

Article

Do Migrant and Native Robbers Target Different Places?

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Abstract: The spatial pattern of crime has been a central theme of criminological research. Recently, the spatial variation in the crime location choice of offenders by different population groups has been gaining more attention. This study addresses the issue of whether the spatial distribution of migrant robbers' crime location choices is different from those of native robbers. Further, what factors contribute to such differences? Using a kernel density estimation and the discrete spatial choice modeling, we combine the offender data, POI data, and mobile phone data to explain the crime location choice of the street robbers who committed offenses and were arrested from 2012 to 2016 in ZG City, China. The results demonstrate that the crime location choices between migrant robbers and native robbers have obvious spatial differences. Migrant robbers tend to choose the labor-intensive industrial cluster, while native robbers prefer the old urban areas and urban villages. Wholesale markets, sports stadiums, transportation hubs, and subway stations only affect migrant robbers' crime location choices, but not native robbers'. These results may be attributable to the different spatial awareness between migrant robbers and native robbers. The implications of the findings for criminological theory and crime prevention are discussed.

Keywords: crime location choice; street robbery; spatial difference; China



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1. Introduction

Understanding how offenders choose crime location is a classic criminological problem [1,2]. Research demonstrates that the spatial distribution of crime is heterogeneous [3–7]. Consequently, several theories have been proposed to explain the spatial patterns of offenders' crime location choices. For example, routine activity theory asserts that the environmental factors play a key role in forming the distribution of crime by promoting the convergence in time and space of a motivated offender with suitable and unguarded victims or targets [8]. However, existing studies on the crime location choice of street robbers mainly aim to explain their spatial pattern by various influencing factors [2,9–13], and rarely estimate the acute difference of selection resulting from the different population groups.

Meanwhile, numerous studies have demonstrated that the different population groups have different activity spaces in the interaction between geospatial and human behavior [14–17]. In other words, human spatial behavior displays different distribution in Hukou (household registration system), age, gender, ethnicity, occupation, culture, and other individuals' socioeconomic attributes, and even shows some degree of bias. The same is probably true for offenders, as offending generally takes up only a small part of their routine activities [18]. A growing body of research has shown that the various environmental factors affect offenders' crime location choices [10,19–27]. Simultaneously, according to the geometry of crime in crime pattern theory [10,28], offenders are more likely to commit offenses within their awareness spaces because they know these areas. In the real society, however, offenders may have different perceptions or cognition of the ambient environment due to the differences of individual attributes and socioeconomic attributes such as Hukou, age, gender, culture, and ethnicity, thus forming their different awareness spaces and prompting them to commit crimes in different places. However, this is still

unclear to the group of offenders of different attributes, especially for migrant offenders and native offenders, whether their spatial awareness is inconsistent has yet to be verified. In addition, crime does not occur randomly, and the crime location choices of offenders follow predictable patterns, which reflect the decision-making processes common to human spatial behavior. In the context of crime research and application, understanding these processes at the individual level can enable research to inform policing strategies: Where is an offender more likely to commit a crime next? Who is more likely to commit a crime in that location [29]? The pooling of individual preferences for crime creates differences between groups. Thus, conducting a comparative analysis of crime groups may provide insight into the particularities or differences between groups, and the consequent crime prevention and control countermeasures.

At present, based on offenders' individual-level attributes, some studies have analyzed their criminal behavior. For example, in terms of the journey to crime, the existing literature has found that individual social and economic attributes such as offender's age, gender, and race have different influences on their crime travel distance [30–33]. Pettitway found that female offenders tend to travel longer distances than male offenders in Philadelphia, America [34]. Xiao et al. concluded that older offenders travel over longer distances to commit burglaries than younger offenders in ZG City, China [30]. In respect of offenders' residential locations, Hesseling confirmed that more experienced and older offenders reside predominantly in lower-social status neighborhoods [35]. Liu et al. demonstrated that the spatial pattern of adult migrant burglars varies largely from those of juvenile migrant burglars [36]. Among the literature on the crime location choices of offenders, however, the difference by individual attributes in offenders' crime location choice is seldom analyzed. To date, the only associated published study is Feng et al. [17]. Using a negative binomial regression model in ZG city, China, Feng et al.'s study found that there is a spatial difference between migrant offenders and native offenders in committing violent crimes, i.e., migrant offenders' crime location choices are more clustered outside the old town, whereas those of native offenders are more scattered in the whole study area. Therefore, it is reasonable to assume that the Hukou attributes may be an important factor influencing the spatial distribution of offenders' crime location choices.

However, little is known about spatial differences between migrant offenders and native offenders in committing street robberies in Chinese society. As we all know, China has experienced large-scale internal migration in the past four decades. The rapidly growing urban population, especially the immigrant population in cities, is the primary social concern on public safety that China is facing in recent decades. Notably, one of the negative consequences of the influx of massive internal migration into cities is the increase in urban crime [17]. The foothold of Chinese internal migrants is different from that of international immigrants. The former arrives in another domestic city for employment, and the latter moves to another country mainly for settlement. Internal migrants in China are restricted by the institutional barriers of the household registration system (also known as Hukou) [37,38], and they are difficult to enjoy benefits or rights such as health care and education as native residents. Since China's economic reform in the late 1970s, the system has gradually relaxed its control over the geographical mobility of internal immigrants in the country. At the same time, to meet the demand for employment opportunities in special economic zones or big cities, a significant number of migrants have shifted from rural to urban areas or from underdeveloped to developed regions. It has been argued that increasing crime is related to the migrant population [39]. According to a public report of China's National Bureau of Statistics, from 2006 to 2010, the crime rate of migrants increased by 21.7% compared to 2001–2005 [40]. Furthermore, official statistics in the past decade reveal a higher level of crime among migrants in big Chinese cities [41]. Recent researches have shown that the proportion of migrants is criminogenic in China's coastal provinces where most of the major cities are located [42]. On the contrary, native residents are rarely mentioned in the statistical analysis of crime [17]. Therefore, based on the interaction between potential victims, motivated offenders, and the environment, and comparative

analysis of the crime patterns of migrant offenders and native offenders remains to be explored in China. For better understanding, we need to specifically point out that migrant offenders register in one city but live in another city, while native offenders register and live in the same city. These two residential groups are distinguished by the different Hukou statuses.

