

Do moral communities have a spatial dimension? A spatial exploratory analysis of places of worship and violent crime in the city of Recife, Brazil

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Abstract A wealth of research exists to suggest that environmental attributes can facilitate or deter criminal activities, as for instance the presence of alcohol outlets or the design of defensible spaces. In this article we present an exploratory spatial analysis of the relationship between violent crime and places of worship in Recife, Brazil. This analysis aims to explore whether there is a spatial dimension to “moral communities” around places of worship. Use of a cluster detection methodology, the results suggest the presence of a strong geographical association between churches and crime. The evidence obtained for the year 2010 indicates a process of clustering of homicide events in the vicinity of places of worship. In addition, it was also possible to verify a pattern of concentration between evangelical churches and violent crimes.

Keywords Moral communities · Crime · Places of worship · Point pattern analysis · Intensity ·

1 Introduction

Violent crime is a widespread phenomenon with negative impacts on many spheres of life and society. Although the rate of homicides worldwide has grown

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at a slower rate than the population, the number of people killed in homicides still increased from 362,000 in 1990 to 464,000 in 2017 (United Nations Office on Drugs and Crime 2019a). Variations in violent crime also tend to be extremely uneven. The Americas, with a population of approximately 793.8 million people in 2019 (or about 10.3% of the world population), accounted for approximately 173,000 homicides in 2017, or approximately 37.3% of all homicides in the world. Within the Americas, Brazil (along with Venezuela, Colombia, and Mexico) is one of the largest countries in the region with high homicide rates. The relevance of variations in the prevalence of violent crime is in fact recognized by the United Nations Office on Drug and Crime (2019a) as being key to achieving policy goals:

High levels of homicidal violence are concentrated in geographic and demographic “pockets”, so achieving target 16.1 of the Sustainable Development Goals requires interventions within the specific regions, countries, communities and population groups that are most at risk (p. 35)

The endemic malady of violent crime represents in fact an important factor that threatens to derail sustainable development goals. Violent crime, furthermore, tends to be more accute in those regions most in need of development. On the one hand, violent crime represents an economic and social drag (Becker and Kassouf 2017) that affects people’s well-being, either through the loss of human life, mental health, limitations in the right to public spaces (Doran and Burgess 2011), or through disturbances in schooling and academic achievement (United Nations Office on Drugs and Crime 2019b). In turn, these negative effects combine to create the unfortunate conditions that exacerbate criminal behavior, thus creating a vicious cycle of economic disadvantage and crime (United Nations Office on Drugs and Crime 2019b). Added to this scenario, social control institutions in Brazil, which in practice should inhibit criminal practice, have deep deficiencies that end up reducing the deterrent power of the criminal justice system. Among these serious problems are the inefficiency of the police, the lack of national legislation, the glacial pace of judicial processes. and the weak situation of the prison system in the country (Menezes et al. 2013). It is not surprising, given the above, that researchers have joined calls for more research to increase our understanding of the patterns of violent crime in Low and Middle Income Countries (LMIC; Murray, Cerqueira, and Kahn 2013).

In order to counteract any criminological factors, it is important to identify empirical regularities. Criminological factors include concrete elements, such as the presence of arms or drugs, as well as environmental factors, such as the built environment, in addition to figurative factors, which include the moral costs of deviant behavior as well as family supervision. Accordingly, a number of studies have investigated various aspects of the environment and neighborhood design (e.g., Foster, Giles-Corti, and Knuiman 2010; He, Pérez, and Liu 2017; Loukaitou-Sideris et al. 2001), whereas other studies have focused on exposure to environmental attributes that signal weakened norms, such as liquor

and tobacco outlets associated with geographical hotspots of crime (Brower and Carroll 2007; Deryol et al. 2016; Lipton et al. 2008; Quick, Law, and Luan 2017). Yet another fruitful avenue for research, and one that has only recently begun to attract attention, is the presence of environmental attributes that can help reinforce moral norms, such as schools and churches (e.g., Abdullah et al. 2018; Davignon and Thomson 2015; Furr-Holden et al. 2010; Traummuller 2011). It is thus that in a recent paper, Warner and Konkel (n.d.) note that the role of places of worship, as distinct entities from the members of the congregations, have received less attention in empirical and theoretical research for their potential to prevent crime. The role of these institutions might be particularly important in places where the State lacks the means or the will to enforce norms - as is the case in Brazil.

