Analysis on the Defense Safety Design of Non-gated Residential Building’s Outside Environment in Changchun in the Perspective of Reducing Spatial Blind Zones: A Case study of Sanfujie Community

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Abstract. Rapid urbanization in China brings about many spatial blind zones (abbr. SBZs), which are kinds of undesirable spaces that stimulate urban crime. The SBZ is divided into three categories, which are the position-based SBZ, the morphology-based SBZ and the atmosphere-based SBZ. The physical elements that cause the SBZ mainly contain three aspects, the building factors, the landscape factors and the traffic factors. After analyzing how the SBZ impacts on the defense safety, the author proposes the series of thoughts on how to cut down SBZs based on CPTED theories. Meanwhile, the author analyzes the defense safety problems about position, morphology and atmosphere caused by improper design of buildings, landscape and traffic factors in Sanfujie, a typical non-gated residential community, and puts forward corresponding improvement strategies.

1. Introduction

Rapid urbanization leads to many spatial blind zones (SBZ) which are undesirable and easy to induce urban crime. In the outside environment of residential communities, the existence of the SBZ brings a series of negative effects and they can not only increase residents’ fear of crime, but also affect people’s environmental behavior. By the ideas of “crime prevention through environmental design” (abbr. CPTED) and improving the physical elements of the outside environment of residential buildings which may result in the formation of SBZ, we can build a behavior environment that potential offenders are not easy to crime. Therefore, the behavior environment improves resident’s sense of safety and it is conducive to building an orderly, harmonious and safe outside environment of residential communities.

In the viewpoint of the defense safety, due to the differences of the layouts of commercial activities, the property orientation, the population, the management situation, the residential scale and the residential cohesion, all these factors can affect the residents’ cognition to the environment and the potential offenders’ decision-making, and they can bring complex influences on the defense safety of building’s outside environment. But the accessibility of residential communities is an important factor that affects the defense of safety and the fear of crime, and it attracts the attentions of many foreign scholars.¹²³⁴⁵⁶
2. SBZ in the perspective of defense safety
The defense safety design aims to restrict and eliminate various factors that facilitate crime through the improvement of building’s outside environment, so as to prevent the crime. Moreover, its indirect effects have impacts on people’s sense of safety and fear of crime.

2.1 The classification of the SBZ
The existing irrational factors of spatial positions, the physical forms and the environmental atmospheres may cause SBZ, and then the crime inhibiting or the stimulating factors, such as the demand of crime, the stimulation of crime, the difficulty of crime, the crime risk, cohesion, attraction and domination, and so on. From the perspectives of the defense safety of outside environment of residential communities, the SBZ can be divided into three categories, i.e. the position-based SBZ, the morphology-based SBZ and the atmosphere-based SBZ. Among them, the former two types of SBZ are visible obviously, and the last one is the indirect SBZ. Namely, the former two types of SBZ influence people’s psychological cognition and environmental perception and the last one is a kind of behavior environment.

2.2 The Causing of SBZ
The Defense safety design of building’s outside environment should avoid SBZ. Reducing the SBZ is reducing the environmental conditions of crime and increasing the difficulty of crime. It adds the cost of crime and increases the risk of crime. The three main aspects of residential building’s outside environment that affect the defense safety include building, landscape and traffic factors, that is to say, the causing elements of three types of SBZ can be divided into building, landscape and traffic elements.

3. The defense safety design of residential building’s outside environment base on reducing SBZ in the viewpoint of CPTED
The building elements, landscape elements and traffic elements are the main reasons of three kinds of SBZ and they are also the main factors of the defense safety design. The building elements include buildings and structures, the landscape elements include landscape and lighting system, the traffic elements mainly include the entrances and exits, traffic streamlines, and parking spaces. They may produce the position-based SBZ, the morphology-based SBZ and the atmosphere-based SBZ, and impact on the spatial “visibility”, “trafficability”, “accessibility”, “attraction”, “cohesion”, “domination”, etc. In the viewpoint of CPTED, the crimes committed by potential offenders must have three elements: conditions factors, subject conditions factors and object conditions. The outside environment where are vulnerable to crime is the overlap area of the three ingredients. As it is shown in the Figure 1.
The author combined with physical spatial elements that affect the defense safety and applied criminology, CPTED, urban “Vulnerable to crime” space theory\cite{7} and the negative influence of three kinds of SBZ which can be summarized as the impact on five kinds of spatial properties, which are physical space “visibility”, “accessibility”, “cohesion”, “attraction” and “domination”. The relations among spatial blind zones, physical space properties and criminal behaviors are shown in the Figure 2.

