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TEMPORAL PATTERNS OF URBAN CRIME

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Abstract

Urban crime is differentiated among space and time. Recognition of temporal patterns of urban crime will help us for better understanding crime phenomenon in the city. The routine activity theory is the most widespread methodological framework of its empirical research. Tempo, rhythm, and timing of the routine activities are crucial for understanding temporal crime patterns. It is proved that the particular seven types of crime (Fights and battery, Robbery, Drug crimes, Residential crimes, Commercial crimes, Car crimes, Theft of property) have different temporal pattern in: long-run, seasonal, monthly, weekly, and daily patterns of urban crimes, taking the city of Gdynia in the years 2004-2014 as an example.

Key words

urban crime, routine activity theory, temporal patterns of crime.

1. Introduction

Cities, especially large cities, has always favored the criminals. This is due to a significant concentration, in a relatively small area, a large number of potential victims and objects of crime, weak social control, anonymity and a significant social and wealth disproportion.

Urban crime is differentiated among space and time. The environmental criminology focuses on the criminal event committed at the specific place and in the specific time. The most common explanatory theory for temporal patterns of crime is the routine activities theory (Andresen, 2014, 33–45, 185–203). Many empirical studies confirmed its assumptions (see e.g. Lewis, Alford, 1975; Farrell, Peace, 1994; Ceccato, 2005; Ratcliffe, 2006; Andresen, Malleson, 2013).

According to L. Cohen and M. Felson (1979) most common routine human activities in the city: work, school, shopping, recreation (as well as journeys between the locations of them) most often occur at the same or similar times in each year, each month, each week, and each day. These activities occurring at the same time (rhythm), might be measured by their frequency rate (tempo), at these activities involved the coordination of multiple individuals and groups (timing). It means, that the opportunities, to commit a crime, connected with persons and their property, change over time as well. M. Felson and E. Poulsen (2003) highlighted that tempo, rhythm, and timing are crucial for understanding temporal crime patterns. Natural crime conditions, like daylight and weather, are subject to temporal changes as well. Some of them stimulate and some inhibit the

criminal events (Cohn, Rotton, 2000; Rotton, Cohn, 2003; Murrataya, Gutiérrez, 2013).

In this paper long-run, seasonal, monthly, weekly, and daily patterns of urban crimes, taking the city of Gdynia as an example, are discussed with explanations in routine activity theory.

2. Crime in Gdynia in comparison with other polish cities

In comparison with other polish cities, Gdynia is at the average crime risk level, measured by indicator of the total number of crimes (criminal crimes, economic crimes, and traffic offences) per 1,000 residents¹.

In 2014, a very high level of crime, more than 50 crimes per 1,000 inhabitants was in cities such as: Sopot, Katowice, and Wałbrzych. High crime rate (between 40 and 50) show great, rich and rapidly developing city of Poznań and Wrocław. The average level of crime rate (from 33 to 40) is a larger group of analyzed cities: Bytom, Sosnowiec, Opole, Gliwice, Kraków, Szczecin, Bielsko-Biala and Gdynia with the indicator of 34.3 crimes per 1,000 residents. The relatively low crime rate (25 to 30) occurs in: Kielce, Łódź, Toruń, Warszawa, Olsztyn, Lublin, Elbląg, Gdańsk and Częstochowa. The lowest delinquency (ratio below 25) is in Rzeszow, Bydgoszcz, and Białystok.

3. Source data and methods

Crime data were provided by the Criminal Intelligence Department of the Headquarter of Voivodeship Police in Gdańsk for the crimes recorded in Gdynia in the time period 2004–2014. The following types of crime were obtained: Fights and battery, Robbery, Drug crimes, Residential crimes, Commercial crimes, Car crimes, Theft of property.

The analysis of time patterns of urban crime in Gdynia in the years 2004–2014 determined different time hot spots of different types of crime. Knowledge of the time distribution of crime concentration is the first step to determine when the crime is a persistent and serious social problem (see. Chainey, Ratcliffe, 2005). Time concentration determines the probability of contact with the criminal offense in certain seasons, months, days of the week, or times of day.

The growth rate was calculated for the analyzed eleven-year period of time for the crimes in total and for crimes by type. For individual years shows the

dynamics of the types of crimes in years, crime in total and by type of months. There is also a summary of crimes in total and crime by type such as:

- the warm and cold seasons of the year (cold season: January, February, March, October, November, December; warm season: April, May, June, July, August, September);
- days of week (from Monday to Sunday);
- times of day (divided into four 6-hour intervals: 6.00–11.59; 12.00–17.59; 18.00–23.59; 24.00–5.59).