With the above considerations in mind, the objective of this paper is to investigate whether moral communities have a spatial dimension discernible from the presence of places of worship. The case study is the city of Recife, in the state of Pernambuco in Brazil's Northeast. Recife is a large metropolitan area in a historically poor region, and afflicted by high levels of violent crime. The empirical strategy is to use spatial analysis to explore the potential geographical relationships between violent criminal events, on the one hand, and places of worship and a selection of commercial establishments, on the other. Dissaggregated data allows us to analyze the phenomena of interest at a very high level of resolution as spatial point patterns.

After this introductory section, the rest of this paper is structured as follows: Sect. 2 reviews the literature on religion and crime; then Sect. 3 presents the empirical strategy used in the work. Sect. 4 presents the context as well as the data used in the study; Sect. 5 systematizes and discusses the main results; and finally, the conclusions are presented in section 6.

2 Background: Theoretical Perspectives

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3 Empirical Strategy

Two different techniques are deployed in this paper to study the spatial distribution of criminal events, and their possible relationship to the location of places of worship. Firstly, the F-function is a nearest neighbor technique that is used to summarize the distance between a set of points and their nearest events. This technique has found extensive use in spatial epidemiology (see Gatrell et al., 1996) and has also been used in spatial criminology (see, inter alia, Craglia et al., 2000; Kiani et al., 2015; Levine, 2006; and Rogerson and Sun, 2001). The second technique is the scan statistic. This method has also been extensively used in spatial epidemiology (e.g., Hjalmars et al., 1996) and has found use in spatial criminology as well (see He et al., 2017a; Nakaya and

Yano, 2010; Malleson and Andresen, 2015; and Shiode, 2011). Use of these two techniques is meant to provide insights with respect to 1) the location of violent criminal events with respect to various types of facilities; and 2) geographically identify places of worship associated with clusters of criminal events. These two techniques are briefly reviewed next.

3.1 Quadrat Analysis

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3.2 Relative Intensity

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4 Case Study

4.1 Context

The study is of the city of Recife, the capital of the state of Pernambuco in the Northeast region of Brazil. With a population of 1,550,390 million inhabitants in 2010, and with an area of 7,133.2 km², Recife is one of the main Brazilian metropolises, exerting a great economic influence in neighboring regions. However, the city experiences a serious problem with violent crime, and has the dubious honor of being one of the five capital cities in Brazil with the highest homicide rates in the period under study (Menezes et al. 2013).

In the current context, the term “violent crime” is an umbrella for several forms of infractions to the penal code. Following recommendations of the National Secretariat of Public Security of the Ministry of Justice of 2006, these are Violent Lethal and Intentional Crimes (CLVI; which includes intentional homicide), theft followed by death (robbery), and corporal injury followed by death. The data on CVLI were extracted from the Police Information System of the Secretariat of Social Defense of Pernambuco (INFOPOL / SDS-PE), which is the most reliable, detailed, and comprehensive information on violent deaths in the region.

4.2 Data

The data are organized at the individual level and it is possible to obtain information about the location, day of the week, day of the month, period of the day, as well as gender, age, and race of the victim. The database used in this study comprises the period from July 1, 2008 to June 30, 2010. Some descriptive statistics regarding this dataset are reported in Table 1, where it

