International Journal of Advanced Culture Technology Vol.9 No.1 1-6(2021)
https://doi.org /10.17703/IJACT.2021.9.1.1

IJACT – 21-3-1

Decomposing the Effect of Population Changes on Crime Changes

[1]Soochang Lee, [1]Cheolyeung Jang*

[1]Professor of Department of Police Administration, DaeKyeung University, Korea
{leesc, heyfor1}@tk.ac.kr*

Abstract

This study aims to test the relationship between the change in population size and population composition and crime changes. The analytical model includes variables representing changes in population size and population composition, three dependent variables for crime changes, and three control variables. Changes in popuvpdllation size and population composition are measured by indicators such as population size, gender, age groups, and immigrants and foreign workers, and crime changes by felonious, burglary, and violent crime volumes. The sample includes 154 cities and counties in South Korea, and the sample period is from 2010 to 2017. As a result of the analysis, I examine that the decrease in the number of young and men are likely to lead to a decline in felonious and violent crimes, but a high rate of the elderly and the increasing racial heterogeneity are likely to accelerate the fear and worries about crimes.

Keywords: *Population Changes, Population Size, Population Composition, Crime Changes*

1. INTRODUCTION

Crime volume has a close relationship with human developments, especially population growth. There is general agreement among scholars that compositional measures such as the socioeconomic and ethnic composition of human developments strongly influence crime volume [1]. Wirth (1938) suggested that population size, population density, and heterogeneity are three key characteristics of human developments [2]. Although those characteristics have limitations on both conceptual issues and theoretical issues [1], they have contributed to building theories on crime through empirical researches for testing a relationship between population growth and composition of the population and crimes.

The population is an influential factor in committing crimes regardless of urban or rural areas, but with a lack of theoretical expansion on population changes. To make us better understand the relationship between population and crime, there should be empirical studies to conceptualize and measure population changes with various and different research approaches. From the literature on the effect of population on crime [3], the population is almost defined as the size and density of people in any place or country, not in a longitudinal time framework but a cross-sectional one.

The concept of population can be defined as dynamic, not static, showing an increase or decrease in the number of people. From the concept of population changes, the size and composition of the population will change over time. It is logical reasoning that these will affect the size of the crime in any way. However, we still do not have enough empirical evidence on population changes and crime [4]. It is too much harder to take a look at empirical works examined in the criminal environment in South Korea than in the US and the EU.

Manuscript Received:January 02, 2021 / Revised: January 15, 2021 / Accepted: February 09, 2021
Corresponding Author: heyfor1@tk.ac.kr
Tel:+82-53-850-1252, Fax:+82-53-850-1108
Department of Police Administration, DaeKyeung University, Korea

This study adds to the empirical evidence on the relationship between population changes and crime by examining the correlation between changes in the size of the population and population composition and changes in the size of crimes.

2. VARIABLES AND DATA

Cullen and Levitt (1999) defined population changes as changes in city population, addressing the relationship between crime and population changes measured as net population changes [5]. They regressed population changes on changes in crime rates. This study also defines population changes as changes in population size, measured as net population changes from 2010 to 2017, but it regresses changes in crime size on population changes. There are differences in the postulations on independent and dependent variables. Previous research, however, has also documented the relationship between population changes and crime rates [6]. Cullen and Levitt (1999)'s work focused on a locational disamenity of crime, where people are affected by the changes of crimes. This study focuses on human developments, in which crimes is dependent on population growth or decline. In terms of better explanation or description of crime occurrence, the study's proposition has strong validity and relevance for the relationship between population changes and changes in crime size.

Based on criminology, population changes are measured by indicators such as population size, gender, age groups, and immigrants and foreign workers. Population size is a representative variable that explains the population changes [7]. Gender and age groups provide a good explanation of how the population composition has changed due to population changes. Men and youth, the age groups most vulnerable to crimes, are among the strongest predictors of crime [8]. With the transition of an aging society, the aging population is an important characteristic parameter that explains the population changes. In an aging society, the elderly not only tend to commit crimes but are also a potential factor causing crime [9]. Immigrants and foreign workers are one of the decisive factors in population influx and represent racial heterogeneity that has a positive relationship with crime [10].