4. The dynamics and structure by type of crimes in total

In the years, 2004–2014 in Gdynia 46076 crimes was recorded in total. Most of them were committed in 2004, almost 7 thousand. The number of crimes decreased rapidly until 2007 (four thousand). Between 2008 and 2009 there was a slight increase in their numbers – over four thousand. In the following years of the period the numbers of crime were still decreasing. In 2014, their number dropped below three thousand. The growth rate of crime in the period (2004 = 100) is 38.9 percentage points, which is a decrease by almost 2/3.

More than half of analyzed types of crimes (52.4%) were *Theft of property*, almost 25 thousand. The second largest group is composed of *Residential crimes* and *Drug crimes*, 13.5% and 12.7%, ca. 6 thousand each. Another group in terms of numbers constitute of a *Car crimes* (8.2%), almost 4,000. Robberies reported about a three thousand (6.1%). *Commercial crimes* were slightly more than 2 thousand (4.7%). The smallest group of offenses, approx. one thousand, were *Fights and battery* (2.3%) (Fig. 1.).

5. Long-run temporal crime patterns

In the period 2004–2014 was recorded an overall declining trend of all types of crime (Fig. 2), as shown by growth rate, assuming that the number of crimes in 2004 equals 100. The largest decrease was observed in Car crimes, the growth rate is 19.4, what equals 4/5. The number of Robberies was significantly reduced – the growth rate is 25.8, which means a decrease by 3/4. Distinct decrease was recorded for Residential crimes, Theft of property and Fights and battery their growth rate were respectively 32.9, 37.4 and 37.6, which means a decrease in the number of these crimes by ca. 2/3. The number of Commercial crimes dropped by 1/4, the growth rate is 74.9. The

¹ own study based on <https://www.mojapolis.pl/>

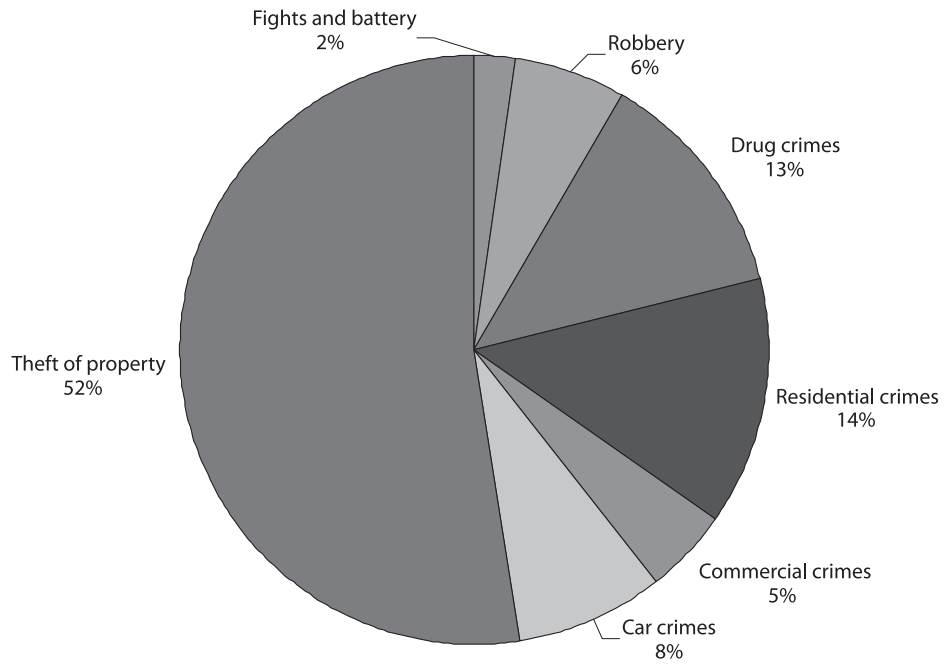


Fig. 1. The types of crimes recorded in Gdynia in the period 2004–2014

Source: own study based on Criminal Intelligence Department of the Headquarter of Voivodeship Police in Gdańsk.

