

# **A Study on the Correlation between Fence and Crime Prevention**

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## **1. Introduction**

### **1.1 Background of the Study**

A fence is a vertical structure made of materials like wood, brick or cement and built at the borderline to define territoriality by differentiating inner and outer space. It is very natural to build a fence on the periphery of one's residence to declare their ownership and to protect one's property from any threat from the outside. Even though it is not sure when fences were first made but it has been built for thousand of years. Especially, in modern cities where we live in a surrounding where we don't know our neighbors, has resulted in the building of higher and stronger fences. As a result of this tendency, however, the scenery of our public space at residential areas has become devastated by monotonous and barren view produced by these overwhelming fences. Nevertheless, this trend is not expected to change any time soon.

However, a movement opposing this tendency first appeared years ago. It was activated by an activist in Daegu, Korea, who demolished the fence of his own house and turned it into a green space for neighbors. Many people sent great compliment to his action, and it was applied to many buildings including schools and government offices. After the success in Daegu, this movement was accepted and applied by many municipalities in Korea. Especially in Seoul, this movement was turned into a government project of the Seoul Metropolitan Government. It is called the Green Parking Project which is a movement aimed at removing fences and changing it to parking spaces, but the participation rate has not been enough to change the barren scenery of the residential area in Seoul.

The biggest reason why there has been little response the possibility being vulnerable against crime after removal of their fence, yet many researchers who investigated CPTED(Crime Prevention through Environmental Design) argued that a wall could make their home more fragile against crime by blocking natural surveillance.

Hence, this study aims to find out what is true about the effect of fence on

crime prevention which has no clear consensus, whether a fence could protect from the attempt of crime or not.

## **1. 2 Research Method**

The remainder of this paper will investigate the relationship between fence and crime through literature review and case study. First, I will introduce the main concept and strategies of CPTED theory. Second, I will present the results of the numerous researches about the subject. Lastly, a case study will be conducted to see the result of removing a fence on the occurrence of crime in Seoul.

## **2. CPTED Theory**

### **2.1 Concept of CPTED**

The theory behind CPTED is that we can diminish the risk of crime by manipulating of the physical environment. An example of CPTED is installing iron window bars at the lower levels of house.

### **2.2 History of CPTED**

The concept of CPTED is so instinctive that it has had a very long history. Long time ago, tribesman used materials like animal bones or unique-shaped stones around their territory to warn others not to trespass. Furthermore, setting a moat around the castle in the medieval era can be said to be one of the CPTED actions.

However, the modern theory of CPTED was first mentioned in a book entitled 'The Death and Life of Great American Cities' (1962, Jane Jacobs). She mentioned about the interaction between crime and circumstances of residential areas, and the effect of the liveliness of neighborhood on the quality of life. It is agreed that this concept was the beginning of CPTED.

Then, in the early 1970's, Ray Jeffery began to use the term, CPTED, in his book. In same time, Oscar Newman published a book called 'Defensible Space', which talks about the result of the research done on the crime of public apartment houses in New York. In addition to these studies, Pruitt-Igoe apartment complex in Saint Louise, USA, demolished since uncontrolled crime, gave great attention to the CPTED theory.

Hence, with the beginning of 80's, the following studies were conducted. As a result, CPTED began to apply to real life by the establishing the acts in

developed countries like America, Canada and Australia.

### **2.3 Necessity of CPTED**

Traditionally, crime prevention is the responsibility of the police. That is, there was no crime prevention as police only participates after the crime has occurred. Even the arrest rate in Korea in the year 2002 was very high, 92.42% (2004, National Police Agency). If one took into account unreported crime rate, which was 70~80% (1997, National Statistical Office), the actual arrest rate could be less than 30%. This means that a pre-treatment method is urgently needed. Moreover, considering the infringement on human rights and property rights of victims, it is clear that variety measures of crime prevention are needed.

### **2.4 The Strategy of CPTED**

There are many action plans for using CPTED theory, but the three basic strategies are access control, surveillance, and territorial reinforcement.