In sum, the present study seeks to contribute to the knowledge about the crime spatial patterns of migrant robbers and native robbers. Using data on the ZG City of China, we set out to answer two questions: whether the spatial distribution of migrant offenders' crime location choices is different from those of native robbers, and what are the main contributing factors?

2. Theories and Prior Findings

Many theoretical approaches can be taken to understand the crime location choice. Consequently, drawing on concepts and empirical findings from environmental criminology and the ecology literature, we briefly identify the primary criminological theories and empirical evidence that bears the most relevance for the topics discussed: crime pattern theory, the routine activity approach, and social disorganization theory.

2.1. Crime Pattern Theory

Crime pattern theory explains the issue of where offenders commit their crimes [18]. It argues that crime is most likely to occur in areas where the activity space coincides between the potential offenders and the potential targets [28]. In other words, it explains that there are two necessary conditions for a crime to be committed in a given location: the place must provide an opportunity for crime, and the potential offender would have to be aware of the location and the opportunity [20]. Consequently, crime can occur where criminal opportunity and spatial awareness overlap. Since offenders' conscious space is maintained and developed in their daily activities, offenders commit crimes in or near the places they frequent. For example, researches on the journey to crime provide support for crime pattern theory, showing that offenders usually commit most of their crimes close to their home location [43,44].

Crime pattern theory focuses on the change in criminal opportunities. It puts particular emphasis on the interaction between offenders, victims or targets, and guardians, and the interaction between people and the environment is of great importance to the occurrence of crime [17]. Accordingly, some research sheds light on offenders' crime location choices by analyzing the influence of the ambient population [45–48], built environment (crime generators and attractor) [49–51], and crime prevention (crime detractors) [2,51–53]. Generally, potential victims are represented by the ambient population, criminal activities are triggered by crime generators and attractors but inhibited by crime prevention.

However, the awareness spaces of migrant offenders may be different from those of native offenders. Some of the migrants may not have lived in the city very long, so they have limited familiarity with the city and confined social networks [17,36]. Native offenders, on the other hand, have been living in the city for a long time. They are more familiar with the city and may have developed a wider social network. The difference in social network and awareness space may lead to a difference in target selection between the native robbers and migrant robbers.

2.2. Routine Activity Theory

Drawing on human ecology theories, routine activity theory suggests that for a crime to occur in a certain location, a motivated offender must encounter a suitable and unguarded target and that this convergence will be a function of the routine activities of offenders, potential victims, and guardians [8]. It considers how people's activities in day-to-day affect their awareness spaces and, for offenders, how this affects their crime location choices when committing a crime [50,54,55]. As a result of engaging in everyday activities, offenders (or others) are considered to form mental maps to represent the daily

activity nodes where they frequently visit, and the pathways that they must travel to move from one activity node to another, and their surrounding area [54,55].

Routine activity theory focuses on the changes in crime opportunities that influence the occurrence of criminal activities, that is, assumes the likelihood of crime is influenced by the routine activities of different individuals (families or friends) and emphasizes the crucial role of daily activity nodes in the criminal process. Typically routine activity nodes include a person's home, workplace, recreation places, etc., and it is the environmental background that determines their distribution in space [54].

Some routine activity nodes such as transportation hubs and subway stations or other places will be shared by many people, and thus encapsulated in their awareness spaces, but others will be more unique to particular individuals [11]. For example, the nodes of daily activity between migrant robbers and native robbers may be different and form different awareness spaces in which they choose to commit robberies in different places.

2.3. Social Disorganization Theory

Social disorganization theory is frequently used to explicate crimes triggered by changes in the social environment, and it concerns how the social composition of neighborhoods makes them deter or promote criminal behavior [56,57]. Many researchers have demonstrated that at the heart of this theory is the notion of social cohesion, which motivates residents to adopt a collective effectiveness approach to intervene and prevent crime [22,58,59]. Existing studies demonstrate that social cohesion is more likely to occur in neighborhoods with stable demographics in which residents can form good social relationships [60–62], and in which residents of homogenous neighborhoods are more likely to share comparable goals and faith [22,63].

Theories of social disorganization have explained the mechanism of crime from three perspectives. First, close social relationships among neighbors can create collective efficacy to decrease opportunities for crime [61]. For instance, inhabitants can exercise informal control over others living in the neighborhood, reducing the likelihood of their participation in the crime [22]. Second, neighborhoods with high socioeconomic heterogeneity or a large proportion of immigrant residents are less likely to jointly resist criminal activity due to a lack of cohesion among residents from very different socioeconomic backgrounds [22,58]. For example, Liu et al. discovered that the urban villages and old urban areas in ZG City, China, are the main "hunting grounds" for criminals because of the high mobility of the population and the high socioeconomic heterogeneity of residents in these areas [64]. Finally, offenders' perceptions of social cohesion may influence their decisions about where to commit crimes [22]. For example, Bernasco et al. argue that social cohesion may act as a deterrent that deters offenders from targeting a particular neighborhood [65].

