Comparison of effects of spatial anticrime in open communities in China
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\textbf{ABSTRACT}
In 2016, the Chinese government raised community opening policy for the first time. In order to study the effects of spatial anticrime in open communities, five quantifiable evaluation indexes are selected, which are “flow density, police deployment distance, spatial visibility, anti-capture ability and spatial connectivity”. They are applied to the quantitative analysis of the spatial anticrime performance of two different building layouts in open community in China. The spatial anticrime analysis model from the perspective of crime prevention is practical and feasible, which is of avail for the police to check up the physical environment vulnerable to crime in advance, and to carry out preliminary prevention from the causes of crime. The empirical study shows that both “Determinant” and “Enclosed” Community layout have their own advantages and disadvantages. Overall, the spatial structure of determinant is safer than the enclosed spatial structure, but the partial safety is lower due to the obstruction of sight and insufficient pedestrian flow in the narrow space between some buildings. The enclosed layout structure has higher safety in the interior space of the community space group, but lower safety factor on the main roads. Finally, the corresponding security promotion strategies are proposed for these two communities.

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1. Introduction
The urban planning policy of “open community” was put forward in the decree for the first time by the State Council of the People’s Republic of China in 2016. The policy points out that in order to promote the intensive land use, the “Narrow streets and dense network” should be gradually promoted in the future for the new unit communities in China, and in principle, new applications for closed uptowns will be no longer accepted (China 2016). The concept of open community originated from the “fusion residential community”, which integrates with urban functional space, contributing to the sharing of urban public infrastructure, creating a dynamic urban atmosphere and improving urban functions. The policy has provoked widespread discussions in all sectors of society (Yao et al. 2018; Yu 2017), and the issue of situational crime prevention and control brought about by community opening has become the focus of heated discussion in all sectors of society (Zhang, Qin, and Zhu 2019).

In the process of urbanization, social issues and various negative factors in the environment lead to high crime rate in urban communities (Desmond, Papachristos, and Kirk 2016; Brook et al. 2011; Takizawa, Koo, and Katoh 2010). In addition to the convenience of access, it also increases the complexity of traffic conditions and composition of people coming and going, after a unit community is open. These changes will exacerbate the community resident’s sense of insecurity. The analysis of the relationship between the crime rate and the spatial pattern of the community has become the main challenge faced by the scholars in criminal geography and urban planning (Tang et al. 2017). Empirical research shows that there is a significant correlation between urban crime and community spatial environment (Marzbali et al. 2016; Peeters and Vander Beken 2017; Yue et al. 2018). Later, people use statistical analysis tools to achieve more accurate results on the relationship between the incidence of community space crime and spatial environment (Tang et al. 2017). However, limited to the government’s requirements for the confidentiality of criminal data, there are few achievements in the study of the distribution of crime in urban residential areas in China.

1.1. Overview of study
Spatial anticrime theory mainly discusses the influence of community spatial environment on criminal behaviour. By reinforcing and transforming the areas with high crime incidence, the probability of crime occurrence can be reduced by ways of increasing the degree of difficulty factor, increasing the risk of arrest, and reducing the benefit of crime (Clarke 1997). Thus, the focus of crime prevention strategies is shifted from social factors to material environmental factors, which makes crime prevention research measures practical and feasible. At the same time, this means effectively...
reduces the cost of crime prevention, which has been adopted by large number of countries in the world (Xu 2003). On the basis of extensive research, three basic theories have been put forward, namely, Routine Activity Theory (RAT), Rational Choice Theory (RCT), and Environmental Criminology.

The Routine Activity Theory was first proposed by Lawrence Cohen and Marcus Felson in 1979 (Cohen and Felson 1979). This theory explained criminal behaviours from the perspective of criminal conditions. The conditions of daily criminal behaviour include three elements: “Potential Criminals”, “the Suitable Targets”, and “Lack of Effective Supervisors”. Among them, “the Suitable Targets” should meet the following characteristics: value, visibility, accessibility, and mobility. Taylor found that if there are too many active people in the community, it is easy to bring too many criminal targets and thus enhance the possibility of crime (Taylor 2002).

The theory of rational choice emphasizes the subjective initiative of criminal subject. It holds that the criminal is a rational person who can make a careful judgment, and the criminal act is a decision made by the criminal after his rational thinking about the benefit and loss of the criminal act. The theory of rational choice is put forward by Clarke and Felson in the premise of “rational economic man hypothesis”. There are two basic elements, one is opportunity, the other is choice. When the criminal’s judgment on the environment meets the requirement that the income is greater than zero, it is possible to commit a crime (Wang 2005).

