Abstract

Purpose: The purpose of this study is to understand the effect of police force on crime. To discuss in more detail, it is intended to understand the change in the number of crimes caused by the police's new police box. Among the various variables that measure police force, police substations such as police constabulary and police box are important variables. In particular, if the police force is improved through the opening of a new police box, crime suppressive effects are also expected to increase. Therefore, the purpose of this study is to compare the difference between the number of theft and violent crimes caused by the police's new police box.

Method: The data used in this study are data on theft and violence in a city of 500,000 people located in Gyeongsangbukdo region. More specifically, a specific administrative dong (Gupyeong-dong in Gumi City) of the city are subject to analysis. Data for a total of 39 months from 2012 (January) to 2015 (May) were analyzed. More specifically, this study compared and analyzed the number of thefts and violent crimes that occurred before and after the opening of the police box in October 2013. In this study, a T-test was attempted for average comparison.

Results: As a result of statistical analysis, it was confirmed that the police force has the ability to suppress crimes in this study. In many existing police studies, it is understood that the police force has a positive or meaningless effect on crime. In addition, few previous studies have identified the relationship between the establishment of new police substations and crime.

Conclusion: Through this study, it is an important result showing that the establishment of a new police box by the police has a suppressive effect on crime. As shown in this study, it can be seen that the newly established police box statistically significantly reduced theft and violent crime. In other words, police forces have reduced crime. This result is important evidence to support the discussion of existing classical criminology and neoclassical criminology. The theory of inhibition developed in classical criminology is understood as an important mechanism by which police can suppress criminals. In particular, it is understood that the establishment of a police box has increased the fear of punishment for criminals. In addition, based on neoclassical criminology, it is understood that the establishment of a police box would have worked to strengthen surveillance and increase the risk of punishment. Based on the results of this study, more policy discussions should be held to maximize the effect of reducing and inhibiting crime opportunities by establishing more small police boxes than large-scale police substations.

Keywords: Police Box, Police Forces, Policing, Crime, Deterrence

1. Introduction

Research on the relationship between police and crime has long been the focus of many scholars in police studies[1][2][3][4][5][6][7]. Police activities were mainly important subjects of research on how the police affect the occurrence of crimes. Early studies on police and crime attempted to examine how police forces held by police are related to crime rates. Police Force often refers to police budgets and manpower. Normally many studies refer to the number of police officers per 1,000 people, police
patrol cars per 1,000 people, police centers and police boxes per 1,000 people, and police arrest rates for major crimes. Most of the preceding studies attempted to examine how the number of police officers, police arrest rate, police equipment, and police patrol activities affect the crime rate. However, in recent years, as police activities have changed from traditional police activities to innovative police activities (community police activities, problem-oriented police activities, disorder police activities, etc.), various police-related variables are being used. Traditionally, studies on the relationship between police force and crime rate have not reached a clear conclusion on the relationship between police activity and crime.

The expectation that police activity will reduce crime is rooted in the existing classical criminology. Classical criminology assumes human-being having a ‘free will’ and ‘rationality’. The theory of deterrence and neoclassical criminology, which developed from classical criminology, is also assumed that police activities will suppress criminals’ participation to crime and reduce criminal opportunities. Thus, the theoretical basis for the current study is deterrence theory [7], rational choice theory [8], crime opportunity theory [9], and situational crime prevention [10]. Most of the research on the relationship between police and crime was done by American researchers. In recent years, empirical studies on the deterrent effect of police forces have been conducted in Korea, focusing on police patrol activities and crime prevention [11], the impact of police manpower and equipment enhancement on crime [12], the relationship between police and crime rate [13], police force and crime environment improvement [1]. However, existing domestic studies were not national-level studies. In addition, there were not many studies that analyzed the experimental effect through time series data analysis. In addition, the economic and sociological variables of the community and police activities should be examined at the same time, and terminology is recommended [14][15]. In addition, an area that has not been verified in previous studies is to understand the effect of the new police substations on the crime rate.

The lowest level of units for the police is a police box in Korea. The introduction of new police substations is required when population inflow increases or crime increases in certain places. In particular, there is a tendency to introduce police precincts or police boxes that have not existed before in places such as new cities. In addition, when it is difficult to respond to one police substation from an existing residence, the need to introduce a new district or police box is raised. However, few previous studies have studied changes in the crime rate due to the introduction of new districts or police boxes. Therefore, this study aims to examine the changes in the occurrence of crime (theft, assault) following the introduction of a new police box.