Table 1 Characteristics of Violent Crime in Recife, July, 2008 - June, 2009

	Percentage
Gender of Victim	
Man	91.35
Woman	8.65
Type of Crime	
Murder	97.82
Robbery	2.00
Body injury followed by death	0.18
Ethnicity of Victim	
Black and White	95.11
Yellow and White	1.27
Not Reported	3.62
Age of Victim	
1 to 12 years	0.18
13 to 17 years	11.31
18 to 30 years	61.70
31 to 65 years	25.84
65 years and older	0.73
Not Reported	0.24
Weapon Used	
Firearm	87.51
Other	12.49

can be seen that overall, about 91% of the victims of CVLI in the period analyzed were men, while approximately 98% of violent crimes were homicides. In addition, most of the victims were black or brown, and the youth population between the ages of 18 and 30 is the most affected by violent crime. Lastly, it should be noted that about 88% of the criminal events under analysis involved firearms. Information about places of interest was obtained from the National Register of Addresses for Statistical Purposes (CNEFE - Census 2010), which lists 78,056,411 urban and rural addresses, distributed among the 316,574 census tracts. This is the first database of its kind produced by IBGE, and the first version was produced at the time of the 2000 Census. The way addresses are described in the National Register is very rich, and it is possible to identify the names of the places of worship including their denomination. Georeferencing was used to geolocate each place of worship. In this way, a total of 1,719 places of worship were geolocated in the city of Recife. Figure 1 (Panel a) shows the spatial distribution of the 1,657 CVLI crimes that occurred in the city of Recife between 2008.2 and 2010.1. Panel b) of the figure shows the spatial distribution of places of worship in the region.

In addition to places of worship, the National Register of Addresses for Statistical Purposes was queried to extract facilities other than places of worship. As discussed above, the idea is to identify points of reference that can be used as controls, having a neutral morality profile. For the sake of the present study, we selected pharmacies, ice cream shops, and bakeries to construct our control group. These three types of establishments comply with the criteria

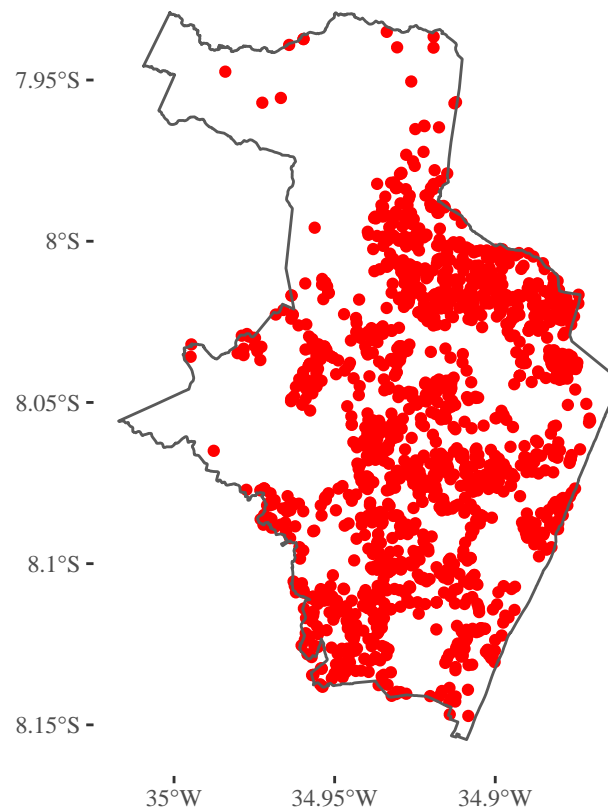


Fig. 1 Lethal and Intentional Violent Crime in Recife

of being morally neutral and having a spatial distribution commensurate with places of worship. Figure 2 shows the spatial distribution of the control establishments, namely pharmacies, bakeries, and ice cream shops in the city of Recife. Note the similarity between the maps. As expected, there are differences in the number of points, but the locations of cases and controls are quite similar.