The theory of environmental criminology transfers the reasoning of the crime from the subject of the crime to the objective environment and focuses its research on the space-time environment. In the early stage, Jeffery put forward the theory of “crime prevention through environmental design” (CPTED) in 1971 (Jeffery 1977), which believed that the reasonable design and effective use of urban physical space could reduce the probability of criminal behaviour and assuage the residents’ fear of criminal behaviour. Then Oscar Newman further developed on this basis and put forward the theoretical concept of “defensible space” (Newmam 1978). This theory is highly valued and widely spread because it pays attention to the transformation of material space to enhance the sense of community security. Jacobs put forward the street eye theory, pointing out the importance of natural monitoring to the safety construction of residential areas (Jacobs 1961; Fuller and Moore 2017); Lee and soyeon pointed out the impact of visibility on children’s safety in the campus (Lee and Ha 2015, 2016). Weisel D. L pointed out that the channel control had a certain impact on the crime rate of burglary in residential areas (Weisel 2004).

It can be concluded that the theoretical and empirical analysis of the environmental characteristics of criminal acts has achieved fruitful results in the world. The research perspective runs through social and physical factors, and the content of social factors such as population structure which influence the distribution of potential criminals and victims (Kauzlarich and Barlow 2009; Shaw and McKay 1972; Rupp et al. 2019), flow density (Rupp et al. 2019), policing distance (변성수 and 배민기 2019) and so on; physical environmental factors include environmental visibility (Fujii, Fujikawa, and Oikawa 2013), space permeability (Cozens 2008), access control ability (Weisel 2004) and environmental aesthetics (Roh and Park 2017), which provide an effective basis for the prediction of urban internal crime in this paper.

1.2. Comparison between technologies

The theoretical research of urban community crime prevention is accompanied by a variety of technical applications. The initial application of technology originated from the demand of statistics. In the early 1920s, New York City police began to use chromatic “pin” to represent the distribution of different types of cases on the base map, in order to find the law of crime zone. Then with the development of computer and geographic information technology (GIS), the research of criminal geography has been further based on computer positioning and display development. In the 21st-century information age, the wide application of GPS positioning technology and big data has brought more new development opportunities to the statistics of criminal geography. For example, through the network monitoring, data can better locate the crime place in the city, and combined with the real-time monitoring and reporting technology, greatly improve the efficiency of police work and detection of cases. However, most of the above-mentioned technical research focuses on the technical analysis of macro statistics, which lacks a certain pertinence for the statistics of crime occurrence within the community level.

Then people’s research perspective gradually turned to the micro-level and reached the community scale level. The micro-level analysis changes people’s research perspective from the macro regularity of the statistical crime place to a series of mechanisms that are easy to cause crime within the community. In this level of analysis, “spatial syntax”, as an important theoretical basis for the study of spatial morphology and spatial perception, has been proposed and fully applied. The development and application of this theory in technology mainly include Depth Map and related plug-in Axxwoman combined with ArcGIS. In addition to technical analysis at the spatial level, research at the social factor level has also developed synchronously, and some new research technologies or approaches have been proposed and applied.
gradually. Research methods such as “perceptual map” and “Questionnaire” are widely used, while related technologies of social statistics, such as AHP (analytic hierarchy process) and multi-factor line region method, are also applied to the prediction of the induction of crime in the community, which greatly improves the judgment of crime and the accuracy and pertinence of land.

However, in the existing research, the micro-level technical analysis still stays in a single space or social element analysis and has not yet explored the correlation between the spatial and social level of crime induction mechanism. As of May 2019, there are only 6 research articles with the theme of “space syntax” and “crime” in the core collection of Web of Science, and only 1 article with “community” in abstract (Hillier and Sahbaz 2005). Thus, the advantages of space syntax in interpreting space security have not been well explored, by using which the empirical research on interpreting open communities still needs to be further expanded and discussed. On the basis of the research and analysis of community-level security prevention and control, this paper will take the method of combining space-time elements and social elements to rate and grade the level of community internal prevention and control. In addition, the data collection will be combined with the network lbs big data, which will improve the accuracy of data, and provide a new technical solution for community prevention and control.

