Spatial Disparity Between Official and Unofficial Crime Data - A Case Study in TL Neighborhood in City Shenzhen, Guangdong, China

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Abstract

This study was conducted against the background of Shenzhen city's crime issues and did a comparison at the neighbourhood scale using individual level data. The main purpose is to identify the criminogenic or crime-mediating conditions from individual opinions derived from first-hand data, to make models on residents' victimization experiences, perceptions about neighborhood safety, and their responses to crime, and to further test the hypotheses derived from Western research into the fear of crime and routine activity theory [1]. Residents' victimization experiences model is built upon routine activity theory with the expectations that:

a) The routine activities of householders affect the availability of targets in time and space, influence the opportunities for them to be exposed to potential offenders thus, overall, affect their risk of being victimized

b) Residents whose routine activities keep them near their home, will have a lower risk of victimization owing to the enhanced guardianship from the family

c) Crime incidents are associated with residents' routine activities and the availability of consumer goods that are easy to take.

Residents' perceptions on neighborhood safety, also termed their fear of crime, is modeled following Western work on the fear of crime [2,3]. focusing on the correlations between fear of crime and "vulnerable" socio-demographic characteristics [4,5]. For example:

a) Demographic physical disadvantages, e.g. being elderly mean these groups are perceived as "vulnerable" to offenders due to their being less able to protect themselves, "either because they cannot run fast, or lack the physical power to ward off attackers" [6]. so they are expected to report higher levels of fear of crime [7].

b) Some empirical studies have found that people on lower salaries or with lower educational attainment, are more likely to report higher levels of fear of crime [6]. [8]. [3]. because of the lack of protection, either by material or social support. So measures of socio-economic disadvantage are included in the models;

c) Residents having higher neighborliness scores indicated a higher social efficacy, so they are more integrated into their neighborhoods, and hence feel less fearful [3].

Background

Shenzhen is comprised by the special economic zone (SEZ) and the outside area (OSEZ). There are in total 612 neighborhoods in Shenzhen, with an area of 3.3 km^2 and a population density of 4,239 people per km^2 on average. It is reported that in 2008 the floating population in Shenzhen was more than 12 million, in contrast to the merely 2 million registered population. This exerts great pressure on, for example, local land-use, traffic capacity, competition for employment, and income inequality. Moreover, in part because of Shenzhen's coastal location, it also experiences intense cultural conflicts, which is taken as a contributing factor in explaining the crime rates and neighborhood dangers. After a pilot study among 16 randomly selected neighborhoods in Shenzhen city, three neighborhoods, (TL), (HL) and (HB), were selected for comparative study, aiming to provide a diverse range of respondent characteristics and varied neighborhood environments. TL and HB were chosen from districts within the SEZ, while HL was chosen from an OSEZ district.

a) TL (40,000 population in 7.5km^2 area, 2009) is a traditional industrial neighborhood with the majority of employees in their 20s, and coming from other cities or even other provinces;

b) The HB (38,000 population in 0.88km^2 area, 2009) is characterized by its prosperous business activities (with more than 600 shops and restaurants in 2009) and high proximity to the core business center of Shenzhen city;

c)   Most of HL's (42,000 population in 2.2km^2 area, 2009) residents work within the SEZ in the daytime and come back to HL at night. The local developments in industry and business in HL are not comparable to those in TL or HB.
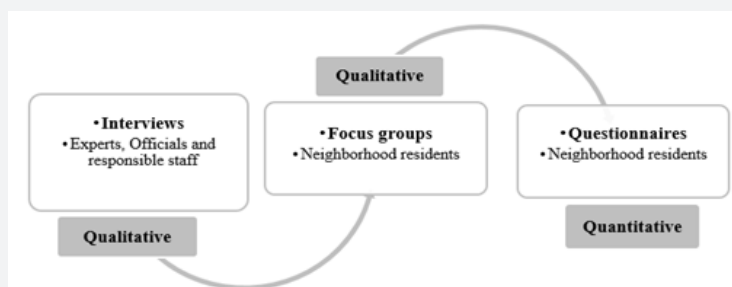
Data and Methodology

Figure 1: Procedure for the neighbourhood case studies.

Table 1: Definition and descriptive statistics of variables.

Name	Description	Scale
Victimization experiences	Times of been victimized during a 2-years period	Never=0, once=1, 1-3 times=2, 3-5 times=3, more than 5 times=4
PNSMI	Perception of neighborhood safety management improvements	Much worse=1, a little bit worse=2, no change=3, improved a little=4, improved a lot=5
Gender		0=female, 1=male
Age		16-20=1, 20-30=2, 30-40=3, 40-50=4, 50-60=5, >60=6
Income	Annual household income	<415=1, 415-1000=2, 1000-2000=3, 2000-3000=4, 3000-5000=5, >5000=6
Education	Highest educational attainment level	<Primary school=1, junior middle school=2, higher middle school=3, undergraduate=4, >graduate=5
Employment	Current employment status	Full-time=1, part-time=2, unemployed=3, student & retired=4, others=5
Marital	Current marital status	Unmarried with no relationship=1, unmarried with a relationship=2, married=3, divorced=4, widowed=5
Living arrangement	Whom the respondent was living with	Live alone=1, live with others=2, live with nuclear family (partner or children or both)=3, live with extended family (parents)=4, others=5
House holdship	Whether the respondent has his/her own house	Self-owned=0, rented house=1
NCI	Neighborhood cohesion index score	Constant numerical values, and be classified by its quartile as 1,2,3,4
PS	Perception on neighborhood safety in day time	Very unsafe=1, unsafe=2, not sure=3, safe=4, very safe=5
NPS	Perception on neighborhood safety at night	Very unsafe=1, unsafe=2, not sure=3, safe=4, very safe=5
Work time	The time slots when the respondent leaves home for work	Day time=1, night time=2, others=3
House attendance	Whether there is anyone staying at home when the respondent goes out to work	Yes=1, no=2
Satisfaction	Respondent's feelings about their current life	Very unsatisfied=1, unsatisfied=2, just ok=3, satisfied=4, very satisfied=5
Activity	The way spare time is spent after work	Stay at home=1, visit neighbors=2, walk outdoors in the neighborhood=3, go to shopping or other recreations=4