This article addresses the variables explaining that population changes have a relationship with crimes, especially size changes in major crimes committed from 2010 to 2017. Based on the literature describing the correlation between population changes and crimes, this study should find valid and reliable variables that can account for variations in population growth or decline. This study uses people size to measure population aged 15 to 85 who are potential criminal age targets, the youth size to measure the number of people aged 15 to 34, the male size to measure the number of men aged 15 to 85, the elderly size to measure the number of people aged over 65, and the size of foreign-born people to measure the number of immigrant workers and migrant workers. They are all independent variables in the study model. The study constructs three major crimes to measure changes in crime size: felony crimes, burglary crimes, and violent crimes. They are all dependent variables measured in number of crimes. This article should include some control variables that correlate with crimes in the research model. In previous studies, floating population and hot spots have a positive relationship with crimes. Additionally, types of the region- city or county could be one of the explanatory variables that describe the variation in crime. Floating people is defined as the number of people entering and leaving an area, and a hot spa refers to an area with a high probability of causing crime, measured by the size of entertainment spots.

The sample for this study has 154 cities and counties in South Korea, not divide eight metropolitan cities such as Seoul into districts, including data from 2010 to 2017 provided by the Korean Statistical Information Service.

Table 1. Definition of variables

Variables	Measurement
Independent Variables	
Changes in Population Size (15 to 85)	Changes in Size of Population between 2010 and 2017
Changes in Size of Young (15 to 34)	Changes in Size of the Young between 2010 and 2017
Changes in Size of Male (15 to 85)	Changes in Size of the Male between 2010 and 2017
Changes in Size of Elderly	Changes in Size of the Elderly between 2010 and 2017
Changes in Population of Immigrants and Foreign Workers	Changes in Size of Foreign-born People between 2010 and 2017
Dependent Variables	
Changes in Number of Felony Crimes	Changes in Number of Felonies between 2010 and 2017
Changes in Number of Burglary Crimes	Changes in Number of Burglary Crimes between 2010 and 2017
Changes in Number of Violent Crimes	Changes in Number of Violent Crimes between 2010 and 2017
Control Variables	
Types of Regions	City =1, County =2
Changes in Size of Floating People	Changes in Size of Floating People between 2010 and 2017
Changes in Size of Hot Spots	Changes in Size of Hop Spots between 2010 and 2017

As you can see from Table 2, the population size over eight years increased by an average of 7,504.51 people, and there were fluctuations in cities or counties. The size of the male, the elderly, and foreign-born people contribute to the population growth. The elderly play the most significant role to go up the population. On the other hand, the young population aged 15 to 34 decreased by an average of 7,886.45 people averagely over eight years, achieving negative growth. While the average number of felony crimes increased by 14.33 cases during the simple period, burglary crimes averaged 583.37 cases and violent crimes averaged 59.66 cases decreased, respectively.

Table 2. Summary statistics

Variables	Mean	SD	Min	Max
Changes in Population Size (15 to 85)	7,504.51	54,065,77	-455,119.00	1,920,246.00
Changes in Size of Young (15 to 34)	-7,886.45	40,992.15	-466,069.00	26,527.00
Changes in Size of Male (15 to 85)	8,643.81	20,050.99	-72,201.00	129,853.00
Changes in Size of Elderly	16,681.88	43,391.37	526.00	452,759.00
Changes in Population of Immigrants and Foreign Workers	3,999.08	8,254.30	-427.00	68,412.00
Changes in Number of Felony Crimes	14.33	115.11	903.00	-407.00
Changes in Number of Burglary Crimes	-593.37	1,492.92	-8,533.00	1,998.00
Changes in Number of Violent Crimes	-59.66	1,265.24	-9,399.00	5,082.00
Changes in Size of Floating People	10,032.93	10,551.65	63.00	53,486.00
Changes in Size of Hot Spots	2,798.27	2,905.31	259.00	17,593.00

Note: for types of region, city =82 and county = 72, all variables are expressed as increase or decrease for 8 years from 2010 to 2017.