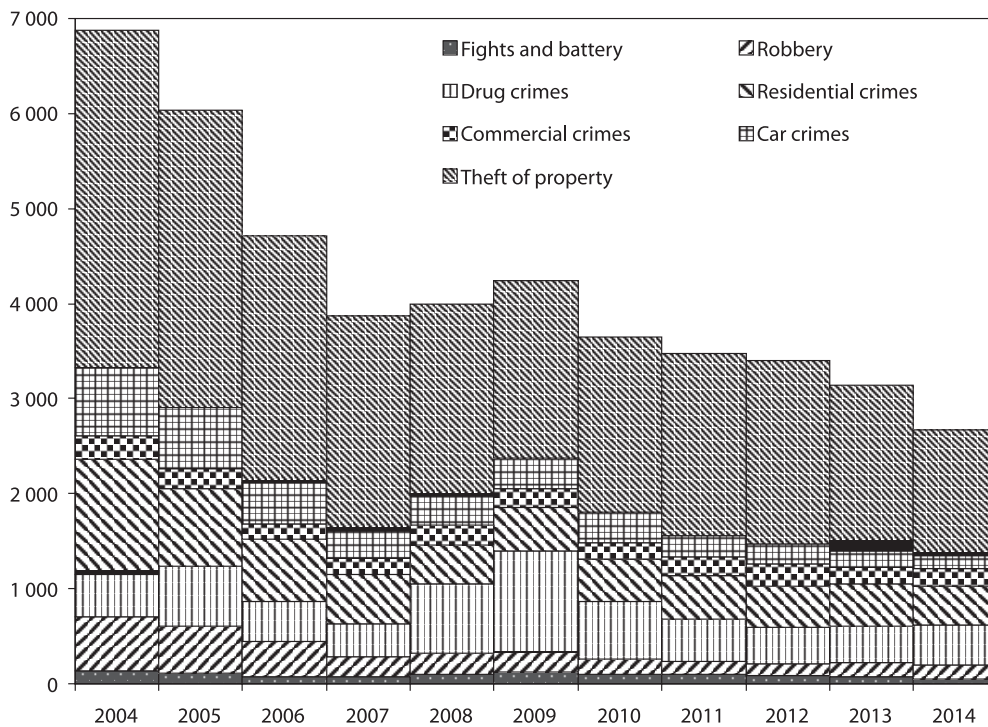


Fig. 2. The dynamics of types of crimes recorded in Gdynia in the years 2004–2014

Source: own study based on Criminal Intelligence Department of the Headquarter of Voivodeship Police in Gdańsk.

smallest decline, only 5.3%, was recorded for Drug crimes.

In general, there is a downward trend in the number of crimes with small fluctuations in the period 2008–2010.

6. Seasonal crime patterns

Generally, the number of crime events registered in warm season of a year is on average ca. 10% higher than in the cold season of the year. Only in three years (2006, 2010 and 2014) the relation is opposite.

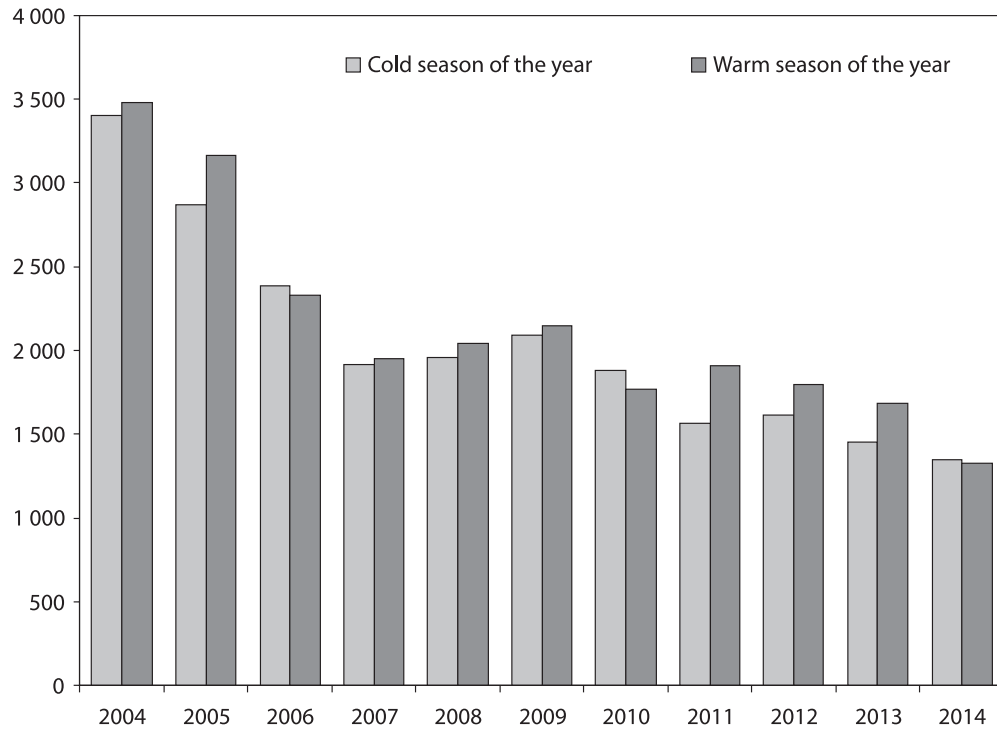


Fig. 3. Numbers of crime in total in the cold and warm seasons of the year recorded in Gdynia in the period 2004–2014
 Source: own study based on Criminal Intelligence Department of the Headquarter of Voivodeship Police in Gdańsk.