We use qualitative data collected from focus groups and interviews, and quantitative data derived from questionnaire surveys. Methodologically, efforts were focused on making comparisons among neighborhoods with various representative features. In each of the three neighborhoods, the same procedure (Figure 1). was used to obtain data among samples. The interviews with experts and officials, who have citywide responsibility and are familiar with the crime situation in Shenzhen, provided information on Shenzhen's crime levels and types by areas. Their views on the neighborhoods with specific features provided the criteria for neighborhoods' selection; the interviews with community officials who are familiar with the local situation, gave a general understanding of the crime issues in selected neighborhoods. The results provided expert understanding of local crime problems, and also contributed to refine the questions used in focus groups and questionnaire surveys. Focus

group meetings with 6 to 10 representatives of residents each are held drawing on insights from the interviews. Each session lasted about 1.5 hours with 5 questions asked, targeting to gain information from several perspectives to explore hypotheses [9]. and help to inform questions for the questionnaire survey[10]. Under the topic of neighborhood crime level changes in the past two years, participants were encouraged to share their opinions and discuss possible crime-inducing conditions, as well as discuss social cohesiveness changes in their area. The last stage was to carry out a face-to-face questionnaire survey among 200 selected residents in each neighborhood. Hypotheses and questions included in the questionnaire survey were informed by routine activity concepts, social disorganization theory, and ideas relating to social control, in order to examine residents' views on social cohesiveness and other features that affect neighborhood safety. They were developed from the results of the focus group meetings, and focused on getting people's responses on five dimensions (Table 1).

a) Attitudes to neighborhood safety: questions on respondents' victimization experiences, and their feeling of safety, etc.;

b) Willingness to report incidents to police and officials: e.g. "If you have been a victim of crime, did you report it to the police or official?", and the possible responses to various crime scenarios;

c) Neighborhood features that might encourage crime. For example, the income levels, people's views on what features of their neighborhood might encourage crimes to take place, their opinions on neighborhood safety improvement and the efficiency of neighborhood management;

d) Social cohesion and mutual support. They were developed by questions on neighborhood population heterogeneity (e.g. the proportion of "floating people", and their accommodation status), residential mobility (duration living in the neighborhood), family cohesion (marriage status and divorce rate) and social control. The last indicator could be discussed by public control, semi-public control and collective efficacy [10]. [11]. where community police stations are the grassroots-level agencies exerting direct public control on neighborhood crime, neighborhood residents' committees provide semi-public control, and collective efficacy is an informal social control as a willingness to intervene when public order is threatened [11]. The measures for collective efficacy are based on:

i. "Do you think your neighborhood is a close-knit neighborhood?" and "If there is a major problem around here, do neighbors get together to discuss and work out measures to solve it?"

ii. "Do you trust your neighbors?" and "how many other people do you know in this area?" Neighborhood cohesion is believed to have a crime mediating effect, so we developed a measure of neighborliness drawing on [12]. neighborhood

cohesion index (NCI), adapting it to the data for this study. The "Shenzhen adjusted" NCI is based on summarizing a set of questions, such as: how long you have been living in this neighborhood; do you feel close to your neighbors; do you ask for help from your neighbors, and how often do you join in neighborhood activities.

Background/Demographics

Questions on individual demographic and socio-economic characteristics are designed according to theories and the hypotheses. For example, crime rates increase with the proportion of young adults among the residents, and older people are more likely to be victimized as suggested by vulnerability theory. The inclusion of employment status is because unemployment rates vary directly with official crime rates over time, but from a routine activity perspective, those employed are less obligated to confine their time to family activities within the household and run a greater risk of predatory criminal victimization [1].

Multivariate logit regression models are built to analyse residents' victimization experiences, their perceptions on neighbourhood safety, and their responses to crimes. Although other types of model might be more appropriate for certain dataset, for example, the hurdle model to explain the number (count) of victimizations, we stick to a more general methodology of multivariate logit regression model for consistence and to highlight the questions of interest.

a) Model for residents' victimization experiences is built to identify relationships between residents' victimization experiences and their demographic, socio-economic characteristics. It takes residents' victimization experiences as the dependent variable, allowing for the excess zero values problem (zero inflation). The independent variables include: their NCI score, demographic variables, their working time and their home guardianship arrangements, residents' opinions on neighbourhood safety management, and their level of satisfaction with current neighbourhood safety management.

b) Model on residents' perception of neighbourhood safety took the measures for neighbourhood safety in the daytime (PS) and at night (NPS) as dependent variables. The independent variables include their neighborliness index (NCI), demographic variables (including household annual income, employment status, education level, age, gender, marital status, household ownership and living status), the degree of satisfaction with their current life and their recreation activities.

c) Model on residents' responses to crime (of different degrees of seriousness) take residents' responses to crime as the dependent variable, using their NCI score, demographic variables, working time and home guardianship arrangements, opinions on neighbourhood safety management, and satisfaction with current neighbourhood safety management as the independent variables. As noted there are three possible responses by a resident (report to the police; to a safety guardian; leave alone) and we build a model for each of the three possible responses.

The respondents were presented a sketch of the neighborhood's street map with some landmarks and been asked to locate 3 unsafe places in the daytime and at night respectively. The data are overlaid in ArcGIS 9.3, after being classified by local land-use data. Gradient colours are applied to indicate the areas with different risks of being crime hot spots. Furthermore, spatial-temporal comparisons among neighborhoods were conducted both in the daytime and at night to:

a) Identify the land-use types that are most likely to be crime-prone places;

b) Identify the land-use types that are least likely to be crime-prone places;

c) Find out the differences in the risk of crime for different land-use types among different neighborhood's; find the temporal similarities in crime occurrence against land-use type; and

d) Account these results for the neighborhoods' environmental features and residents' demographic composition.

Results

Shenzhen experienced rapid urbanization and development during China's period of economic reform with crime becoming a prominent issue for the city. At the neighborhood scale, the police officer interviewees provided more information from their expert knowledge that, the crime rates increased especially in the case of larceny and other acquisitive crimes (burglary, robbery and fraud). From interviews with neighborhood officials and focus group discussions:

a) Larceny occurred widely in all the neighborhoods, while fraud in HL, burglary and fraud in TL, and burglary, pick pocketing and stealing are common in HB;

b) The majority of the victims are women and older people, which is consistent with hypotheses about residents' vulnerability;

c) Suspects are normally groups of young males from small towns and villages, such as the group of burglars from Hunan province in HL, and thefts by people from Xinjiang province in HB;

d) Crime hot spots accumulated both in space and time, for example, robbery crimes in HL normally happened in early morning in the markets and in late evening around the overpass and parks.