2. Theoretical Background

2.1. Deterrence and neo-classical theories

2.1.1. Deterrence theories

One of the main arguments in criminology is whether the criminals choose the criminal act. A representative criminology theory that assumes that criminals reasonably choose criminal behavior is classical criminology. Classical criminology has developed into a theory of deterrence and a theory of rational choice (neoclassical criminology). Humans consider the possibility of punishment in advance and calculate it carefully before deciding on a crime. The basis of classical criminology lies in utilitarianism. Utilitarianism is the idea that public policymaking should maximize pleasure and minimize pain. Therefore, since criminals maximize profits through crime and minimize losses, an effective way to prevent criminals is to strengthen losses.

Cesare Beccaria, known as the father of modern criminology, published a book titled ‘On Crime and Punishment’. Beccaria argued that the imposition of punishment should be effectively carried out to suppress crime on the premise that humans are rational, pursue pleasure, and act by free will. Accordingly, it was argued that the effectiveness of punishment can be maximized, such as certification of punishment, severity of punishment, and swiftness of punishment, and consequently crime can be
First, the severity of punishment is the principle that the size of punishment should be punished a little more strongly than the infringement of legal interests caused by criminal acts. However, there is a lot of controversy as to what level of strict punishment should be considered. A key study in the discussion of the severity of punishment is the work of Kennedy[18], who was in charge of the Boston Area Gang Project and established the pulling levers theory. In this study, the result showed that all criminal justice agencies in Boston expressed their willingness to strongly deter gang-related killings and then resulting in a significant reduction of murder[18]. The pulling levers theory is a classification of representative deterrence theory and is applied at the police field. In addition, Braga and Weisburd found that the severity of punishment had a significant effect on crime reduction in 9 out of 10 studies that properly analyzed the impact effect of 26 experimental studies applying the pulling levers theory for crime reduction[19]. Overall, existing discussions on the severity of punishment admit that simply punishment alone has limitations in the effect of reducing crime[16]. Next, the certainty of punishment is related to how reliably the punishment will be applied. If punishment is necessarily imposed, criminals will be more likely to be punished for crimes, which will show the effect of reducing crimes. However, as a result of the existing discussions, there is still a limit to verifying the effect of the certainty of punishment. This is because almost all criminals are punished for their crimes, but most are not detained and are subject to probation, fines, or other low sentences. Nevertheless, there are considerable consequences that the likelihood of criminal inclusion decreases if criminals have the recognition that they will be definitely punished[20][21]. Paternoster[21] analyzed studies of inhibition theory in the 1970s and 1980s, and showed that the certainty of punishment had a certain reduction effect on criminal charges. Finally, the swiftness of punishment. The assumption is that the possibility of prompt punishment for criminals will help prevent crime. However, almost all criminal damage reports are reported after the crime occurs. Therefore, it is highly likely that the criminal has already fled and the crime has already occurred. In other words, it is difficult to expect the effect of crime prevention. However, there is little evidence to support this in existing discussions[17].

Recent discussions in deterrence theory are expanding to a new concept of possibility of informal punishment, not limited to formal punishment. Williams and Hawkins argue that the deterrent effect of informal punishment should be introduced into the theory of inhibition[22]. Informal punishment refers to individual social costs, which are divided into commitment costs, attachment costs, and social stigma of arrest. Loss of commitment means anxiety and fear that arrest for criminal acts may restrict social activities such as work, education, and marriage. Next, attachment loss is the fear of relationship loss that if punished for a crime, the relationship with family, friends, and lovers will be damaged. Finally, the stigma of arrest is the fear that being punished for a crime will undermine one’s reputation and reputation.

### 2.1.2. Neoclassical theories

Neoclassical criminology, which is rooted in classical criminology, tries to understand the crime phenomenon by focusing on the situation of crime occurrence. The crime opportunity theory, which has developed into neoclassical theory or the Opportunity Theory of Crime, is more interested in blocking crime opportunities through the control of the situation of crime than the importance of punishment for criminals. Representative crime opportunities include Rational Choice Theory, Routine Activity Theory, Pattern Theory, Crime Prevention Through Environmental Design, and Situational Crime Prevention.