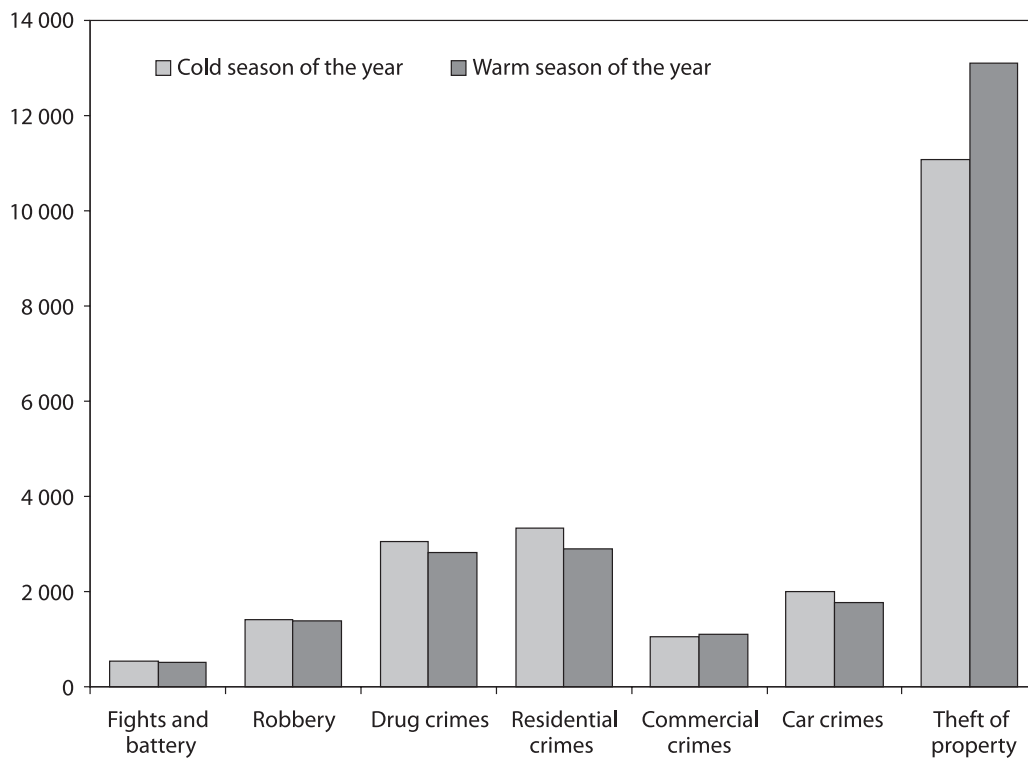


Fig. 4. Numbers of crime by type in total in the cold and warm seasons of the year recorded in Gdynia in the period 2004–2014
 Source: own study based on Criminal Intelligence Department of the Headquarter of Voivodeship Police in Gdańsk.

In these years, there were registered extremely high temperatures in July and in August. Because more than a half crimes are Theft of property – typical outdoor crime, the weather condition may be inhibiting the criminal activity (Fig. 3.).

The influence of weather conditions on particular crime types is differentiated. For such crime types: Fights and battery and Commercial crimes the number of crime events is balanced over the year. Drug crimes, Residential crimes, and Car crimes occurred slightly more often in the cold season of the year. As already mentioned above only the number of the Thefts of property is about 20% higher in the warm than in the cold season of the year. In summer there are lots of tourists visit Gdynia who are easy victims of the thieves. Only extremely high temperatures decrease these type of criminal activity (Fig. 4.).

7. Monthly crime patterns

The changes in the numbers of crime in total and in different types of crime in Gdynia, in the years 2004–2014, involving a significant systematic decrease in most of them (with the exception of *Drug crimes* and *Commercial crimes*) influenced on the structure of different types of crime (Fig. 5.). The largest share, about half, were *Theft of property*. This share ranged from 58% in 2007 to 44% in 2009, mainly due to a big increase in the number of *Drug crimes*. The

share of *Car crimes* and *Residential crimes*, steadily decreased accordingly from ca. 10% to ca. 5% and from 18% to 15%. However, the share of *Commercial crimes* increased from 4% to 7%. The share of *Drug crimes* ranged from 7% in 2004 increased to 25% in 2009, and fall up to 11% in 2012 and increased again to 16% in 2014. There is also systematically falling share of *Robberies* from 8% in 2004 to 5% in 2014. The share of *Fights and battery* both in 2004 and in 2014 was 2%, but in the period 2009–2011 was slight increase 3%. Despite these changes and noticeable trends, the structure of crime in Gdynia in these years characterized by a certain stability and is similar to the structure of crime in other polish large cities (Mordwa, 2013, Sypion-Dutkowska, 2014).