#### **(1) Access control**

Access control strategies are typically classified as organized, mechanical, and natural. Organized access control means using man power to control access, mechanical control means to use mechanical tools like door lock, and lastly, natural access control uses manipulated physical environment to show territoriality.

#### **(2) Surveillance**

This method means to create a physical environment that enables one to make observation of unknown people. It is also classified into three categories: access control, organized (e.g. guard), mechanical (e.g. CCTV), and natural (e.g. window). In the past, either access control or surveillance strategies used mechanical or organized methods more, but CPTED emphasizes using natural methods more. This is to prevent crime, and at the same time, use space efficiently. Moreover, this point of view makes the third strategy more important.

#### **(3) Territorial Reinforcement**

In this strategy, it presumes environmental determinism, namely, through the environmental design we can intensify territoriality. By designing physical environments, it makes sure that the owners manage their territory better, and puts burden on others intending to pass through another's property. It's

how it operates to decrease the opportunity of crime.

#### (4) Comprehensive Approach

In this paper, I explained three strategies separately. It should be noted that they are not mutually exclusive or independent. In the implementation stage, they are overlapping each other.

In addition, to maximize the capacity of CPTED, the comprehensive approach should be used, because the cause of crime is not only due to reasons attribute to the physical environment. It is necessary to consider the use of social means of crime prevention such as engaging in efforts to fight against poverty, increase education opportunity, and revitalize the neighborhood, etc.

### **3. Study on the effect of fence on crime prevention**

#### **3.1 Literature Review**

For a long time, fences have been used to protect residence from outside threat. These days, however, fences are not built and used as much as before due to the increase of durability of building and improvement of protective equipment. Nevertheless, the recognition of the fence as a primary method for protection has not yet changed.

A study by Kim (Kim, etc. 2005) showed the result of a survey conducted on prearrangement area of the Green Parking Project. According to those results, most of the residents (97.3%) worried about the possibility of the increase in crimes following the removal of fences. Furthermore, Choi (2005)'s survey on the Green Parking Project area showed that residents who did not participate in the project requested to set up more CCTV. This suggests that these participants were feeling anxious about the possible occurrence of crime. In a similar study (Kim, 2000), a survey showed that 89.6% of responses agreed on the necessity of fence, and 63.8% of these people responded that a fence is necessary to prevent theft. In addition, Cho (2003) conducted a survey on residents and governmental officers, and the result shows that around 50% of the participant chose increased vulnerability as the most serious problem after removal of fences. These surveys confirm that the belief that fences provide protection against crime is so strong that it will most likely not change easily.

However, in contrary to the above, many studies have reported that wall

fence could increase the chances of crime. Jeong and Kim (1996) analyzed break-ins in residential areas and argued that fence acted as only a tool for defining territoriality, but did little to prevent break-ins. Moreover, they stressed that the fence provides thieves with hiding places. Park (1995) conducted a research on the physical characteristics of crime scene. The results show that break-ins usually occur not in the house that has a lower fence, but in which provides shorter length of visual access caused by blocking natural surveillance. In addition, robbery was apt to happen in the street enclosed by high fences.

Moreover, studies on the surveillance have led us to the same conclusion. Park (2005) investigated the relationship between crime and visible window area in Ulsan. He concluded that the wider the window area, especially perceived by passersby, can decrease the risk of crime. Furthermore, in another study (Choi and Lee, 2002), the authors analyzed the crime-prone location using visual access and exposure model. According to their paper, they concluded that blocking of the view increases the chance of crime.

Based on these literary reviews, it is confirmed that fences do not work well from the point of view of crime prevention. Now, let us begin with a case study on the Green parking area.

### **3.2 Case Study**

#### **3.2.1 Object and method**

I chose three areas among the example model areas of Green Parking Project, which awarded by Seoul government for its successful result, for this case study.. All areas were chosen as the model areas in 2003 and the removal of fence was completed in December, 2004. Hence the study compares the occurrences of crime in 2005 with the data from 2001 to 2004, based on which we can see the effect of removal.

