Article

Crime count and crime harm in a post-socialist city: How does the law of crime concentration at places apply?

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Abstract

This article reports on a new empirical study evaluating crime concentration at places in a post-socialist city. We use principles of the law of crime concentration at places and the Cambridge Crime Harm Index to measure crime count and crime harm concentration at the level of street segments. The research found differences between crime concentration in a post-socialist city and crime concentration reported by recent studies from US or UK cities. Both crime and harm concentration are consistently less spatially clustered than expected by the theory in a post-socialist city. This finding has significance for both international criminology and national policing authorities, because the success of place-based policing is highly dependent on strong spatial clustering of crime. The study underlines the importance of experimental criminology and theory testing for the transfer of crime prevention approaches from their original contexts.

Keywords

Law of crime concentration, crime at places, crime hotspots, post-socialist city, Czechia

Introduction

The set of place-focused crime prevention strategies, collectively designated as place-based policing, is among the key pillars of current policing and prevention (Telep and

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Weisburd, 2012). Targeting a limited number of neuralgic places with policing proved effective in reducing crime, or at least certain types of crime (Sherman, 2013). The key precondition for successful hotspot policing is a high spatial concentration of crime in a small number of places. Knowledge of crime hotspots and harm spots allows for the focus of policing and crime prevention to be on locations where the most effective outcome can be achieved (Gibson et al., 2017). However, if crime is distributed randomly and not significantly clustered, it is not possible to focus crime prevention and policing effectively. Similarly, if crime is less concentrated and produces less frequent and less significant clusters, the effectiveness of preventive and repressive measures is reduced or even negated. In accord with recent calls in the criminological community to provide replication studies testing existing theories (Bruinsma, 2016) and enable reproducibility of empirical findings (Lösel, 2018), including the law of crime concentration at place (Favarin 2018), we test the law of crime concentration at places in a new geographical context – post-socialist Czechia.

The conditions for a criminal activity to arise do not occur universally (Cohen and Felson, 1979), but occur in only a limited number of locations, as documented by current studies investigating spatial concentration of crime (Braga et al., 2017; Newton and Felson, 2015). Crime concentration in individual street segments of the city is very high and its spatial distribution is quite stable in time and space. Half of the crime occurs in only 5 percent of the street segments and a quarter of the crime occurs in only 1 percent of the street segments. The above-mentioned empirical regularity in the spatial clustering of crime, identified primarily in US cities, led Weisburd (2015) to the law of crime concentration at places:

> A law of crime concentration predicts that the range in percentage of micro geographic units –
> what I term bandwidth of percentages – that is associated with a specific cumulative proportion
> of crime (for example, 25 percent or 50 percent of crime in the city) would be very narrow for
> a standard unit of crime and geography. (Weisburd, 2015: 138)

In the case of large cities, half of the total crime count is committed in 4 to 6 percent of the street segments, whereas, in smaller towns, half of the crime is concentrated in 2 to 4 percent of the street segments. So far, this law has been tested mainly in Western countries.

Current knowledge of hotspot policing is based on research in countries where detailed crime data with GPS coordinates are available (as illustrated clearly by annual conferences of the European Society of Criminology). However, according to an important review by Lee et al. (2017), almost all studies analysing crime concentration at places originate from the US, with a small minority from Israel, the UK, the Netherlands, Belgium, Italy and Sweden. This fact creates a potential bias in international criminology by over-exposing findings from a small set of advanced industrial countries. As Bannister et al. (2019) point out, major findings of the criminology of place are based on the study of street segments in North American cities. Countries with dissimilar justice systems, economic polarization or structure of crime might have dissimilar spatial distributions of crime. Therefore, the methods of hotspot delimitation and practical tools of hotspot policing might have limited applicability beyond their original context. According to

Bannister et al. (2019), there is no clear reason why the findings from the US should be universally applicable to other contexts. Studies from European cities – with the exception of those of Steenbeek and Weisburd (2016) and Favarin (2018) – are rare. This notion is critically important in post-socialist European countries, where GPS-based crime evidence was introduced only recently. Furthermore, the implementation of the new GPS-driven analytical options in those countries is still evolving. Rigorous application of experimental criminology methods to new crime data with GPS coordinates still has to be conducted and critically evaluated to form evidence-based policy. As far as we know, there are few studies using crime data with GPS in post-socialist countries (Ceccato and Oberwittler, 2008; Ivan and Horák, 2018; Jíchová and Šimon, 2020; Sypion-Dutkowska and Leitner, 2017).