Some studies from non-Western contexts demonstrated that migrant offenders mainly reside in urban villages [36], and also shows that urban villages in Chinese cities are associated with declining public safety and deteriorating social order [66]. The migrant population does not enjoy the same rights as the native population because of the restrictions of the household registration system. This restriction has led to poor social integration between the migrants and the natives. The past four decades have witnessed an unprecedented wave of rural migrants to the city for employment in China. These migrants are often in a disadvantaged position in terms of employment and earnings. These disadvantages, coupled with the poor integration, might drive some migrants to commit crimes.

Although various theories focus on neighborhood social processes, environmental criminology asserts that the physical environment plays a central role by shaping people's activity patterns and the opportunities for crime. Therefore, in this paper, the built environment is also used to explain spatial differences in crime location choices between migrant and native robbers, while the social environment, ambient population, and crime prevention and control as well as journey to crime are integrated into the model as control variables.

3. Materials and Methods

3.1. Study Area

ZG City—one of the largest cities in Southeast China [19]. In 2018, the resident population was 14.9 million, and the GDP of the city was 2.30 trillion with an annual growth rate of 6.50%. Due to the influx of large numbers of immigrants, ZG City has become the best place for study on the crime location choice of street robbers under different household registration attributes. The study area consists of 1971 neighborhoods (Figure 1) with an average area of 1.62 square kilometers.

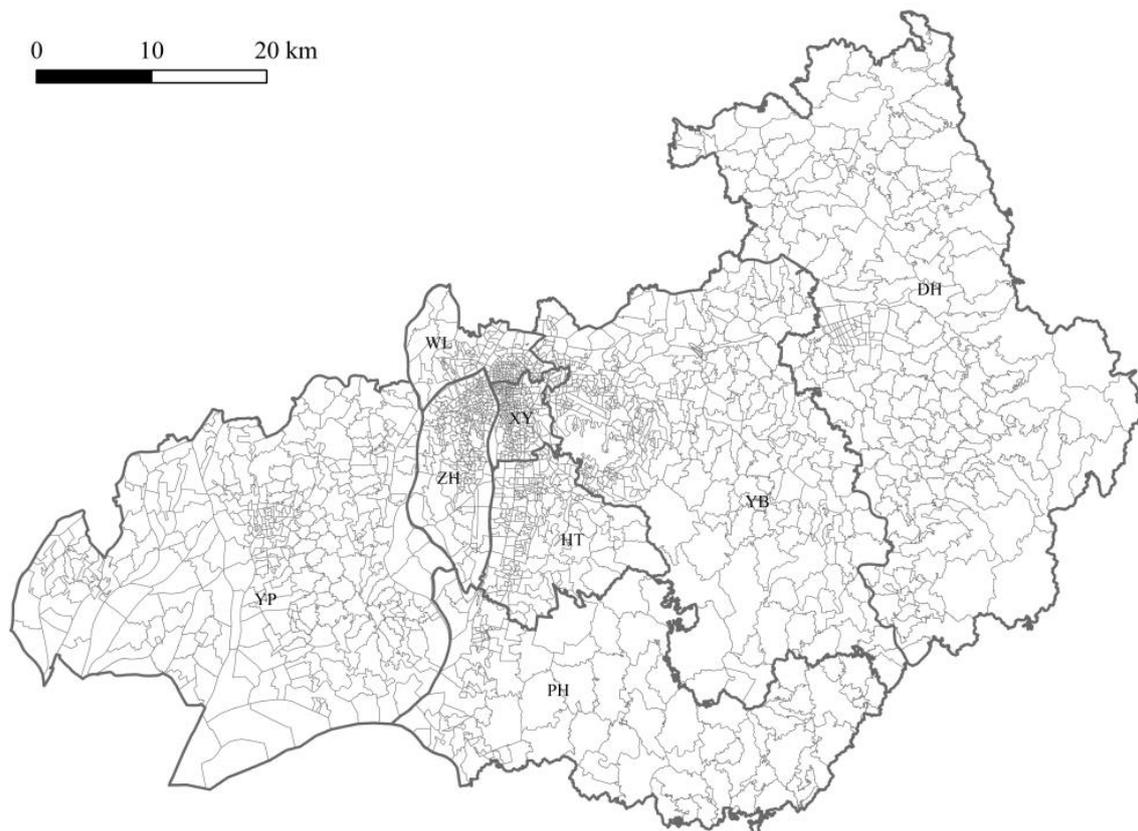


Figure 1. Schematic diagram of the study area, ZG City.

3.2. Crime Data and Independent Variables

The data used in this paper include the arrest data and neighborhood characteristics data of ZG City. The first type of data is the arrest data of street robbers in ZG City from 2012 to 2016 provided by ZG City's Public Security Department. These data recorded detailed individual information of street robbers and their case information. Individual information such as name, gender, ethnicity, household address, date of birth, and education level of street robbers; case information such as time of the robbery, address of robbery and residence at the time of the robbery, as well as the object of a crime, place of crime, tools of crime, means of crime, and amount of lost property or money. A total of 11,455 arrest records within 8 districts of ZG city from 2012 to 2016, excluding 2285 records of street robbers whose residence was outside the study area and 1310 records with no fixed residence or unknown residence, leaving 7860 records involving 7124 street robbers. For robbery groups, this paper refers to Bernasco et al. [10,19,67], and treats each robbery group as a separate decision-maker, i.e., one robber is randomly extracted from each robbery group to construct the sample, while a single robber directly constructs the sample, resulting in 4358 street robbers included in the individual attribute table (Table 1).

Table 1. The basic situation of street robbery cases is based on the arrest data. (N = 4358).

