Homicide in the Brazilian Favela: Does Opportunity Make the Killer?

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HOMICIDE IN THE BRAZILIAN FAVELA

Does Opportunity Make the Killer?

ELENICE DE SOUZA* AND JOEL MILLER

High rates of homicide in Brazil are heavily concentrated in poor urban shanty towns or ‘favelas’. This paper looks beyond conventional social and economic explanations of homicides, and examines the relationship between situational factors and homicide incidents within a case-study favela in the city of Belo Horizonte. Initial exploratory research identified potential mechanisms linking local situational characteristics with homicide. A matched case–control study then tested hypotheses based on these mechanisms. When the characteristics of 100 addresses of homicide incidents were compared with those of 100 nearby non-homicide addresses, they showed statistical associations with drug areas, bars, alleys, windows onto the street and vehicular traffic, lending general empirical support to theorized situational mechanisms.

Keywords: favela, homicide, situational factors, environmental criminology

Introduction

High rates of homicide affect vulnerable urban areas across the developing world, and long ago reached crisis proportions in Brazil, Latin America’s most populous country. Committed by young men and adolescents using firearms and living in impoverished shantytowns or ‘favelas’ (Zaluar 1984), they represent a problem of grave national concern. Existing scholarship has sought to understand why favelas produce such a high level of violence. Studies note the marginalization and poverty, and draw attention to the surge in drug trafficking in recent years that has come to dominate favela neighbourhoods (Beato Fiho et al. 2001; Silva 2004; Nascimento 2004; Silveira 2007). In line with much conventional criminology, these studies have been concerned with explaining homicide primarily with reference to its broader social and economic context.

While these accounts likely form an important part of the explanation for favela violence, this study takes a different, complementary, approach. It uses the lens of environmental criminology (e.g. Wortley and Mazerolle 2008; Felson and Clarke 1998; Brantingham and Brantingham 1981) to examine whether immediate situational factors, within the favela environment, help explain the commission of homicide. Specifically, the article assesses whether homicides are more often found in favela locations with features that draw potential killers and victims together, where characteristics are present that may make homicide more likely, and where a lack of natural surveillance could make it easier for a killer to operate without fear of detection. It examines these questions within the Alto Vera Cruz, a favela on the outskirts of Belo Horizonte, Brazil’s third-largest city.

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Background

Homicide and the Brazilian favela

According to 2004 statistics published by the United Nations Office on Drugs and Crime (UNDOC), Brazil’s 28.5 homicides per 100,000 ranks as the 11th highest homicide rate in the world (UNDOC 2009), based on a tally of 199 countries and territories (the United States had 5.8 per 100,000). In the 1980s, pioneering studies exploring the reasons for this high level of violence showed that homicides, contrary to other types of crime, were largely confined to the poorest areas of regions and cities, particularly the favelas (Beato Fiho 1998; Batittuci 1998; Beato Fiho and Reis 2001). Favelas, common in Brazil’s cities, are urban spaces formed from the informal occupation of municipal and private lands by poor and low-income workers, the great majority of whom are of African descent (Vargas 2006; Goldstein 2003; Zaluar and Alvito 1998). They are usually built on irregular terrain and comprise shanties, wooden houses and unfinished brick houses, and are characterized by high population density, poverty, lack of infrastructure and intense social life (Vargas 2006; Zaluar and Alvito 1998).

Studies reveal that the high rates of homicide in favelas are not related to the problem of poverty alone, but to an explosion of illicit drug trafficking beginning in the 1980s. The growth of drug markets has been coupled with the easy availability of firearms for impoverished young men involved in the local drug trade (Zaluar 1984; Beato Fiho et al. 2001; Beato Fiho 2003). At the same time, favelas offer a strategic environment for drug commerce to flourish (Soares et al. 2005; Vargas 2006): typically positioned close to highways, they allow easy access to consumers from outside the favela. Inside the favela, the maze of crooked alleys and paths provides opportunities to hide activities from police or other residents (Vargas 2006). The drug trafficking has been accompanied by oft-repeated cycles of violence with offenders and victims often having grown up in the same neighbourhood and known to one another (Beato Fiho et al. 2001). Violence arises from battles between drug-dealing groups for the control of drug markets, disputes over drug debts, as well as trivial acts of revenge (Beato Fiho et al. 2001; Silva 2004; Nascimento 2004; Silveira 2007), in a pattern reminiscent of Anderson’s (1999) ‘code of the street’ characterizing parts of the US inner city.

Environmental criminology and situational determinants of crime

In contrast to traditional criminology’s focus on the social and economic causes of crime, environmental criminology seeks explanations for crime in the daily activities of actors, their intersection with one another, and their interactions with the social and physical structures around them. Complementary theoretical approaches emphasize how opportunities for crime are created by victims’ or offenders’ routine activities (Cohen and Felson 1979), by the layout and land use of urban settings (Brantingham and Brantingham 1981; 1995) and by ‘situational’ characteristics that influence offender decision making (Clarke 2009; 1997; 1995; Cornish and Clarke 1986). These approaches to explaining criminal behaviour shift thinking away from underlying criminal propensities, to the distribution and accessibility of opportunities to commit crime.

