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Of form and feeling: correlating urban form and feelings of insecurity in Porto, Portugal

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Abstract

Environmental criminology is built on the principle that criminal behaviour is conditioned by the (built) environment it occurs in, and that the introduction/removal of design and built features may reduce insecurity and criminal occurrences. Hence, local-based strategies have proven that "place matters" in crime-prevention, and have established the need for interdisciplinary research where urban morphology plays a central role, due to the influence of different spatial elements in feelings and behaviours. Although environmental criminology exists since the 1970s, it has recently been the object of new interest due to the increased success of strategies related to the criminology of places. This paper pretends to contribute to this debate by making an early exploration of how different components of place (built environment) and safety (perceptions of insecurity) correlate, using the city of Porto as case study. Based on a population survey carried out in 2020, feelings of unsafety towards places and their environmental features were determined, and compared with morphological variables at local level, derived from official data sources. A sample of about 500 respondents was analysed, and the results were compared spatially. It is expected that the resulting research contributes to draw locally-based prevention strategies based on the articulation between urban morphological elements, planning policies and the different realms of prevention.

Keyword: *Environmental design, Urban crime, Feeling of insecurity, Spatial analysis, Porto*

Introduction

Urban morphology is understood as the study of urban form, related to the configuration and structure of the built environment over time. It is, as Moudon (1997) wrote, the study of city as a human habitat; because the city is not just the outcome of its physical heritage, but the consequence of how form interacts and affects future building processes, land-uses and the relationship of people with the environment. Indeed, this relationship affects various aspects related to the sustainability of cities, as a sense-of-place and an increased urban identity benefit place-making and social relationships, thus facilitating social mix and cohesion (Butina-Watson and Bentley, 2007). It is rather universal that urban spaces should be well structured and feel appealing and safe. Those that do not may run the risk of promoting unwanted behaviour and instilling a sense of insecurity, leading to a loss of liveliness and identity.

Such ideas are not new. Urban safety – and consequently urban crime prevention – have long been established as having strong links, not only to social and economic aspects of urban spaces, but also to their

design and spatiality (Kamalipour et al., 2014). The discipline of Environmental criminology (Andresen, 2014; Weisburd et al., 2016; Wortley and Townsley, 2016) considers that both crime and feelings of insecurity are conditioned by the nature of the (built) environment, in its various physical and contextual dimensions. Consequently, they vary in space and time, and thus can be predicted through spatial approaches that inform urban planning, design, management and security directives, able to mitigate crime opportunities and instil a sense of belonging which reduces insecurity.

In recent years, not only has the study of urban morphology substantially increased and popularized (Oliveira, 2016), but so have place-based approaches of environmental criminology. The idea that "Place Matters" (Weisburd et al., 2016) has become central to understanding and explaining crime and insecurity patterns at the micro-scale, because places have distinctive characteristics that have been shown to be relevant predictors of occurrences (Kikuchi, 2010; Faria et al., 2018). Preventive strategies based on the manipulation of these characteristics, such as CPTED (Crime Prevention Through Environmental Design) (Cozens and Love, 2015; Saraiva and Pinho, 2011) are called useful, effective, and viable by the European Union Council, and a cornerstone for reaching the safer-cities goal.

Today, research on crime and place is concerned with uncovering the connections between crime/ insecurity hot-spots, and the physical and contextual characteristics of such locations. The purpose of this paper is to contribute to this debate through an exploratory analysis in the city of Porto, in Portugal, where the results of a survey on perceptions of insecurity are spatially compared with a set of morphological and contextual variables. In Section 2 the theoretical background of the research is briefly discussed. Section 3 presents the methodology used. Section 4 shows the results, whereas Section 5 draws the paper's conclusions.