Before analyzing the data, this study investigates the variance of variables because some data have outliers, and then it removes outliers to make the coefficient estimation stable. Since the data are measured as numbers with relatively large values, this study needs to stabilize the data values. Since some of the data values, however, have values less than 0, the data values are not able to be converted to natural logarithms.

As we can see in Figure 1, the population changes, which represent the population difference for the previous and subsequent years, were in decline for most of the sample period. Since the peak in 2011, populations steadily declined, with an average decline of almost 13% from 2011 to 2017. The population grew sharply between 2013 and 2014, but the population decline started to increase since 2014.

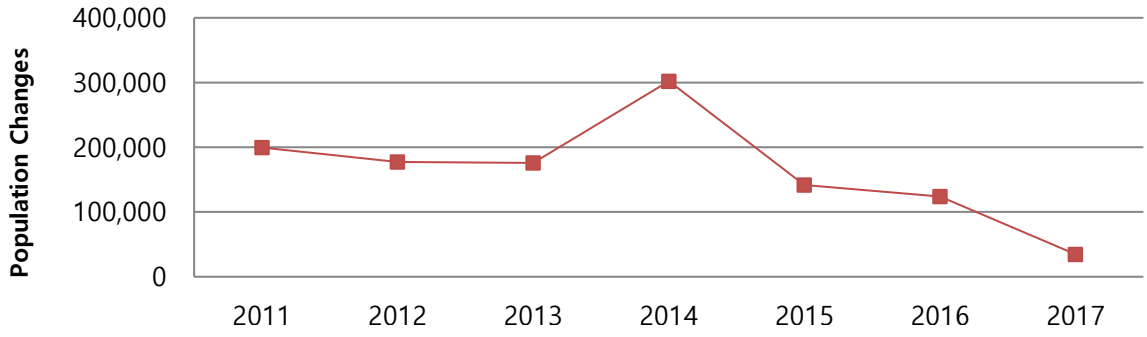

Figure 1. Population changes from 2010 to 2017

As can be seen in Figure 2, the changes in crimes, measured by the differences in the number of crimes in the previous year and after, were in large fluctuations. Felony crimes steadily increased slightly during the sample period, but there was a significant decrease between 2011 and 2012; burglary crimes declined significantly until 2016 but increased significantly between 2016 and 2017; violent crimes were in a decreasing trend even if there were fluctuations of increase or decrease during the sample period.

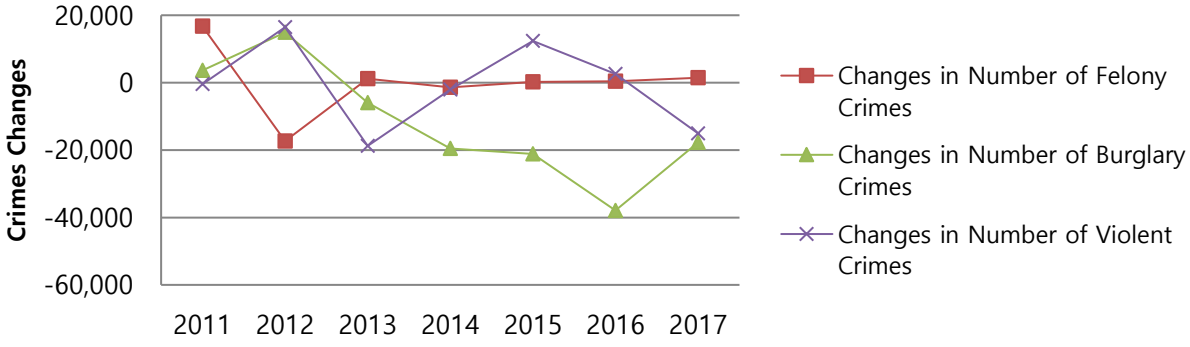

Figure 2. Crime changes from 2010 to 2017

3. ANALYSIS AND RESULTS

Based on existing studies on the causal relationship between population and crime, this study assumes that population changes have a positive relationship with crime changes. The analysis model includes five independent variables for population changes, three dependent variables for crime changes, and three control variables. To estimate the impacts of changes in population size and population composition on crime changes, this study regresses crime changes on population changes. More specifically, I estimate the following regression equations.