1.3. Objectives of this research

In view of this, from the perspective of anticrime, we attempt to analyze the crime prevention and control of urban communities based on extensive research and empirical theories. This paper analyzes and selects the spatial and social factors that influence the formation of crime from empirical analysis, selects those indicators that can be quantified, and makes an empirical interpretation of the established open community in China, aiming to provide effective guidance for the later construction. The main objectives of this study are:

- Establish a quantitative analysis model that can be used for safety prevention and control analysis, which can enrich the existing theories and methods of crime prevention and control.
- Summarize the advantages and disadvantages of determinant layout and group layout in time dimension and space dimension, respectively, from the results, providing effective evidence for the future safety construction of open communities in China.

2. Materials and methods

2.1. Subjects

China has experienced rapid population growth during the past few years. In order to alleviate the pressure of city housing, high-rise buildings are widely used in the construction of habitations. Cluster high-rise buildings have become the trend of housing construction in China. In the densely populated area of the city, the layout of the building complex can be mainly divided into two types: “determinant” and “enclosure”. The former presents a “streamlined” structure, which is characterized by a “multi centre” activity site outwards, while the latter is often used by the designers who prefer to a “central command” structure, forming a lot of “internal centripetal” spaces (Figure 1).

Since China’s open community is still in the stage of exploration and construction, there are few cases especially those that meet the actual opening up of “main roads inside the community”, such as Beijing Huaping Jiayuan Residential District, Shanghai Chunshen Vanke City, Chengdu No.1 Block, etc. First of all, a preliminary screening is carried out for these cases, the main purpose of this step is to select the communities that can obviously reflect the two layout patterns, and then further examine the urban location and population

![Figure 1](image-url). Community A of determinant layout and community B of enclosed layout.
structure of these communities to make sure that the two cases finally selected are similar in these aspects. Finally, we selected the eligible communities A and B as the research object of this paper.

Community A’s building shape and direction are relatively uniform, in line with the deterministic layout structure. It is located near the fourth ring road in the central area of second-tier cities in central China. It has a large total population and a moderate overall population density. Community B is formed by multiple internal groups of buildings, presenting the structural characteristics of the enclosed community. It is located between the third ring and the fourth ring of second-tier cities in central and western China and has a moderate regional population density. There is much comparability between the controlling factors of Communities A and B, especially the layout and population structure.

2.2. Experimental design

Considering the complexity of the factors involved in this research, we used weighted superposition analysis (SAW) in order to make the data available for effective analysis. The indicators come from various influencing factors in the theory of crime prevention (Clarke 1997), which are mainly divided into two parts: social indicators and environmental indicators.

Social indicators include population structure (distribution of potential criminals and victims) (Kauzlarich and Barlow 2009; Shaw and McKay 1972; Rupp et al. 2019), community flow density (Rupp et al. 2019), police deterrent strength (변성수 and 백민기 2019), and other factors. Indicators that can be used for data processing are selected as follows:

- Using community flow density and police deterrent strength as social indicators, and other factors as invariants.
- Establishing spatial environmental indicators mainly including spatial visibility (Fujii, Fujikawa, and Oikawa 2013), permeability (Cozens 2008), intensity of access control (Weisel 2004), and environmental aesthetics (Roh and Park 2017), among which quantitative visibility, permeability, and intensity of access control are also selected for analysis.

Combining with the anticrime section, respectively, the above five selected indicators are named as flow density (corresponding to community flow density), police deployment distance (corresponding to police fortification intensity), spatial visibility (corresponding to visibility), anti-capture ability (corresponding to intensity of access control) and spatial connectivity (corresponding to space permeability). We selected the quantitative data sources of the five indicators, detailed in Table 1. And in the last two columns of Table 1, it points out the processing method of later data and the positive or negative contribution to the anticrime evaluation. The “+” in the table indicates that the index value is positively related to the safety performance. The larger the value obtained from the analysis, the higher the community safety, the less likely to cause crime. On the contrary, the “-” represents that the larger the value of the analysis result, the lower the community safety prevention and control performance, the more likely to cause crime, and the lower the residents’ sense of safety. Overall, see Figure 2 for the final stacking process.

2.3. Data acquisition: base map

The overlay base map was derived from OSM (Open Street Map). After obtaining the four spatial coordinates of community A and community B, we imported them into OSM to get the latest base map data. Then, by aid of actual geographic image, the acquired geographic data was matched and calibrated, and closed road boundaries were marked. In order to carry out the spatial analysis of visibility and permeability with Depth Map software, further, we drew the enclosure interface of building outline, green planting boundary line, structures affecting the vision of the community, and other invisible factors. In the base map of night visible layer, according to the actual visit of the community, the space visibility of the main road was reserved, and the visibility of the branch road with insufficient illumination in the community was removed. Finally, we got a more complete base map of community space analysis.