Therefore, the transfer of knowledge and crime prevention tools based on regularities highlighted by the law of crime concentration at places might be stifled when applied in countries with different legal systems, welfare states, immigration histories or housing segregation. International experts in policing as well as experts at the national level are critically aware of major differences between countries. For example, the homicide rate in the US is 10 times higher than that in post-socialist Czechia, and the incarceration rate of the former is three times higher (The World Bank, 2020; Walmsley, 2018). Therefore, it is vital for spatial criminology to test whether major differences between countries affect the crime concentration at places in cities.

A direct comparison of crime in West European and East European cities was introduced by Ceccato and Oberwittler (2008), who pointed out the spatio-temporal differentiation of robbery distribution in the cities studied – Cologne and Tallinn. The urban structure of post-socialist cities is different from that in cities in Western Europe. For example, in Eastern Europe, housing estates are an integral part of many cities; they are not the poorest areas of social housing and do not have the highest concentration of ethnic minorities, as is common in Western Europe. A comparison of criminological studies conducted in Eastern Europe and Western Europe indicates that certain crimes have distinct patterns. For example, in post-socialist cities, violent crimes and theft frequently occur at city edges with lower population densities and local peri-urban centres (Ceccato, 2009; Ceccato and Lukyte, 2011; Sypion-Dutkowska and Leitner, 2017). Other types of crime follow the same patterns in both regions. For example, property crimes are concentrated mainly in the city centre and in the inner city and decrease towards the city edges (Ceccato, 2009; Ceccato and Lukyte, 2011; Phillips, 1972; Wikström, 1991). Similarly, violent crimes are linked to the city centre and the inner city, associated with the presence of alcohol-related services such as shops, pubs and clubs (Nelson et al., 2001; Smith, 1986; Sypion-Dutkowska and Leitner, 2017).

The law of crime concentration at places treats all crimes as equal. However, as repeatedly pointed out by Sherman (2007, 2011, 2013; Sherman et al., 2016), adding up crimes of all kinds into a single total can be misleading. Spatial concentration of crime might be driven by frequent but petty crimes. Therefore, we decided to enrich our evaluation of the law of crime concentration at places by including both crime count and crime harm. In a similar way to other studies (Andersen and Mueller-Johnson, 2018; Curtis-Ham and Walton, 2017; Mitchell, 2019), we developed a national version of a Crime Harm Index (CHI) by applying the principles of the Cambridge CHI (see Sherman et al.,

2016) to the Czech legal framework (Šimon and Jíchová, 2018a). Recent studies of crime harm indicate that the spatial distribution of crime harm spots is even more concentrated than that of crime hotspots (Weinborn et al., 2017).

The objective of this study is to test the law of crime concentration at places in the context of a medium-sized Czech city, which is used here as an example of an ordinary post-socialist city. The basis of analysis is a full set of crime data with GPS coordinates, provided by the Czech police, covering a three-year period in one city. Concentration of both crime count and crime harm is included in our analysis. The article evaluates the concentration of crime count and crime harm at the level of street segments. The results indicate lower crime and harm concentration than expected from theory. In the discussion, we elaborate on the practical and theoretical implications of this finding for crime prevention.

Theoretical background for the criminology of place

Criminology of place is a relatively new direction of criminological analysis that works with micro-geographical units (Jones and Pridemore, 2019). Segments of streets, individual addresses or a spatial grid are typical units of micro-geographical analysis. The interest in micro-geographical units in criminology can be traced through the history of modern social science (Boggs, 1965; Snaphaan and Hardyns, 2019; Taylor, 2015). However, it was the growing availability of geo-localized data on crime and the progress in information technology that enabled criminological analysis at the micro level (Braga and Clarke, 2014; Sherman et al., 1989). Criminology of place is based on empirical observations that a very small number of places generate most of the crime in urban areas (Braga et al., 2017). This approach differs significantly from previous analyses carried out at the level of neighbourhoods. Recent studies have repeatedly indicated that patterns of crime concentration are not related to the level of social cohesion at the neighbourhood level (Curman et al., 2015), at least not in a straightforward way. However, pointing to a lack of consensus in current scholarly literature, other studies find collective efficacy at neighbourhood level to be strongly associated with crime in the public environment (Gerell and Kronkvist, 2017). The empirical regularity of the law of crime concentration at places has been successfully tested in several Western countries and cities (in the US: Weisburd et al., 2004 – Seattle; Schnell et al., 2017 – Chicago; in Canada: Andresen et al., 2017; Song et al., 2017 – Vancouver; in Israel: Weisburd et al., 2012 – Tel Aviv and Jaffa; in The Netherlands: Steenbeek and Weisburd, 2016 – The Hague). This empirical verification has clear implications for international criminology and the transfer of policing methods across contexts. The use of place-based crime prevention strategies has led to demonstrable crime reductions in territories without crime spill-over to the surrounding streets (Weisburd, 2017).