The current article draws on these theories to consider the links between the immediate situational characteristics of places and homicide. In particular, it is concerned
with the characteristics of small and specific ‘micro places’ that can have strong impacts on crime (Bernasco and Block 2011; St Jean 2007). Such places may include ‘crime generators’—such as public transport stations, shopping malls, entertainment districts, schools or parks—to which large numbers of people are attracted for reasons unrelated to crime, but nonetheless provide opportunities for people to commit crime (and to be victimized) (Brantingham and Brantingham 2008; 1995; Bernasco and Block 2011; Clarke and Eck 2005). They may also include ‘crime attractors’ that directly attract motivated offenders, who come in search of crime targets, such as around drug markets, prostitution areas or bars (Brantingham and Brantingham 2008; 1995; Clarke and Eck 2005). According to ‘crime pattern theory’, these crime-prone locations emerge from a dynamic urban ‘backcloth’ formed through the interplay of roads, land use and economic structures, varying through time as people’s activities around them change (Brantingham and Brantingham 1981; 1993; 2008; Beavon et al. 1994).

Additionally, this article is concerned with factors that make the commission of crime easier and more probable, even after a potential offender and target or victim have converged in space and time. In the language of situational crime prevention, these are ‘facilitators’ (Clarke and Eck 2005; Clarke 1997; 2009). ‘Physical facilitators’ can include tools used in the commission of crimes, such as guns (Lester and Murrell 1981; 1982) or the layout of physical spaces to make crime easier. ‘Social facilitators’ increase rewards, or provide encouragement and legitimation, for criminal acts. These may be more common among gatherings of groups of young men, or among people in gangs. ‘Chemical facilitators’ include alcohol or drugs, and work to ‘increase offenders’ abilities to ignore risks or moral prohibitions’ (Clarke and Eck 2005: 66). A body of research links alcohol with crime (e.g. Bernasco and Block 2011; Brantingham and Brantingham 1982; Loukaitou-Sideris 1999; Ratcliffe 2011; Rice and Smith 2002; Roncek and Bell 1981; Roncek and Maier 1991; Roman et al. 2009; Duailibi et al. 2007; Biderman et al. 2006; Louw and Shaw 1997).

The article also considers the relevance of natural surveillance—an idea present in situational crime prevention (Clarke 1997) and which has emerged in particular from scholarship on architecture and design, including ideas of ‘crime prevention through environmental design’ (Jeffrey 1971) and ‘defensible space’ (Newman 1972; 1996). Opportunities for surveillance by the public may be enhanced by physical design, such as the presence of windows or otherwise clear views of the streets from homes, by interaction among local residents around their homes, by people going about their daily routines with clear views of potential crime settings or by enhanced lighting making natural surveillance easier (Cozens 2008; Felson and Boba 2010; Clarke 1997).

**Bringing environmental criminology to the favela**

In bringing the lens of environmental criminology to the favela, our aim is to identify and understand features of the favela that contribute to the problem of homicide—particularly in specific places (Eck and Weisburd 1995)—which might inform interventions to reduce its incidence. This should be seen as complementary to broader social and economic explanations for elevated rates of favela violence, already reviewed, which might suggest other kinds of interventions to address the problem.
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With this in mind, it is broadly hypothesized that the types of situational mechanisms, reviewed above, also have relevance to the favela environment and the crime of homicide. However, it was not clear, at the outset, what forms they might take. To develop and test specific hypotheses, homicides were examined within the Alto Vera Cruz favela in Belo Horizonte. The city of 2.2 million residents occupies an area of 335 square kilometres, while the favela, with a population in 2000 of 21,499, occupies just 0.83 square kilometres (Joao Pinheiro Foundation 2006). In 2001, the Alto Vera Cruz favela registered 36.6 homicides per 100,000 while the rate in Belo Horizonte outside of the favelas was 14.7 (Beato Fiho et al. 2001). Official statistics highlight the economic adversity experienced by Alto Vera Cruz residents, with unemployment rates for 15–17-year-olds at 60 per cent, and 34 per cent for those aged 18–24 (Joao Pinheiro Foundation 2006).

The Alto Vera Cruz favela has features reminiscent of the crime generators and attractors of existing literature, including a ‘downtown’ commercial area, bus-stops, bars and illicit drug markets (Brantingham and Brantingham 2008; 1995; Clarke and Eck 2005). Meanwhile, the presence of gangs, and the consumption of alcohol and drugs offer potential crime facilitators (Clarke and Eck 2005).

Figure 1 shows a map of the favela, indicating the street grid, including alleyways, along with the downtown commercial area, areas controlled by drug gangs, and drug-selling locations. Based on the 3,942 addresses registered to the favela by Belo Horizonte’s Department of Data Processing, the favela has approximately one address for every 210 square metres, on average, akin to an average distance between nearest addresses of about 15 metres, not accounting for variations in address concentration.

Despite the similarity between favela features and the generators and attractors of conventional criminological literature, it is possible that the make-up of the favela produces a distinctive ‘backcloth’ compared to many of the contexts and crime types in which environmental criminology has evolved. For example, unfinished houses, uneven terrain and the criss-crossing of alleys may have specific local implications for defensible space and patterns of surveillance. Furthermore, in an environment characterized by economic marginalization and high unemployment, the routine activities of potential offenders and victims may have more to do with leisure activities than employment.