Neighborhood Population Characteristics

According to the focus group discussions, "almost 90% of the residents are so-called floating population, who normally stayed in this neighborhood for less than 1 year, and some of them just temporarily for 1 month" (HL, in August 2010). So, the sample selection criteria needs to take account of this population mix, rather than solely based on the official census record.

600 samples (200 in each neighborhood) aged above 16 are randomly selected for neighborhood surveys, and statistically giving consideration to the need for 95% confidence intervals. The demographic characteristics of these samples are different in their composition (Table 2) . It is reflected that,

Table 2: Sample Demographic Differences Between Neighbourhoods.

	TL-HL	HL-HB	TL-HB
Gender	-	-	-
Age	**	-	**
Income	*	-	-
Education	**	*	**
Employment status	**	*	-
Marital status	**	-	**
Living status	**	**	**
Household ownership	*	-	-

a) The demographic composition differences between TL and HL, and TL and HB are statistically significant in terms of age at the 1% level. Differences are mainly due to the larger proportion of younger residents in TL, which is a crime-prone cohort;

b) For income differences, TL and HL are significantly different at the 5% level, because of the higher proportion of lower-income residents in TL;

c) As for educational level, differences between TL and HL, HL and HB are significant at the 1% level, and those between TL and HB are significant at the 5% level. The percentage of residents with low educational background is lowest in TL and highest in HB, while higher educated residents make up the largest proportion in TL;

d) The employment status differences between TL and HL are significant at the 1% level, and significant at the 5% level for HL and HB, which could be ascribed to the higher proportion of unemployed in HL;

e) The higher unmarried rate in TL made its marital status significantly different from the other two neighborhoods;

f) Living status is an indicator of family support. It is highest in HL and lowest in TL, the values are significantly different among these three neighborhoods at the 1% level;

g) The indicator for residential stability is based on whether residents' own their own house, and it is significantly different between HL and TL at the 5% level, in that HL has a higher rate of owner-occupied houses among respondents;

h) The higher NCI is, the closer neighbors' relations are and hence the higher the level of neighborhood cohesion. So the neighborhood cohesion order is: HL>HB>TL. NCI is also affected by local economic and social conditions. For example, the community official in HB provided the information during interview that: "in fact, considerable numbers of residents in the

poor areas (the older area) do not know each other, and never try to contact with their neighbors; it is only 10% of them who know their neighbors well. Comparatively, for residents living in richer areas (the newer area), almost 90% of them know well about their neighbors and communicate much with them" (interviewee from HB, 2009).

Models of Victimization Experiences

From the questionnaire survey results, the frequencies of residents (out of 200) who have been victimized in the past 2 years have been compressed into single victimization and multiple victimizations, and:

a) The proportion of residents having multiple victimization experiences in HL is significantly higher than that in HB, but the proportion of single victimized residents is not significantly different between these neighborhoods;

b) In terms of crime category, the proportions of residents that have had such experiences are not significantly different among these neighborhoods, either for the total of expressive crimes or for the total of acquisitive crimes. But for burglary, the proportion of victims who have been victimized in TL is significantly higher than in either HL or HB. Based on this information, the null hypotheses to be tested are:

i. Residents' victimization experiences are related to people's perceptions on neighborhood safety, as well as the level of local safety management. It is suggested that people having fewer victimization experiences tend to feel safer.

ii. Men have a higher tendency to suffer expressive crimes, while women, especially those who are older, are more likely to be victims of property crimes;

iii. People with higher income levels are more likely to be victims of property crimes such as burglary, theft, etc.;

iv. Higher-educated residents should have fewer victimization experiences because they are less frequently exposed to potential offenders and have better awareness of the need for self-protection;

v. People with more stable social relationships, for example married people, those living with family, or having their own house, are less likely to be victimized because of the strong crime deterrent and property surveillance functions of families;

vi. A higher level of neighborhood cohesion (NCI) will help to reduce residents' victimization experiences;

vii. Having routine working hours and higher level of home attendance could be important on residents' risks of being victimized;

viii. The significant estimates on coefficients of influential conditions may vary across neighborhoods and among different groups of people.

The results on model fitting and coefficient estimates are presented in Table 3. with * indicating a significant coefficient at the 95% level. Take the results in TL neighborhood as an example:

Table 3: Regression Results of Residents' Victimization Model.

		TL	HL	HB
Percentage correctly predicted		74.50%	79.50%	81.50%
Overall model test	Chi-square	32.864	55.593	39.774
	Sig.	0.003	0	0
Model fit statistics	-2 Log Likelihood	213.153	183.452	168.428
	Cox & Snell R Square	0.152	0.243	0.18
	Nagelkerke R Square	0.214	0.348	0.279
PNSMI	-0.709*	-0.876*	-1.659*
Gender	-0.075	0.494	-0.747
Age	0.417	-0.116	0.321
Income	-0.277	-0.096	-0.27
Education	-0.439	0.04	-1.34*
Employment	-0.923	-0.583	0.697
Marital status	-0.905	1.097	-0.285
Living status	0.222	-0.911	-0.576
Household ownership	-0.019	-0.119	-0.553
NCI	-0.826*	0.243	-0.956*
PS	0.594	1.753*	0.383
NPS	1.217*	0.162	-0.579
Working time	-0.903*	-1.817*	0.662
House attendance	0.986*	-0.887*	-0.546

a) The "percentage correctly predicted" indicates that using this model to predict whether a resident is victimized (or not), you will be correct 74.5% of the time.

b) The overall test of model fit (Chi-square value) shows the model is significant at the 0.003% level.

c) Model fit statistics reported the smaller the log likelihood statistic (213.153) is, the better the model is. No bivariate correlations were found to be extremely high (i.e., above 0.8), so concerns about multicollinearity were not found to be serious in these victimization models. The model fits best in HB, then HL, and TL, but the higher R square value in HL indicated a stronger prediction ability of the model.