The interest in high crime places is not new from a historical point of view, as Taylor (2015) points out. The law of crime concentration at places clarifies and formalizes previous knowledge of the concentrated incidence of crime. Already in 1965, Boggs had formulated the principles of the probability approach to the concentration of individual types of crime in urban areas. The current popularity of the criminology of place is enabled by a technological shift in crime data collection, the algorithmization of research

praxis and the mainstreaming of sophisticated GIS and other software tools for analysis. The pragmatic reason for the spread of this approach is a very practical finding that crime hotspots can be effectively addressed by crime prevention strategies, even without understanding the aetiology of crime in places (Bannister et al., 2019). However, this mentality could prove misleading, because it does not incentivize policymakers to implement these methods to test the efficiency and utility of hotspot policing. For example, the police in Czechia use hotspot policing methods despite the fact that there is very scarce research into this topic, and independent analysis of hotspot policing efficiency or randomized controlled trials does not exist.

The knowledge of the criminology of place, despite its undisputable value for practice, faces criticism that (1) there are limited possibilities of statistical inference from the data, (2) crime hotspots are objectified, and (3) scale constraints result from the focus on the micro-geographical scale (Bannister et al., 2019; Hope, 2015; Taylor, 2015).

Hope (2015) points out that the law of crime concentration at places takes into consideration places without crime (places that are resistant to crime). Places without any crime are more extensive and spatially more stable than places with crime, so the changes in the characteristics of crime hotspots cannot be easily distinguished from the mathematical effect of regression to the mean. The law of crime concentration at places is thus a criminological application of the established distributions of inequality, similar to Pareto's rule in economics, Zipf's law for cities or Korčák's law in geography (Imre and Novotný, 2016; Korčák, 1941), applied to crime as a specific human activity.

The second criticism of the criminology of place is the objectification of crime hotspots (Hope, 2015). They are not physical objects that can be captured directly, even if they are visualized on a map or other graphical representation of crime. Crime hotspots show crime places; they do not show crime perpetrators or their motivations (Taylor, 2015). This critique is further developed by Newton and Felson (2015), who stress the absence of a time dimension in defining crime hotspots and point out the interpretation risks stemming from this omission. For example, experimental criminological research has shown that underestimating the time dimension of the definition of hotspots and the resulting inappropriate design of crime prevention measures can lead to a paradoxical increase in crime (Ariel and Partridge, 2017).

The third weakness of the criminology of place stems directly from the scale limitations of micro-geographical analysis (Taylor, 2015). The use of very small spatial units reduces ecological error by making the units of analysis relatively homogeneous. In contrast, the use of very small spatial units cannot take into account the effects of crime at the meso and macro levels (Sampson, 2013). Importantly, changes in neighbourhoods and in wider social and political systems affect the structure and intensity of crime. Approaches in the criminology of place cannot distinguish the development of crime at the micro level from a wider transformation of urban space and society (Bannister et al., 2019). Sampson (2013) discusses the contradiction between methodological individualism as a dominant paradigm in criminology and the necessity of including higher-order social contexts (and interactions with them) to explain crime development. Crime cannot be explained as a result only of individual behaviour, because it is also a result of the social context. These multiple analytical levels are necessarily interrelated and each of them may have its own logic and causality of crime (Sampson, 2013). Despite all these

limitations, Taylor (2015) points out the practical value of monitoring the concentration of crime at places (or the concentration of harm at places), even if the theoretical and methodological justification for such a measurement may be dubious.