The crime-related data were obtained from the CIMS (Crime Information Management System) of the National Police agency from 2001 to 2005. Among these data that comprise of 5 main crime classifications, violence and murder was not considered as it is argued that these are not closely related with physical environment of the crime scene. (Park, 1995; Choi, 2003) Thus, I will analyze only the occurrence of robbery, sexual assault, and theft.

With this adjusted data, I will analyze the changes of number of crime

occurrence from 2001 to 2005, and give special attention to the data before and after the project. Then, to see the statistical meaning of the difference of the number of crime occurrence between the houses that participated in the project and those that did not, I will conduct a chi square test.

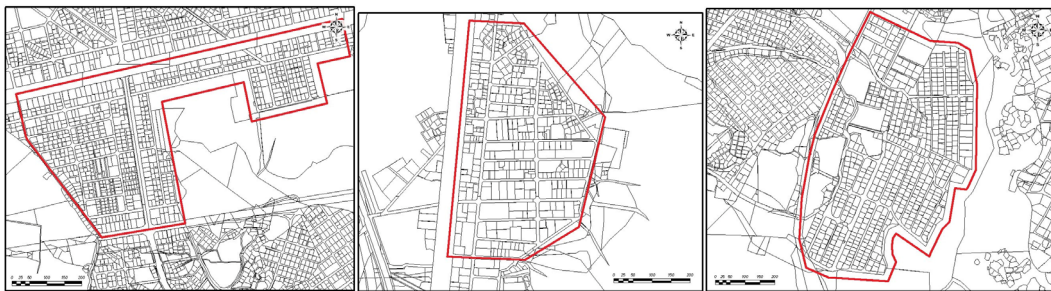
### 3.2.2 Outline of case study areas

To avoid misuse of crime data, I will designate the chose area as just A, B, and C. All areas are all residential areas with low rate of apartment so that wall fence is a critical factor determining the quality of the environment such as scenery. In area A, there is a total of 5,069 houses with 15,199 residents, in area B, 4,314 houses with 13,714 residents, and in area C, a total of 9,898 houses with 30,530 residents living in the area(2005, National Statistical Office).

**Figure 3-1 A area**

**Figure 3-2 B area**

**Figure 3-3 C area**



The geological characteristics of each area are as follows, in case of A area, an 8 lane artery road passes along the northernmost of the area, a 4 lane road can be found in the southernmost and the middle of the area. In addition, many commercial buildings stand alongside these roads so that this area has so much through traffic, both walkers and cars.

In contrary, area B and area C do not have as much traffic compared with area A. In case of B, even there is a 8-lane artery road on the western border of the area. It is almost used as car-only road so there're not many commercial facilities. In addition, there are hills on the easternmost border of both areas, thus there's no reason to pass through both areas.

### 3.2.3 Analysis of Crime Data

The crime data of chose area are summarized in Table 3-1 below. Some data in raw data does not provide the full address of the crime scene, so I deleted those data. But if it is sure that it happened in the designated area, I wrote the number of that kind of data in parentheses.

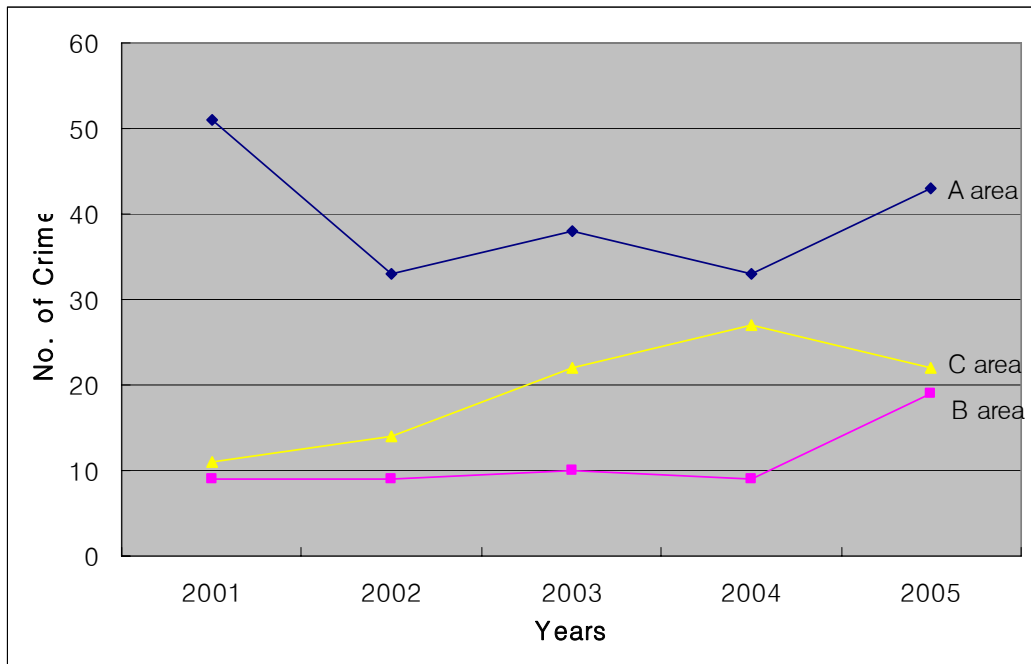
**Table 3-1** Number of Crime in the areas