Crimes are committed with various intensity at different times of the year or day. Time characteristics of individual types of crime varies. This is due to the different and sometimes specific conditions and factors of crime associated with the criminals and their victim's activity, and even the length of day and weather as well. Among the 46 thousand of crimes events in the period 2004–2014, their number in each month varied from 4,600 in July to 3,400 in December. In January, March, August, and October ca. 4,000 crimes was committed in each month. Another group consists of the following months: February, April, May, June and September – ca. 3500 crimes per month. The least number of recorded crimes was in the months of unfavorable weather conditions, with

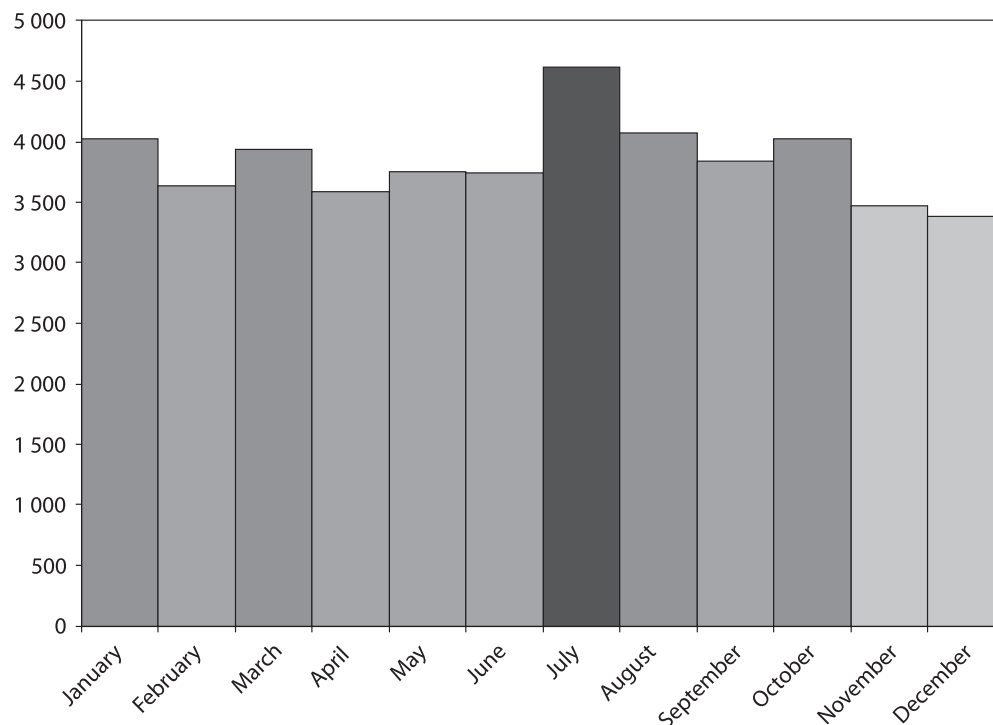


Fig. 5. Crimes in total by months in Gdynia in the period 2004–2014

Source: own study based on Criminal Intelligence Department of the Headquarter of Voivodeship Police in Gdańsk.

short days, such as December and November – less than 3500. The least safe months in Gdynia are summer months, especially July.

In particular months number of crimes their structure by type is varied (Fig. 6). The most common crime – Theft of property was the most numerous in July, and the least numerous in February, November, and December. Residential crimes usually are committed in January, and the least in April and June. Drug crimes appear particularly common in September and October, and the least is in April, May, and June. Car crimes are dominated in January and March, and the least number of it is in June. Robberies threaten residents mainly in March and September, at least in December. Commercial crimes usually are carried out in March and July, and the least in May, October, and November. Fights and battery occur very often in January and June, and the least in May, August, and September.

An attempt to clarify the distribution of such crime within a year is as follows:

- Theft of property is conditioned primarily tourist season.
- Concentrated in March: Residential crimes, Car crimes, and Commercial crimes can be associated with improvement in weather conditions, lengthening the day, and perhaps also with an increase in the activity of criminals in connection with the spring growth “in demand” on stolen vehicles, objects and furniture.

- Temporal variations of Drug crimes, in Polish circumstances of youth, can be associated with the beginning of the (intensification) and the end (weakness) of school and academic year.
- Fights and battery can be explained by events during the carnival.

8. Weekly crime patterns

Everyday activity of inhabitants, visitors and tourists are changing over the week. From Monday to Thursday – the standard working days – the number of committed crimes is more or less on the same level for each type (Fig. 7.). Friday is a working day as well, but in the second half of the day shopping, preparation for the weekend and free time activities starts. Friday is also the last working day for offenders, they work really hard and get rest during the weekend. The number of crimes are the most numerous on Friday and is dramatically dropping during the weekend. After the weekend offenders activity goes back to the working days level. The difference between the number of crimes committed in the weekends and the rest of the week can be observed for all of types of them. The only one exception is for Fights and battery which are significantly growing for the weekend. The riskiest day of the week is Friday. Tuesday, Wednesday, and Thursday are rather safe days in terms of criminality.