Background

Moudon (1997) described three major principles of morphology: (i) form (buildings and streets, linked to open spaces, plots and land parcels); (ii) resolution (in four levels: building/lot, street/block; city, region); and (iii) time. The morphological characteristics of each element (which has a given pattern and typological function), are set against a geographical backdrop (topological dispersion), which can be measured on levels ranging from the macro to the micro, and in a temporal scale. All these aspects are intrinsically connected to how environmental criminology has of late perceived the connection between crime and place.

The "where" and the "when" are now as important as the "why" and the "how" (Weisburd et al., 2012). Advances in crime mapping and spatial analysis, which have been given an extensive boost due to the proliferation of geospatial technologies in the new millennium (Chainey and Ratcliffe, 2013; Leitner, 2013), have approached the "where" in three levels (Eck et al., 2005): the neighbourhood/census track level; the street level and the place (point) level. Progressive approach into the micro-scale has led Weisburd (2015) to formulate the Law of Crime Concentration, determining that crime hot-spots are concentrated in specific

locations and display a great spatial variability (which is unseen when analysing at larger scales). Furthermore, these hot-spots are stable over time. Concomitant research has also stated that the same appears to occur regarding fear of crime (Solymosi et al., 2015).

Consequently, because such micro-geographical units are also recognized as relevant social and urban systems, research has moved beyond the mere representation of spatial patterns of crime, to a more thorough understanding of contextual elements. Theories of environmental criminology, particularly CPTED strategies, had already established a correlation between insecurity and urban design elements such as those that potentiate territoriality, natural surveillance, movement and activities, and proper maintenance (Saraiva et al., 2016). In statistical models, such built environment elements initially comprised of census data related to socio-demographics and socio-economic status, or land-use diversity. Then, they progressively moved to a more complex – and more morphological – conceptualization, including measures of form and the built environment (Foster et al., 2010; Sohn, 2016), and of accessibility/connectivity related to network indexes (Silva and Li, 2020; Iwan et al., 2019) or space syntax (Matijosaitiene, 2016; Summers and Johnson, 2016). Recent research has further uncovered strong correlations between patterns of fear and the social meaning of place (Batella, 2010; Chataway et al., 2017; Weisburd et al., 2020).

These works conclude that crime location and the perception of safety derives from the cumulative effect of morphological, planning, land-use and perceptual elements (Foster et al., 2010). However, further research is still required to combine all these approaches, and explore such relationships in wider contexts (Andresen and Weisburd, 2018). Multi-scalar and time sensitive models need to be produced, based on georeferenced datasets and spatial-statistical analysis techniques, that uncover the relationships between insecurity patterns, form and structure and feelings toward places (Bannister et al., 2019). Such a holistic approach could return the “why” to equal standing with the “where” and the “what” within the Criminology of Place, merging pattern and meaning, leading to more robust urban policies.

Methodology

Data used on this study has come from a survey implemented in 2020-2021 in the Portuguese city of Porto. This is the second city of Portugal, after Lisbon, comprising of 41,42 Km^2 and 237.591 inhabitants in the last population Census (INE, 2012). It is at a centre of a metropolitan region with further 16 municipalities, and a total population of 1.722.374. In terms of insecurity, Porto is on the highest level in the country, along with other municipalities as Lisbon or some in the Algarve, with larger numbers of reported crimes per thousand inhabitants (Saraiva et al., 2021), and an increasing insecurity perception (Saraiva and Amante, 2020).

The survey consisted of 31 main questions in seven groups including socio-demographic data; feeling towards Porto and towards (in)security; perceived problems in urban spaces; collective efficacy; and both real and perceived knowledge of victimization. Interviewing both resident and those who work/study in the city,

about 500 valid responses were obtained, and this was used to georeference the places respondents felt the most unsafe, as well the morphological and environmental characteristics that most caused a sense of insecurity. For this paper, and following the literature (eg. Alves, 2015), a buffer with a radius of 250 meters was drawn around the ten locations most signalled as unsafe by the respondents. Using ArcGIS, seven indicators were calculated for the ten catchment areas, based on census data (2011) and municipal sources. These were the population density; building density; percentage of derelict buildings; density of services and activities; percentage of residential buildings; percentage of green areas; and the Link node ratio (Gamma index). These values were divided in classes using Natural Breaks. Then, they were compared with those of the wider administrative divisions of the city (parish level), as well as with a cluster analysis, derived from several other responses to the survey related to perceptions of safety and collective efficacy.