Given the social character of the favela, a further theoretical question arises. Perceptions of risk are an important component of environmental criminology including the role of natural surveillance (Cozens 2008; Felson and Boba 2010; Clarke 1997) and situational crime prevention (Clarke 1997). Ethnographic analyses (Vargas 2006; Goldstein 2003; Zaluar 1984) paint a picture of favela life in which perpetrators of homicide and violence face relative impunity for their crimes, raising questions about the importance of this risk calculus in the favela. Young drug-gang members are born and live in the favelas, perhaps lending money, supporting families and providing other forms of assistance there (Zaluar and Alvito 1999). Meanwhile, through threats and violence, and through corrupt ties with political leaders and police, they strengthen local rule and drive out community residents who challenge them, creating an atmosphere of ‘peaceful’ familiarity based on a code of silence (Alvito 1996; 2001; Vargas 2006; Goldstein 2003; Zaluar 2004). These descriptions suggest the favela may be characterized by ‘offensible space’ (Atlas 1991). Rather than law-abiding residents establishing control of territory, such as by defining boundaries, controlling access and exercising
natural surveillance (i.e. creating Newman’s (1972) ‘defensible space’), drug dealers and criminals use similar techniques to establish and maintain their ownership and control of these spaces instead.
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With these issues in mind, the paper develops and tests hypotheses about the situational predictors of homicide in the Alto Vera Cruz favela. It describes an initial, exploratory, phase to identify potential mechanisms linking situational characteristics to homicide, and a hypothesis-testing phase using a matched, case–control design.

Exploratory Research

Methods

The initial exploratory research was guided by the literature reviewed, but sought to inductively identify potential situational mechanisms at work within the favela. It relied on a number of sources of data, collected by the first listed author, a native Brazilian from Belo Horizonte, during 2005 and 2006.

Police interviews

Group or individual interviews were conducted with the military police commander overseeing the Alto Vera Cruz favela, ten police officers drawn from community policing and traditional emergency response squads, and seven homicide investigators from the civil police—all operating within the favela. These interviews allowed for general discussions about favela life, police operations and the character of violence and homicide.

Police ride-alongs and foot patrols

The researcher also accompanied police officers on two ride-alongs and three foot patrols, during day and night-time hours, to different areas of the favela. This provided an opportunity to observe favela life, including gang and drug activities. It also allowed for more conversations with police officers about operational policing and the nature of violent crime.

Interviews with killers

Interviews were conducted with eight offenders who had perpetrated homicides within the favela. Three of these were interviewed in a prison setting, following an application to the relevant government office. The other killers—at large within the favela—were interviewed in neutral locations, with access negotiated through a local anti-violence activist and former drug dealer familiar with local gang figures. These helped illuminate the character of homicides and other violent acts by detailing the series of actions that made up these crimes (Cornish 1994; Braga 2008).

Field observations

Across three afternoons, the researcher spent time walking around the favela, accompanied by a local anti-violence activist well known to local people, making observations about the physical layout and social life of the favela. In the course of these observations, a number of informal conversations took place with favela residents about their experiences and perceptions of crime in the favela.
Homicide data
The researcher had access to electronic records for all homicide incidents perpetrated in the favela between 2000 and 2006 from a civil police database. Additionally, the researcher was granted access to paper investigatory files on 74 individual homicide incidents held by civil police, which provided some additional data on homicide incidents. From these sources, 100 of the 110 homicide incidents between 2000 and 2006 were geocoded (an incident could include more than one offender or victim). This was possible because the favela was characterized by a detailed system of addresses, involving street names and numbers with which the police were largely familiar. Address information was clarified and corroborated, as far as possible, by cross-checking electronic and paper sources, and by reviewing case notes and crime scene photographs that provided information or images concerning the crime location. Sometimes, this helped correct an erroneous address or interpret an address recorded using informal street names or other geographical reference points. Ten cases were ultimately dropped because incomplete address information prevented reliable geocoding.

Characteristics of homicide
The geographical patterning of homicides is presented in Figure 2. The graphic shows a point map of homicide locations between 2000 and 2006, overlaid on a kernel density function. The latter uses a nonparametric technique to estimate a continuous surface representing the expected probability of homicide through space, based on the available homicide points (Anselin et al. 2008).

The map suggests some areas of the favela tend to greater concentrations of homicide than others. Calculation of Ripley’s L function (Anselin et al. 2008), using Splancs statistical software, indicates statistically significant clustering (p < 0.05) for distances greater than 65 and up to more than 250 metres, indicating clustering at an area level, but not so much around specific places.

For the 75 homicide incidents in which a clear homicide time could be identified from available data, analysis showed they were rare in the morning (4 am–12 am), and peaked late afternoon (4–6 pm) and late evening or early hours (10 pm–4 am). Figure 3 shows the distribution of homicides by time of day. Based on analysis of 100 homicide records, homicide was more common on weekend days (20 per cent occurred on Saturday, 26 per cent on Sunday) compared with weekdays (11 per cent per day on average), though weekdays still accounted for the majority of homicides overall.

The reasons for homicide were often hard to establish from investigatory case files and other sources of data (many remained unsolved). In the 82 homicide cases in which victim gender information was available, 81 were male. From the 74 case investigatory files, 53 made clear mention of drug involvement of victims. Ninety-nine out of 100 homicide incidents took place outside.