Number of People Involved Cases	Arrested Records	Number of Cases	Cases Proportion
1	2646	2646	60.72%
2	1758	879	20.17%
3	1209	403	9.25%
4	812	203	4.66%
5	565	113	2.59%
≥6	870	114	2.62%
Total	7860	4358	100%

In this study, we selected the domicile attributes of street robbers in the individual attribute table to study the spatial differences in crime location choices of street robbers with different household registration attributes. Street robbers in the study area were predominantly out-of-town, with 3650 individuals, or 83.75%, while 708 individuals were native, or 16.25% (Table 2). In addition, we should point out that in the discrete spatial choice model of this paper, 708 samples will be randomly selected from 3650 migrant robbers so that the sample size can be matched with that of local robbers, which in turn facilitates a comparative analysis of migrant and local robbers' crime location choices. This is because a larger sample size will result in a smaller p -value given that the standard error remains unchanged.

Table 2. Descriptive statistical analysis of household registration attributes of street robbers.

Household Registration of Street Robbers	Number of People	Proportion
Migrant robbers	3650	83.75%
Native robbers	708	16.25%
Total robbers	4358	100%

Note: Migrant robbers are those whose household registration is not in ZG City, while native robbers are those whose household registration is within ZG City.

The second type of data is a dataset coupled with individual factors (distance of journey to crime variables) and key neighborhood factors, including 2014 POI data (point coordinates), 2014 traffic road network vector map data, 2015 bus stop data (point coordinates) crawled based on Baidu API, within one week of 12 to 18 May 2016 ZG City's mobile phone data and the sixth census data of ZG city in 2010 (Table 3). For built environment characteristics, (1) Malls and supermarkets, (2) Grocers, (3) Wholesale markets, (4) Bars and clubs, (5) Sports stadiums, (6) High schools, (7) ATMs and banks, (8) Carparks, (9) Bus stops, (10) Transportation hubs, (11) Subway stations, (12) Density of road network were selected; for social environment characteristics, (13) Proportion of migrants, (14) Proportion of youngsters, (15) Socioeconomic heterogeneity. It should be noted that although some studies related to social disorganization theory also control for family disruption and poverty [68,69], data on these aspects are not available for this research, so they are not included as control variables in the discrete spatial choice models. The ambient population selected (16) Daily human mobility, the crime prevention selected (17) Detection rate, and the individual factor selected (18) Distance of journey to crime. In this paper, the attributes of the built environment are used as explanatory variables, while the variables of social environment, ambient population, crime prevention, and crime travel aspects are incorporated into the model as control variables (Table 3). In addition, the distance of journey to crime is expressed in terms of Euclidean distances by referring to studies by [19,20], such as calculating the distance from the street robber's residence to each neighborhood center. At the same time, these studies also showed that the attractiveness of the crime location is an exponential function of its distance to the place of residence [19,20]. Therefore, to make it linear, the model in this study also takes the logarithm of the value of the distance of journey to crime. In addition, the above variables passed the multicollinearity test.

Table 3. Description of variables for comparative analyses of the crime location choices of street robbers with different household registration attributes.

Variables	Calculation Method
Explanatory variables	
Malls and supermarkets	Number of malls and supermarkets in the neighborhood
Grocers	Number of grocers in the neighborhood
Wholesale markets	Number of wholesale markets in the neighborhood
Bars and clubs	Number of bars and clubs in the neighborhood
Sports stadiums	Number of sports stadiums in the neighborhood
High schools	Number of high schools
ATMs and banks	Number of ATMs and banks in the neighborhood
Carparks	Number of carparks in the neighborhood
Bus stops	Number of bus stops in the neighborhood
Transportation hubs	Number of transportation hubs in the neighborhood
Subway stations	Number of subway stations in the neighborhood
Density of road network	The total length of roads in the neighborhood/Total area of the neighborhood
Control variables	
Proportion of migrants	Total number of the migrant in the neighborhood/Total number of people in the neighborhood
Proportion of youngsters	Total number of the youngster in the neighborhood/Total number of people in the neighborhood
Socioeconomic heterogeneity	Qualitative difference index of different housing property groups
Daily human mobility	Number of flow crowd in the neighborhood/Total area of the neighborhood
Detection rate	Total number of cases resolved/Total number of case reports
Distance of journey to crime	The distance of street robbers' residence from crime location

3.3. Discrete Spatial Choice Modeling

Discrete spatial choice modeling is widely used to analyze the selection behavior in microeconomics [19,65]. Based on the theory of stochastic utility, it assumes that a decision-maker must choose a discrete set of choices while assessing the relative utility of each alternative [70]. Considering that crime location choice is similar to the above choice, Bernasco and Nieuwbeerta introduced the method to the study of crime and verified the crime location choice of burglaries in The Hague, the Netherlands [65]. Subsequently, some studies used this method to analyze a range of crimes. For example, Johnson et al. examined the crime location choice of vehicle thieves in Dorset, England [22]. Bernasco et al. recently examined the difference of time in the crime location choice of street robbers in Chicago, USA [20]. Long et al. examined the crime location choice of street robbers in ZG city, China [19]. All of these studies are based on the aspect of criminals and tested whether their crime location choices were influenced by a series of factors.

This study will refer to the above studies and use the conditional logit selection models in the Discrete Spatial Choice Modeling to calculate. In the case of the control of variables of the social environment, ambient population, crime prevention, and crime travel, according to the utility maximization hypothesis, street robbers with different household registration attributes will choose the neighborhood with the greatest benefit on their crimes. The utility function is calculated as follows:

$$U_{ij} = \beta_i x_{ij} + \varepsilon_{ij}, \quad (1)$$

where U_{ij} is the expected utility of street robber i robbing in neighborhood j . The x_{ij} is the value of the interpretive variables associated with street robber i and neighborhood j . The β_i is the coefficient estimation vector for street robber i . Moreover, the ε_{ij} is the random error of models.