The criminology of place has been developed and critically examined in several Western industrialized countries. The law of crime concentration and many other spatial criminological concepts have not yet been analysed in the Czech Republic. The reasons for the lack of spatial criminological studies in the Czech Republic are two-fold. First, there is a lack of a tradition of doing spatial criminological research.[1] Czech criminology developed not as a standalone discipline, but only as a small sub-branch of criminal law (Drápal, 2019). Second, detailed crime data with GPS coordinates or addresses are strictly under the purview of the Czech police and are not usually available for research purposes (Šimon and Jíchová, 2018b). This study therefore aspires to provide the first evidence-based evaluation of the law of crime concentration at places in the Czech Republic and thus provide an important contribution to the international body of literature on crime concentration. Furthermore, we strongly believe that contrasting and comparing the Czech case study with Western counterparts will provide an incentive for national policymakers to become more involved in current international criminology and, by doing so, keep up with current trends in the field.

Measuring crime harm

Places of high crime concentration are not necessarily places where the most severe damage to a society is caused. Recent studies on policing prioritization and use of crime data show that there is substantial value in measuring crime harm for interpreting macro crime trends (Andersen and Mueller-Johnson, 2018) and focusing micro hotspot policing (Weinborn et al., 2017). Crime harm as a measure of harm to society is based on the idea of assessing the risk of crime to the population not only on the basis of the number of crimes, but also on their severity. Sellin and Wolfgang (1964) came up with initial proposals for weighted crime rates in the 1960s, which have been a perennial issue in criminological debates (Dorling et al., 2008; Paoli and Greenfield, 2013). The critical issue in these debates is the definition of harm and its practical operationalization. Hillyard and Tombs (2007: 15) point to different dimensions of crime harm in the context of the broader social harm approach: physical harm, financial harm, emotional and psychological harm, sexual harm or harm related to specific cultures. The operationalization of these broader dimensions is difficult. At present, indices prevail that are based on the classification of crimes according to their harmfulness relative to other crimes (see, for instance, Sherman, 2007, 2011, 2013). Risk of crime is assessed, for example, by converting it to financial damage or to penalizing individual acts (Ratcliffe, 2015).

One of the first proposed and most explored metrics is the Cambridge Crime Harm Index (CCHI). This index uses a simple principle to translate types of crime into a single metric. Types of crime according to the penal code are multiplied by the minimum number of days in the prison sentence for a given type of crime. In order to avoid police-induced bias, the index does not include crime detected by police or organizational victims, drug crimes, or traffic offences (for more details, see Sherman et al., 2016). In response to CCHI, a number of national or local specifications of harm indices have

emerged, responding to different criminal and legal systems, the availability of the necessary data (Andersen and Mueller-Johnson, 2018; Curtis-Ham and Walton, 2017; Kärrholm et al., 2020) and the specific crime structure (Mitchell, 2019). In addition to aggregate indices, indices are also designed to evaluate only selected offences, such as a drug harm index (MacDonald et al., 2005), or used to evaluate repeat victimization (Dudfield et al., 2017).

The benefits of using harm indices are substantial (Ratcliffe, 2015). They enable a more accurate link to the local environment, a measuring of the diffusion of benefits from precautionary measures (Telep and Weisburd, 2012), data triangulation, and signalling to a community the social weighting of crime (McMahon and Roberts, 2008). However, even when using CHIs, it is necessary to reflect on the omission of a number of important contexts, such as the differences in impact of the same offence on different populations in terms of income, gender and age. Similarly, Mitchell (2019) highlights the risks of the automatic picking indices in cases of lower rates of crime, specifically violent crime.

Research hypothesis

The aim of this study is to test the validity of the law of crime concentration at places using geo-localized crime data in the Czech Republic. We have set two hypotheses. The first hypothesis examines the crime rate at the level of street segments and compares it with the values expected by theory. The hypothesis tests the validity of the law of crime concentration at places specifically for the category of 'small towns' (see Weisburd, 2015): our pilot city falls within this size in an international context. The second hypothesis tests the spatial concentration of crime harm. In line with crime harm studies, we expect that crime harm is more heavily concentrated than crime count.

> **Hypothesis 1:** The concentration of crime in the city is between 2.1 and 4.0 percent. That is, the street segments with the highest crime level account for half of total crime in the city. The values of the tested intervals are set according to the threshold value of crime concentration for the 'small town' category.

> **Hypothesis 2:** The concentration of crime harm is between 0.1 and 2.1 percent. That is, the street segments with the highest crime harm level account for half of total crime harm in the city. We have set the upper value of the tested interval at 2.1 percent, which is the threshold value of crime concentration for the 'small town' category, according to the law of crime concentration at places.