<i>Area</i>		<i>Robbery</i>	<i>Sexual</i>	<i>Theft</i>	<b>Total</b>
A	2001	2	-	48 (1)	50 (1)
	2002	1	1	31	33
	2003	2	2	34	38
	2004	2	3	27 (1)	32 (1)
	2005	1	-	41 (1)	42 (1)
B	2001	-	-	9	9
	2002	-	-	9	9
	2003	1	2	7	10
	2004	-	-	9	9
	2005	-	-	19	19
C	2001	-	1	10 (1)	11 (1)
	2002	-	-	14	14
	2003	-	1	18 (3)	19 (3)
	2004	-	-	27	27
	2005	-	1	21	22

**(1) Crime Tendency Analysis**

When we study the graph (Fig. 3-4) using the data of table 1, it is not easy to establish a trend as there are many unpredictable changes in the case of area A, but in areas B and C, the lines show a clear tendency, but not same direction.

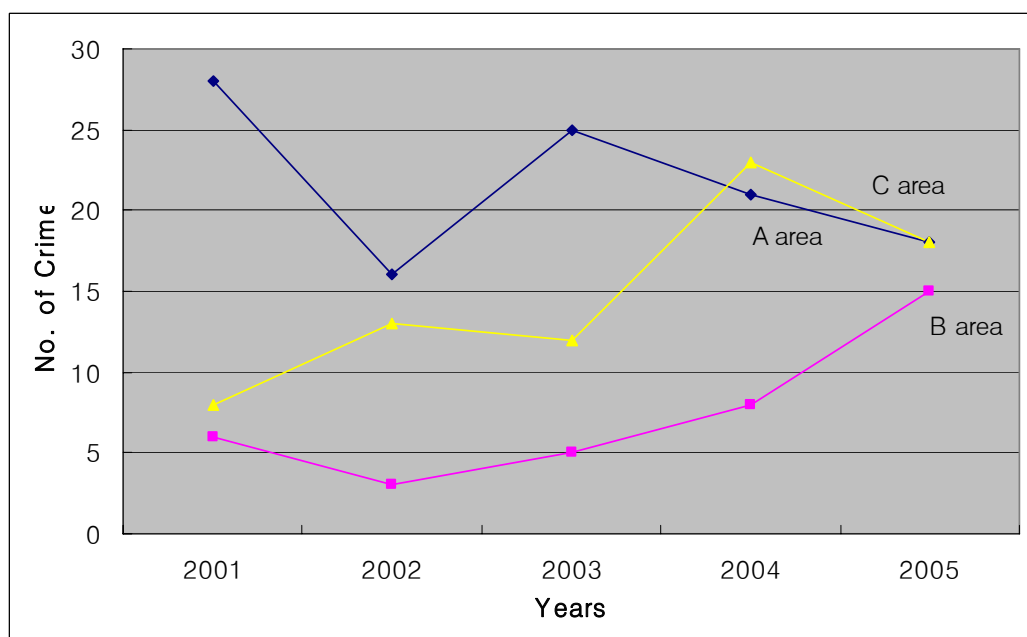
**Figure 3-4.** Tendency of Crime 2001-2005



From this graph, we cannot find any consistent effect resulting from the removal of fence. That is, a small number of houses in the area cannot affect on the occurrence of crime in total area.