The utility function can be estimated based on the Conditional Logit Selection models. Therefore, the formula for calculating the robbery probability of street robbers i in the neighborhood j is as follows:

$$Prob(Y_i = j) = \frac{e^{\beta_i x_{ij}}}{\sum_k e^{\beta_i x_{ik}}}, \quad (2)$$

where Y_i is the choice of street robber i . Models calculations were done under Stata 13.0 software.

4. Results Analysis

4.1. Spatial Distribution Characteristics of Crime Location Choice

Figure 2a–c shows the spatial distribution of the crime location choices of all migrant robbers (3650), randomly selected migrant robbers (708), and native robbers (708), respectively, and it can be seen that there are obvious spatial differences between migrant robbers and native robbers. From Figure 2a, there is a crime hotspot area “M”, which is located in the leather goods industry cluster area of ZG City; and the area with a higher value of kernel density (or called crime sub-hotspot) is located in the neighborhood where the railway station and the province (or city) bus transportation hubs are located in ZG city and its surrounding neighborhoods, as well as the urban village area in the middle of the “ZH” district.

Meanwhile, a comparison between Figure 2a,b suggests that the crime location choice of the 3560 migrant robbers is similar to those of the 708 randomly selected migrant robbers. For example, both Figures show the same hot spot in location M, and both show the same general spatial pattern. Thus, the set of 708 randomly selected migrant robbers is representative of all the migrant robbers.

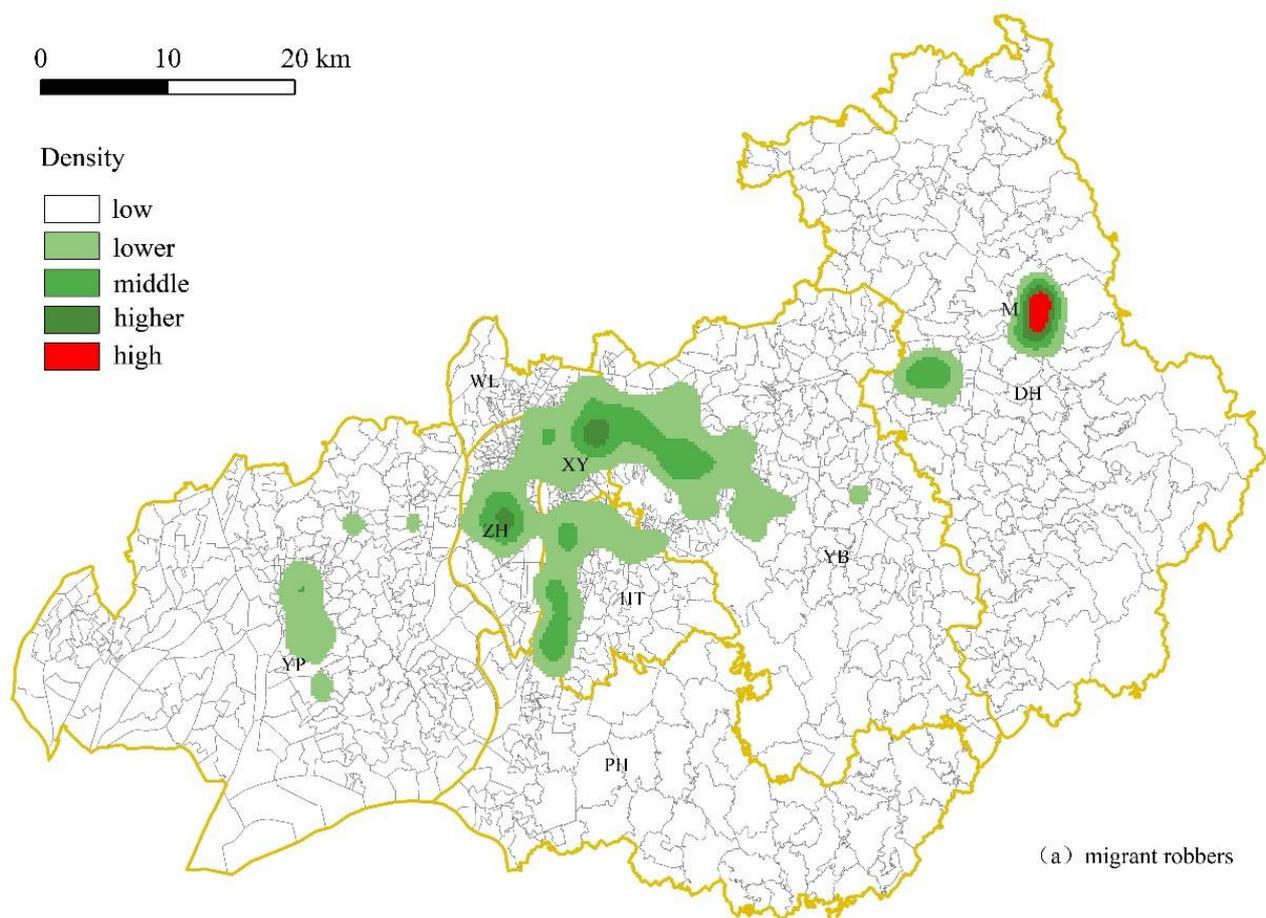


Figure 2. Cont.