Context, data and methodology

The analysis is based on a complete set of crime data with GPS coordinates from a police database for one Czech city for a three-year period. The analysis is conducted at the level of street segments. We are not authorized by the data provider to disclose the name of the city; therefore, we call our study area the City. We do not specify more characteristics of this city, because that would allow for identification. However, the City is not exceptional, and it has features typical of Czech and other post-socialist cities. Generally speaking, the City has a low level of residential segregation and a low level of ethnic heterogeneity, a
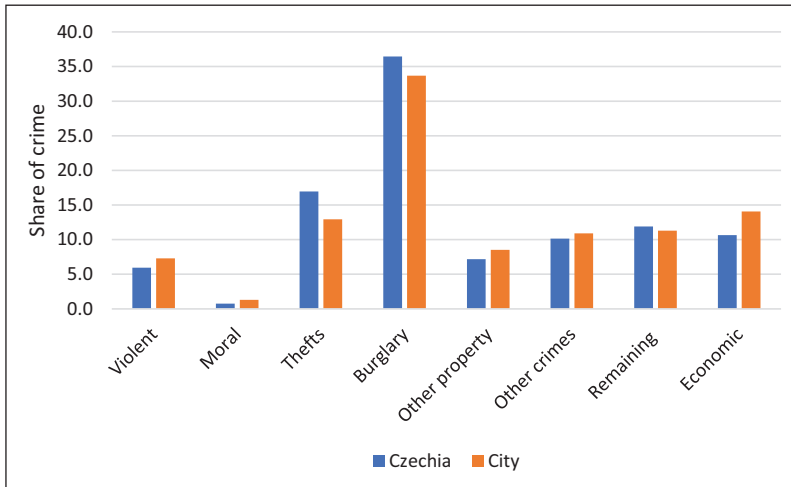
Figure 1. Crime structure in the Czech Republic and the City in 2013–15.
Note: Average values for the period 2013–15.
Source: Police of the Czech Republic.

large share of housing in socialist housing estates and well-functioning public transport. The City's crime structure is very similar to that of the whole country (see Figure 1). In terms of population size, the City falls into the category 'medium-sized city', of which there are roughly 40 in the Czech Republic. The main difference between the crime structure of the City and that of the greater Czech Republic is with regard to property and economic crimes. In the City, there is typically a lower share of thefts and burglary and a higher share of economic and violent crimes. However, these differences are minor and do not raise significant concerns regarding the ordinary character of the City.

The source of the crime data is the Police of the Czech Republic, which provided the data on request for the purpose of applied security research. The data set includes all crime as registered in the internal police criminal proceedings database for the City over the period 2013–15. The data include temporal and spatial delimitation of crimes with GPS coordinates and are classified into the detailed crime categories used in penal proceedings. The spatial geocoding of crime events was collected by the police. Geocoding might have different accuracies or validities in some types of crime. However, we consider the data to be sufficient for the purposes of our analysis, because we are focused on general patterns of crime distribution. A few incidents were excluded from the data set either because of missing GPS coordinates or because the coordinates pointed to a place outside the municipal boundary of the City. Owing to the sensitive nature of the data and to respect people's privacy, the data were treated as confidential in accordance with the ethical regulations of research conduct applicable in the Czech Republic.

Importantly, the use of data on the localization of crime with GPS coordinates is not common in criminological research in the Czech Republic (Jíchová and Šimon, 2020), and the Czech Republic's police are reluctant to share their data.[2] To date, there is not a standardized procedure in place to apply for police crime data for research purposes.

However, the police are currently conducting a pilot project on crime mapping in cooperation with the Ministry of Interior, where progress in data provision is foreseen. The crime data collected by the Police of the Czech Republic are intended primarily for the police's own internal activities, and secondarily as statistical evidence of activities in the criminal justice system. The use of localized data on crime in criminological research is desirable, but the possible disclosure of data is entirely within the purview of the Police of the Czech Republic.