2.4. Experiment1: flow density

Tencent’s “Easy to Go” software can be used for data crawling and processing. As open source data, the “Easy to Go” software provides an API data interface for developers and researchers to obtain data. Besides, it has a large customer base and can reflect

| Table 1. Evaluation index system. |
|----------------------------------|
| **Type** | **No.** | **Indicator** | **Data Source** | **Data Processing Method** | **Relevance** |
| Social Indicators | 1 | Flow Density | Location Based Service data | core density analysis | + |
| | 2 | Police Deterrent Force | Point Coordinates of Police Service | Multi-ring buffer analysis | - |
| Spatial Indicators | 3 | Spatial Visibility | Visual Clustering Coefficient | Point data to raster | - |
| | 4 | Anti-Capture Ability | Spatial Control data | Point data to raster | + |
| | 5 | Spatial Connectivity | Spatial Connectivity data | Point data to raster | - |
2.5. Experiment2: police deployment distance

Based on collected POI (Point of Interest) data within 1 km around the community in the map of Gaud, 5 effective policing points around community A and 4 effective policing points around community B are obtained. After importing the data derived from the above step into ArcGIS software, we used the buffer analysis tool to analyse the deterrence of the police station. The buffer zone was set to five levels. According to experts’ opinions:

- 0–50 m was set to the level of 5, representing a strong deterrent force.
- 50–100 m was set to the level of 4 with a strong deterrent force.
- 100–200 m was the level of 3 with a strong deterrent force.
- 200–500 m was set to the level of 2 with a certain deterrent force.
- 500–1000 m was the level of 1, with a slight deterrent force.

By making use of Depth Map software to deal with community spatial visibility layer and accessible layer, respectively, we analyzed the spatial visibility, anti-capture ability, and spatial connectivity and read the visual clustering coefficient, control value, and connectivity value. The corresponding calculation formulas of these three indicators are shown in Table 2. Then the data were exported after analysis to the format of TXT data, and imported into ArcGIS software for processing.

2.6. Experiment3: weighted analysis

We put the above analysis data into ArcGIS layer and then used SAW to overlay analysis. AHP was used to set the weight value according to questionnaire from eight experts, including associate professors in urban planning and landscape architecture fields, police officers, and community residents. In order to avoid some individual unreasonable scores which might lead to the overall value deviation, the consistency ratio (CR) was used to test the results. After testing, the consistency of the model matrix is 0.0843, less than 0.1, which meets the requirements of the consistency test. Therefore, the above expert scoring data can be used as a reference for weight in this experimental model. Finally, with these steps, we got the weight values in Table 3.

In view of the different distribution of values in the above layers, the difference between floating-point and integer values is too large, so it is necessary to reclassify the data. The data were reclassified by Natural Breaks (Jenks), which was set to nine levels. After that, the corresponding weight value of each layer data was given, and the formal analysed layers
3. Results

3.1. Holistic analysis result

In terms of time mode, 12 timing nodes of open communities A and B (measured every two hours, time periods are 02:00, 04:00, 06:00, ..., 24:00) were selected as inspection time to analyze and interpret the 12 evaluation figures about the effects of anticrime. In the resulting map, the red color depth is proportional to the value and the security level of community open space which is inversely proportional to the blue color depth. It means that violent crime is more likely in the community in low security level. The results of the overall analysis and comparison show that the blue areas of community A and B are significantly higher than that of the daytime and the evening during 24:00–04:00 at night, and 02:00 and 04:00 in the morning are the two time when the blue area is most widely distributed in the whole day; in the daytime layer, 12:00, 16:00, and 18:00 are the three time when the warm color area occupying the main position of the community space, and the value also reaches the peak within the whole day in this time period.

Based on the situational variables in the formation of the crime behaviours, time mechanism can affect community security mainly from two factors:

- Firstly, with the change of time, the real-time flow density in the community will change significantly, reflected in the difference in the amount of LBS real-time positioning data obtained (Table 4).

- Secondly, the change of time has an impact on the visibility of community interior space, and the difference between the light radiation intensity of sunlight and night lighting will also lead to the change of community interior space safety.