To solve the defense safety problems and improve residential building’s outside environment, the relation between SBZ and crime need to be established. We should analyze the impact of SBZ on conditions of crime occurrence and clarify the relationship between the crime and residential building’s outside environment. Namely, the planners determine what the characteristics of the physical space are easy to generate SBZ, thus easy to induce and stimulate the crime. Therefore, in view of the personal defense safety problems that exist in the outside environment of residential buildings, we can improve the environment to reduce the position-based SBZ, morphology-based SBZ and atmosphere-based SBZ elements, such as buildings, landscapes or traffics. We can put forward the environment design strategies and use the CPTED ideas such as natural surveillance, access control, territorial reinforcement, image building, facilities maintenance, target strengthen and activities support, so as to improve the “visibility”, “accessibility”, “cohesion”, “attraction” and “domination” of buildings’ outside environment. The author use the strategies to increase the risks and difficulties of crime, reduce the crime stimulation and remove conditions of crime. The strategies force the potential offenders to give up crime motive and ultimately improve the residential building’s outside environment that can promote the interaction of neighborhoods and lower the fear of crime.
4. Defense safety situation and improvement strategies for building’s outside environment in Sanfujie residential community

The Sanfujie community is a typical non-gated residential community. The area is located in the south of Changxin street, north of Sanfujie street, east of Changping street, west of Erdaogou street. It has a population of more than ten thousands people. The location is shown in the Figure 3.

4.1 Current situation and problems of defense safety of building’s outside environment in Sanfujie residential community

4.1.1 Current situation and problems on defense safety of buildings elements. It has relatively unified architectural style in Sanfujie residential community. The layout of buildings adopts the parallel type mainly, which results in the gable sides of buildings that have lower “visibility”. The positions of the part of the structures is unreasonable and they weaken the natural surveillance. The buildings have influence on the crime control because of their length. There are too much concave and convex on the facade, which increases the opportunities of crime. The small distance between buildings and the trim roads weakens the “visibility” of space. The above environment problems lead to the existence of SBZ and they are not conducive to improve defense safety of residential community.

4.1.2 Current situation and problems on defense safety of landscapes elements. There are some defense safety problems about landscapes in Sanfujie residential community. For example, the
environmental landscape facilities are lack; there are little space permeability surrounding the buildings; community fences weaken the informal surveillance; some landscapes are too close to the buildings; density of part of greening affect space permeability; lack of lighting results in the decrease of spatial “visibility” and reduces the risk of crime. The above landscape problems lead to the existence of direct SBZ. In addition, the lack of “attraction” in outside spatial environment leads to the increase of the sense of fear of crime, as well as affects the activities of the space, and then it is easy to form indirect SBZ.

4.1.3 Current situation and problems on defense safety of traffics elements. In the book Creating an Defensible Space (1996), Oscar Newman proposed some governance strategies aiming at the high “accessibility” road and he recommended using the cul-de-sac to strengthen the criminal control[8].

Through field visiting, we found that there are some defense safety problems in Sanfujie residential community. The major problems are as follows: 1) Natural surveillance problems. There are the lack of “visibility” around peripheral road, single direction entrances and exits, too small distance between buildings and the trim roads, and so on. All these factors weaken the natural surveillance; 2) Crime opportunity problems. Some residential buildings are added back doors, which increases the opportunities for potential crime; 3) The crime control problems. The accessibility in the community is very high and there are too many entrances and exits, which is bad for crime prevention and control. Meanwhile, the gird type network of road and redundant pedestrian paths weaken the crime control, as is shown in the Figure 4. The insufficient parking areas lead to the relatively serious road parking problem such as some vehicles parking in the front of building’s gateways, which weaken the space “visibility”. Meanwhile, parking in the gables areas increases the chances of crime.

4.2 The defense safety design strategies on building’s outside environment for Sanfujie residential community

4.2.1 Cutting down the direct (immediate) causation of SBZ to reduce crime. From the perspective of reducing SBZ, we can do some reasonable optimization and improvement from the following aspects to Sanfujie residential community, residential buildings, landscapes and traffic elements, which reduce the SBZ that induce crime and provide opportunities and conditions for crime.