5 Analysis and results

5.1 Quadrat Analysis

Calculate the intensity of other ppp by quadrat:

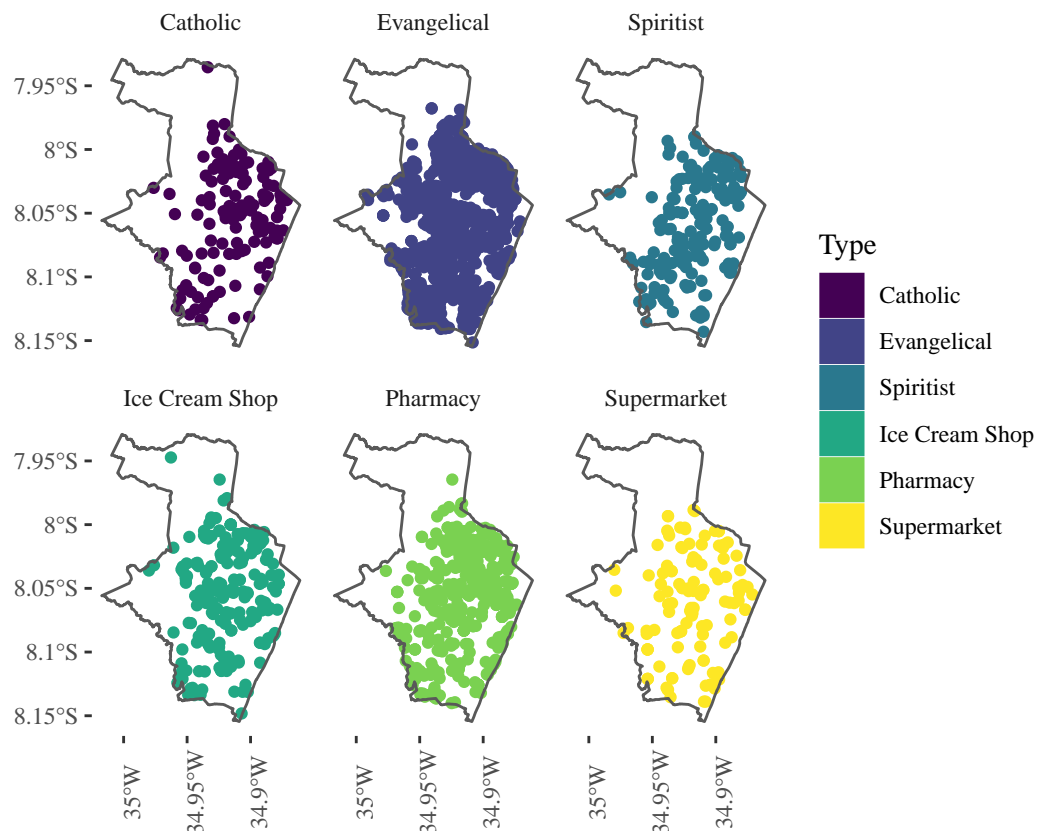


Fig. 2 Places of Worship and Commercial Establishments in Recife

5.2 Relative Intensity

6 Conclusions

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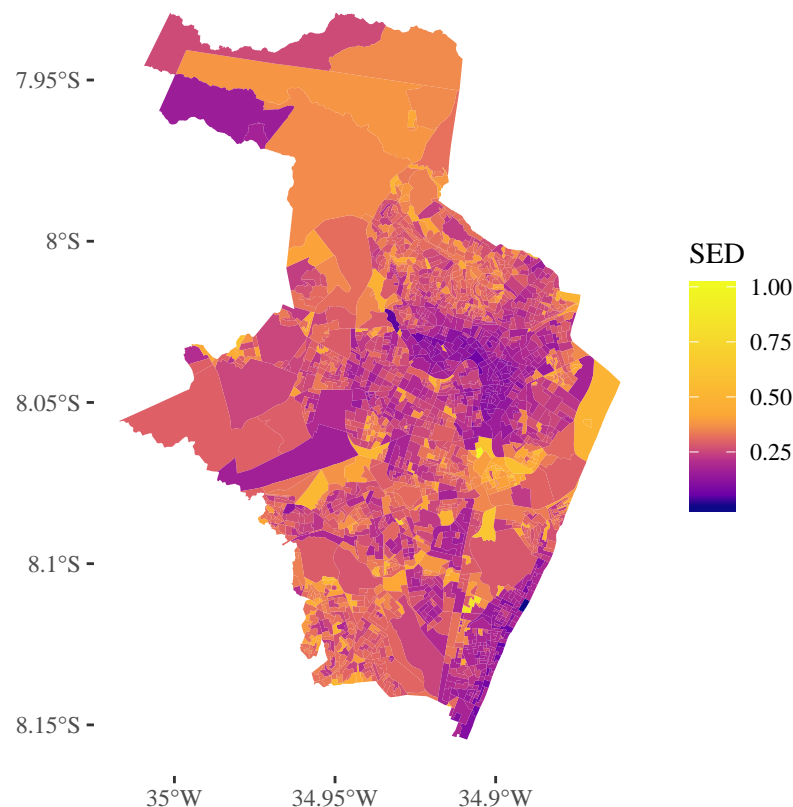


