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Repeat and Near Repeat Burglary Victimization in Taiwan

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Abstract
Extensive evidence shows that repeat victimization is common and widespread, but studies on the prevalence of repeat victimization in Asia are limited. This study examines the extent and patterns of repeat and near-repeat burglary victimization in Taiwan using both 2015 Taiwan Area Victimization Survey data and police recorded burglary data. Results indicated that: (1) burglaries against the same household in Taiwan are highly concentrated (with the top 10% most burgled households making up around 30% of reported victimizations), more so than is often found in many Western countries; (2) the risk of (repeat) burglary is not consistently spread over space and time, particularly within the 100-m range of an initial burglary incident; and (3) the levels of near repeat burglaries identified in this study are notably lower than was observed in prior studies both in China and in many western countries. The findings highlight the value of developing prevention strategies specifically targeting repeat burglary victimization.

Keywords Repeat victimization · Near-repeat victimization · Burglary · Concentration of crime · Decay function

Introduction

Repeat victimization (RV) refers to the tendency for some crime targets to experience multiple victimizations over a given time period. There is now an extensive body of research and theory on repeat victimization covering a wide range of settings and crime types (see for example Farrell & Bouloukos, 2001; Farrell & Pease, 2017; O et al., 2017). That research identifies several recurrent findings: (1) prior victimization is a reliable predictor of future victimization; (2) repeat victimization is widespread such that a small number of repeat victims typically accounts for a disproportionately high number of all victimizations; (3) repeat victimization typically occurs quickly in the wake of an initial victimization; and (4) repeats are particularly prevalent in high crime areas (see Farrell, 1995;

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Farrell & Pease, 2017). Moreover, recent evidence indicates that against the backdrop of large reductions in crime — the so-called international crime drop (Farrell et al., 2014) — the proportion of total victimizations experienced by the same individual is *increasing* (Ignatans & Pease, 2015; Pease et al., 2018).

RV deals with crimes against the same target. An extension of RV is *near-repeat victimization* (NRV), whereby comparable targets located close to a previous victimization display an elevated risk of victimization in the short term (Farrell & Pease, 2017; Johnson et al., 2007; Townsley et al., 2003). NRV is consistent with the observation that crime often clusters in space and time and follows a contagion-like process. Like RV, patterns of NRV have been identified for a variety of crime types across numerous settings, including burglary (Clark, 2018; Johnson & Bowers, 2004a, 2004b), gun-shootings (Ratcliffe & Rengert, 2008), and sex crimes (Amemiya et al., 2020).

The regularity of repeat and near-repeat victimization has important implications for crime prevention. If crime concentrates on a small number of repeatedly victimized targets, then gains in prevention can be maximized by targeting (and tailoring) interventions to those targets at greater risk of re-victimization in the short term. There is strong evidence to support this approach, particularly in relation to residential burglary (see Grove et al., 2012). Likewise, if the risk of criminal victimization is shown to spread in space and time, then time-limited predictions can be made about where crime is most likely to occur and preventive resources deployed accordingly. Again, there are numerous case studies demonstrating the effectiveness of this near-repeats-informed approach in reducing residential burglary (Fielding & Jones, 2012; Stokes & Clare, 2019).

Despite the regularity with which repeat and near-repeat victimization are observed, and its importance for crime prevention, research into the extent, patterns and prevention of repeat and near repeat victimization in Asia is limited (and is reviewed below). That available research suggests that the extent of repeat victimization in Asia is often lower than that found in Western industrialized countries, which are the focus of the bulk of the research literature. If patterns of RV and NRV in Asia are different from those in the West, then it is important to develop Asian-specific research findings to guide local crime prevention policies and practices. To this end, this article contributes to the limited evidence-base on repeat and near-repeat victimization in Asia. More specifically, by drawing on both police-recorded and crime survey data, this study investigates the extent and patterns of repeat and near-repeat burglary victimization in Taiwan.

The remainder of this article is organized as follows. First, we review the literature on repeat and near-repeat burglary victimization, with a particular focus on research undertaken in Asian settings. Next, we describe the data and analytical strategy used in this study. Our findings are then presented, covering first RV and then NRV. The paper concludes by discussing key findings and their implications both for future research and crime prevention.

Repeat and Near-Repeat Burglary Victimization: Evidence and Theory

Most of the research on repeat and near repeat victimization has focused on residential burglary. Evidence for the presence of repeat burglary victimization has been found in the UK (Forrester et al., 1988; Johnson, 2010), the Netherlands (Kleemans, 2001), Australia (Townsley et al., 2003), Italy (Favarin, 2018), Brazil (Carvalho & Lavor, 2008), and North America (Robinson, 1998).