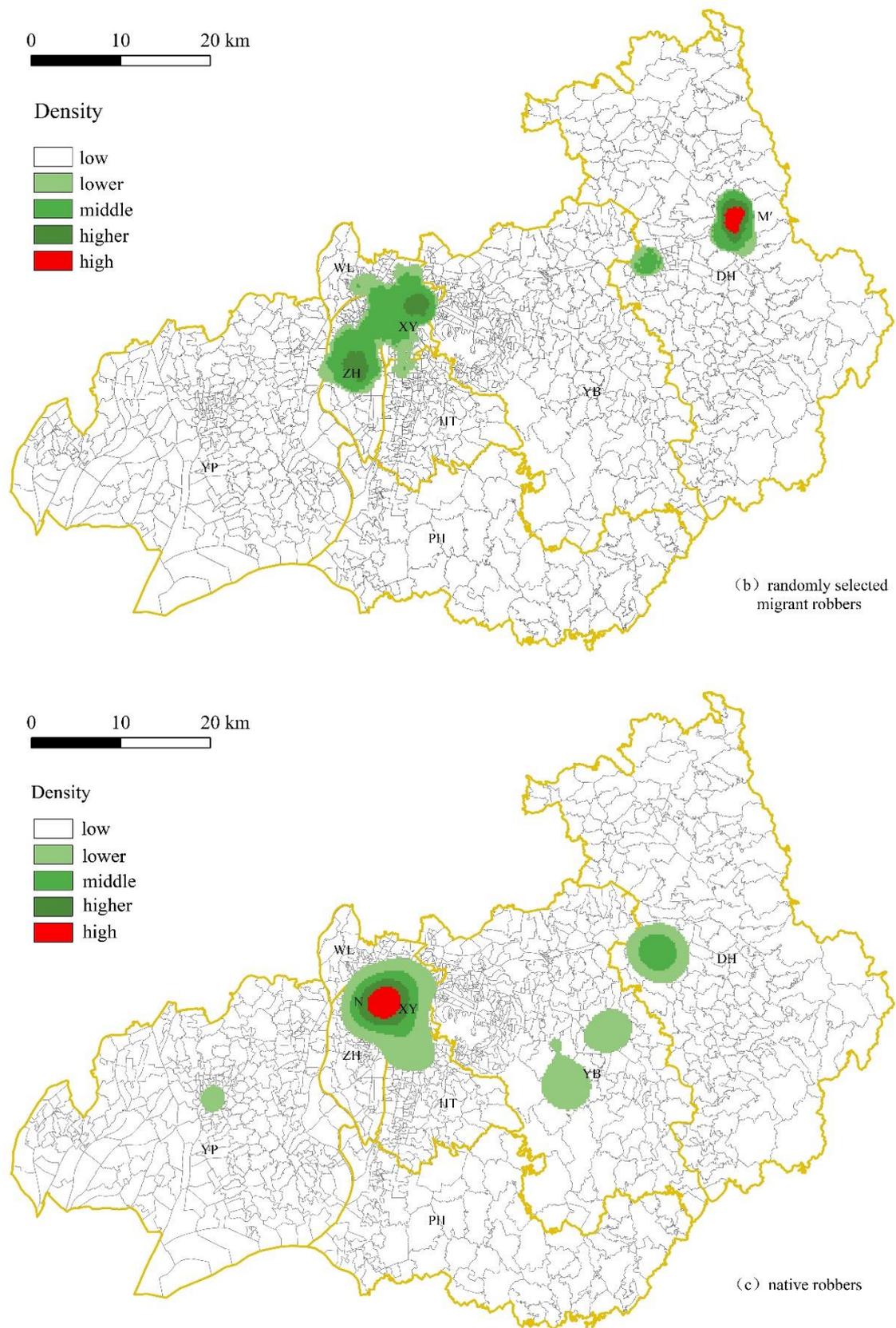


Figure 2. Kernel density estimation of street robbers' crime location choices. ((a–c) respectively represent the spatial distribution of crime location choices for all migrant robbers, randomly selected migrant robbers, and native robbers. The data provider requested for confidentiality of the place names, so “pinyin” codes are used as substitutes).

Figure 2c shows a hotspot area “N” where the native robbers commit their crimes, which is located the southwest corner, also the old urban area, of the “XY” district, and the urban village and old urban area in the northwest corner of “ZH” district. The former area is the business district full of stores and a dense flow of people, such as toys, seafood, stationery, and grocery stores along the “YD” Road, and stores along the street and comprehensive shopping malls such as clothing, footwear, department stores, jewelry stores, and restaurants along “BJ” Road; while the latter is dominated by residential functions and cultural and educational functions.

According to the above, the crime hotspots of crime location choice between migrant robbers and native robbers are different. Migrant robbers tend to choose the labor-intensive industrial and wholesale clusters, while the preference of native robbers is for old urban areas and urban villages.

4.2. Comparative Analyses of Spatial Differences in Crime Location Choice

In Model 1, a subset of 708 immigrant robbers (the sampling model is consistent with the overall model for migrant robbers) was randomly selected for comparison with the 708 native robbers in Model 2. The OR value, Z value, and significance level (p -value) of each factor were obtained by conditional logit regression analysis of the crime location choice and their influencing factors of street robbers with different household registration attributes (Table 4). In the discrete spatial choice modeling, the OR value of the variable is greater than 1 for positive influence, and it is larger to indicate a greater positive influence; OR value less than 1 for negative influence, and it is smaller to indicate a greater negative influence. From Table 4, we can see that the Pseudo R^2 of both migrant robbers (Model 1) and native robbers (Model 2) are greater than 0.25, which indicates that the two models fit perfectly and they have strong explanatory power.

Table 4. Evaluation results of migrant robbers and native robbers in ZG City.