$$\text{Model 1: } y_{fc} = \alpha + \beta_1 ps + \beta_2 ys + \beta_3 ms + \beta_4 es + \beta_5 fp + \beta_6 c1 + \beta_7 c2 + \beta_8 c3 + \varepsilon$$
$$\text{Model 2: } y_{bc} = \alpha + \beta_1 ps + \beta_2 ys + \beta_3 ms + \beta_4 es + \beta_5 fp + \beta_6 c1 + \beta_7 c2 + \beta_8 c3 + \varepsilon$$
$$\text{Model 3: } y_{vc} = \alpha + \beta_1 ps + \beta_2 ys + \beta_3 ms + \beta_4 es + \beta_5 fp + \beta_6 c1 + \beta_7 c2 + \beta_8 c3 + \varepsilon$$

where y_{fc} is changes in the number of felony crimes; y_{bc} is changes in the number of burglary crimes; y_{vc} is changes in the number of violent crimes respectively, and *ps* is changes of population size (15 to 85); *ys* is changes in the size of the young (15 to 34); *ms* is changes in the size of the male (15 to 85); *es* is changes in the size of the elderly; *fp* is changes in population of immigrants and foreign workers; and *c1*, *c2*, and *c3* are

all control variables.

As shown in Table 3, the three sample regression equations are statistically significant at p <0.01. From model 1 that regresses changes in the number of felony crimes on population changes, changes in population size (β = .878, p <0.01), changes in the size of the elderly (β = 1.284, p <0.01), and changes in the population of immigrants and foreign workers (β = .950, p <0.01) positively affect changes in felony crimes, but changes in the size of the youth (β = -1.320, p <0.01) and size of the male (β = -.620, p <0.01) have a negative effect on changes in felony crimes. In model 2 for estimating the impacts of population changes on changes in the number of burglary crimes, changes in population size (β = .478, p <0.01), change in the size of the elderly (β = .779, p <0.01), and changes in the population of immigrants and foreign workers in model 2 estimation of the coefficient for population change (β = .410, p <0.01) have a positive relationship with the changes in the number of burglary crimes. According to model 3 showing the analytical result of impacts of population changes on changes in the number of violent crimes, changes of population size (β=.855, p<0.01), changes in the size of the elderly (β=1.108, p<0.01), and changes in population of immigrants and foreign workers (β=.682, p<0.01) have a positive influence on changes in the number of violent crimes, but changes in the size of the young (β=-.914, p<0.01) and changes in the size of the male (β=-.944, p<0.01) negatively influence changes in the number of violent crimes.

Table 3. Regression analysis

Dependent Variable		Changes in Number of Felony Crimes		Changes in Number of Burglary Crimes		Changes in Number of Violent Crimes	
		β	SE	*β*	SE	*β*	SE
Independent Variables	Changes in Population Size	.878$^{**.}$	.229	.478$^{**.}$	.211	.855$^{**.}$	.257
	Changes in Size of Young	-1.320$^{**.}$	.748	-.072	.689	-.914$^{**.}$	.840
	Changes in Size of Male	-.620**	.172	.213	.159	-.944$^{**.}$	.193
	Changes in Size of Elderly	1.284$^{**.}$	.564	.779$^{**.}$	.520	1.108$^{**.}$	.634
	Changes in Population of Immigrants and Foreign Workers	.950	.095	.410$^{**.}$	.088	.682$^{**.}$	.107
Control Variables	Types of Regions^{city}	-.026	.143	.010	.131	.034	.160
	Changes in Size of Floating People	.076	.066	-.003	.061	-.024	.074
	Changes in Size of Hot Spots	-.001	.067	-.080	.062	-.222**	.076
F		14.663**		32.615**		12.300***	
R^2		.451		.646		.408	
Adjusted R^2		.420		.626		.374	

* p< 0.05, $^{**.}$ p< 0.01

4. DISCUSSION

This study aims to test how the change of population affects crime changes. In previous studies on the relationship between the population and crime, there has been a tendency to be limited to the relationship between net population and crime volume based on cross-sectional data. Considering that the population has a positive relationship with crime, this study assumes that if there are any changes in the number of population or population composition, there will be changes in the type, pattern, and number of crimes.