Potential mechanisms linking situational factors with homicide
On the basis of insights drawn from data collection and theoretical ideas provided by the existing literature, a number of potential mechanisms were elaborated that could link aspects of the favela environment to the occurrence of homicide.
Fig. 2  Point map and kernel density function of homicides in Alto Vera Cruz favela 2000–06 (n = 100)
Mechanism 1: Areas associated with drug trafficking and selling are attractors to potential killers and victims; the territorial rivalries and gang norms at play in these areas legitimate and promote violence, acting as facilitators to homicide

Police officers, killers and local residents who were interviewed for the research highlighted areas involved in drug activity as particularly important in understanding homicide. In 2007, the police had identified eight different groups involved in drug activities, with their own territories, coupled with 37 drug-selling locations. During observational fieldwork, it was common to see young males—typically wearing long shorts, t-shirts, flip-flops or tennis shoes, some with hats or coloured hair—hanging out, often in groups, on street corners, near bars or at the entrances of drug-gang territories. According to accounts given by community members and police, these individuals were often lookouts for drug dealers, drug sellers or ‘soldiers’ protecting drug lords. Accounts also described how violence was triggered by the trespassing of drug dealers into drug locations and territories controlled by rivals, the settling of drug debts among drug dealers and users, and other disputes or acts of revenge among those involved in the trade.

Mechanism 2: Bars act as generators of homicide due to their central place in favela life, bringing potential killers and victims into contact; some bars also act as attractors to potential killers seeking out crime opportunities; by serving alcohol (a chemical facilitator), they also make homicide a more likely outcome of contacts

Bars are one of the few places in the poor community of the Alto Vera Cruz favela that offer entertainment to its residents, along with a few diners, pizzerias and ice-cream stores. One bar owner estimated there were a total of 350 different bars in the favela, though it was difficult to corroborate this in the absence of formal lists. During the period of homicides for which research was conducted, bars were not formally licensed or subject to municipal regulation. Observations indicated that some bars were gathering points for young men apparently involved in the drug trade (an insight supported...
by the accounts given by police and community informants). At one point in a police ride-along, the researcher attended a homicide crime scene, directly outside a bar. In conversation, police officers also noted that some bars were used by drug-dealing gangs to stash weapons. It seems likely, too, that the consumption of alcohol in these settings would tend to increase the vulnerability of potential victims and potential killers’ ability to ignore risks and moral prohibitions (Roberts 2007; Clarke and Eck 2005; Homel et al. 2004; Louw and Shaw 1997).

Mechanism 3: Alleys act as physical facilitators for homicide when they are structured to allow killers to escape the scene easily

Alto Vera Cruz, like other favelas, has a confusing maze of narrow alleys intersecting the main street grid. The police described how people involved in shootings and violence often used these alleys to mount getaways from the crime scene. In doing so, they highlighted their own reluctance to enter too far down alleys where they would be confronted with uncertain terrain, blind curves and a risk of being shot. Residents, too, mentioned how, following a shooting, perpetrators would scramble down alleyways—often near their homes—in their bid to escape. An interviewed killer also described his own routine use of alleys in the immediate aftermath of violent incidents. Observations revealed that there was often direct and easy access to narrow alleys at a number of locations where, historically, homicides had taken place.

Mechanism 4. Natural surveillance, produced by physical structures and people’s interactions with them (e.g. concentrations of vehicular traffic, street-facing windows in homes, street lighting, commercial stores, public phones) increases the perceived risks for potential homicide perpetrators

Both killers and police officers mentioned the potential advantages of empty streets lacking witnesses, or locations with limited lighting, in the commission of violence and homicides. These ideas fit with criminological theories concerned with natural surveillance already discussed (Cozens 2008; Clarke 2009; Krueger et al. 2001; Painter and Tilley 1999; Newman 1972; 1996; Jeffrey 1971). During field observations, a number of favela features seemed potentially relevant to patterns of natural surveillance because they could increase the chances of potential killer being seen. These included the presence of windows in homes with a direct view of the streets, vehicular traffic passing through streets, commercial stores and public telephones (which provided places for people to congregate), and street lighting that could enhance visibility.

Testing Hypotheses

Methods

To assess the empirical evidence for the mechanisms described, a case–control study design was used. This method compares a group of cases sharing an outcome of interest with a group of ‘controls’ without the outcome (Schlesselman 1982). Differences between groups highlight risk factors predictive of the outcome of interest. Direct matching between cases is a modification of the case–control design that is used here. Matching increases the efficiency of the methodology by directly eliminating threats to validity of the confounding variables involved in the matching and is particularly efficient for smaller sample sizes (Schlesselman 1982). The case control methodology has
been successfully applied to some criminological studies (Clarke and Eck 2005), including research on drug-dealing locations in San Diego, California (Eck 1994), homicide victimization in Maryland (Dobrin 2001) and convenience store robberies (Hendricks et al. 1999), the latter involving direct matching on location—similar to the current study.

Sample
The study sample included the 100 cleaned address locations for homicide incidents for 2000–06, as described above (see Figure 2), along with 100 matched control addresses where there were no homicides during the period. Control locations were selected for each homicide with a sufficient distance from the homicide to minimize sharing of the same immediate situational factors characterizing the ‘place’ associated with an address, while ensuring that the address pairs were approximately matched in terms of the broader area or ‘space’ in which they are located (Block and Block 1995; Eck et al. 2005), thus avoiding the confounding of local with area-level variation. Distances chosen were informed by fieldwork observations on the nature of spatial variation within the favela. A minimum distance of half a favela block was used (50 metres) and a maximum distance of about a block (approximately 100 metres). Selection involved taking each homicide address in turn, drawing a random sample of non-homicide addresses (using a comprehensive database of favela addresses obtained from Belo Horizonte’s Department of Data Processing), calculating their distances from the homicide address and then selecting the closest address beyond 50 metres. Ultimately, the results of this matching process produced control addresses that met reasonably well with criteria: they ranged between 50 and 137 metres from their homicide pair, with most (90 per cent) less than 75 metres away.