Two mechanisms have been proposed to explain the occurrence of RV: *event dependence* and *risk heterogeneity* (Johnson & Bowers, 2004b; Osborn & Tseloni, 1998). Event dependence suggests that successful victimization "*boosts*" the likelihood of further victimization. In the context of burglary, the boost account argues that once an offender has successfully burgled a home then they are more likely to revisit it for purposes of burglary. This is because of their increased familiarity with the layout and security measures in the property and surrounding area, and their intention to return for those items they couldn't take on the first occasion (Shaw & Pease, 2000). It is argued that the boost mechanism can also occur through means other than an offender's own successes, for example, through information flows within offender networks (Hearnden & Magill, 2004; Lantz & Ruback, 2017; Polvi et al., 1991). From a rational choice perspective (Clarke & Cornish, 1985), increased awareness and familiarity following successful crime commission reduces the perceived risk of getting caught in subsequent burglaries against the same property.

The second proposed mechanism giving rise to RV is called risk heterogeneity, which focuses on those characteristics that make some targets more susceptible to victimization than others, independent of their victimization history. These characteristics serve as "*flags*" advertising to potential offenders' target suitability (Pease, 1998). In the context of residential burglary, such flags include easy access, poor security, and signs of inoccupancy (Bowers et al., 2005; Johnson, 2008), cues which rational offenders may use to assess the perceived risks, effort, and rewards associated with burgling a given household (or not).

Like RV, there is now a large body of research indicating that NRV is common, particularly in relation to residential burglary. Space–time burglary clusters have been demonstrated in the UK (Johnson & Bowers, 2004a, b), Australia (Townsley et al., 2003), the USA (Johnson et al., 2007), South Africa (Clark, 2018), Brazil (Chainey & da Silva, 2016), and China (Chen et al., 2013), albeit with some variation in the time and distance ranges used to define 'near'. For example, early research in the UK (Johnson & Bowers, 2004a, b) identified an increased risk of burglary victimization for houses located within 300–400 m of an initial burglary for a period of 1 to 2 months. Similarly in Houston, Texas, Zhang et al. (2015) found that the risk of residential burglary was significantly elevated for properties located within 2.5 km from an initial burglary for a period of up to 90 days. From an offender's perspective, these patterns of NRV are typically explained via optimal foraging theory (Bowers & Johnson, 2004; Stokes & Clare, 2019), which holds that, all things being equal, offenders seek to maximize available opportunities (here, properties to burgle) in a targeted area before moving on to "forage" in other locations (Chainey & da Silva, 2016).

As indicated above, research into the extent and patterns of repeat and near repeat victimization in Asia is sparse. To the best of our knowledge, there are only eight published studies that focus specifically on repeat and/or near repeat burglary victimization in Asia (see Table 1). It is clear from Table 1 that the available research evidence points towards the presence of both repeat and near repeat burglary victimization in Asian settings, albeit that the extent of these patterns is typically less than that observed in the Western literature. Two additional points are considered noteworthy. First, the majority of studies (n = 4) in Table 1 use data from mainland China. Second, most studies use official police recorded crime data (n = 5), with three drawing on victim surveys and one using interviews with burglars. No studies utilized multiple sources of data.

To reiterate, past research shows that repeat and near-repeat victimization are both common and widespread, and that preventing repeats and near-repeats is an effective way to reduce crime overall. However, there is limited research on repeat and near-repeat victimization in Taiwan in particular and Asia in general. Little is therefore known about

Table 1 Summary of research into repeat and near repeat burglary victimization in Asia

Author(s)	Date of publication	Location	Data source	Sample size	Time frame	Focus	Key findings relevant to repeat and near repeat burglary victimization
Hino & Amemiya	2019	Japan	Police recorded crime data	8,845 burglaries)	January 2005—December 2014	RV&NRV	• 31% of all burglary incidents occurred in once-burgled multifamily buildings; 8.4% of all burglaries occurred in once-burgled dwelling units • Risk of RV of a unit significantly communicated within 160 days from the originator incident • Burglaries were spatially and temporally concentrated in burgled buildings' neighborhoods. The risk communicated 60 days within 200 m of an offended place • The risk of NRV did not decay uniformly by temporal and spatial proximity to the offended place, with several peaks being observed within the defined range

Table 1 (continued)

Author(s)	Date of publication	Location	Data source	Sample size	Time frame	Focus	Key findings relevant to repeat and near repeat burglary victimization
Wang & Liu	2017	China	Police recorded crime data	4,226 burglaries	1 January—30 December 2013	NRV	• Demonstrated the existence of hot spots in a Chinese city • Regions in the vicinity of hot spots shared a similarly high risk • The risk of NRV could expand for 42 days and 1 km
Kuo	2015	Taiwan	2000 Taiwanese victim survey	10,354 survey respondents	January—December 1999	RV	• Opportunity model applied • 1.5% HHs experience RV (401 incidents or say 47.2%)
Wu et al	2015	China	Police recorded crime data	10,548 residential burglaries	2013	NRV	• Risk of the same location experiencing a second burglary within the next 7 days from the initial incident is over 600% greater than the city's average risk level • Should the crime prevention measures focus on targets within 120 m of any burglarized location within 14 days after an initial event, 16% of the city's burglaries could be prevented