The present study tests crime count and crime harm concentration at the level of street segments. In current international criminological research, street segments are considered a suitable unit of analysis (*Journal of Quantitative Criminology Special Issue: The Law of Crime Concentration at Places* – Andresen et al., 2017; Bernasco and Steenbeek, 2017; Braga et al., 2017; Gill et al., 2017; Haberman et al., 2017; Hibdon et al., 2017; Hipp and Kim, 2017; Levin et al., 2017; O'Brien and Winship, 2017; Rosser et al., 2017; Schnell et al., 2017). Criminological analysis at the micro level is able to explain a large proportion of the variability in crime incidence (Rosser et al., 2017). In our research, a street segment is defined as a section of a street between two crossings. The official street defining points provided by the Czech Cadastral Office were used to define street segments. The advantage of using street segments is the detail that allows one to capture the immediate surroundings of a crime scene. A spatial algorithm in ArcGIS software was utilized to link crime data to street segments using the closest option as the matching option. Thus, crimes on both sides of a street are linked to a street segment. This minimizes the possible environmental errors that are typical in studies using large spatial units.

Individual offences differ greatly in terms of harm to society; however, studies of the spatial concentration of crime do not usually address this issue. At the same time, there is no uniform and generally accepted approach to measure social harm in international literature (Radcliffe, 2015; Sherman, 2013). In our article, we measure crime concentration as a cumulative share of street segments sorted according to crime count. Thus, a specific cumulative proportion of crime is calculated and compared with the expected values. In order to measure crime harm concentration, we construct a similar measure but weight individual crimes in street segments by their harm value. We have used the Czech Criminal Code as an objective converter from a multiplicity of crimes and punishments to a unified measure of social crime harm. For the purpose of this pilot study, we have opted for a simple procedure. For crimes, we have calculated a mean value from the basic punishment range of the penalty and expressed it as the number of days of the penalty. In the case of misdemeanours, we divided the mean value of the fine range by the minimum wage in the Czech Republic (€400 a month) and thus obtained the number of days of paid work required to make up for the fine. For the sake of simplicity, we consider the number of days derived from both options to be equivalent. The resulting value of social crime harm is thus a sum value, which can be expressed similarly as the spatial concentration of crime in territorial detail up to the level of individual street segments.

Results

The law of crime concentration at places assumes a high level of concentration in relatively few localities where the vast majority of offences occur. Table 1 compares the

Table 1. Comparison of crime concentration in cities.

| | | Proportion of street segments on which crime is concentrated | |
		25 percent of crime	50 percent of crime
Usual range for big cities		0.8–1.6	4.0–6.0
Usual range for small towns		0.4–0.7	2.1–4.0
The City	2013	2.3	7.9
	2014	1.9	6.9
	2015	1.5	6.1
	Average	1.9	7.0

Sources: Own calculations from police data for the City; Weisburd (2015) for the usual range for big cities and small towns.

Table 2. Crime harm concentration in the City.

| | | Proportion of street segments on which crime harm is concentrated | |
		25 percent of crime harm	50 percent of crime harm
The City	2013	2.2	7.0
	2014	2.1	6.9
	2015	2.2	7.1
	Average	2.2	7.0

Source: Own calculations from police data.

usual values of crime concentration for large cities and small cities and for the City. All values use crime rate measurements at the level of street segments. In our data sample, 79 percent of street segments contained at least one crime or misdemeanour and 21 percent of street segments were crime free.

A comparison of crime concentration (Table 1) shows two basic differences between the expected values of concentration and the concentration in the City. First, the City has less than half the rate of crime concentration compared with the usual range for small towns (where its population size fits in the international context). Concentration of crime in the City does not correspond to the values expected by the law of crime concentration at places for the category of small towns; therefore, we reject Hypothesis 1. Second, the City has an even lower concentration of crime than is typical in big cities.

The concentration of crime harm is not distinctively higher than the concentration of the crime count in the City. The data show a relatively consistent level of concentration for both indicators for each year (compare Tables 1 and 2). We therefore reject Hypothesis 2. We do not consider this finding surprising, because it reflects an overall high level of safety and low presence of high-harm crimes in the country. Based on current mainstream criminology, we expected that the spatial concentration of crimes would increase after a weight with a high degree of variability was added to the data (CHI). This expectation is based on a valid assumption that high-harm and low-harm offences spatially

Table 3. Comparison of crime count and crime harm spatial clustering.

	Top percentage of street segments	Crime (percent)			
		2013	2014	2015	Average
Crime count	1	15.2	17.5	19.9	17.5
	5	39.2	42.5	45.5	42.4
Crime harm	1	15.0	16.5	14.5	15.3
	5	40.9	41.9	40.8	41.2

Source: Own calculations from police data.

overlap and thus scale up the level of concentration. However, a comparison of crime hotspots and crime harm spots suggests that the spatial overlap of high- and low-harm offences is rather low in the City. When z-score standardization is used to delimit hotspots and harm spots as values more than 2 standard deviations away from the mean in each group, then 66 percent of hot-spots are also harm spots and only 51 percent of harm spots are also hotspots (see Weinborn et al., 2017 for a detailed methodological account of hotspot delimitation). The concentration of crime at places is therefore saturated more by a high presence of low-harm criminal offences and less by a clustering of high- and low-harm offences.