Data collection
A structured environmental survey protocol, resembling a closed-response questionnaire, was designed to collect direct observational data from each of the sample addresses concerning the presence or absence of key situational features. To allow for validity checking of data, multiple photographs were also taken of many sample locations, which were subsequently used to check recorded data after the observations had taken place. Assessing the coincidence of sample addresses with drug areas, however, relied directly on intelligence data provided by the Military Police 128th Precinct in Belo Horizonte, rather than observation.

Fieldwork was conducted between September and December of 2007, once again by the first listed author of this article, on Thursdays, Fridays and Saturdays between 5:00 pm and 7:30 pm, and on Sundays between 10 am and 2 pm when the streets were busier. Collecting data late at night was judged too dangerous because of risks posed by armed young males present on the street. This meant we were not able to examine variations in dynamic situational characteristics during these times—an issue we return to in our analysis. Fieldwork was conducted in the presence of a key informant who lived and worked in the favela, a person known to many residents and familiar with the geography and social dynamics of the streets and alleyways. This allowed the author to circulate through the favela without arousing suspicion, and to access the more dangerous drug-dealing and gang areas.
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Table 1  Final variables hypothesized to predict homicide

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measurement</th>
<th>Theorized mechanisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug areas</td>
<td>Address located inside drug-gang areas or at the location of drug-selling spots (as defined by police operational intelligence)</td>
<td>Crime attractors: Killers are drawn to drug areas because of drug activity&lt;br&gt;Crime facilitators: Drug-gang areas have potential for conflicts or provocations arising from drug-dealing disputes, defending turf and revenge</td>
</tr>
<tr>
<td>Bars</td>
<td>Address within 15 metres of a bar</td>
<td>Crime generators/attractors: Killers and victims drawn to bars for recreational purposes and in some cases because of opportunities for crime&lt;br&gt;Crime facilitators: Presence of alcohol reduces a potential offender’s sense of risk and moral inhibition, and the judgment of potential victims</td>
</tr>
<tr>
<td>Alleys</td>
<td>Address within 15 metres of alley leading off the street. Alley must be interconnected with others to provide an escape route (i.e. it is not a dead end)</td>
<td>Crime facilitators: Interconnected alleys provide easy exit routes from crime scene and potential hiding places to avoid pursuit and detection</td>
</tr>
<tr>
<td>Windows onto street</td>
<td>Address has residences with front windows looking directly onto the street</td>
<td>Natural surveillance: Residential building design creates natural surveillance at address, increasing potential offenders’ perceived risk of detection by residents in their homes</td>
</tr>
<tr>
<td>Daytime vehicular traffic</td>
<td>Address is located on a route where the flow of cars or buses is constant and observable, at least every two minutes, during daytime/evening hours</td>
<td>Natural surveillance: Presence of vehicular traffic produces natural surveillance effect as people driving are able to survey the street. This increases potential offenders’ perceived risks of detection</td>
</tr>
<tr>
<td>Shops</td>
<td>There had to be at least two or more commercial stores located within two or three addresses either side of, or directly across the street from, the sample address</td>
<td>Natural surveillance: Presence of shops promotes natural surveillance effect, owing to customers and shopkeepers congregating at stores that have views of the street. This increases potential offenders’ perceived risks of detection</td>
</tr>
</tbody>
</table>

Variables and hypotheses
At the completion of data collection, six binary independent situational variables were available based on the more reliable situational data collected. These were used to test hypotheses related to the theorized situational mechanisms. Other, potentially relevant, situational variables were ultimately dropped from the research because they appeared unreliable in some way. For example, it was not possible to know whether street lamps, observed during the day, functioned adequately at night. Or, in the case of public phones, it became clear that people’s presence at these locations varied substantially through time and space, making their presence or absence in an area generally an unreliable measure of surveillance.

It was hypothesized that drug areas, bars and interconnected alleys near an address would be associated with an increased incidence of homicide, while windows in homes facing on to the street, more intense traffic and the presence of stores would be associated with a lower incidence of homicide. Table 1 provides an overview of the five variables at the heart of these hypotheses, their operationalization and the theorized mechanisms with which they were associated.

Results
Table 2 presents cross-tabulations of the six situational variables across homicide and control addresses, along with significance tests using MacNemar’s test for matched
pairs. The table includes comparisons for the whole sample of 200 cases (100 pairs) and separate comparisons for two subgroups of paired addresses differentiated by the time of the original homicide where this was known (25 pairs or 50 addresses were dropped because they lacked this information). Subgroups differentiated night-time (from 10 pm until 5.59 am) from daytime/evening (6 am until 9.59 pm). These time periods matched the daily rhythms of favela life: during the night, stores would be closed, traffic calmer and favela residents more often at home, compared to daytime and evening. Significance levels of p < 0.1 are considered as noteworthy in this table (and later analysis) given that the modest sample sizes involved in the comparisons (Maltz 1994).