Variables	Migrant Robbers (Model 1)				Native Robbers (Model 2)			
	OR	Z	[95% Conf. Interval]		OR	Z	[95% Conf. Interval]	
Explanatory variables								
Malls and supermarkets	1.247 ***	8.70	1.19	1.31	1.028 ***	4.07	1.01	1.04
Grocers	1.017 **	3.04	1.00	1.04	1.033 *	2.16	1.00	1.06
Wholesale markets	1.147 ***	5.09	1.09	1.21	1.018	1.00	0.98	1.05
Bars and clubs	1.024 ***	4.57	1.01	1.05	1.051 *	2.55	1.01	1.09
Sports stadiums	0.816 **	−3.05	0.72	0.93	1.016	1.01	0.99	1.05
High schools	1.129 ***	3.68	1.06	1.20	1.124 **	3.27	1.05	1.21
ATMs and banks	1.051	1.11	0.96	1.15	0.981	−1.96	0.96	1.00
Carparks	1.025 ***	4.46	1.01	1.04	1.017 ***	4.56	1.01	1.03
Bus stops	1.099 **	3.25	1.04	1.16	1.046 ***	7.08	1.03	1.06
Transportation hubs	1.052 **	3.38	1.02	1.08	1.018	0.19	0.84	1.23
Subway stations	1.038 ***	4.26	1.03	1.05	1.022	0.65	0.96	1.09
Density of road network	0.739 ***	−3.97	0.64	0.86	0.929 ***	−6.11	0.91	0.95
Control variables								
Proportion of migrant	1.043 ***	4.78	1.03	1.06	0.377 ***	−3.99	0.23	0.61
Proportion of youngster	1.086 *	2.64	1.00	1.21	0.984	−0.03	0.36	2.65
Socioeconomic heterogeneity	1.042	0.81	0.94	1.15	1.000	0.02	0.96	1.05
Daily human mobility	0.984	−0.23	0.86	1.13	1.003	0.07	0.93	1.08
Detection rate	1.096 *	2.42	1.07	1.27	1.035	0.11	0.54	1.97
Log distance	0.105 ***	−52.14	0.10	0.11	0.115 ***	−67.96	0.11	0.12
Pseudo R^2			0.502				0.526	

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; the 708 samples in Model 1 were randomly selected from 3650 migrant robbers.

From Table 4, it can be seen that the OR of wholesale markets influence on the crime location choice of migrant robbers is 1.147, with a p -value of 0.000 less than 0.001, which is statistically significant, while the OR of influence on the crime location choice of native robbers is 1.018 with a p -value of 0.318 greater than 0.05, which is not statistically significant.

Therefore, wholesale markets have a significant positive effect on the crime location choices of migrant robbers, but not for native robbers' crime location choices.

In Model 1 and Model 2, the OR for the effect of sports stadiums on the crime location choice of migrant robbers is 0.816, with a p -value of 0.002 less than 0.01, which is statistically significant. The OR for the effect on the crime location choice of native robbers is 1.016, with a p -value of 0.314 greater than 0.05, which is not statistically significant. Hence, there is a significant negative effect of sports stadiums on migrant robbers' crime location choices, while the effect on the crime location choices of native robbers, although positive, is not significant.

The OR values for the influence of transportation hubs and subway stations on the crime location choice of migrant robbers are respectively 1.052 and 1.038, with p -values less than 0.01 and 0.000, i.e., both were statistically significant. And the OR value of the same influences on the crime location choice of native robbers are respectively 1.018 and 1.022, with p -values greater than 0.05, i.e., both were not statistically significant. Consequently, transportation hubs and subway stations have significant positive influences on migrant robbers' crime location choices, but not for native robbers.

Meantime, it is necessary to point out some variables that have similar effects on both migrant and native robbers. Table 4 contains OR values and confidence intervals regarding the following six typically routine activity nodes: malls and supermarkets, grocers, bars and clubs, high schools, carparks, bus stops. All of them have a significant positive effect on the crime location choices of both migrant and native robbers. In addition, the OR values for the effect of density of road networks on the crime location choice of migrant robbers and native robbers are less than 1, with p -values all less than 0.000, i.e., both were statistically significant. Therefore, there is a significant negative effect of the density of road networks on migrant and native robbers' crime location choices.

In terms of control variables, for example, the OR values for the influence of the proportion of migrants on the crime location choice of migrant robbers and native robbers are respectively 1.043 and 0.377, and both had statistically significant p -values of 0.000 less than 0.001. Thus, the proportion of migrants have a significant positive effect on the crime location choices of migrant robbers, but a significant negative effect on native robbers' crime location choices. Finally, there is a significant negative influence of the distance of journey to crime on migrant and native robbers' crime location choices.

In summary, controlling other variables constant, the spatial differences in crime location choices between migrant robbers and native robbers are mainly affected differently by wholesale markets, sports stadiums, transportation hubs, and subway stations. That is, wholesale markets, sports stadiums, transportation hubs, and subway stations have significant influences on the crime location choice of migrant robbers, while they have no significant influences on the crime location choice of native robbers.

5. Discussion and Conclusions

Street robbery seriously affects public safety and lifestyles. The comparative research between native and migrant street robbers can find out the difference of crime location choice among them, providing insight for targeted crime prevention and control strategies. There exist obvious spatial differences in crime location choices between migrant robbers and native robbers. Migrant robbers tend to choose the labor-intensive industrial clusters, while native robbers tend to choose the old urban areas and urban villages. Spatial differences in crime location choices between migrant robbers and local robbers are differentially affected by some factors in the built environment, controlling for other variables. Wholesale markets, sports stadiums, transportation hubs, and subway stations only affect migrant robbers' crime location choices, but not native robbers'. These results may be attributable to the different spatial awareness between migrant robbers and native robbers.