(1) To reduce the SBZ caused by building elements in Sanfujie residential community. The nonlicet structures should be demolishes, so as to improve the environmental image. We can apply the target strengthen strategies of CPTED to reinforce the lower window which has no guarding railings. Directing at the problem of too many gateways, we should reduce the number of entrances and exits and strengthen access control and eliminate the potential “gateway” to reduce crime opportunities and apply the territorial reinforcement strategies. At the same time,
we should also strengthen the territorial signs and controlling abilities, which aim to intensify the criminal deterrence and enhance the crime difficulties.

(2) To reduce the SBZ caused by traffic elements in Sanfujie residential community. Aiming at the problem of insufficient spatial vitality, we can promote attraction through augmenting the functions and enjoyments of the spaces surrounding the path, such as adding amusement equipment for children and facilities for senior citizens. To improve the vitality and attraction of the trim road space and the natural surveillance, we should also provide activities sites for people of different ages. Through these methods, the atmosphere-based SBZs are reduced and the control abilities of crime enhanced. For the problem of high “accessibility” in the area, we can take the cul-de-sacs to lower the accessibility moderately so as to enhance the control abilities to potential offenders in the premise of fitting the fire prevention codes and daily use; In addition, for the serious road parking problem in the front of buildings, lowering afforestation boundaries should be set up, which is integrated with setting parking spaces and greening between buildings. The natural surveillance of parking spaces could be promoted.

(3) To reduce the SBZ caused by landscape elements in Sanfujie residential community. Tall trees and hedges that block the view of sight should be transplanted to open areas and attention should be paid to avoid the formation of secondary shade. Plants should be pruned regularly in order to improve the “visibility” of space. Living roads should be built by using landscape elements so as to increase interesting nodes to boost spatial attraction and vitality. We can set up low walls and low greening to strengthen border and enrich space levels, and we can provide residents with a short-time rest facilities, structures or landscape sketches at the same time. We can add landmarks, attractive and memory structures or landscape sketch which are combined with interesting space node, to reinforce the territoriality, the perception of affiliation, the sense of belonging of the field and enhance the domination of the spaces, the abilities of natural surveillance and social control to crimes.

4.2.2 Cutting down the indirect (secondhand) causation of SBZ to reduce crime. Direct at the defense safety problems in Sanfujie residential community, we can also improve the space environmental atmosphere and reduce the atmosphere-based SBZ through auxiliary methods except the buildings, landscapes and traffic elements.

(1) To promote the space vitality by improving infrastructure. Activities infrastructure and facilities should be added in Sanfujie residential community. The shabby and old facilities should be replaced or repaired. The layout of the activity facilities should follow the principle of human nature. First, according to habits of different people, facilities should be arranged to fit for different crowds, so as to increase the diversities of crowds and activities in outer spaces. Second, according to the characteristics of cold weather in Changchun, the facilities should be set up in the place with enough lights to arouse the enthusiasm of people to do outdoor activities, thereby improve the spatial vitality and strengthen the control abilities to crime. In addition, we can create living roads to promote the spatial vitality. As it is shown in the Figure 5, lower walls can meet the needs of residents to lean on and have a rest.

Figure 5. Build up living road to improve spatial vitality
(2) To enhance the space visibility by reasonably adding lighting. For the problem of lacking lighting, we can add lamps and lanterns to enhance “visibility” of the space reasonably, so as to increase the risks and difficulties of crime. In view of the lighting arrangements, we should pay attention to the space and color of lighting. The space should not be too big or too small and its lighting should not be too bright or too dark. The facial recognition ability should be guaranteed. At the same time, we should pay attention to the color of the lighting. We can use color lights to relieve mental tension and pressure, such as blue lights, to reduce the stimulation to potential offenders, thus reduce the crime motivation.

5. Conclusion
The SBZ in the outside environments of residential buildings has a series of negative effects. It threatens residents’ sense of safety, increases the sense of fear of crime, and influences the environmental behavior of residents. It is not conducive to building a harmonious society. Using CPTED ideas, improving the physical elements that causes the SBZ in the outside environment of residential communities can effectively improve these negative effects, so as to build a behavior environment where potential offender are not easy to commit and construct a harmonious and orderly buildings’ outside environments with high sense of safety and low sense of fear of crime.

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