The bivariate results provide initial support for most hypotheses tested: the drug areas, bars and windows all showed profound and statistically significant differences between the two sets of addresses (p < 0.01)—differences that were consistent for the two time periods. Daytime vehicular traffic shows smaller differences overall (though still significant at p < 0.05), but much stronger associations during the daytime/evening (p < 0.01) than at night. This makes sense: traffic is probably busier during the daytime and evening (when our measures were taken) than at night, and hence more likely to produce a surveillance effect. Finally, stores had no statistically significant associations with homicide in any of the three comparisons.

While bivariate analyses provide important clues to relationships, multivariate models allow us to assess the separate effects of each independent variable after controlling for the others. We planned to estimate models using conditional logistic regression that examines differences within (rather than between) grouped sets of observations, and is commonly used with case–control studies (Menard 2010). However, these models did not achieve convergence for our data so we instead calculated linear probability models using ordinary least squares estimation with fixed effects. While this is not the ideal method for modelling binary-dependent variables (Long 1997), it probably provides acceptable estimates for our purposes, provided adjustments are made for

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Table 2. Bivariate comparisons of situational characteristics between homicide (H) and control (C) sites with McNemar’s test for matched pairs

<table>
<thead>
<tr>
<th>Situational factors</th>
<th>All cases (n = 200)</th>
<th>Daytime/evening (06.00–22.00) (n = 78)</th>
<th>Night-time (22.00–06.00) (n = 72)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug areas</td>
<td>H 94 C 32 **</td>
<td>H 92 C 28 **</td>
<td>H 97 C 39 **</td>
</tr>
<tr>
<td>Bars</td>
<td>H 48 C 22 **</td>
<td>H 56 C 26 **</td>
<td>H 53 C 22 *</td>
</tr>
<tr>
<td>Alleys</td>
<td>H 74 C 26 **</td>
<td>H 74 C 26 **</td>
<td>H 67 C 25 **</td>
</tr>
<tr>
<td>Windows onto street</td>
<td>H 29 C 66 **</td>
<td>H 21 C 56 **</td>
<td>H 42 C 72 **</td>
</tr>
<tr>
<td>Daytime traffic</td>
<td>H 53 C 70 *</td>
<td>H 44 C 74 **</td>
<td>H 58 C 69 ns</td>
</tr>
<tr>
<td>Stores</td>
<td>H 19 C 28 ns</td>
<td>H 21 C 33 ns</td>
<td>H 19 C 33 ns</td>
</tr>
</tbody>
</table>

Daytime/evening and night-time calculations exclude 25 homicide-control pairs (50 cases) for which time of homicide was not known.

**p < 0.01, *p < 0.05, + p < 0.1, ns = non-significant.

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1Bivariate comparison of cases with and without time information showed similarities on most variables, but with bars (p < 0.05) and shops (p < 0.1) significantly less frequent at addresses with the missing information.
Table 3. Fixed-effects linear regression on homicide using cluster robust standard errors

<table>
<thead>
<tr>
<th>Situational factors</th>
<th>B</th>
<th>(SE)</th>
<th>All cases (n = 200)</th>
<th>Daytime/evening (06.00–21.59) (n = 78)</th>
<th>Night-time (22.00–05.59) (n = 72)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug areas</td>
<td>0.61</td>
<td>(0.10)</td>
<td>**</td>
<td>0.52 (0.15) **</td>
<td>0.67 (0.12) **</td>
</tr>
<tr>
<td>Bars</td>
<td>0.39</td>
<td>(0.13)</td>
<td>**</td>
<td>0.62 (0.13) **</td>
<td>0.33 (0.13) *</td>
</tr>
<tr>
<td>Alleys</td>
<td>0.26</td>
<td>(0.13)</td>
<td>**</td>
<td>0.28 (0.15) +</td>
<td>0.33 (0.15) *</td>
</tr>
<tr>
<td>Windows onto street</td>
<td>–0.32</td>
<td>(0.12)</td>
<td>**</td>
<td>–0.15 (0.12) ns</td>
<td>–0.52 (0.15) **</td>
</tr>
<tr>
<td>Daytime traffic</td>
<td>–0.11</td>
<td>(0.14)</td>
<td>ns</td>
<td>–0.27 (0.13) +</td>
<td>0.08 (0.21) ns</td>
</tr>
<tr>
<td>Stores</td>
<td>0.01</td>
<td>(0.12)</td>
<td>ns</td>
<td>–0.07 (0.13) ns</td>
<td>0.06 (0.16) ns</td>
</tr>
<tr>
<td>Constant</td>
<td>0.07</td>
<td>(0.15)</td>
<td>ns</td>
<td>0.05 (0.14) ns</td>
<td>0.02 (0.18) ns</td>
</tr>
</tbody>
</table>

Daytime/evening and night-time calculations exclude 25 homicide-control pairs (50 cases) for which time of homicide was not known.

** p < 0.01, * p < 0.05, + p < 0.1, ns = non-significant.

heteroskedasticity (Wooldridge 2009). Table 3 presents the results of the ordinary least squares fixed-effects regression models with cluster robust standard errors.