Table 4 shows the changes in the flow and density of people in communities A and B over daytime. To ensure the confidentiality of data, we divided the overall flow of people by a certain coefficient. As can be seen from the changes in the line chart, the flow of people in communities was low from 02:00 to 06:00 in the morning, and the natural monitoring by residents in the community was insufficient, which meant the sense of security is low. The peak value of pedestrian flow occurred from 10:00 a.m. to 12:00 a.m. at this time, the pedestrian flow in the community was the largest, and the local density reached the peak value of the whole day in this period.

In the spatial pattern, community A and B have their own specificity. Overall, the safety of the main longitudinal road in community A is higher than that of other secondary roads and branches in the community. It can be found based on the comparing data of the overlaid figures of each layer. This is mainly because the main road has the strongest visibility in the community. At the same time, the centre of the road has set up a special police department, which has a good supervision and control on the site. In contrast, community B is different from community A in that the safety of the primary open road in the community is not high. Combined with overlay layer analysis, the reason is that the value of connectivity of the road is too high, which gives the lawbreakers a great chance to escape when they commit crimes and increases the probability of their success, thus reducing...
### Table 2. Formulas for calculating spatial syntactic variables.  

| Space syntax variable | Meaning                                                                 | Formula                                                                 | Notes |
|-----------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|-------|
| $V_i$ (Visual Clustering Coefficient) | It indicates the strength of space in limiting the sight to people. | $V_i = \frac{1}{\sum_{j=1}^{K} \frac{1}{d_{ij}}}$ | "K" represents the number of cells with a visual depth of 1 when starting from one pixel, "K" represents the total number of nodes directly connected to the node "i". |
| $Ctrl_i$ (Control) | It reflects the control strength of mutual restriction between spatial nodes. | $Ctrl_i = \sum_{j=1}^{K} \frac{1}{d_{ij}}$ | "K" represents the total number of nodes directly connected to the node "i". |
| $C_i$ (Connectivity) | It reflects the permeability of the space node. | $C_i = \sum_{j=1}^{K} R_{ij}$ | The calculation result indicates the total number of other cells intersecting the "i" spatial cell. |

#### 3.2. Comparative analysis result

Judging from the result of the data calculation, the anticrime value of community A, which has a determinant layout in the range of 3.28, is higher than that of community B, which has a nondeterminant layout in the range of 3.31. Both values are within the range of 3.28 to 3.50, indicating that community A has better safety and fewer security risks.

- The surrounding police deployment has high impact on the community safety. The community has high crime security, but places such as supermarkets and markets are vulnerable. Some branches have high connectivity and higher frequency of events, which have a greater impact on the flow of people. The level of crime security has been improved.
- The safety of roads in the community is affected by the specific community structure, and the main influencing factors are visibility and the main branches in the community. Based on the above analysis, it can be concluded that the level of space security has been improved due to the proper distribution of people flow and the internal high control ability of the community. The overall safety level of the space environment has been improved.
3.3. Suggestions

The streamline spatial attribute of the Determinant layout structure leads to more pedestrian flow in the primary trunk road than in the other secondary roads and branches, which will inevitably lead to more potential places with high risk of crime between residential buildings in the later development, so it is particularly important to increase the supervision mechanism of residential buildings in such communities. In terms of improving the visibility of the space, on the one hand, the monitoring of local road space by road nodes can be increased; on the other hand, enough lighting facilities and monitoring cameras should be set up to improve the overall visibility of the space and the external supervision. At the same time, it can be considered to increase the vitality of the site between the lanes of large residential buildings. In order to improve the sense of safety, we should regularly improve and repair the internal infrastructure of the place to avoid the subconscious influence of the community image on criminals in the “broken window theory” (Kelling and Wilson 1982). In addition, organize community activities regularly among the residents of each building to create the sense of domain and belonging to the site.

The main problems of the Enclosed layout are mainly on the main open roads between building complexes. Therefore, in such a road space, it is necessary to strengthen police patrol and arrange enough monitoring and camera facilities to ensure that there will be no monitoring leakage areas in the site. The enclosed layout has better performance in anticrime in branches, but we can also improve its visibility in the intersection, which is more conducive to strengthen the monitoring of branch space and improve the overall sense of security. At the same time, in the future urban planning and design, it is necessary to avoid the design that the branches of each group are connected in series, which may lead to the high connection between roads and increase the potential environment vulnerable to crime. In addition, carrying out activities such as fitness and entertainment sports to attract people in the enclosed space can play a significant role in improving the sense of security.