Fig. 3 Socio-Economic Deprivation in Recife

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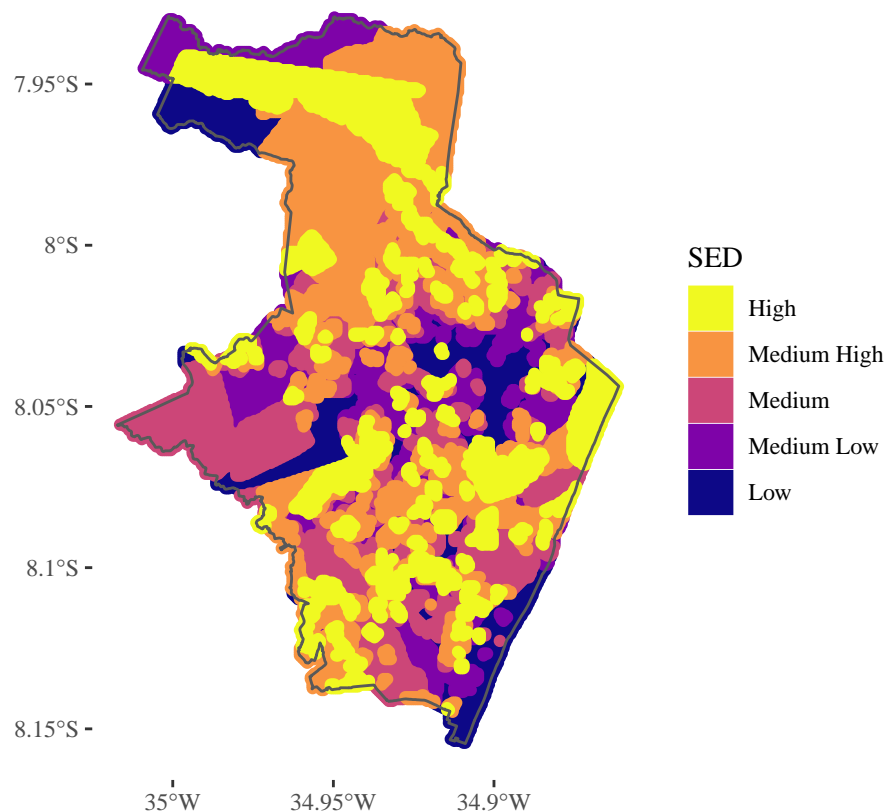


Fig. 4 Socio-Economic Deprivation as Quintiles

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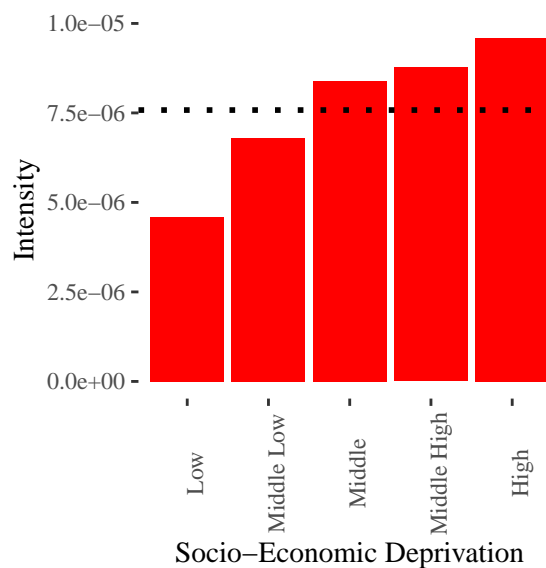


