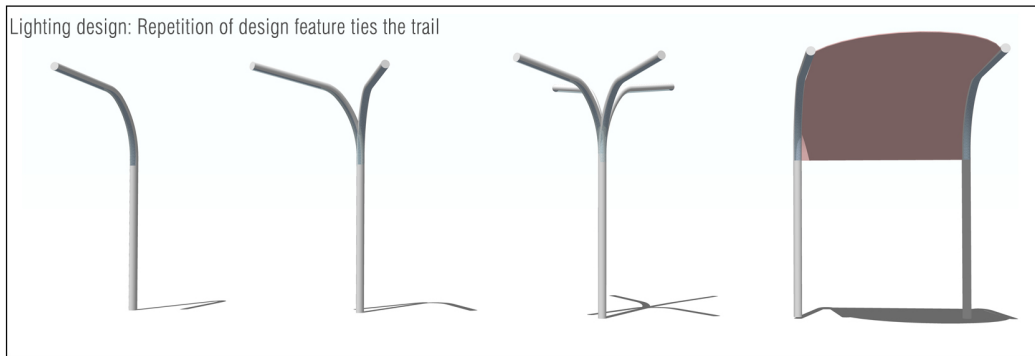


Figure 29: Unified lighting design

Situated in the east side of the trail and densely covered by trees, a dozen of fitness equipment that meet with different fitness purposes form the community's fitness hub. All fitness equipment are organized in a way to stimulate social interactions between users. Also, measurement of progress is installed in every fitness equipment to ensure that users know exactly how much efforts have been put in exercise and adjust accordingly. Furthermore, the sandbox on the west is a joyful spot for children, where movable wood logs and plastic boards could be found to build their imaginations (see Figure 30). Again, fitness equipment and the sandbox are kept in a considerably short distance to allow "kid watching".

On the edge along densely grown trees, a yellow iron bar is built in a shape for users to stretch and pull-up. All design elements are "looped" by a small running track which allows users to warm up.



Figure 30: Design illustration of the community fitness hub

In between the residential building complex in the center of the community, a linear shape community garden is proposed for gardening and education purposes. It connects the community fitness hub to the pedestrian boulevard, thus provides an intriguing walking journey for all users. Raised timber planting beds are built along a wood pathway. They would be assigned to every family in the community to grow their own foods. Further, a rainwater harvest system is proposed to collect rainwater and grey water for irrigation and other purposes for families (see Figure 31). This system would not only reduce cost for water, but also reduced the risk of the flood during a storm and increased groundwater recharge through the process of gardening (see Figure 32).



Figure 31: Design illustration of the community garden

Rain water collection: Generates ecological benefits and builds up community garden



Figure 32: Design diagram: rainwater harvest system for the community garden

CHECKLIST- URBAN FITNESS TRAIL DESIGN

DESIGN GUIDELINE		DESIGN APPROACH
1	Provide opportunities for social health	<ol style="list-style-type: none"> 1. A new plaza along the pedestrian boulevard. 2. New outdoor seatings for cafes and bars along Yuleiyi street.
2	Develop community garden for healthy food	<ol style="list-style-type: none"> 1. A new community garden that connects the community fitness hub and the pedestrian boulevard.
3	Provide mind games for mental health	<ol style="list-style-type: none"> 1. A redesigned shaded pavilion in the play area for children and seniors. It provides a welcome setting for Mahjong, Chinese chess, and Poker games.
4	Provide play opportunities for children to enhance physical health	<ol style="list-style-type: none"> 1. A new children's playground in the play area for children and seniors. 2. A new sand box in the community fitness hub.
5	Offer "free play" opportunities for health development among children	<ol style="list-style-type: none"> 1. Unstructured play opportunity - "Running light". 2. Unstructured play opportunity - Wood log and plastic boards
6	Establish a green setting for comfort and environmental health	<ol style="list-style-type: none"> 1. Increased number of trees and vegetation on site.
7	Higher accessibility	<ol style="list-style-type: none"> 1. Increased access to the trail. 2. ADA design is applied.
8	Supportive infrastructure	<ol style="list-style-type: none"> 1. New seatings. 2. New bike racks. 3. New design infrastructure for shade.
9	Vertical green	<ol style="list-style-type: none"> 1. New green walls in three different locations.
10	Lighting system	<ol style="list-style-type: none"> 1. A new lighting system with unified design feature.
11	Measurement of progress in fitness equipment	<ol style="list-style-type: none"> 1. New digital plug-ins to provide measurement of progress in all fitness equipments.
12	Apply Water-sensitive urban design (WSUD) approaches	<ol style="list-style-type: none"> 1. A new rainwater harvesting system on site.