The multivariate models suggest some broadly similar patterns to the bivariate analyses, though they also suggest some interesting effects less visible in the bivariate comparisons. Drug areas still appear large and significant in their association with homicide across all models. Bars also show significant relationships in all comparisons, but with coefficients larger during the day/evening than night, perhaps reflecting their greater activity at these times. Alleys also continue to appear important, and were statistically significant across the three models, at the p < 0.05 level for the overall model and the night-time model, and p < 0.1 level for daytime/evening. Windows, while significant overall, did not show a statistically significant relationship during the daytime/evening. However, they had a large and highly significant effect during the night (p < 0.01). This may be because residents spend more time out on the street during the day and evening, and more time at home during the night, making these times more important. Daytime traffic shows no statistically significant effects for all cases, but reaches borderline significance (p < 0.1) for homicides during daytime/evening. This is consistent with earlier bivariate observation and tends to confirm the greater relevance of traffic as a source of surveillance during the daytime/evening than at night. Finally, stores had no statistically significant associations with homicide, though coefficient size and direction were consistent with a possible weak effect during the day/evening only. However, in the absence of statistical significance, we cannot be confident about any underlying effect.

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2While we treat the linear probability models here as an approximation, we recognize the need for some caution. The linear functional form of OLS in linear probability models is not well suited to a binary-dependent variable, and can produce misleading coefficient estimates and (when estimating from model results) may estimate probabilities out of the range of 0–1—namely the conceivable probability range for a binary variable (Long 1997).

3The fixed-effects modelling approach helps control for spatial dependency in the data by ‘modelling out’ variations in spatial influences between (rather than within) homicide pairs, while treating spatial influences on each homicide-control pair as similar. The latter seems reasonable because homicide-control pairs were spatially proximate, and Ripley’s L-function showed spatial clustering as significant at larger distances (>65 metres).
Considering threats to validity

On its face, the research affirms the role of situational factors in the commission of homicide. However, it is prudent to consider whether any threats to validity might compromise the results reported. A number of issues warrant discussion.

First, though we enjoyed access to homicide investigation files alongside electronic address data to corroborate information on many homicide addresses, we recognize possible imprecision in geocoding. This might have occurred, for example, where address information was consistently recorded incorrectly or where homicide victims fell at a distance from the places they were shot (though we suspect this was not common given the multiple shots often used in killings). Second, we could not control for the changes to infrastructure and land use that may have taken place between the times at which homicides occurred (between 2000 and 2006) and the collection of observational data (in 2007). Third, our fieldwork observations—focused as they were on daytime and evening—could not fully represent the characteristics of those same locations at night, especially with regard to traffic flows. Finally, there may have been confounds that we were not able to control for through the research that raise the risk of spurious statistical findings.

However, these threats are not overwhelming and, in some cases, may even serve to strengthen conclusions. Limitations in the precision of homicide addresses would probably lead to measured locations failing to fully represent the distinctive characteristics of the original homicide settings, and instead taking on characteristics of more ‘average’ favela addresses. Similarly, taking measures of homicide locations years after homicide incidents risks a ‘regression to the mean’ effect, as changes at homicide locations lead them more towards the average favela address, rather than sites particularly prone to homicide. Both of these problems would therefore tend to decrease (rather than increase) the differences between homicide and control locations, in turn decreasing the chances of significant effects (a Type II error). This would make the positive results presented here more, rather than less, persuasive. Meanwhile, our separate analysis of daytime/evening and night-time homicides helps address the limited hours of observation because we can directly compare homicides during similar times of day to those at which observations were made. Finally, the use of a case–control design that focuses on different places that are broadly matched on local area characteristics has the advantage of also controlling for a wide range of potential confounds that may characterize the area, such as economic characteristics, collective efficacy or visible disorder. It remains possible that more proximate, local situational factors of relevance were not measured and controlled for. Ultimately, however, a failure to control all confounds is a common limitation of non-experimental research that this study must also live with, even if the matching in this study does much to limit these threats.

Conclusions

This paper set out to assess whether immediate situational factors could help explain homicide within the favela, in ways that go beyond conventional social and economic explanations of favela violence. The study was conducted in a somewhat atypical

\footnote{This problem would be further exacerbated if the initial shooting happened at an address chosen as a control.}
environment by the standard of many existing studies in environmental criminology: high rates of violence, chaotic physical infrastructure, a culture of impunity and a developing world context. We questioned whether this might produce some atypical conclusions.

Overall, the research found that a number of situational factors had statistical associations with homicides. These factors mostly lent support to theorized mechanisms involving crime attractors (Brantingham and Brantingham 2008; 1995), crime generators (Brantingham and Brantingham 2008; 1995), social, physical and chemical facilitators (Clarke and Eck 2005) and natural surveillance (Cozens 2008; Clarke and Eck 2005; Krueger et al. 2001; Newman 1972; 1996; Jeffery 1971). Importantly, factors and mechanisms were quite conventional, most having close parallels with those from existing literature, suggesting that the backcloth of the favela has much in common with other settings that environmental criminologists have studied. Factors include drug areas (Taniguchi et al. 2011), bars (Bernasco and Block 2011; Brantingham and Brantingham 1982; Loukaitou-Sideris 1999; Ratcliffe 2011; Rice and Smith 2002; Roncek and Bell 1981; Roncek and Maier 1991; Roman et al. 2009; Duailibi et al. 2007; Biderman et al. 2006; Louw and Shaw 1997), adjacency to interconnected alleys (Clarke and Eck 2005), windows (Crowe and Zahm 1994; Newman 1972; 1996; Jeffreys 1971) and traffic flow, though the particularly prominent role of alleys and drug areas in the favela environment seems atypical compared to many other settings. There were also important variations in the relevance of predictors according to time of day, largely consistent with theoretical expectations and highlighting the dynamic nature of the ‘favela backcloth’. The lack of a convincing effect of stores on homicides is an interesting finding, given our expectations that they would increase natural surveillance. It is notable that, in other studies, retail areas and shops have been identified as crime generators and attractors for a range of crimes (Bernasco and Block 2011; Brantingham and Brantingham 1995) and it is therefore conceivable that they also play this kind of role for homicides in the favela. This would complicate the expected statistical relationship, with the criminogenic aspects of stores offsetting their potential surveillance effects on homicide. Such a scenario would be consistent with the null results found in the analysis. However, it is also possible that stores simply do not have the strong surveillance function hypothesized, even though other factors apparently do.