The wholesale markets are one of the main reasons for the spatial differences in crime location choices between migrant robbers and native robbers. Wholesale markets have such environmental characteristics as a strong ability to aggregate elements and relatively

loose management. Our study found that wholesale markets seem to increase the odds of committing a crime by a larger degree for migrant robbers than they do for native robbers, due to their different awareness space. According to crime pattern theory [20], the wholesale markets provide more opportunities for robbery, and the potential migrant robbers may already be aware of the place and the opportunity because most of them may live and work near the markets due to lower rent. A wholesale market is typically a crowded place with heavy traffic and many people. It has a huge daily throughput of goods, requiring tens of thousands of employees for shipping and handling. These low-earning positions are mostly filled by migrants [17]. A large number of merchants make transactions, some of which are based on cash. Robbers can find a suitable target fairly easily, and escape into the crowd after a robbery [2,10]. Wholesale markets are not only convenient for them to “lurk and hide”, but also an ideal “hunting ground”.

For local robbers, although the wholesale markets have a positive effect on their target places, it was not statistically significant. There are two possible explanations for this. First, wholesale markets gather in neighborhoods that contain a large migrant population, which also includes potential migrant offenders. Thus, the activity space of the migrant population in a neighborhood suppressed or reduced those of native robbers. In other words, the more migrant population in a neighborhood, then the main activity in that neighborhood are dominated by migrants and relatively less by native groups. This point can be supported by the control variable of the proportion of migrants in Table 4. In this paper, we find that the migrant proportion coefficient on target places is significantly positive for migrant robbers, yet significantly negative for native robbers. Second, native robbers have been living in ZG City for a long time, and have a wider social network and greater familiarity with ZG City. While wholesale markets present substantial crime opportunities, other venues can provide criminal opportunities as well. According to routine activity theory, some typically routine activity nodes include a person’s home, workplace, recreation places, etc. [54]. As a result, local robbers, are more likely to rob in neighborhoods with more malls and supermarkets, grocers, bars and clubs, high schools, carparks, and bus stations than in neighborhoods with more wholesale markets.

Sports stadiums also contribute to the spatial differences in the crime location choices between migrant robbers and native robbers. Sports stadiums are typically well maintained and with natural surveillance [71,72], which is more likely to deter the influx of migrant criminals, who tend to be less familiar with the surroundings. However, native robbers are familiar with the sports stadiums and their surroundings (or paths) that they frequent or are near their homes. Thus, native robbers are more inclined to go near sports stadiums to find criminal opportunities.

Although crime prevention and control in the surrounding area of the sports stadiums will be improved during the opening hours, especially during the events, the influx of people will create more opportunities for native robbers to commit crimes because they may seize the opportunity to take advantage of the situation if they encounter some attractive targets in their familiar environment, and later slip away along the familiar paths. In addition, the insignificant result of the effect of sports stadiums on native robbers is likely to be an effect caused by the turnover between event and non-event periods, which will be verified in future studies.

There is more evidence that migrant robbers and native robbers may form different consciousness spaces. Results show that transportation hubs and subway stations affect the choice of crime locations between migrant robbers and native robbers. Due to the affordability, these facilities are used more often by migrants, including migrant offenders [11].

Transportation hubs and subway stations are always the high-risk areas for robbery cases with the characteristics such as crowded flows around and relatively complicated scenes [10,49]. For migrant robbers living in ZG City, their activities spaces are usually limited [17,36]. In other words, they may have a more familiar perception (awareness space) of the transportation hubs and subway stations, where they frequently travel to and

from compared to other places or sites outside their place of residence or work, and they believe there will be many opportunities for crime, and therefore they will be biased to go there to find suitable targets for robbery (as shown in Table 4 in Model 1, the transportation hubs and subway stations with larger OR values). For native robbers, who were born and lived in ZG City, as mentioned above, they have more activities spaces to move around as well as social networks. So they are inclined to commit crimes in lifestyle and leisure type places, for example, malls and markets, grocers, bars and clubs, high schools, and bus stations.

Besides, it is worth noting that we found that other typically routine activity nodes such as malls and supermarkets, grocers, bars and clubs, high schools, carparks, and bus stops have a similar effect on migrant robbers and local robbers' target places. In other words, migrant and native robbers' preference for neighborhoods with the above six typically routine activity nodes without significant difference. Finally, our findings suggest that migrant and native robbers all prefer areas closer to their residence, which is consistent with previous studies that do not distinguish individual household registration [19,20].

In summary, the differences in the functional and environmental characteristics of wholesale markets, sports stadiums, transportation hubs, subway stations, and other places are the main reasons for the spatial differences in crime location choices between migrant robbers and native robbers. In other words, the preference of crime location choice between them is determined by the difference of the functional or environmental characteristics of these places that are attractive to them, as well as their different awareness space in these places, resulting in different crime location choice preferences. Alternatively, such spatial differences may also be determined by differences in their characteristics, behavioral preferences, social experiences, and means of committing crimes. Migrant victims may be less inclined to report their victimization incidences, leading to under-representation of the offenders tied to these incidences. Previous studies have reported such under-representation issues. For example, based on an official source (police) and an unofficial source (hospital) from Campinas, Brazil, Melo et al. found rapes have different spatial patterns, as only a few rapes are reported to the authorities [73]. The representativeness of the data needs to be validated in future studies.

Based on the findings of this paper, it is recommended that crime prevention and control should be strengthened by the deployment of security facilities in wholesale markets, sports stadiums, unoccupied rental rooms, and small hotels, especially those in urban villages or near the wholesale markets.

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