Results and Discussions

Figure 1 shows the location of the 10 places most signalled as unsafe by the respondents, whereas Table 1 names them, and describes the morphological indicators for the 250m buffer areas. Six of the ten locations correspond to social neighbourhoods, often mentioned in the media (Aleixo, Cerco, Pasteleira, Pasteleira Nova/Pinheiro Torres, Viso and Lagarteiro), mostly located in the parishes of Lordelo do Ouro, Ramalde and Campanhã. Respondents cited that these were unsafe locations due to, specifically, problems regarding the consumption and/or trafficking of narcotics, and absence of policing in the streets. The other four locations correspond to areas downtown, usually associated to tourism and nightlife spots (Ribeira, Sé and Cordoaria), and to the university campus in the parish of Paranhos. The grey scale in Table 1 corresponds to the division of each indicator in five classes using Natural Breaks, from very low (1), to very high (5).

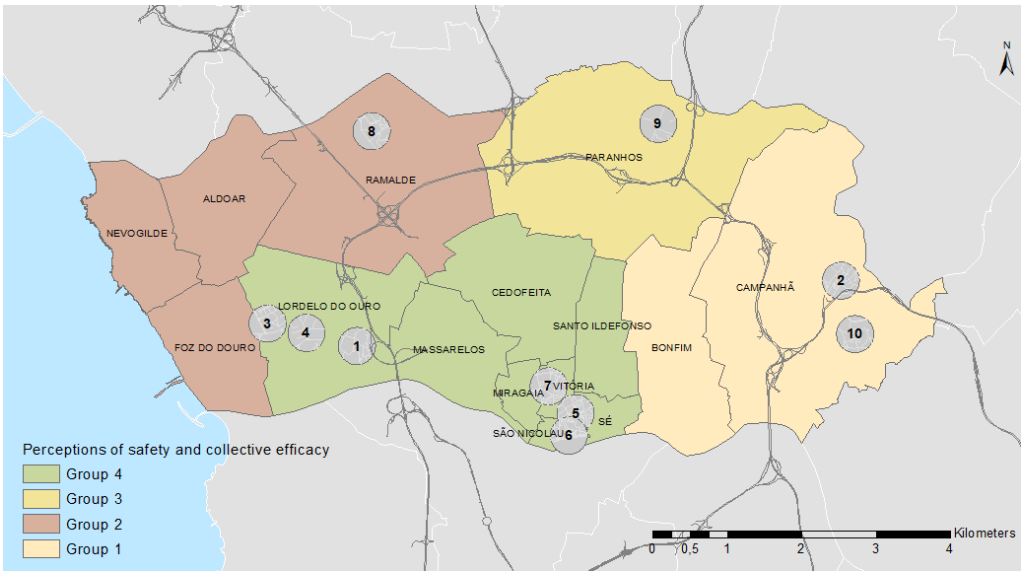

Figure 1. *Location of the 10 places most signalled as unsafe, respective 250m buffers; and groups of parishes according to neighbourhood perceptions of safety and collective efficacy.*

Table 1. Morphological variables by insecure location, considering a 250 meter-buffer, and values for the parish they are located in [classes: very high (black) to very low (light grey)]