Table 3 compares the level of crime count and crime harm concentration in the top 1 percent and top 5 percent of street segments. First, crime harm is, on average, less concentrated than crime count. The increase in total crime between 2013 and 2015 led to a higher saturation of top crime count street segments, whereas the spatial concentration of crime harm remained stable. The role of high-harm criminal offences is likely to be small in the creation of crime hotspots. Place-based policing focused on crime hotspots is therefore much more likely to address crime hotspots rather than crime harm spots. Second, the level of crime harm concentration appears to be less prone to year-by-year fluctuations than is the crime count. This is a logical result, because more frequent low-harm offences are less spatially volatile than less frequent high-harm offences.

Discussion

Consistently lower crime concentration and lower crime harm concentration at places than expected from the theory were identified in the City. The values of crime concentration and harm concentration are still high and point to the importance of the law of crime concentration at places in environmental criminology and practical policing. Nevertheless, our empirical results suggest that the concentration of crime is not only a reflection of the size of a city but also affected by local conditions and the character of the urban context. Cities with a high spatial concentration of poverty, for example due to ethnic residential segregation, might have higher crime and harm concentration than less segregated cities. The level of ethnic residential segregation in Czech cities is very low in international comparison (Šimon et al., 2020) and thus less likely to saturate crime concentrations. Criminological knowledge of social disorganization factors and

journey to crime location theory are in line with this reasoning. Thus, a lower clustering of criminogenic factors in urban space might lead to a lower clustering of crime. Therefore, the law of crime concentration at places could be clarified and the categories of typical concentrations of crime (bandwidth of percentages) could be defined for different urban contexts. This modification would more accurately reflect the differences between types of cities (for example, North American vs. European, North American vs. South American, and West European vs. post-socialist cities). The data set of three years does not allow the evaluation of long-term trends in crime concentration. The differences between individual years are probably driven both by substantial changes in crime occurrence and by normal fluctuations of variability in crime data.

The apparent differences in crime and harm concentration inevitably lead to a theoretical debate about the causes of this difference, but also to a very practical debate about the transferability of criminological knowledge. One of the proposed explanations of the difference in the concentration of crime is the overall level of crime. In contrast to countries where the law of crime concentration at places was primarily developed and tested, the Czech Republic has a lower level of crime. Therefore, the law of crime concentration at places can work differently in this low-crime context. Structural factors, such as the morphology of cities and the segregation of urban functions and social groups, may influence the spatial patterns of crime.[3] Similarly, the work of the police, in terms of the spatial, material and capacity focus of crime prevention activities, can play a role. Research with this focus exists to some extent in other countries (Moore and Braga, 2003); however, it is a completely internal matter of the police in the Czech Republic. A separate issue is the methodological aspect of the research, including the different classifications of crime in individual countries produced by legislative and historical conditions, among other things. However, the confirmation or rebuttal of these initial theses requires comparative international research beyond the scope of this article.

From a practical point of view, the lower concentration of crime in the City has clear implications for policing and crime prevention strategies. In such conditions, it is more difficult to apply a place-based policy of prevention and policing strategies. Evidence from Western cities shows that targeted police surveillance of crime hotspots leads to a reduction in crime rates: 'The police cannot prevent crime – it is a social myth – criminality can be effectively reduced by watching neuralgic sites' (Bayley, 1996: 3). Moreover, crime does not move easily into the surrounding streets, because it is tied to criminogenic factors in places (Weisburd et al., 2006). These findings have not been explicitly and rigorously tested via randomized controlled trials in the Czech Republic. The lower concentration of crime conflicts with the police effort to focus on a limited number of hotspots. Surveillance of a territory with a low concentration of crime is ineffective, both economically and practically (Gibson et al., 2017; Wain et al., 2017). Therefore, crime prevention and policing experts in the Czech Republic face a tough challenge in proving the efficiency of hotspot policing in order to justify its utility to policymakers, police officers themselves and the general public. However, as new insights from field experiments using randomized controlled trials suggest, the success of hotspot policing is not just a matter of the right amount and timing of police patrolling. Quite paradoxically, the deterrent effect of hotspot policing in one recent study was higher when police were not present in places than when the police were actually patrolling (Ariel et al., 2020). The residual effect of

uncertainty about a police presence and the simultaneous likelihood of their expected presence can thus work as stronger crime prevention than the actual presence of uniformed police officers (Ariel et al., 2020).