4. Conclusion and discussion

China’s open community is still in the experimental stage, how to deal with the security crisis after the opening of the community is worth thinking. The Chinese government cannot make it transparent about the criminal data
| Layer | Spatial Structure with Low Security | Spatial Structure with Higher Security |
|-------|-----------------------------------|--------------------------------------|
| WI    | Spatial Layout                    | Spatial Layout                       |
|       | Determinant layout                | Determinant layout                   |
|       | Enclosure layout                  | Enclosure layout                     |
|       | 0.31                              | 0.20                                 |
|       | Visual Clustering Coefficient     | Spatial Control                      |
|       | 0.31                              | 0.20                                 |
|       | Spatial Connectivity              | Spatial Connectivity                 |
|       | 0.09                              |                                      |
|       | Final Layer                       |                                      |
|       |                                    |                                      |

Table 5: Comparative analysis and summary of crime prevention and control performance of different community layout structures.

| Spatial Structure | Low | High |
|-------------------|-----|------|
| The Determinant   |     |      |
| The Branch Wi     |     |      |
| Analysis          |     |      |
| The Crossroads    |     |      |
| Main passageway   |     |      |
| Value of convergence | 0.31 | 0.20 |
| The community is less safe. |

Due to relevant considerations, which has brought difficulties to relevant researchers of criminal geography. Based on the perspective of crime prevention, this paper analyses and deals with the areas that were vulnerable to crime in the community and establishes the corresponding theoretical model to evaluate the two existing domestic open community layouts. The results can be used by property and police officers for reference.

From the perspective of research methods, this paper makes up for the shortcomings of crime prevention theory and technology and applies LBS spatiotemporal big data to real community security monitoring, which reflects the impetus of new technology to theoretical research in the information age. At the same time, this is the first case to analyse and overlay the evaluation indicators related to spatial syntactic. Compared with the previous scholars “item by item” analysis of a single spatial indicator (Fuji, Fujikawa, and Oikawa 2013), this is an innovative application to a certain extent.

From the research results, this paper mainly draws the following conclusions:

1. The comparative analysis of time dimension shows that the human flow reaches a trough in the community from 02:00 a.m. to 06:00 a.m., which contributes to crime crisis due to insufficient monitoring of human flow, while the peak period of human flow is from 10:00 a.m. to 12:00 a.m., which can avoid crime cases due to efficient natural monitoring. At the same time, the impact of time dimension on the effects of anticrime is mainly reflected in two aspects: one is the difference of human flow in the environment over time, and the other is the change of day and night space visibility due to the change of time.

2. The comparative analysis of spatial dimensions shows that the safety of main roads in the community is affected by the specific community structure; the main factors affecting road safety are road visibility and road connectivity values; some branches within the community with higher local control strength are safer; the surrounding police deployment is not decisive for the safety of the community, while places that have a greater effect on the flow of people such as supermarkets, farmers’ markets, etc., have a higher impact on the improvement of security.

3. According to the analysis of spatiotemporal aspects, there are both advantages and disadvantages of “Determinant” layout and “Enclosing” layout. From the perspective of the built environment, the overall safety of the spatial structure of the determinant layout is higher than that of the enclosed layout. However, due to the narrow space between community buildings and the insufficient flow of people, the safety is low. In the future, the overall safety of the site can be
improved by means of strengthening monitoring and repairing the environment. The enclosed layout structure is safer inside the building groups, but the safety factor is lower on the main road. In the future stage, it is necessary to strengthen the police patrol on the main road and add appropriate monitoring facilities to improve the overall safety index of the community.

However, the following deficiencies still need to be solved: firstly, there is a certain deviation between the actual pedestrian flow and LBS data in the community, and the way to obtain more comprehensive and accurate community pedestrian flow data needs to be further mined; secondly, the spatial syntax cannot analyze the three-dimensional space for its calculation rules are limited in a two-dimensional plane. Even though there is a high visibility in the plant groups, it cannot be analyzed by Depth Map software. All of these will bring some deviation to the result. However, from the preliminary conclusion of the study, we can conclude that the impact of open community on space security is not as undesirable as the external discussion, and the enclosed space security of the community is guaranteed. At the same time, the prevention and monitoring of the determinant space at the road nodes can also play a significant role in crime prevention. In the future, residential area planning can even consider a more reasonable building layout or other community structures in addition to those cases listed in this paper, and then the research methods in this paper will provide an effective solution for its early safety analysis.

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