Parish	Top 10 locations signalled as insecure	Population Density (per Km^2)	Building Density (per Km^2)	% Derelict Buildings	Density of Commerce / Services (per Km^2)	% Residential Buildings	% of Green Areas	Gamma Index [0-1]
Lordelo do Ouro	1. Aleixo	10451	2920	72,6	163,0	97,1	6,9	0,44
	3. Pasteleira	10793	1345	46,7	137,6	99,0	4,8	0,44
	4. Pinheiro Torres / Pasteleira Nova	10309	1203	18,1	35,7	95,5	10,8	0,37
	(Parish total)	**(6114,7)**	**(1953,8)**	**(42,5)**	**(161,1)**	**(93)**	**(13,8)**	**(0,52)**
Campanhã	2. Cerco	15099	1090	66,6	71,3	89,1	0	0,39
	10. Lagarteiro	8369	2303	76,7	101,9	75,9	0	0,41
	(Parish total)	**(4060,7)**	**(2103,9)**	**(48,44)**	**(93,4)**	**(91,2)**	**(6,2)**	**(0,49)**
Sé	5. Sé	8907	7119	71,2	1299,4	57,9	0	0,44
	(Parish total)	**(7129,6)**	**(4621,8)**	**(61,54)**	**(651,1)**	**(71,5)**	**(0)**	**(0,56)**
São Nicolau	6. Ribeira	7315	3868	80,8	723,6	78,6	3	0,45
	(Parish total)	**(76129)**	**(3790,5)**	**(83,5)**	**(718,9)**	**(85,6)**	**(2,3)**	**(0,57)**
Vitória	7. Cordoaria	3315	3908	52,8	1207,7	67,1	11,2	0,45
	(Parish total)	**(5788,9)**	**(5779,7)**	**(55,5)**	**(1540,9)**	**(54,1)**	**(6,4)**	**(0,61)**
Ramalde	8. Viso	10828	2252	62,1	249,7	95,7	0	0,49
	(Parish total)	**(6525,7)**	**(2456,3)**	**(33,2)**	**(204,5)**	**(90,7)**	**(3,6)**	**(0,51)**
Paranhos	9. University Campus	57	632	83,1	56,0	94,8	14,6	0,33
	(Parish total)	**(6179,9)**	**(3305,3)**	**(37,5)**	**(187,4)**	**(89,7)**	**(2,8)**	**(0,52)**

In general terms, the areas signalled as unsafe are places of high concentration of population and buildings, with the justifiable exception of the University Campus. Most 250-meter catchment area comprise of around 10 thousand inhabitants (higher in Cerco, lower in Cordoaria) and between 1-2 thousand buildings per square kilometre. Downtown locations (5, 6, and 7) have higher building density but lower number of residents, which also reflects the shift towards temporary residencies related to the tourist market and a higher multi-functionality. Precisely, as these ten areas are mostly social neighbourhoods, the number of residential buildings is in the highest classes as compared to diversity of activities, with the exception of the three downtown locations. Also with the exception of Pinheiro Torres / Pasteleira Nova (4), the percentage of

derelict buildings is generally similar or higher than the parish average (which could be the signal of abandonment or lack of investment), whereas network connectivity is always lower, something to be expected of neighbourhoods that may be closed unto themselves. Considering these values, as well as the division of parishes based on the neighbourhood perceptions of safety and collective efficacy (see Figure 1), further considerations can be made regarding these locations.

Group 1 of parishes, covering Bonfim and Campanhã (Figure 1), correspond to the places with the lowest crime records in the city, according to Police data, but with a high sense of insecurity felt by the city's inhabitants, much due to the reputation of the two neighbourhoods Cerco and Lagarteiro (2 and 10). A large percentage of respondents in these highly dense residential locations signal social incivility problems as risk behaviours, homelessness, delinquency or vandalism, but also, importantly, public space problems as degradation of urban areas and sidewalks, insufficient lighting, accumulation of garbage, derelict buildings and lack of mix-uses and leisure spaces, which fits with the morphological indicators calculated in Table 1. Nonetheless, respondents living in these poorly connected areas display interesting levels of sense of belonging and social cohesion which, along with the clear need to improve morphological conditions, may justify the existing perceptual gap between residents and outsiders.