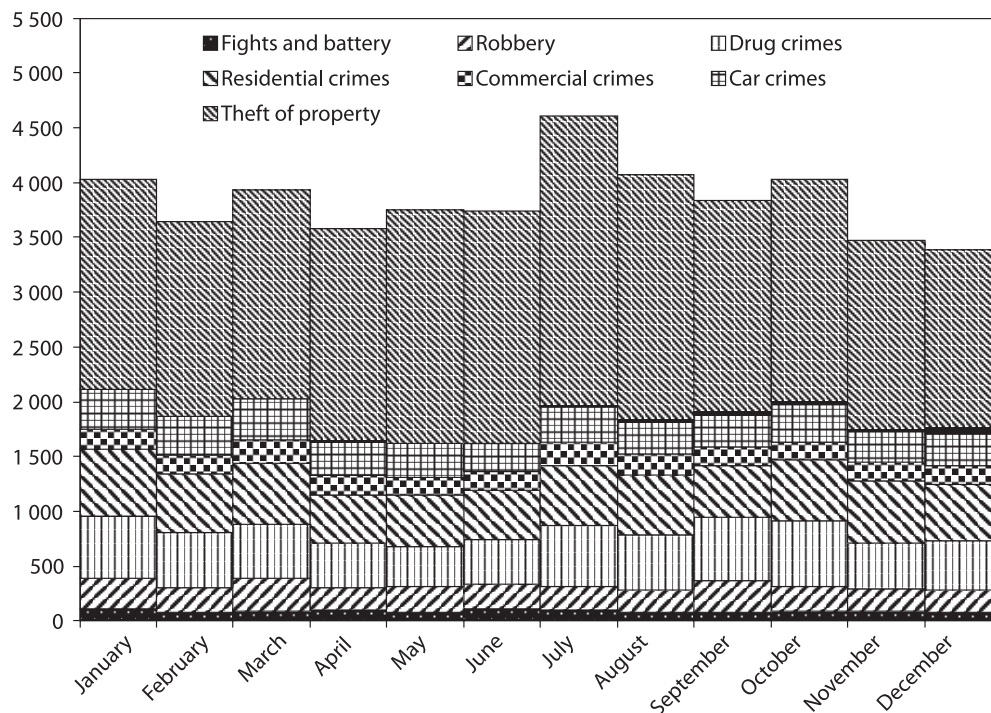


Fig. 6. Crimes by types in months in Gdynia in the period 2004–2014

Source: own study based on Criminal Intelligence Department of the Headquarter of Voivodeship Police in Gdańsk.

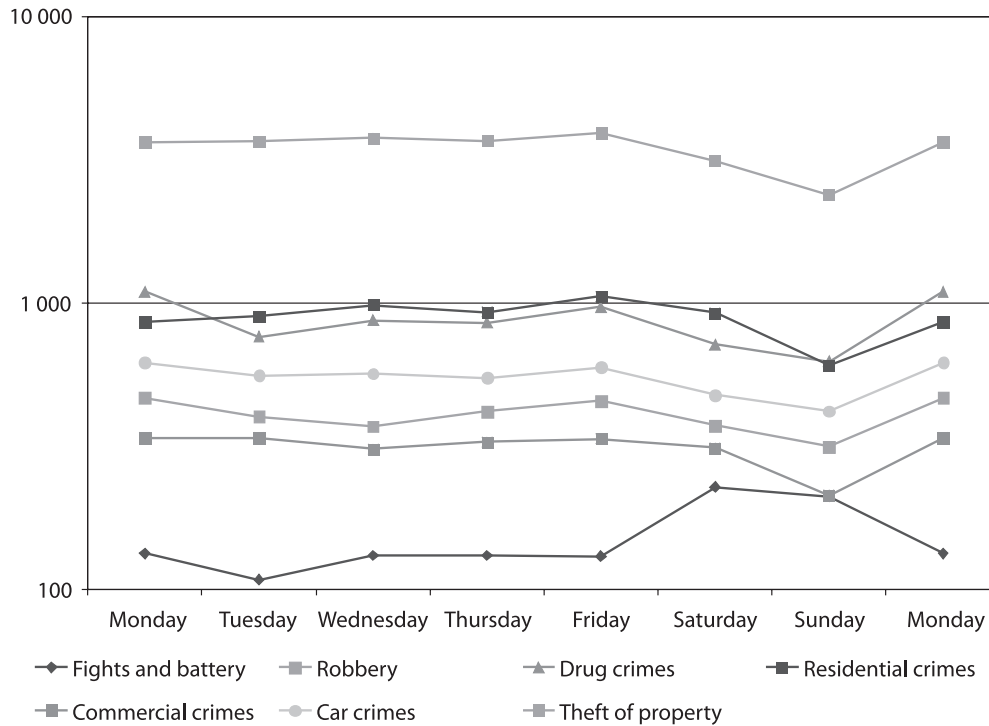


Fig. 7. Numbers of crime by type in total in the days of the week recorded in Gdynia in the years 2004–2014 (axle x is in logarithmic scale; Monday repeated)

Source: own study based on Criminal Intelligence Department of the Headquarter of Voivodeship Police in Gdańsk.