From the coefficient results in Table 3. the estimates associated with each independent variable can be used to predict the (conditional) odds of being a victim. This is done by exponentiating the coefficient estimates exp.(coefficient). For example, in the case of TL and the variable PNSMI, the significant coefficient is -0.709, and its exp (-0.709) = 0.492. This implies

that residents who are dissatisfied with the management of safety in their neighborhood (score 1) are less likely to be a victim than those satisfied with the management of safety (score 0), with the predicted (conditional) odds ratio as 0.492:1. The residents' perception of neighborhood management improvement (PNSMI) coefficient estimate is negative in all neighborhoods, indicating that people who have lower perceptions on neighborhood management improvement are less likely to be victimized than those having higher perceptions, and the odds ratio is highest in HB (1:0.19) and lowest in TL (1: 0.492). The educational attainment level variable is significant in HB, with the fact that the proportion of residents with a lower educational attainment level is largest in HB, indicates that these group of lower-educated people in HB are less likely to be victimized than those highly educated. The neighborliness (NCI) variable has a significant minus value in TL and HB, indicating that people with lower NCI values tend to have less chance of being victimized than the others. This may signify that people having higher neighborliness values tend to rely more on their neighbors' guardianship and are not cautious enough in preventing victimization. By contrast, those with lower neighborliness values have no choice but to be careful on their own most of the time, so are less likely to be victimized.

The measure for residents' perceptions on neighborhood safety, is significant positive in HL in the daytime and in TL at night. It means that residents reporting lower perception on neighbourhood safety are more likely to be victimized. On the other hand, it also reflects that residents who have been victimized more often tend to feel less safe than others. In another word, the disparity between residents' fear of crime and their real victimization experiences are prominent in HL in the daytime and in TL at night. The working time and house attendance variables have opposite effects in both TL and HL as expected, in that, residents who go out for work between 8am to 7pm with nobody staying at home could expect lower odds to be victimized, while others who work at abnormal times whilst their homes are unattended, have a greater chance of being victimized. It can be concluded that residents' victimization experiences in these two neighborhoods are linked to their routine activities. However, other variables, such as age, gender and income, do not exhibit any significant relationship with victimization.

Residents' Perceptions on Neighborhood Safety Model

Residents' perceptions on neighborhood safety either in the daytime or at night are collected through 5-point Likert scale questions. From the results, all the samples' perceptions on safety are lower at night than that in the daytime and are ordered as: TL<HL<HB all above 3, indicating a feeling between "not sure" and "safe". It is also found that the proportion of choosing "very unsafe" is lowest, while the selection of "safe" has the highest proportion. The responses of "very unsafe" and "unsafe" are almost equal in all the neighborhoods; but residents in HL have higher selections on "safe" and "very safe". This is thought to be linked with neighborhood demographic characteristics, in that

Table 4: Regression Results of Residents' Perceptions on Safety Models.

		TL		HL		HB	
		PS	NPS	PS	NPS	PS	NPS
Prediction correct percentage		91.50%	86.50%	90.50%	93.50%	96%	91%
Omnibus	Chi-square	14.333	22.495	20.059	13.75	20.38	43.823
Test	Sig.	0.215	0.021	0.045	0.247	0.04	0
Model summary	-2 Log Likelihood	106.682	132.059	100.957	82.454	53.028	86.21
	Cox & Snell R Square	0.069	0.106	0.095	0.066	0.097	0.197
	Nagelkerke R Square	0.152	0.198	0.21	0.174	0.025	0.412
Income		0.56	-0.319	0.904	0.218	0.327	1.266
Education		-0.456	0.274	-1.202	-0.375	0.431	-1.159
Employment		18.755	19.302	0.212	-0.406	0.651	-0.642
Marital		-1.33	-1.359	1.632	-0.144	-1.888	-0.782
Living status		0.196	0.251	1.232	1.586	1.868	-0.672
Household		-0.8	-1.293	0.406	1.535*	1.086	0.706
NCI		-0.936	-0.23	1.112	-0.525	-1.527	-1.542*
Gender		0.56	1.265*	-0.157	0.529	-0.357	-0.338
Age		0.92	0.585	-0.358	-0.331	0.367	0.715
Satisfaction of life		1.348	1.29	-1.2*	-1.098	-2.658*	-2.793*
Free time activity		0.086	0.107	-0.764	-0.453	0.087	1.063

a) TL's prosperous industries attract more young workers, who are thought to be the most crime-prone, inducing groups of them to linger in recreational places, which are thought to be crime-producing. On the other hand, due to rapid development and high turnover rates in this area, local residents' being unable to identify strangers on the street;

b)   HL's residential features make it likely to be much safer than TL, but the results showed it to be less safe than HB, due to influences from nearby neighborhoods and insufficient police patrols;

c)   HB takes advantage of being located within the SEZ and is safer than HL because it benefits from regular police patrols. Furthermore, shopkeepers play the role of safety guardians keeping an eye on neighborhood safety during the day, making residents in HB feel much safer because of the informal neighborhood surveillance.

The logistic regression results on residents' perceptions on safety model in Table 4 are significant in HB for both PS and NPS, for NPS in TL and PS in HL. The prediction ability is strongest in HB (96%) in the daytime, and in HL (93.5%) at night, while weakest in HL (90.5%) in the daytime, and in TL (86.5%) at night. In general, the model summary indicates that this model is better fitted in the daytime for PS than at night for NPS and is less well fitted in TL than in the other two neighborhoods. All models are statistically significant but their R2 values are very low; each model has only 1 significant independent variable, except for the 2 significant variables for NPS model in HB. For PS models, only the variable on residents' satisfaction of current life is significantly negative in HL and HB, indicating that people satisfy with their current life are less likely to report their fears of crime; for NPS models, the positive coefficient for gender variable in TL indicated women tend to be more fearful of crimes than men; and minus coefficients for the variables NCI and satisfaction with current life in HB, reflected that people with higher NCI values and more satisfied with their lives are less likely to feel fearful of crimes.