Overall, the findings seem to affirm the importance of risk in the rational calculus of potential killers, most clearly demonstrated by the importance of natural surveillance in homicide incidence, as suggested by associations with windows and daytime traffic. This was not necessarily expected, given the culture of impunity within the favela, tending to protect killers from justice. After further reflection, we speculate that, despite the tight control of local neighbourhoods by gangs and the reluctance of residents to work with the police, there remains a perceived, and perhaps real, possibility that residents will collaborate with the police. We learned, for example, that the police operate extensive networks of informants within Alto Vera Cruz who may be willing to provide intelligence—perhaps about a killer’s identity—even if they are not prepared to give evidence in a criminal investigation. A second possibility is that potential killers do not fear so much the possibility of detection and prosecution by the police and criminal justice system—implicit in the conventional rational choice framework (Clarke 1997)—but the risk of retaliation by rival gang members. In the Alto Vera Cruz, a killing conducted in the view of residents could lead to the killer’s identity being known to rival gang members fairly quickly and easily, raising the prospect of imminent retribution.
Though it is beyond the scope of this article to contemplate fully, findings can directly inform the application of situational crime prevention techniques (Clarke 2009; Wortley 2008; Cornish and Clarke 2003; Cornish 1994; Clarke 1997) to homicide problems in Alto Vera Cruz. Changes to bar-licensing policies—perhaps including restrictions on drinking hours—could limit the frequency with which potential perpetrators and victims come together, and do more to reduce opportunities for violence when they do (Biderman et al. 2006; Stockwell 1997; Guerrero and Concha-Eastman 2001). Gating of alleys, while providing keys to the local residents (Bowers et al. 2004; Clarke 1995), could prevent a potential killer’s easy escape from a crime scene. Future building work could incorporate principles of natural surveillance in their design (Newman 1972; 1996; Crowe and Zahm 1994; Jeffrey 1971; Poyner 1994; Beavon et al. 1994) or surveillance could be enhanced more formally through the introduction of CCTV systems (Cozens 2008; Clarke and Eck 2005).

While these modest interventions may seem simplistic when set against the severity of homicide and the challenging character of the favela, similar measures have apparently had substantial impacts on serious and lethal violence in other tough settings. For example, ‘semi-dry’ laws introduced in Cali Colombia that required earlier night-time bar closing apparently helped bring down homicide rates in the city during the 1990s (Guerrero and Concha-Eastman 2001); an initiative to prevent drive-by shootings at gang crime hotspots in Los Angeles, relying on street closures, was associated with substantial reductions in homicides and other violence (Lasley 1998); and a study of CCTV in Newark, one of the United States’ most violent cities, suggests that some of the cameras may have contributed to reductions in nearby shootings (Caplan et al. 2011). These examples provide grounds for optimism that targeted situational measures would also be helpful for the reduction of homicide in the Alto Vera Cruz favela.

The findings also provide insights relevant to other, similar, settings. Poverty, alleys, drug trafficking and violence are regular features of favela life elsewhere in Brazil (Beato Fiho 1998; Batittuci 1998; Beato Fiho and Reis 2001; Vargas 2006; Zaluar and Alvito 1998). Furthermore, slums or ‘shanty towns’, akin to favelas, are found in urban settings across the world, particularly in developing nations (Davis 2006; Potter and Lloyd-Evans 1998) and are similarly characterized by poverty, improvised housing and crime. However, while this single study likely provides useful insights for other settings, we should be cautious about generalizing too readily, as there are likely important differences beneath their broad-brush similarities. Within Brazil alone, there are notable variations in favela organization, including the extent to which favelas encompass a multitude of independent drug gangs vying for control of separate territories—as is the case in Alto Vera Cruz—or a single gang with monopoly control. We might expect homicide in the latter environment to display some differences in its situational predictors, as gang rivalries and turf conflicts play a much smaller role in favela life, such as in many of Rio’s favelas.

Further research, therefore, would likely add to an understanding of the situational predictors of homicide and other types of violence in these types of environment. In advancing this agenda, the case–control methodology used here presents a promising model. Its utility is premised on an adequate local infrastructure to apply GIS technology and homicide data with sufficient geographical precision. It also requires a willingness to conduct research on the ground in often dangerous environments. However, research of this kind may be worth the risks, if it can pave the way for new insights, and
ultimately practical solutions, to the problems of violence and homicide among some of the world’s most marginalized populations.

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DE SOUZA AND MILLER


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