As a result of an empirical analysis of how the population changes affect the changes in the three core crimes: felony crimes, burglary crimes, and violent crimes, it shows that t changes in the population size have a positive effect on all three crimes. During the sample period, the population increased by an average

of 0.53%, the number of felony crimes by 8.04, but the number of burglary crimes decreased by 555.94, and the number of violent crimes by 6.61. As the number of the elderly increased by 3.7% on average, it has a positive correlation with the changes in the three major crimes. The numbers of immigrants and foreign-born workers increased by 27.35% on average with a positive influence on the changes in burglary and violent crimes. On the other hand, the number of the youth decreased by an average of 3.22%, and the number of the male decreased by an average of 0.34%, showing that they had a negative relationship with felony crimes and violent crimes.

From the analytical results, this study show that the decrease in the number of young and men are likely to lead to a decline in felonious and violent crimes. For Korea, the population has been increasing slightly, but the decline in youth due to the extremely low fertility rate and the higher mortality rate for men than women are expected to lead to a decline in burglary and violent crimes. On the other hand, a high rate of the elderly and the increasing racial heterogeneity of immigrants and foreign-born workers are likely to be factors that can accelerate the fear and worries about crimes in our society. Finally, to further strengthen efforts to protect our lives from crime, through this study, I emphasize the need for additional research to test the relationship between population changes and other crime changes such as intelligent crimes and economic crimes, which are increasing recently.

REFERENCES

[1] J. R., Hipp & A. Roussell, "Micro- and Macro-Environment Population and the Consequences for Crime Rates," *Social Forces*, Vol. 92, No. 2, pp. 563-595, 2013. doi: org/10.1093/sf/sot091.

[2] L. Wirth, "Urbanism as a Way of Life," *American Journal of Sociology*, Vol. 44, pp. 1-24, 1938. doi: org/10.1086/217913.

[3] J. R., Hipp, "Block, Tract, and Levels of Aggregation: Neighborhood Structure and Crime and Disorder as a Case in Point," *American Sociological Review*, Vol. 72, No. 2, pp. 659-680, 2007. doi: org/10.1177/000312240707200501.

[4] W. R., Freudenburg and R. E., Jones, "Criminal Behavior and Rapid Community Growth: Examining the Evidence," *Rural Sociology*, Vol. 56, No. 4, pp. 619-645, 1991. doi: org/10.111/j.1549-0831.1991.tb00449.x.

[5] J. B., Cullen & S. D., Levitt, "Crime, Urban Flight, and the Consequences for Cities," *The Review of Economics and Statistics*, Vol. 81, No. 2, pp. 159-169, 1999. doi: 10.1162.003465399558030.

[6] D. R., Smith and G. R., Jarjoura, 1988, "Social Structure and Criminal Victimization," *Journal of Research in Crime and Delinquency*, Vol. 25, No. 1, pp. 27-52, 1988. doi: org/10.1177/0022427888025001003.

[7] J. J., Nolan, "Establishing the statistical Relationship Between Population Size and UCR Crime rate: Its Impact and Implications," *Journal of Criminal Justice*, Vol. 32, No. 6, pp. 547-555, 2004. doi: org/10.1016/j.jcrimjus.2004.08.002.

[8] D. W., Denno, "Gender, Crime, and the Criminal Law Defenses," *Journal of Criminal Law and Criminology*, Vol. 85, No. 1, pp. 80-180, 1994. doi: org/10.2307/1144115.

[9] A. Wahidin, M. Cain, and D. Ramsbotham, "*Ageing, Crime and Society*," London and New York, Uk, William Publishing, 2006.

[11] M. R., Wenger, "Clarifying the Relationship Between Racial Diversity and Crime: Neighborhoods Versus Cities," *Crime and Delinquency*, Vol. 65, No. 11, pp. 1513-1536, 2018. doi: org/10.1177%2F0011128718768726.