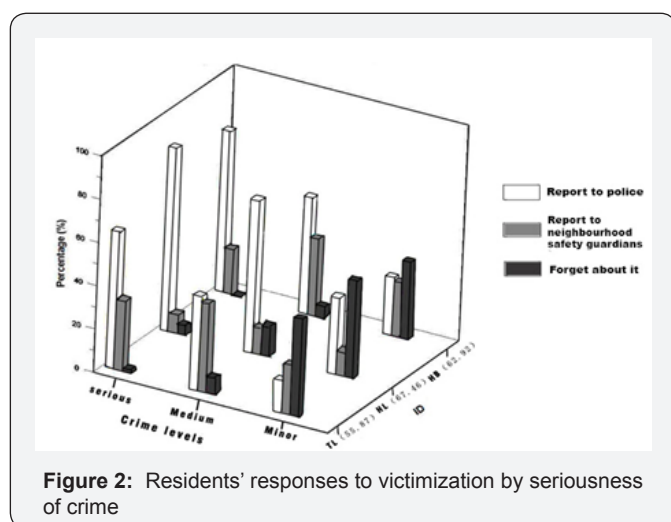## Response to Crimes Models

Figure 2: Residents' responses to victimization by seriousness of crime

Residents' responses to victimization are thought to vary by crime seriousness, so they should be discussed under 3 scenarios: 1) serious crimes, such as robbery with violence, burglary where more than 1,000 RMB have been stolen; 2) medium level crimes, including burglary around 500 RMB, theft of electric bicycles; and 3) minor crimes, for example, stealing and pick-pocketing of petty cash. From the focus groups, people tend to seek help from the police or neighborhood safety guardians for "formal measures", when experiencing serious or medium level crimes. While they may prefer informal solutions, such as to just forget about the crimes, when facing with minor crimes, or those haven't resulted in severe loss. So residents' responses to victimization are classified into three categories:

a)   Report to police;

b)   Report to local safety guardians; and

c)   Forget about it and been summarized in Figure 2.

All neighborhoods share similar response patterns:

a)   Or serious crimes, the percentage choosing "report to police" is larger than that for "report to neighborhood guardians", with people choosing to "forget about it" making up the smallest proportion;

b)   For medium crimes, TL and HB kept the same pattern as for serious crimes, but people in HL tend to choose "forget about it" more than choosing "report to neighborhood guardians";

c)   For minor crimes, most of the residents chose to "forget about it". And in HL and HB more residents choose to "report to police" than to "report to neighborhood guardians", but in TL the situation is reversed. In general, the tendency for residents to report a crime to the police is higher in HL and HB. Residents living in HL placed the least reliance on neighborhood guardians; they would rather choose to report to police or forget about the victimization than engaging with neighborhood safety guardians. Besides of these formal solutions, the informal response is higher in HL under each scenario.

TL's residents have higher levels of trust in neighborhood guardians than those in HB, but lower trust in the police. HB's residents have the lowest percentage choosing to "forget about it". The logistic regression results on residents' responses to crimes are presented in Tables 5-7. and because there is no response of "forget about it" to a serious crime in the HB neighborhood, it is recorded as 0 in this case. For serious crimes, the predicted ability is lowest at choosing solution "1" in every neighborhood, especially in TL. However, through the overall goodness of fit test, none of the response models are significant in any of the neighborhoods. At this stage, these logistic regression models do not provide any statistically significant results for serious crimes, regardless of victim response. This may be because the overwhelming response is to report the offence to the police. For medium level crimes, the models are only significant for solution "1" in TL and HL, and for solution "2" in HL and HB, and the prediction ability is strongest in HL for both solutions. The model summary indicates that this model is better fitted in HL for solution "2", and for solution "3" in TL and HB, but they will not be discussed because of their insignificant test results.

Table 5: Regression results of residents' responses to serious crimes model (RSC).

		TL (1)	(2)	(3)	HL (1)	(2)	(3)	HB (1)	(2)	(3)
Prediction correct percentage		80%	82.5%	98.5%	90.5%	97%	96%	91.5%	94.5%	0
Omnibus Test	Chi-square	13.909	11.671	15.242	18.539	19.677	16.871	6.306	16.131	
	Sig.	0.380	0.555	0.292	0.138	0.104	0.205	0.934	0.242	
Model summary	-2 Log Likelihood	188.993	173.820	23.974	102.476	41.009	56.537	114.709	74.656	
	Cox & Snell R Square	0.067	0.057	0.073	0.089	0.094	0.081	0.031	0.077	
	Nagelkerke R Square	0.105	0.094	0.412	0.195	0.358	0.263	0.068	0.212	
PNSM		0.16	-0.06	0.00	0.87	-0.26	-1.48	0.31	0.75	
NCI		-0.25	0.09	17.49	0.24	1.76	-2.05*	-0.20	-0.36	
Gender		0.30	-0.42	0.63	-0.39	0.98	-0.06	0.53	-1.07	
Living		0.57	-0.70	-0.14	-0.59	2.16	-0.31	-0.29	0.70	
Household		-0.29	0.39	0.15	-19.46	17.20	19.22	-0.10	19.56	
Marital		0.89	-0.8	-2.32	-0.17	-1.93	0.76	0.42	-0.73	
Age		0.08	-0.27	-0.29	0.34	0.94	-0.84	-0.33	1.25	
Income		-0.36	0.65	-2.34	0.73	0.31	-1.45	0.20	-0.71	
Education		-0.26	0.08	0.41	-0.40	0.91	0.12	0.20	0.17	
Employment		-1.16	0.54	-16.28	-0.80	2.71*	-1.16	-0.18	-18.37	
Work time		-1.35*	0.99	17.69	1.19*	-1.49	-0.17	0.29	-0.84	
House attendance		-0.30	0.14	16.90	0.21	-0.87	-0.31	0.65	-1.50	
PSI		19.60	-18.93	-19.36	18.84	-16.07	-18.97	-1.56	2.57	

Table 6: Regression results for residents' responses to medium level crimes model (RMC).