Rational choice theory goes beyond the suppression theory, which simply emphasizes the fear of formal punishment, to argue that criminals decide whether to proceed to crime by considering both personal needs(money, status, sexual desire, entertainment) and criminal contextual factors(such as probability and level of protection of crime)[23]. Unlike economic choice theory, rational choice theory describes the process of criminal choice based on limited rationality, excluding the complete rationality.
of criminals in criminal situations[23]. The theory of everyday behavior is the occurrence of three crimes: synchronized criminals, attractive targets, and the absence of supervisors. It is argued that when a cow converges at a specific time and space, the likelihood of a crime occurring increases without a change or increase in the structural conditions of the synchronized offender[9]. People travel to and from certain sections in everyday activity spaces, and it is said that both crime victims and perpetrators share these sections. If a person frequently and repeatedly passes a section where criminal opportunity factors are likely to be combined, he or she will be likely to be subject to criminal damage. Situational Crime Prevention is the most comprehensive and multifaceted crime prevention technique among the crime opportunity theories. The situational crime prevention theory explains the crime opportunity structure and suggests opportunity reduction techniques to block criminal situations caused by the crime opportunity structure[10]. The theory of situational crime prevention is divided into three ways to reduce crime opportunities. First, it directly intervenes in specific forms of Crime to reduce criminal opportunities. Second, maintain, design, or manipulate the immediate environment in a systematic and permanent manner. Third, it is to make crime more difficult(Difficulty), risky(Risky), less compensatory(Less Reward), and less excuse for the criminal to rationalize[10]. Situational crime prevention presents 25 current situation control techniques[10].

2.2. Police forces and crime

Studies on the ability of police to deter crime are theoretically based on the official control of criminal justice agencies through human free will and punishment, which is claimed by classical criminology. After classical criminology, neoclassical schools were proposed. The common assumptions of these theories argue that humans can reasonably calculate profits and losses and that crimes occur depending on the situational presence of formal punishment or inhibition factors that can control human behavior. Therefore, any human can commit a crime, and the reason for committing a crime is determined by the presence or absence of situational control factors. Criminals act by reasonably calculating punishment and losses from crime, which must be swift, severe, and certain[7]. In addition, the role of the police is important in maximizing the punishment effect for crime control because it is assumed that official supervision to monitor the crime situation among the basic elements of situational crime occurrence(subject to crime damage, lack of supervision). It is assumed that the police are the frontline criminal justice agency that recognizes criminal cases or criminal situations through citizen’s reports, police personnel, and equipment, and plays a role in increasing the threat of punishment and arrest to potential criminals. In particular, the police’s ability to suppress and control crimes can be obtained by notifying criminals of the existence of the police through the enhancement of the manpower and equipment of police agencies and increasing the crime arrest rate.

The results of existing studies evaluating the influence of police force and police activity on crimes do not provide a single result. For example, many studies conclude that police forces can reduce social disorder and crime[14][24][25][26][27]. Meanwhile, several other researchers argue that police activity increases crime or has no significant relationship with crime[28][29][30].

Using data collected from 98 cities in the United States, Greenberg and Kessler found that arrest rates and crime rates did not have a significant relationship[14]. In a later study, they re-used longitudinal panel data to overcome statistical limitations. And then they concluded that there were no significant impacts of police arrest on crime. As a later study, Chamlin’s longitudinal study through Philadelphia’s monthly official data can be examined[24]. He looked at the relationship between police arrest rates and crime rates in seven cities in Philadelphia, where police departments with consistently high arrest rates can reduce burglary, burglary, theft, and car theft. In Addition, Marvell and Moody found that a 10 percent increase in crime would increase the number of police officers from state and city governments by about 1.5 percent, and that hiring one more officer could reduce 24 crimes[31].

Other studies attempted to verify the effectiveness of specific programs employed by police stations. In many studies, renovated policing programs such as order maintenance policing, hot spots policing, problem-oriented policing can reduce crime and disorder[26][27]. On the other hand, some studies have shown that aggressive or proactive policing by police rather increases crime rates[29][30]. Similarly, Kane found that New York City tends to arrest more of these residents for violent crimes in
areas inhabited by socially marginalized lower-class people, and that violent crimes in these areas will increase in these areas in the future [32]. Finally, many other studies conclude that there is no evidence to empirically prove police deterrence. For example, Rosenfeld and his colleagues argue that the new police activities employed in some cities before 1994 did not show significantly different results compared to those that did not [33]. The results of existing studies show that the use of police force can show a positive or negative relationship to the crime rate, and in some cases, there is no relationship.

The results of these U.S. studies are not very different from those of limitedly verified studies in Korea. For example, it shows that the police force, which increased in the short term due to the protests against Buan Bangbangjang and Busan APEC, did not have a significant deterrent effect on the five major crimes, but resulted in a decrease in crime or traffic crimes [12]. In a study by Lee [11], police patrol and police visibility can reduce crime to a certain extent in an observation and investigation study on patrol activities at police boxes in Daegu. In addition, Yun [1] conclude that police arrest can reduce crime.