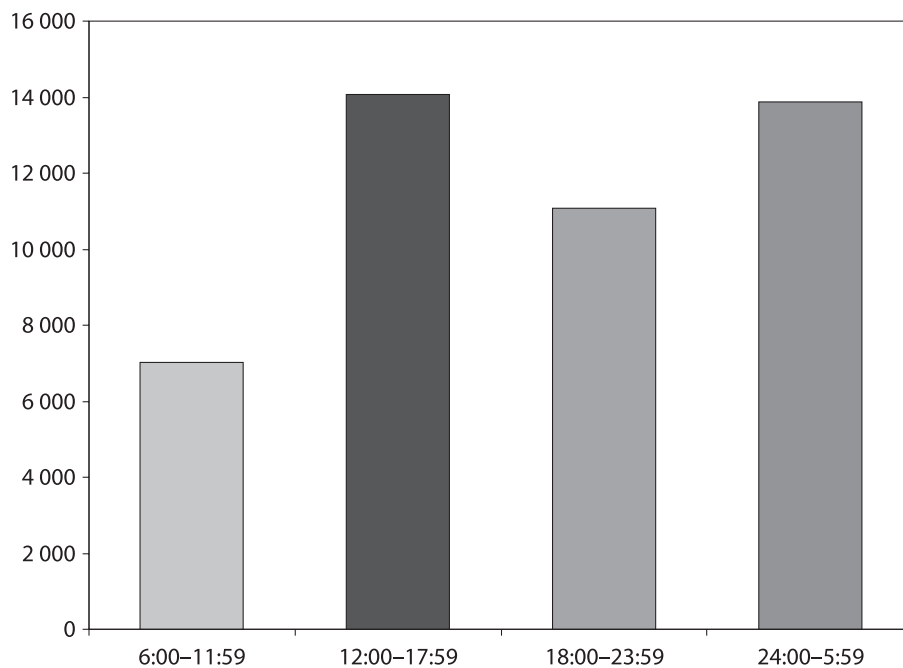


Fig. 8. Crimes in total recorded by times of day in Gdynia in the period 2004–2014

Source: own study based on Criminal Intelligence Department of the Headquarter of Voivodeship Police in Gdańsk.

9. Daily crime patterns

A total number of crimes committed in different times of day (6.00–11.59, 12.00–17.59, 18.00–23.59, 24.00–5.59) is differentiated (Fig. 8.). In the years, 2004–2014 in Gdynia the safest time of day

is morning, from 6.00 till 11.59. At the time of day, every seventh crime is committed. In the next time of the day from 12.00–17.59, the number of committed crimes is doubled. A similar number of crimes is committed during the night’s hours (24.00–5.59). In these times of the day approx. 60% of crimes in total