		TL (1)	(2)	(3)	HL (1)	(2)	(3)	HB (1)	(2)	(3)
Prediction correct percentage		63.5%	67%	91%	76%	91%	85.5%	62.5%	70%	95%
Omnibus Test	Chi-square	26.087	20.565	13.333	31.091	31.328	19.026	15.755	27.292	21.605
	Sig.	0.017	0.082	0.422	0.003	0.003	0.122	0.263	0.011	0.062
Model summary	-2 Log Likelihood	251.152	238.414	112.249	198.132	84.998	146.549	252.618	218.725	69.182
	Cox & Snell R Square	0.122	0.098	0.064	0.144	0.145	0.091	0.076	0.128	0.102
	Nagelkerke R Square	0.163	0.135	0.138	0.211	0.329	0.161	0.103	0.180	0.281
PNSM		0.04	0.33	-0.84	0.90*	-0.54	-0.77	0.03	0.43	-1.51
NCI		0.09	-0.30	0.58	0.38	0.30	-0.78	0.53	-0.90*	1.13
Gender		0.59	-0.44	-0.52	0.89*	-2.10*	0.06	0.03	-0.32	0.78
Living		0.10	-0.17	0.30	0.18	0.31	-0.27	0.11	0.06	-1.08
Household		-0.50	0.40	-0.03	-0.60	0.16	0.68	-0.94	0.86	1.30
Marital		1.96*	-1.73	0.01	-0.36	1.18	-0.70	-0.24	0.24	1.00
Age		0.43	-0.36	-0.19	-0.58	0.97	0.69	-0.35	0.62	-1.28
Income		-0.34	0.29	-0.20	-0.08	-0.54	0.26	0.84*	-1.22*	1.27
Education		-0.09	-0.36	0.20	0.78*	-1.15	-0.27	0.35	0.25	-0.07*
Employment		-0.80	0.68	1.11	0.33	-0.74	-0.34	-1.13	0.24	1.47
Work time		-0.43	0.37	0.25	1.34*	-1.07	-1.35*	0.17	-0.31	-0.19
House attendance		-0.34	0.23	0.46	-0.58	0.76	0.57	0.14	-0.23	0.55
PSI		-21.66	-19.98	23.00	-0.37	-18.56	-19.13	-0.00	-19.95	0.01

Table 7: Regression results of residents' responses to minor crimes model (RMNC).

		TL			HL			HB		
		(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Prediction correct percentage		84.5%	79%	62.5%	69.5%	90%	61.5%	73.5%	76.5%	68.5%
Omnibus Test	Chi-square	10.442	13.254	12.307	37.542	22.608	27.083	16.970	24.941	16.903
	Sig.	0.657	0.428	0.503	0.000	0.047	0.012	0.201	0.023	0.204
Model summary	-2 Log Likelihood	162.072	192.328	264.451	224.955	111.765	248.895	220.211	199.993	243.292
	Cox & Snell R Square	0.051	0.064	0.060	0.171	0.107	0.127	0.081	0.117	0.081
	Nagelkerke R Square	0.088	0.100	0.080	0.234	0.218	0.169	0.117	0.174	0.111
	PNSM	0.26	0.78*	-0.44	-0.39	2.62*	-0.02	0.40	0.82*	-0.98*
	NCI	0.42	-0.10	-0.22	-0.44	0.05	0.20	0.77*	-0.35	-0.08
	Gender	0.59	-0.39	-0.02	0.59	-0.23	-0.44	0.20	-0.03	0.01
	Living	0.16	-0.45	-0.21	1.16*	0.05	-1.00	-0.92	1.10*	-0.21
	Household	-0.32	0.48	-0.34	-0.45	0.36	0.46	0.72	-1.11	0.20
	Marital	0.39	0.47	-0.76	-0.72	0.44	-0.05	0.14	-0.40	0.63
	Age	-0.27	-0.14	0.22	-0.25	0.44	0.19	0.29	0.65	-0.83*
	Income	0.28	0.37	-0.30	-0.77*	0.12	0.45	0.92*	0.24	-0.24
	Education	0.13	-0.60	-0.05	0.83*	-1.49*	0.05	-0.09	0.41	-0.47
	Employment	-0.49	1.28	-0.63	1.15*	0.56	-1.09*	-0.74	-0.63	0.52
	Work time	0.40	-0.16	-0.26	0.85*	-0.44	-0.27	-0.20	-0.46	0.36
	House attendance	-0.91*	0.10	0.48	-1.16*	0.03	1.13*	0.47	-0.76	0.00
	PSI	-19.02	-19.16	21.06	-0.38	3.75*	-21.21	0.49	-20.33	-0.77

From the coefficient estimates, the significant positive value for marital status in TL with solution "1" indicates that, unmarried people are more likely to report medium crimes to police, rather than choosing other solutions; in HL, solution "1" is preferred to the others by groups of female, well-educated, night-time employees and those satisfied with neighbourhood safety management; in HB, the positive coefficient indicates that lower-paid employees are more likely to report medium crimes to police rather than choosing other solutions. On the other hand, the significant minus values with solution "2" in HL means that women are less likely to choose solution "2", and in HB residents with lower payments or those with lower neighborliness also are less likely to choose solution "2". For minor level crimes, it indicated the models are significant for all solutions in HL, and solution "2" in HB. The predictive ability is lowest for solution "3" in every neighborhood and is highest in HL for solution "2".

From the model summary results, this model is better fitted in TL for solution "1", and in HL and HB for solution "2", but not strong enough to do predication from the low R2 values. Solution "1" has a significant minus coefficient with home attendance in HL, indicating that minor crimes happened in houses with family attendance during the normal working time, are less likely to be reported to police. It is also found that in HL residents living with others rather than their family, the well-educated, daytime workers and the unemployed are more likely to report minor crimes to police, while people with lower payments tend to be less likely to choose this solution; from the results for solution "2", residents who are satisfied with neighborhood safety

management (PNSM), are more likely to report minor crimes to neighborhood guardians in HL and HB. Residents' choice of solution "3" is only found to have significant estimates in HL with the minus value, indicating that unemployed residents are less likely to choose to forget about minor crimes, while the positive value means that people who have their family to occupy their houses during the normal working time will prefer to forget about such crimes, which is consistent with the result that they are less likely to resort to solution "1" on such occasions.

Neighborhood Insecurity: Comparing Mental Maps

Table 8: Contingency Table.