Fig. 5 Intensity of crime by level of Socio-Economic Deprivation; the dotted line indicates the global intensity of crime

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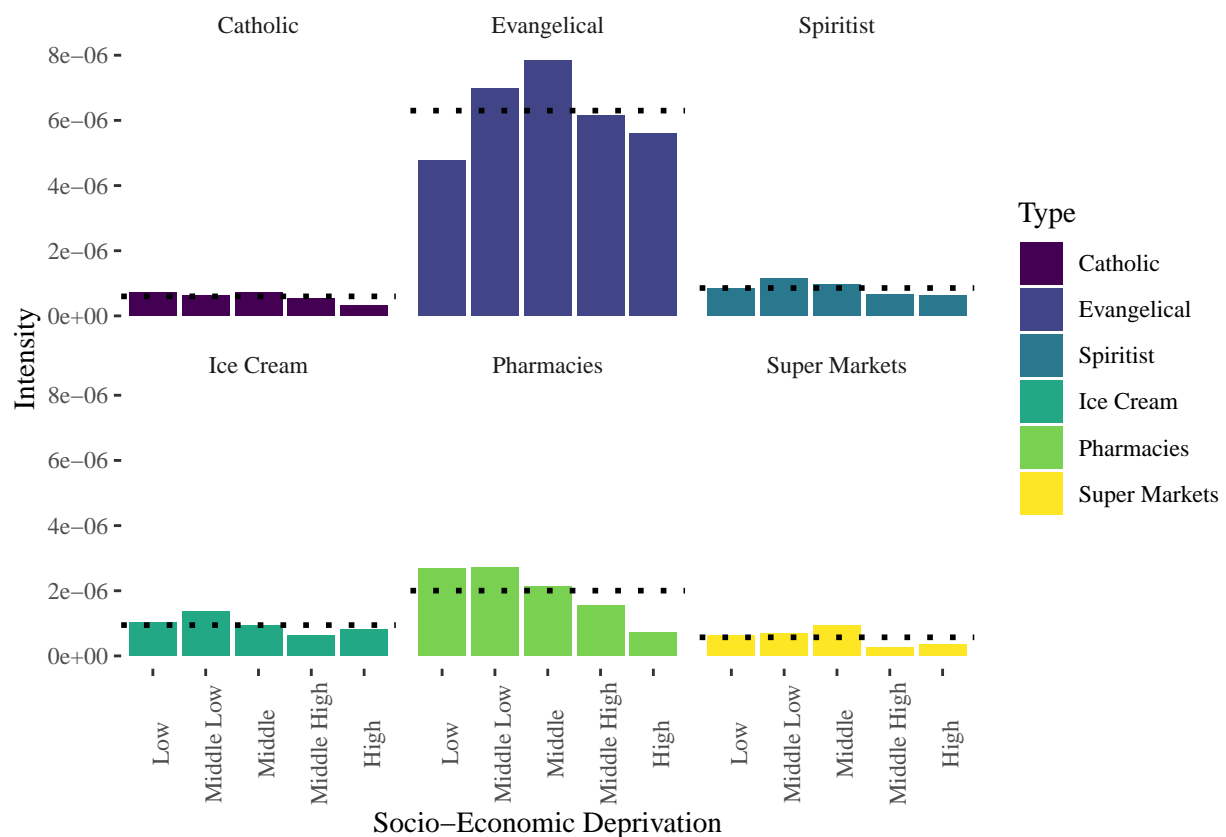


Fig. 6 Intensity of places of worship and commercial establishments by level of Socio-Economic Deprivation; the dotted lines indicates the respective global intensities

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