3. Research Method
3.1. Research model

The hypothesis to be verified in this study is the crime reduction effect of the new police box. More specifically, since a new police box was opened in October 2014, it will be possible to compare the difference between the number of thefts and assaults that occurred before and after the police box was opened. Through this, it is possible to analyze the deterrent effect due to the new police box in the area. The opening of the new police box will lead to increased surveillance and deterrence in crime-prone areas. This will increase the fear because of increasing the likelihood of arrest rather than the benefit of crime for criminals in the area. As a result, it will lead to crime suppression and reduce the incidence of crime in the region. Therefore, the following hypotheses can be verified.

Hypothesis 1. A new police box will reduce the incidence of crime.
Hypothesis 1-1. The opening of a new police box will reduce the number of theft crimes.
Hypothesis 1-2. The opening of a new police box will reduce the number of assault crimes.

3.2. Data and analysis

To achieve the purpose of this study, this study intends to analyze using official crime statistical data obtained from the police station. In detail, the police will use theft and assault data that have been reported as a crime. The theft and assault crimes are data from January 2012 to March 2015. Since a new police box was opened in October 2014, it is possible to compare the difference in the number of crimes before and after the new police box was opened. Since the effect of opening a new police box will be the greatest in the early stages, data for 6 months after the opening of the police box were used for analysis. Statistical analysis was conducted using descriptive statistical analysis, frequency analysis, and T-test using SPSS 22.0.

4. Result
4.1. Descriptive statistics

The table below shows theft and violent crimes that occurred for a total of 39 months from January 2021 to March 2015. There were 10.7 thefts per month and 6.2 violence crimes. The month when the most theft occurred was 25 cases, in June 2012, and the month when the least theft occurred was 4 cases, from November 2014 to March 2015. Next, the month when the most violent incidents occurred was March 2013, with 13 violent incidents. Overall, it can be seen that theft and robbery have decreased considerably since the establishment of a new police box.
Table 1. Descriptive statistics for theft and violence crime from January 2012 to May 2015.

<table>
<thead>
<tr>
<th>Crime occurrence from Jan 2012 to May 2015</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theft</td>
<td>Violence</td>
</tr>
<tr>
<td>Mean</td>
<td>10.769</td>
<td>6.282</td>
</tr>
<tr>
<td>SD</td>
<td>4.676</td>
<td>3.203</td>
</tr>
<tr>
<td>Minimum</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Maximum</td>
<td>25</td>
<td>13</td>
</tr>
</tbody>
</table>

4.2. New police box and crime

The situational crime prevention theory proposes 25 ways to reduce crime opportunities. All methods of reducing criminal opportunities are to influence the rational choice of criminals to prevent them from proceeding to criminal acts. In particular, it emphasizes the importance of increasing the likelihood of punishment for criminals rather than benefits through criminal acts. It also proposes to improve the ability to protect crime victims. The deterrence theory also induces criminal deterrence by emphasizing the possibility of receiving official punishment from criminals. From this point of view, the establishment of a new police box is expected to reduce theft and violent crimes at the same time. However, on the other hand, the establishment of a new police box may increase the possibility of detection of criminal acts, and rather, it may appear that the occurrence of crimes has increased by attracting more criminals than before. This is because more crimes that have not been previously discovered will be revealed due to the strengthening of the police’s surveillance capabilities. However, such an argument is virtually unreliable. This is because almost all crimes are filed through 112 phone calls. In other words, crimes are discovered by voluntary reporting by citizens. Without the help of citizens, the police themselves are only very few to recognize the occurrence of crime. Therefore, the location of the new police box is expected to reduce the occurrence of crimes by maximizing the effect of crime suppression and surveillance. In order to verify this hypothesis, an average comparison was conducted in this study. The average comparison target is the number of thefts and violent crimes. Among the 39-month analysis data, the average number of theft and violent incidents was compared between 18 months after the establishment of the police box and 21 months before the establishment. As a result of the comparison, both theft and violence were significantly reduced compared to before the construction of the police box <Table 2>. In other words, it was found that the establishment of a police box reduced theft and violence in the community.

However, these results may be affected by other social factors. Therefore, in this study, a regression analysis was conducted using the divorce rate, which has the greatest influence on community bonds, as a control variable. However, the limitation of this analysis is that the number of divorces per month can be confirmed, so the number of divorces per year was used. As a result of regression analysis, the establishment of a police box in theft crimes showed a significant reduction effect even after controlling the divorce variable <Table 3>. Divorce has also been shown to increase theft crimes. This is a result understood in terms of the fact that divorce is understood as an important variable symbolizing social bonds in existing social ecology studies. Next, in violent crimes, even after controlling the divorce variable, the establishment of a police box showed a significant reduction effect <Table 4>. Divorce was found to have no effect on violent crime. In other words, the establishment of a police box is an important police force variable that has the effect of suppressing crime and reducing criminal opportunities.
Table 2. Mean differences between the installation of the new police box on theft and assault.