Table 1 (continued)

Author(s)	Date of publication	Location	Data source	Sample size	Time frame	Focus	Key findings relevant to repeat and near repeat burglary victimization
Ye et al	2015	China	Police recorded crime data	882 residential burglaries	January–June 2013	NRV	• Within 100 m and 7 days after a residential burglary happens, the risk of victimization is 55% more than the average
Tseng, (Chinese)	2014	Taiwan	Interviews	31 serial burglars	N/A	NRV	• 80% chance that a serial burglar in Taipei would commit a subsequent offense within a 2.4-km radius of the former event
Chen et al	2013	China	Police data	1533 recorded burglaries	May–October 2007	NRV	• Burglary risk communicated at least 3 weeks within 200 m of an offended place
Huang (Chinese)	2011	Taiwan	Individual survey	472 HHs (12 NBs)	N/A	RV	• 8.26% of households victimized more than once, around 64% of cases were RV

min Park's (2015) study was not included in this table as it examined eight types of victimization (ranging from robbery to automobile theft) as a sum rather than burglary victimization alone

the extent and patterns of (near) repeat victimization in Taiwan, and whether focusing resources on reducing repeats and near-repeats is a sensible crime prevention strategy. This study aimed to fill this knowledge gap. To our knowledge, it is the first empirical study on RV and NRV in Asia to use both a victimization survey and police recorded data.

Methods

Data

This study used two data sources: (1) the 2015 Taiwan Area Victimization Survey (TAVS), and (2) police-recorded burglary data for 40 months (2015–2018). Here, we discuss each dataset in turn.

Taiwan Area Victimization Survey

The TAVS is Taiwan's national victim survey. Like most national crime surveys, the central purpose of the TAVS is to ascertain the extent and patterns of criminal victimization and victim reporting from a representative sample of the population. The TAVS was first initiated in 2000 and is conducted every 5 years. The 2015 survey was the most recent version at the time of writing.

The 2015 TAVS used stratified random sampling with the assistance of Computer Assisted Telephone Interviewing (CATI). All registered citizens aged 12 or older were eligible to take part in the survey. The survey collected participants' self-reported experience of criminal victimization in the previous year (1 January to 31 December 2014). Between 5 May and 20 July 2015, 162,304 phone calls were made and 13,016 cases were completed, making a response rate of 30.76%. There were eight types of crime included in the 2015 TAVS: residential burglary, motorcycle theft, car theft, fraud, robbery, forceful taking, injury, and general larceny. For the purposes of this study, the question *"In the past year, did anyone steal belongings from your residence (including residential and office mixed-use buildings)?"* was used to code participants' experience of burglary victimization in the past year. Respondents could report a maximum of six victimization per crime type over the survey period. We acknowledge that the survey question used in this study does not make specific reference to illegal entry, which is an important component of burglary in some jurisdictions. Caution must therefore be exercised when making comparisons with burglary as measured here and that of other countries.

Table 2 shows the distribution of self-reported burglaries in Taiwan according to respondents of the 2015 TAVS data. As can be seen, of the 13,016 surveyed households, 194 respondents (1.49%) indicated that they were the victim of burglary in the past year.[1]

Police-Recorded Crime Data

The second dataset used in this study relates to police recorded crime data for Taoyuan city — the fourth-largest metropolitan area (1221 square km) and fifth-largest populated

[1] This is comparable to the 2.29% of respondents in the Crime Survey of England and Wales over the same period (Office for National Statistics, 2015).

Table 2 The distribution of burglaries in Taiwan using data from the 2015 TAVS (13,016 households and 308 burglaries)

Burglary num	Prevalence	Incidence	% all targets	% victims	% incidence
0	12,822	-	98.51	-	-
1	135	135	1.04	69.59	43.83
2	37	74	0.28	19.07	24.03
3	9	27	0.07	4.64	8.77
4	3	12	0.02	1.55	3.90
5	-	-	-	-	-
≥6	10	60	0.08	5.15	19.48
Total	13,016	308	100%	100%	100%

city (2,249,037 persons) in Taiwan (Taoyuan City Government, 2020). These data cover the period January 2015 to April 2018 (40 months) and contained 506 police-recorded burglary incidents. The supplied police data contained information on the date the burglary was believed to have occurred and the location (latitude and longitude coordinates) of the burglary. These data were used specifically to measure NRV. An advantage of these data is that they are not limited to a cap of six victimizations, as is the case with the TAVS data. However, a familiar limitation with police recorded crime data is that not all crimes are reported to the police. Reporting rates for burglary in Taiwan are reported to be around 40% in the three sweeps of TAVS between 2005 and 2015 (Central Police University, 2015).