Figure 33: Proposed design approaches based on the design checklist

Chapter 7: Discussion

The influences of urban fitness trails are huge. They are being intensively built by the support of NFP. But the result is quite disappointing. The observation made by the study reveals that most most trails are highly underuse. Although there are endless opportunities to turn things around by design, little effort has been made until now. It is very clear that NFP, as the driven power of the topic, focused more on the quantity of the trails instead of the quality, which eventually led to terrible urban fitness trail design and narrow minded on potential health benefits to be achieved.

With more explicit goals generated by the study, NFP could invited landscape designers to contribute more in designing new urban fitness trails. Landscape designers see connections between human and environment, understand potential health benefits that could be sought by design. Their abilities in creating landscape framework and visioning health -promoting design ideas make them inevitable part in designing urban fitness trails in China. In this chapter, I will assess the contribution of the thesis, propose recommendations for future research, and discuss the limitation of this study.

7.1 Contributions

The observation to 30 existing urban fitness trails in Guangzhou shows their shortcomings and the fact that the use of a trail is limited by factors including but not limited to bad location, poor maintenance, and a lack of design for children. These findings indicates a more comprehensive design process before construction is a premise of active urban fitness trails.

Next, the in-depth analysis to the two urban fitness trails in Liuyun community finds that current urban fitness trails are more attractive to children and seniors because there is an

inequity in accessing sports facilities among different age groups. Further, possible connections between urban fitness trails are overlooked, which diminishes the potential of building up a healthy landscape framework for more diverse health benefits.

Through literature overview, I explored potential health benefits that could be achieved through urban fitness trails including physical health to social health, mental health, and environmental health. Potential health benefits and design enhancements are identified to level up the use of a trail. Base on solid research and literature review, a set of design guidance for a more desirable health promoting trail system is generated.

The design checklist illustrates ways in which social health, mental health, environmental health, healthy food, and play opportunities for children could be attained. For example, two existing nearby fitness trails could be connected for a more productive healthy landscape framework which includes children's playground, pedestrian boulevard with event space, community fitness hub, and community garden. Also, rainwater could be captured for irrigation use and further reduce the risk of flood in a bigger scope. These guidelines are grounded because they grow from both in-depth understandings of the NFP system, and existing urban fitness trail conditions, then being evaluated through design.

7.2 Future Research

In this thesis, the proposed design guidelines and design illustrations offers us a new perspective in ways to improve a large number of Chinese urban fitness trails. Its scope, rather than focusing on the efficiency of any exercise equipment, expands to a wider range of potential health benefits and landscape design enhancements. Indeed, more data need to be acquired in future research to testify the effectiveness of design guidelines. Also, more research questions need to be answered. As every community shares an unique identity, what

design enhancements could be made in urban fitness trails to gain a sense of the place? What other potential health benefits could benefit urban fitness trail as well? How to use social network to invite more users to enjoy urban fitness trails?

7.3 Conclusion

Although Chinese urban fitness trail has been immensely shaping Chinese living environment for over a decade, its scope and expectations still remain unclear. It is a crucial moment to re-think what these trails have left us and what they could accomplish. Without proper design and input from landscape architects, urban fitness trails could become extremely negative spots like many of them in Guangzhou. They nibble up shared public spaces in high-density urban communities and provided limited effects on public health. As a driven power in creating healthy living environment, landscape architect has the potential to step in and become a leading role in designing healthier and more engaging urban fitness trails in China. And now, the opportunity is in reach.

Works Cited

1. Barker, Jane E., Andrei D. Semenov, Laura Michaelson, Lindsay S. Provan, Hannah R. Snyder, and Yuko Munakata. "Less-structured Time in Children's Daily Lives Predicts Self-directed Executive Functioning." *Frontiers in Psychology Front.* 17.6 (2014). Print.
2. Bremer, A., Jenkins, K. & Kanter, D. (2003). *Community Gardens in Milwaukee: Procedures for their long-term stability & their import to the city.* -Milwaukee: University of Wisconsin, Department of Urban Planning.
3. Brussoni, Mariana, Rebecca Gibbons, Casey Gray, Takuro Ishikawa, Ellen Sandseter, Adam Bienenstock, Guylaine Chabot, Pamela Fuselli, Susan Herrington, Ian Janssen, William Pickett, Marlene Power, Nick Stanger, Margaret Sampson, and Mark Tremblay. "What Is the Relationship between Risky Outdoor Play and Health in Children? A Systematic Review." *International Journal of Environmental Research and Public Health IJERPH* 12.6 (2015): 6423-454. Print.
4. Busch, Chris, and CC Huang. *Cities for People in Practice.* Represent Energy Innovation. Website March 27 2016.
<http://energyinnovation.org/wp-content/uploads/2015/01/Cities-for-People-in-Practice-2015.pdf>.
5. Carr, Stephen. "Needs in Public Spaces." *Public Space.* Cambridge England: Cambridge UP, 1992. 231. Print.
6. Carver, Alison, Anna Timperio, and David Crawford. "Playing It Safe: The Influence of Neighborhood Safety on Children's Physical Activity—A Review." *Health & Place* 14.2 (2008): 217-27. Print.
7. Caspersen C.J., Bloemberg B.P.M., Saris W.H.M., Merritt R.K., Kromhout D. "The prevalence of selected physical activities and their relation with coronary heart disease risk factors in elderly men: The Zutphen study, 1985" *American Journal of Epidemiology*, 133, (1991): 1078-1092. Print.
8. Cohen, D. A., J. S. Ashwood, M. M. Scott, A. Overton, K. R. Evenson, L. K. Staten, D. Porter, T. L. McKenzie, and D. Catellier. "Public Parks and Physical Activity Among Adolescent Girls." *Pediatrics* 118.5 (2006). Print.