	P(A)	P(E)	P(max)	K	Klocation	Khisto
TL	0.26	0.1	0.59	0.1796	0.3274	0.5487
HL	0.56	0.239	0.84	0.4177	0.5278	0.7913
HB	0.49	0.136	0.84	0.404	0.4959	0.8147

Neighborhood insecurity refers to residents' fear of crime and trying to test the hypotheses that: Some of the crime-prone hot spots shift over time. For example, areas around supermarkets may be unsafe places for respondents in the daytime, but are safer at night; on the contrary, public places like parks will be taken as safe places in the daytime but unsafe at night, due to the insufficiency of capable guardians; Places with similar land-use functions may turn out to have different neighborhood insecurity scores by residents from different neighborhoods, resulting from the different neighborhood features and residents' compositions; Some areas may have

persistently high levels of insecurity no matter of time, such as main road intersections; while some highly-regulated places areas are always seen as safe places, such as schools and new residential areas; Residents' definitions of unsafe places will vary by their demographic characteristics, such as their age, gender, educational level and employment status.

The insecurity map in Figure 3. has defined the insecurity level by 10 categories, with gradient colours to indicate places from the safest (green) to the most unsafe (red). The inter-map comparison on their similarities between daytime and night in each neighbourhood has been measured by Kappa statistics (Pontius 2000: 1101-6; Monserud and Leemans 1992: 275-19). The basis for the calculation is the so-called contingency table in Table 8. It details how the distribution of safety categories in the daytime map relates to that of the night map. For example, a value of 0.33 for P12 would indicate that 33% of the mapped area is of category 1 in the daytime map and category 2 in the night map; hence the value for P11 indicates the unchanged areas' proportion of category 1. From (Figures 3). we draw the following conclusions regarding resident's perceptions about neighbourhood safety:
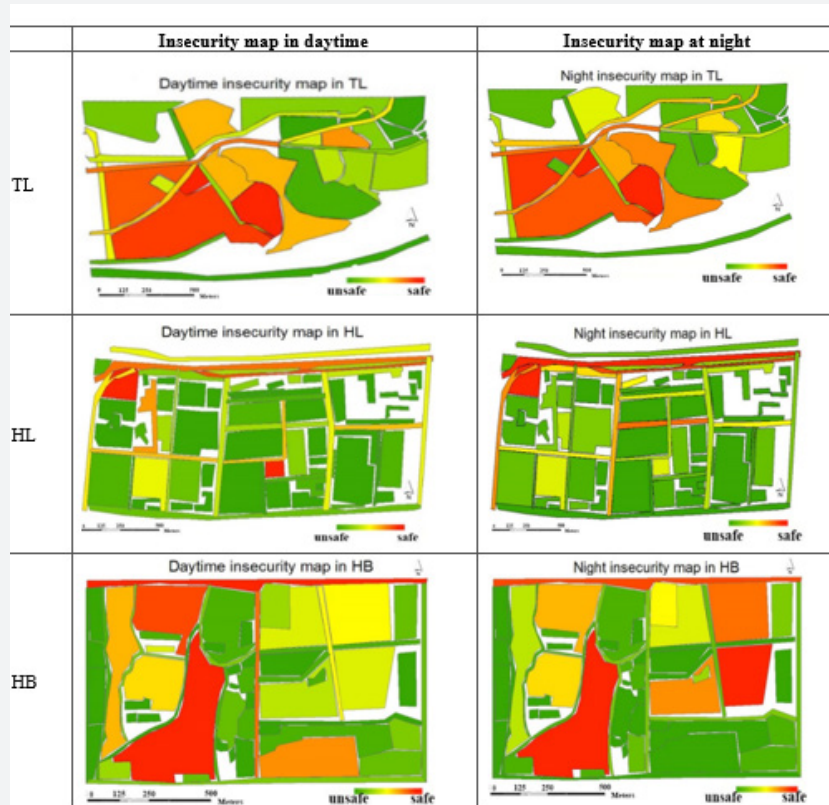

Figure 3: Neighbourhood insecurity maps comparison.

a)   Residents' perceptions on neighborhood unsafe places vary most (between day and night) in TL. They vary least in HL closely followed by HB. The daytime and night time maps are not at all similar in TL but show a moderate degree of similarity for HL and HB.

b)   Spatially, the prominent unsafe places in TL, both in the daytime and at night, are the old village, the main street entering the neighborhood and the business areas, e.g. the supermarket and market. These places are followed (in terms of being less unsafe) by certain industrial places on the west side near to main streets, and the forest area; the safest areas are industrial areas on the east side. The most identifiable differences between daytime and night, are the school area in the north part and the main street in front of the school. The school area is safer at night, while the street in front of the school is more insecure at night.

c)   In HL, both in the daytime and at night, the unsafe places are the park in the northwest and the overpass in the north; most of the residential areas are perceived as amongst the safest places except for the one in the southwest. The most identifiable differences between daytime and night are the market in the center, the road near the market, and the road near the park. The market is seen as very unsafe in the daytime, but very safe at night, so is the road near the park; while the road near the market is thought safer at night.

d)   In HB, there are some very pronounced perceptual differences between daytime and night comparing with the other two. For example, the eastern parts in the new village, which are close to surrounding business areas, are much safer in the daytime; while the business area in the new village is unsafe in the daytime, but safe at night; residential areas in the north and west of the old village are unsafe in the daytime, but safe

at night. However, there are still some places remaining unsafe throughout the day, such as the main street in the north and the residential area at the entrance to the old village.

Comparatively, the insecurity level for residential areas ranks as: TL>HB>HL both in the daytime and at night; the insecurity levels for the green areas (parks, recreational areas etc.) are higher in HL and TL; schools in HL are safer than those in HB and TL. Generally, the similarities among these neighborhoods are:

a) Residential areas in the new village are safer than those in the old village, and their insecurity increases from daytime to evening;

b) The recreational areas and main transport interchanges are places felt to be unsafe both in the daytime and at night, especially in the daytime;

c) Residential areas and industrial places with less traffic flow tend to be much safer, especially at night;

d) The main streets are always seen as unsafe places especially in the daytime.

The differences between these neighborhoods are:

a) The business areas, where the market and supermarket are located, are seen as unsafe all the time in TL and HB, but safe in HL at night;

b) School areas are seen as safe except in TL, especially in the daytime. These results linked to neighbourhood features and the demographic and socio-economic characteristics of the residents.