<table>
<thead>
<tr>
<th>New police box</th>
<th>Mean differences</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theft</td>
<td>Assault</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>12.904</td>
<td>7.428</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-3.509**</td>
<td>-2.589**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After</td>
<td>8.277</td>
<td>4.928</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *p<.05, **p<.01, ***p<.001.

Table 3. Multiple regression to verify the deterrent effect of the new police box on theft.

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>b</th>
<th>Std.E</th>
<th>β</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>New police box</td>
<td>-6.601</td>
<td>1.360</td>
<td>-.713</td>
<td>-4.854***</td>
</tr>
<tr>
<td>Divorce</td>
<td>.097</td>
<td>.032</td>
<td>.445</td>
<td>3.028**</td>
</tr>
</tbody>
</table>

Adjust R²                      | .369 |

F                             | 12.100*** |

Note: *p<.05, **p<.01, ***p<.001.

Table 4. Multiple regression to verify the deterrent effect of the new police box on assault.

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>b</th>
<th>Std.E</th>
<th>β</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>New police box</td>
<td>-3.309</td>
<td>1.071</td>
<td>-.522</td>
<td>-3.091**</td>
</tr>
<tr>
<td>Divorce</td>
<td>.041</td>
<td>.025</td>
<td>.271</td>
<td>1.607</td>
</tr>
</tbody>
</table>

Adjust R²                      | .166 |

F                             | 4.788* |

Note: *p<.05, **p<.01, ***p<.001.

5. Conclusion

The purpose of this study is to understand the effect of police force on crime. To discuss in more detail, it is intended to understand the change in the number of crimes caused by the police’s new
police box. Among the various variables that measure police power, police stations are important variables. In particular, if the police force is improved through the opening of a new police box, crime suppression is also expected to increase. Therefore, the purpose of this study is to compare the difference between the number of theft and violent crimes caused by the police's new police box.

The data used in this study are data on theft and violence in a city of 500,000 people located in Gyeongsangbukdo. More specifically, specific administrative dongs of the city are subject to analysis. Data for a total of three years from 2013 to 2015 were analyzed. More specifically, this study compared and analyzed the number of thefts and violent crimes that occurred before and after the opening of the police box in 2014. In this study, a T-test was attempted for average comparison.

As a result of statistical analysis, it was confirmed that the police force has the ability to suppress crimes in this study. In many existing police studies, it is understood that the police force has a positive or meaningless effect on crime. In addition, few previous studies have identified the relationship between the establishment of new police stations and crime.

Through this study, it is an important result showing that the establishment of a new police box by the police has an effect of suppressing crime. As shown in this study, it can be seen that the newly established police box reduced theft and violent crime statistically significantly. In other words, police forces have reduced crime. This result is important evidence to support the discussion of existing classical criminology and neoclassical criminology. The theory of inhibition developed in classical criminology is understood as an important mechanism by which police can suppress criminals. In particular, it is understood that the establishment of a police box has increased the fear of punishment for criminals. In addition, based on neoclassical criminology, it is understood that the establishment of a police box would have worked to strengthen surveillance and increase the risk of punishment. Based on the results of this study, more policy discussions should be held to maximize the effect of reducing and inhibiting crime opportunities by establishing more small police boxes than large-scale districts.

6. References
6.1. Journal articles


6.2. Books

7. Appendix

7.1. Authors contribution

<table>
<thead>
<tr>
<th>Initial name</th>
<th>Contribution</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>- Set of concepts ☑</td>
</tr>
<tr>
<td></td>
<td>- Design ☑</td>
</tr>
<tr>
<td></td>
<td>- Getting results ☑</td>
</tr>
<tr>
<td></td>
<td>- Analysis ☑</td>
</tr>
<tr>
<td></td>
<td>- Make a significant contribution to collection ☑</td>
</tr>
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<td>- Final approval of the paper ☑</td>
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<td>- Corresponding ☑</td>
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<td></td>
<td>- Play a decisive role in modification ☑</td>
</tr>
<tr>
<td></td>
<td>- Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑</td>
</tr>
<tr>
<td></td>
<td>- Participants in Drafting and Revising Papers ☑</td>
</tr>
<tr>
<td></td>
<td>- Someone who can explain all aspects of the paper ☑</td>
</tr>
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