9. Conroy, Molly B., Kyeongra Yang, Okan U. Elci, Mindi Styn, Jing Wang, Susan M. Sereika, Andrea M. Kriska, Kelley Pettee Gabriel, and Lora E. Burke. "Associations Among Self-monitoring, Leisure Physical Activity, And Weight Loss: 6-month Results From The Smart Trial." *Medicine & Science in Sports & Exercise* 42 (2010): 164. Print.

10. Emmons, Karen M., Laura A. Linnan, William G. Shadel, Bess Marcus, and David B. Abrams. "The Working Healthy Project: A Worksite Health-Promotion Trial Targeting Physical Activity, Diet, and Smoking." *Journal of Occupational and Environmental Medicine* 41.7 (1999): 545-55.

11. Guangdong Sports Lottery Center. "How China Welfare Lottery utilizes its profits." December 15 2014. *Sports Welfare Lottery*. March 8 2015.

12. Hallegatte, Stephane, Colin Green, Robert J. Nicholls, and Jan Corfee-Morlot. "Future Flood Losses in Major Coastal Cities." *Nature Climate Change Nature Climate Change* 3.9 (2013): 802-06. Print.

13. Jia-Wei. "Research and Analysis to the Use of Guiyang Fitness Trails . " *Hubei Sports Science* (2011): 27-29.

14. Leuzinger, Sebastian, Roland Vogt, and Christian Körner. "Tree Surface Temperature in an Urban Environment." *Agricultural and Forest Meteorology* 150.1 (2010): 56-62. Print.

15. Mean, Melissa, and Charlie Tims. *People Make Places: Growing the Public Life of Cities*. Rep. Demos, September 2005. Website. April 17 2016.
http://www.demos.co.uk/files/Demos_PMP_Final_02.pdf?1240939425

16. Moore, Malcolm. *How China's 'whole nation' system works*. July 18 2011. The Telegraph. November 29 2015.
<http://www.telegraph.co.uk/news/worldnews/asia/china/8645188/How-Chinas-whole-nation-system-works.html>

17. *Public Playground Safety Handbook*. Bethesda, MD: U.S. Consumer Product Safety Commission, 2016. Print.

18. Quan Hai-ying; He Min-xue. "How long could the 'whole nation system' of competitive sports resist." *Journal of Physical Education* (2011): 21.
19. Shilts, Mical Kay, Marcel Horowitz, and Marilyn S. Townsend. "Goal Setting as a Strategy for Dietary and Physical Activity Behavior Change: A Review of the Literature." *American Journal of Health Promotion* 19.2 (2004): 81-93. Print.
20. The Department of Administration of Sports of Guangzhou. "New Accomplishments of National Fitness Program in Guangzhou." December 20 2012. *Administration of Sports of Guangzhou Municipality*. November 30 2015.
21. The State Council. "National Fitness Program." June 20 1995. *General Administration of Sport of China*. November 29 2015.
22. The Sports Administration of China. *Fifteen Years of National Fitness Program*. Beijing: General Office of the States Council, 2011.
23. Veisten, Knut, Yuliya Smyrnova, Ronny Klæboe, Maarten Hornikx, Marjan Mosslemi, and Jian Kang. "Valuation of Green Walls and Green Roofs as Soundscape Measures: Including Monetised Amenity Values Together with Noise-attenuation Values in a Cost-benefit Analysis of a Green Wall Affecting Courtyards." *International Journal of Environmental Research and Public Health IJERPH* 9.12 (2012): 3770-788. Print.
24. Verghese, J., Cuiling Wang, M. J. Katz, A. Sanders, and R. B. Lipton. "Leisure Activities and Risk of Vascular Cognitive Impairment in Older Adults." *Journal of Geriatric Psychiatry and Neurology* 22.2 (2009): 110-18. Print.