Group 2 of parishes, in the west side of the city, has also low levels of reported crimes, but contrary to Group 1, respondents signal very little problems of maintenance or social incivilities. As a consequence, these are the parishes which reveal the greatest levels of sense of belonging and social cohesion. Therein, only one location, Viso (8) is included in Table 1. Again, this is a highly dense social neighbourhood, with lack of green spaces and an above-average percentage of derelict buildings. However, due to its location, it favours by having good connectivity and the highest mix-use density of all the social neighbourhoods' analysed.

Group 3 is comprised by the parish of Paranhos and includes the University Campus (9). This is an area that has intermediate levels of reported crimes, and respondents (albeit in lesser number in relation to Group 1) also identify some insecurity problems in public space as accumulation of garbage, degradation of sidewalks and insufficient lighting. It can be seen in Table 1 that the immediate area around the Campus has the highest percentage of derelict buildings, and the lowest connectivity. It is also on the lowest class of services and activities, something that has also been signalled by respondents, who claim the need for more leisure and cultural activities, even though this area has a quantity of green spaces. This, along with the presence of student residencies, may help justify that respondents show a very little sense of belonging and collective efficacy in this area.

Finally, Group 4 includes the central parishes of the city; Lordelo, Massarelos and the five of the historical city centre. This is the area of the city with the highest levels of registered crime and, accordingly, includes six of the ten spots most signalled as unsafe. These are concentrated in Lordelo do Ouro (1, 3, 4) and the downtown parishes (5, 6, 7). There is an interesting duality in this area, according to the survey. One third of

respondents signalled the area as having risk behaviours and urban space problems as sidewalks in improper conditions and absence of mix-use and leisure and other facilities. However, the majority of respondents answered very highly to questions concerning sense of belonging and collective efficacy, showing strong apprehension about the maintenance of the public space. The variables in Table 1 address this duality by distinguishing between the two places of aggregation of insecurity hot-spots. In Lordelo, the areas identified are associated to four social neighbourhoods (1, 3 and 4), highly dense and exclusively residential, that however stand very close to green areas, services, axes of high connectivity and the high-end neighbourhoods of the city. The ones in the historical city centre (5, 6 and 7), are located in places of high density of buildings, connectivity and mix-use, but with less residents and with notable dereliction.

Conclusions

Urban safety is a major pillar of quality of life, social progress and cohesion strategies. Models of research and prevention call for multi-domain and multi-disciplinary works that can accommodate the various facets of insecurity and its relationship with urban areas and how they are used and experienced. As an exploratory work, this research uncovered some initial pertinent relationships between morphological characteristics of urban spaces with feelings of insecurity and crime statistics. As Sohn (2016) points out, crime and the perception of crime are two different things, and reveal different territorial patterns, as was the case in Porto. There are perceived dichotomies between territories considered as unsafe by the city's inhabitants, the perceptions of the residents of those areas and the reported crime statistics. On the contrary, the morphological indicators selected in this first approach (densities, land-use mix, connectivity), as well as other aspects of disorder or dereliction identified for the 250-meter radius around the hot-spots, fitted well with the responses to the perception survey, and could give relevant clues as to why a place is considered unsafe, and support intervention needs in such areas.

But to do so, it is important to point out that areas that are similarly regarded as unsafe present different (morphological) characteristics. This heterogeneity means that public policies for safety should be anchored to particular contexts, and research should move towards a higher comprehension of micro-scale dynamics, as Weisburd et al. (2016) suggests, where the role of space-based approaches, as well as the participation of local actors, is paramount. This research is, recognizably, just the first approach at city level, that now needs to dig deeper into the specific contexts and develop explanatory and prediction models. The articulation between urban morphological elements, planning policies and the different realms of prevention, can produce holistic locally-based strategies able to support changes in urban, as well as social conditions. By giving a spatial weight to these connections, a further territorial understanding can be grasped by comparing form and feeling with other socio-economic vulnerabilities, thus informing on aspects of environmental design, safety and quality-of-life.

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