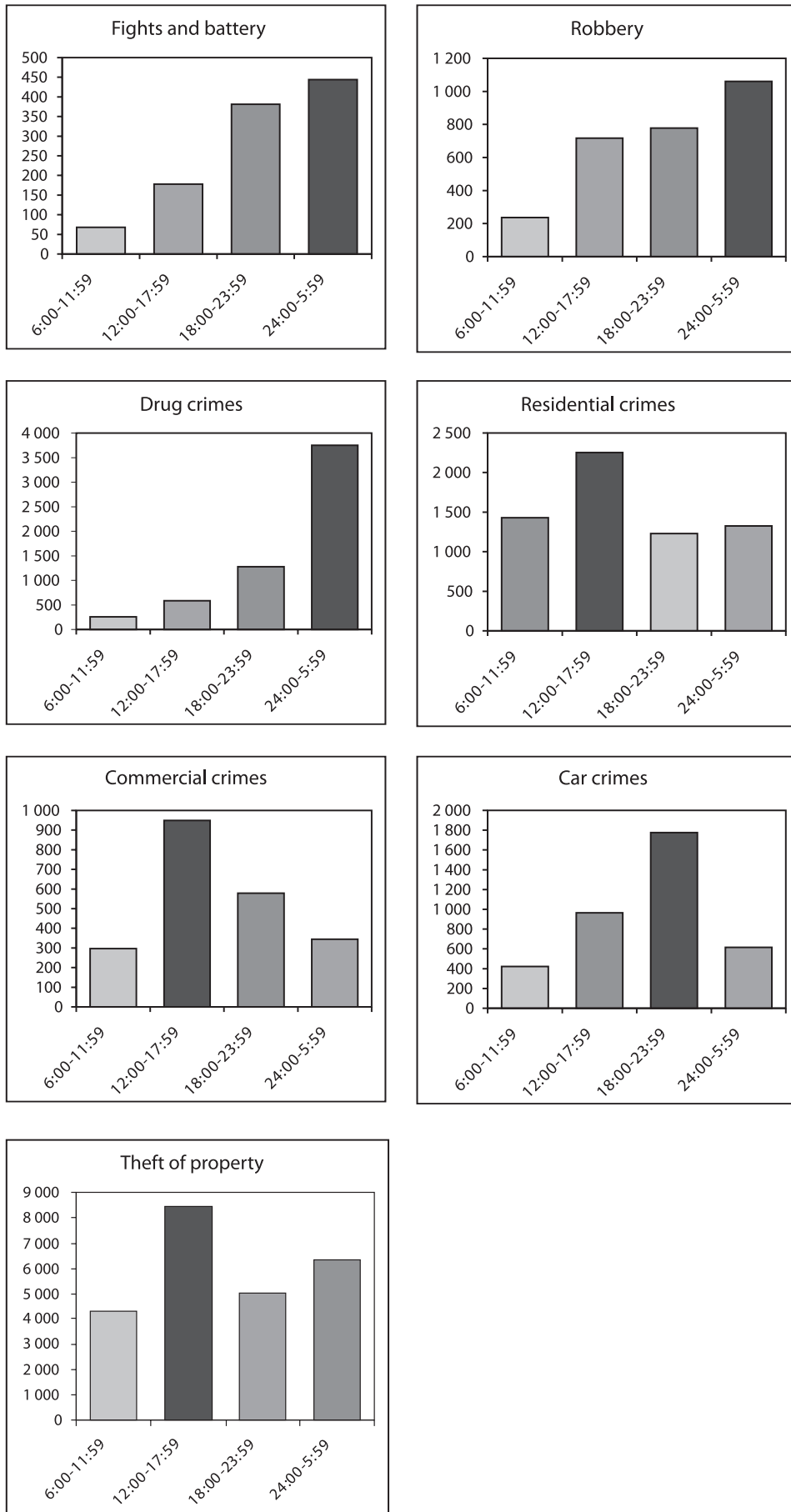


Fig. 9. Crimes by type recorded by times of day in Gdynia in the period 2004–2014

Source: own study based on Criminal Intelligence Department of the Headquarter of Voivodeship Police in Gdańsk.

were committed. In the evening hours (6.00–23.59) every fourth crime was committed.

The time schedule of particular types of crimes in times of the day can be described by several types (Fig. 9.):

- the first type – domination of crimes recorded in the afternoon and at night hours, here are Fights and battery and Robberies, respectively 77% and 66% of crimes recorded in these times of day;
- the second type – domination of crimes recorded in the night hours, here are only Drug crimes, 64% of these crimes was registered;
- the third type – number of crimes is compensated in times of the day with a slight dominance of afternoon hours, here are Residential crimes and Theft of property;
- the fourth type – the dominance of crimes recorded in the afternoon's and evening's hours, here are Car crimes and Commercial crimes, respectively 73% and 71% of crimes recorded in these times of day.

10. Summary

The state of public safety in the city is good and is improving. The level of crime in total in Gdynia in comparison with other Polish cities is average. In the period 2004–2014, the number of crimes decreased steadily from ca. 7 thousand to ca. 3 thousand. Crime by type is dominated by Theft of property, which is about a half of total numbers of crime. The number of Residential crimes fell in 2004–2008 from ca. 1200 to 400, and has continued since then at a constant level. The number of Car crimes decreases constantly. The number of Commercial crimes is constantly growing. The number of particularly dangerous Fights and battery and Robberies decreased in the years 2004–2014 respectively from ca. 150 to ca. 50 and ca. 550 to ca. 150.

Generally, the number of crime events registered in warm season of a year is on average ca. 10 % higher than in the cold season of the year. The influence of weather conditions on particular crime types is varied by different type of crime.

In the period 2004–2014 the least crimes registered in December and November. The least safe month in Gdynia is July. From Monday to Thursday there are standard working days, the number of committed crimes is more or less on the same level for each type. The only one exception is for Fights and battery which are significantly growing for a weekend. The riskiest day of the week is Friday. Tuesday, Wednesday, and Thursday are rather safe days in terms of criminality.

The safest time of day were the early morning hours (6.00–11.59). The next time of day (12.00–17.59) is the most dangerous one, the number of crime is doubled, the night hours (24.00–5.59) has almost the same number of crimes. In these times of the day there ca. 60% of crimes in total were registered.

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