Conclusions and Discussions

Crime rates in Shenzhen have been increasing over the past 30 years along with rapid economic change, and the pattern of crime types has also changed during this period. On the individual level, it was found that:

a) From residents' self-reports of victimization experiences, the industrialized neighborhood (TL) has a higher frequency of crime, but more repeat victimizations are reported in the residential neighborhood (HL) and the business neighborhood (HB). According to routine activity theory, we might expect more industrialized neighborhoods to have weaker neighborhood surveillance than residential neighborhoods. More shops along the street in HB mean more "capable guardians" in the daytime to provide higher local security. On the other hand, active business in HB provided more opportunities for property crime as suggested by opportunity theory, more suitable targets as suggested by routine activity theory, and more repeat crimes there.

b) The ratio of victims from acquisitive crimes and expressive crimes are not significantly different among these neighborhoods. Findings are broadly consistent with ideas expressed in modernization theory. The residents' victimization

logistic regression model is found to have the strongest predictive ability in HL, and we further conclude that: lower perceptions on neighborhood management improvement are associated with a lower possibility of becoming a victim, especially in HB. In HB, lower educational attainment and lower neighborliness values reduced the possibility of being victimized. Similarly, residents having lower neighborliness values in TL were less likely to get victimized. In TL and HL, residents' victimization experiences are associated with their routine activities and family support, in that residents going out for work during normal daytime are less likely to be victimized than those who work at abnormal times, while people with their homes unattended when they are out for work are more likely to get victimized.

c) Residents having lower perceptions on neighborhood safety are more likely to be victimized in HL in the daytime and in TL at night. This group of residents are normally those that have been victimized more often and hence tend to feel less safe. Fear of crime is closely related to victimization experiences in all the neighborhoods, and there will be a bidirectional influence, as noted by Gibson et al. (2002: 537-28) who observed that the victimization model is based on the premise that, victims of crime will be more likely to be fearful than non-victims.

d) Residents' perceptions on neighborhood safety are higher in the daytime than at night. Results from the logistic regression model suggest that, the model has stronger predictive ability for PS in HB and for NPS in HL and fits worst in TL. However only one or two independent variables are significant influential, and they even vary by neighborhoods. Residents satisfied with current life or having higher neighborliness are less likely to feel fearful of crimes in HL and HB, but in TL the gender significantly affected perceptions on safety, in that women tend to be more fearful of crimes.

e) Residents' responses to victimization are influenced by crime seriousness. Residents tend to resort to formal solutions, such as reporting to the police, for serious crimes and medium crimes, but they often choose to "forget about it" for minor crimes where the loss is small and difficult to attract the police's attention. The model's predicted odds are significant for formal and semi-formal solutions, but insignificant for informal solution, and has the best predictive ability in HL. Conditions having significant influences on residents' responses vary with crime scenarios and neighborhood features.

i. there is no significant influential condition in all neighborhoods for the overwhelming choice of solution "1" for serious crimes;

ii. solution "1" is preferred for medium crimes by unmarried people in TL, the female, well-educated, night-time employees and those dissatisfied with neighbourhood safety management in HL, and low-paid employees in HB;

iii. for minor crimes, people lacking family support and those with knowledge about how to protect themselves, tend to

turn to formal solution. While residents who have higher levels of trust in neighbourhood guardians are more likely to choose solution "2"; residents in HL are more likely to choose "forget about it" when they have their family to occupy houses during the normal working time. This could be ascribed to a Chinese cultural tradition that "disguises a major crime as a minor one and reduces minor ones to nothing at all". This might also be linked to fears that offenders will take revenge on their families.

In general, residents' confidence in their neighborhood and strong family support are incentives for them to resort to formal and semi-formal solutions. Individually, their gender, income levels, employment status and working time periods in specific neighborhoods are influential to residents' decision, on whether it is worthwhile devoting time and energy to report a crime, especially for medium and minor crimes. It is noted that the well-educated are more likely to resort to formal solutions for crimes, for their higher exposures to non-traditional medias [13]. and hence they have higher levels of consciousness on self-protection through official means. Liu et al . also emphasized the strong ties and "familism" from extended families and proposed that elders having greater involvement with families and communities may have a lower risk of being victims, lower fear of crime, and are less likely to report crimes.

From the comparison of neighborhood insecurity maps, it is found that residents' perceptions on neighborhood insecurity vary by locations, land-use types, and individual characteristics. The industrialized neighborhood is most unsafe, followed by the business neighborhood and the residential neighborhood over time. Residential areas in the new village are safer than those in the old village, and their insecurity increases from daytime to evening; recreational areas and road junctions are felt to be unsafe in that, traffic flows are important elements affecting residents' feelings of insecurity. The results are consistent with the hypotheses that, areas with more diversified human activities are found to be more crime-attracting than those with fewer suitable targets and opportunities, while places like road junctions provide a more convenient channel for criminals to effect their escape, which means less chance to get arrested on the spot, hence a better opportunity and lower cost associated with committing any crime. From this perspective, victims perceived crime-prone hot spots coincide with expectations.

This paper has presented some results in line with the proposed hypotheses. For example, residents tend to feel much safer in the daytime than at night; higher level of neighborliness is crime mediating at least in certain neighborhoods. However, there are still some unexpected results inconsistent with theories and hypotheses, e.g. the disadvantaged groups did not always feel safer than other groups as suggested by vulnerability theory. The demographic conditions seem to work interactively on local safety, and their effects also vary according to specific neighborhood features and environments, respondents' characteristics and their individual backgrounds. Meanwhile,

residents usually score their feelings on neighborhood safety from their own direct victimization experiences, which typically are few or non-existent and may be discounted as atypical of their neighborhood [14]. Moreover, residents' fear of crime may be influenced by their accessibility to the mass media, so the well-educated may be more fearful of crimes that are unknown to other residents [15-17]. Some aspects of neighborhood safety can be concluded from this research, such as that residents feel safer in the daytime than at night, they tend to report serious crimes to police while disregarding minor crimes, and they mostly think new villages are safer than old villages [17-19]. As for the insecurity mental maps comparison between crimes hot spots and land-use types. Some similarities among these neighborhoods are found regardless of the respondents' individual characteristics, while there are also some shifts over time and space. However, absolute results cannot be arrived at this stage simply based on one case study due to the limits of the data, time and financial budgets, and further parallel studies need to be done in the future.

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