So, in this study I focused on the crime that occurred in residential buildings. Removal of commercial buildings also means removal of some areas which are used as neighborhood market. It is useful because that kind of areas have little effect from the project.

**Figure 3-5.** Tendency of Residential Crime 2001-2005





In sum, there were some changes before in area A, whereas areas B and C remained almost the same with Fig. 3-4. Of course we can see some changes when we compare the number of crimes before and after the project. But considering normal amount of changes in other years, these are not outstanding changes thought to be occurred by the project. As a conclusion of tendency analysis, there's no consistent effect on crime, different with expectation of literature review.

## (2) Comparison of vulnerability against crime

Lastly, I will directly compare the vulnerability against crime after the removal of fence between participated and not participated houses. The data used for this analysis is presented in Table 3-2.

**Table 3-2** Crime rate per residential buildings after the project

Area	2005			gap
	total	attended	unattended	
A	3.37	1.96	6.02	+4.06
B	5.73	6.48	2.22	-4.26
C	3.23	3.59	1.79	-1.8

With this table, with the exception of the data for area A, the other two areas show positive result as anticipated. In the case of area A, the vulnerability of the houses that participated in the project is higher than those not participated in.

Next, in order to know whether or not these changes are statistically meaningful, I will conduct a two-way chi-square test. But the expectation crime frequencies of each area are so low that we cannot use unadjusted data. Thus, I put the data adjusted using Yates's correction. The results are shown in the table below.

**Table 3-3** Chi square value of each area

Area	A	B	C
Chi square value	1.9919	1.5585	1.5024

With  $df=1$  and a confidence interval of 95%, the chi-square value is 3.84.

Thus, this number cannot reject null hypothesis. The difference between the crime occurrence of attended and unattended house is not statistically meaningful. Namely, vulnerability against crime is the same in both houses.

#### **4. Conclusion**

Wall fences have been played an important role as a key element for Korean single detached houses for a long time. However, the alteration of residential circumstance makes it has made fences to be less reliable in terms of crime prevention.

An activist in Daegu removed the fence of his house to improve living environment. This movement gained momentum and quickly spread to other cities in the nation. As a result, some municipalities like Seoul accepted the movement and made it an official project called the Green Parking Project. However, the recognition about the fence was so strong that the participation level was much lower than expected [and it could not change the monotonous environment of residential areas. In this study, I investigated whether fences were doing its duty to protect residents from crime.

According to proceeding studies on fences, many showed that the fence has not performed well in terms of protecting people from crime as generally believed. The studies that analyzed the physical environment at areas where crimes occurred commonly points out that fence failed to prevent crime from occurring. Moreover it provided hiding places for intruders. Furthermore, many researches on the opportunity of surveillance implicate that the removal of fence could decrease the opportunity of crime.

The case study, despite its strong theoretical base, there is no clear evidence showing that removal of fence decreased crime occurrence. Both the analysis of crime tendency and vulnerability against crime showed inconsistent results.

In summary, the case study failed to yield no certain result that the removal of fences diminished crime, different with literature review, however, in the same time there is no evidence that shows that crime occurrence increased after the Green Parking Project. That is, there was no difference before and after the removal of fence. Therefore, although it is difficult to insist that the removal of fence diminishes crime, fence has shown to fail in fulfilling its function of preventing crime.

However, it remains to be seen why the different direction of change, even it's small, in Area A. To find the definite result, there needs to be a continuing research on architectural element analysis in following research.

There still remains to be a problem in that the credibility of the data needs to be verified. The data used in the paper was based on crime reports prepared by the police. However the report rate of crime is so low one cannot say that the crime rate reflects the actual occurrence of crime. Especially, considering that most of the crimes that occurred in residential area are usually minor and so are rarely reported. Hence further research should be done, taking into consideration a method to complement this problem.

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