The findings of this study support the thesis that the dynamics of crime are different in countries with overall lower levels of crime. This highlights the practical limits of the transferability of criminological knowledge and analytical tools from countries with higher levels of crime (see Temelová et al., 2016, and Jíchová et al., 2019, for a similar argument). This opens up a fairly wide scope for revision of the existing concepts and theories based on comparative cross-country research. Although this study provides novel evidence on the law of crime concentration at places and critically examines its utility for crime prevention in a post-socialist context, there are limitations to this pilot study.

Possible limitations of the study stem from the spatial and temporal extent of our analysis. Our analysis focuses on one city over a relatively short period of time. We thus face a comparative disadvantage against studies based in countries with advanced spatial criminology, where data are often available for a larger number of cities for longer time ranges (compare with Braga and Clarke, 2014). However, our findings provide evidence from a new geographical context – the post-socialist Czech Republic. Furthermore, many studies on spatial and temporal stability in the distribution of crime clearly indicate that even results achieved with a relatively limited set of data may have a more general and sustained validity.

Another conceivable limitation of this study is differences in crime evidence and crime measurement in police statistics. The Czech crime data used in the study are derived from an internal police system that is designed to capture all proceedings and documents relevant to particular crime investigations. The data therefore reflect crimes that are reported and recorded by the police. However, the way in which particular data are collected might be different from an international perspective. The current practice of collecting geo-localized data on crime by the Police of the Czech Republic shows that this type of data is crucial for crime investigation and the robustness of the data will increase in time. The practical limit of spatial criminology is the relatively low general crime rate in the Czech Republic. A smaller amount of crime data limits the application of more robust geo-statistical methods, thus limiting the possibilities of predictive analyses of individual types of crime.

Conclusion

This article broadens the knowledge base of European spatial criminology by evaluating the validity of law of crime concentration at places in a post-socialist context. Parallel evaluation of crime harm concentration is conducted using harm measurements analogous to the Cambridge Crime Harm Index. The study provides novel evidence of lower crime concentration and lower crime harm concentration than has been reported in Western countries and cities (Andresen et al., 2017; Schnell et al., 2017; Song et al., 2017; Steenbeek and Weisburd, 2016; Weisburd et al., 2004, 2012). The concentration of crime and crime harm in the City is less than half the level expected from the theory for this category of city. The concentration of crime count and crime harm is even lower than the expected values for the large city category. The absence of places with extreme

concentrations of crime and relatively low crime rates may be associated with the lower physical segmentation in Czech cities and the lower socio-spatial segregation of the population and urban functions.

The low crime concentration and low crime harm concentration at places have logical consequences for place-based policing and the strategical orientation of crime prevention policy in general. In practical terms, it is difficult to focus on neuralgic crime places in the City where crime is less concentrated and more evenly spread over a larger area. Lower levels of crime concentration can stifle the efficiency of place-based policing, or can completely obstruct the implementation of place-based policing and prevention. When support for place-based methods is inconclusive owing to low statistical power or a lack of statistical significance, policymakers might opt for other methods (for example, traditional policing tools and prevention strategies). Therefore, more nuanced and data-extensive criminological research is needed to address this research gap.

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Notes

1. An exceptional study by Večerka, Holas and Štěchová (1995) analysed the concentration of crime using data on locations of crime from criminal investigation documents. However, the study was conducted prior to the availability of GIS software tools and it was not replicated owing to the extremely laborious nature of data collection. Interestingly, the study reported a similar pattern of crime concentration as the law of crime concentration at places using a very small spatial grid as a unit of analysis.
2. Investigative journalists applied for the geo-localized crime data from the police for 2011–16 using the Freedom of Information Act. In the court hearing, the police agreed to provide the data, but claimed that a processing fee was necessary to manually verify each requested crime record, to a total value of approximately €1,000,000.
3. Preliminary testing of contextual factors contributing to the concentration of crime and harm shows only weak correlations with the spatial distribution of social housing and immigrant population. The tested contextual factors were inter-correlated with population density in street segments and did not lead to a statistically significant conclusion.

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