Analytical Strategy

The analysis presented here comprises three steps. The first step is to quantify the extent of repeat victimization in Taiwan. To do this, following Tseloni and Pease (2005), we present concentration rates, the percentage of repeat crimes and the cumulative distribution of burglary victimization. Results are presented in frequency distribution tables and the cumulative distribution is presented using Lorenz curves. The cumulative distribution is then compared with a Poisson-simulated distribution, estimated by a Monte Carlo simulation of a Poisson process with 500 replicates (see Estévez-Soto et al., 2021). Gini coefficients are also reported as an additional way to quantify burglary concentration, for which a figure of zero indicates no concentration and a figure of one indicates complete concentration. To examine if the observed distribution statistically differs from a reference distribution (i.e., the aforementioned Poisson distribution), we use one-sample Kolmogorov–Smirnov (KS) tests (Arnold & Emerson, 2011; Estévez-Soto et al., 2021). It is noted that since the frequency of victimization is discrete and the victimization population in the 2015 TAVS (n = 194) was greater than a suggested sample size of 30 (Dimitrova et al., 2017), the KS test is suggested to be performed using an improved R package 'KSgeneral' (Dimitrova et al., 2020).

Second, Chi-square analysis (or Fisher's exact test when appropriate) is used to explore the risk of RV by types of dwelling and accessibility, two variables which the research literature repeatedly finds to be associated with (repeat) burglary risk (Bowers et al., 2005). Types of dwelling included here as measured in the TAVS are (a) bungalow/detached; (b) semi-detached; (c) apartment; (d) high rising building; and (e) other. Accessibility was

referred to as detached houses or those located on the lower floor (in the context of Taiwan, the second floor) or below within an apartment or high-rise building. The logic behind this is that detached houses contain more entry points while the lower-floor dwellings might be more accessible by potential offenders. Therefore, it is expected that there would be variation in the risk of burglary victimization across types of dwellings and across dwellings with different levels of accessibility.

For the third and final step, we used Johnson et al.'s (2007) permutation test to analyze NRV. Built on the Knox test (Knox, 1964), this approach pairs the temporal and spatial distances of events and determines whether there are more observed pairs in temporal and spatial proximity than would be expected based on a random distribution (i.e., if burglaries are independent of one another). Should NRV be present, the observed counts of burglary will be significantly higher in space and time than would be expected by chance.

Two issues are often raised in relation to the use of the Knox test when analyzing patterns of NRV: (a) population bias resulting from population growth by geographic subareas (Zhang et al., 2015), and (b) the selections of the bandwidth of the space–time clusters. The first issue is less of a concern here as our unit of analysis is the household rather than the individual person, and the number of households is expected to be relatively stable over the 40-month study period. The second issue relates to prior research into the spatio-temporal clustering of crime. Despite the aforementioned sparsity of this kind of research found in Taiwan (and Asia more generally), we were able to choose a bandwidth of 7 days and 100 m based on some evidence available in a Chinese context (Wu et al., 2015; Ye et al., 2015). In view of better clustering prediction, we also include exact repeats with pairs of events with 0 distance (practically less than 0.1 m, see Davies, 2019). We initially set cut-off points in the distance as 3000 m and time as 98 days, suggested by the aforementioned Chinese literature. However, we decided to present a shortened distance range of 1000 m and a temporal range of 42 days considering an improved visualization of NRV; the results for spatial and temporal limits of 3000 m and 98 days can be accessed upon request. The NRV analysis reported here used Python with the function defined by Davies (2019).

Results

Repeat Burglary Victimization in Taiwan

Table 2 shows the distribution of burglary victimization in Taiwan using data from the 2015 TAVS. According to these data, around 30% of burglary victims reported experiencing more than two burglaries in the past year. These repeat victims accounted for more than half of all burglary incidents. Using these same data, Fig. 1 shows the Lorenz curves for the observed and expected distribution of burglary. The left panel indicates the extreme inequality in reported burglary victimization across the sampled population (Gini index = 0.99) while the right panel indicates a similar yet lessened level of inequality across the entire victim population (Gini index = 0.30). When only those households who experienced at least one burglary were retained in the analysis, the top 10% most burgled households (n = 194) made up around 30% of reported victimizations (n = 308). The KS test indicated that the observed distribution of burglaries over victims was significantly different from the null distribution ($D = 0.55$, $p < 0.001$). Altogether, these results suggest that repeat burglaries were significantly more concentrated across Taiwanese households than would

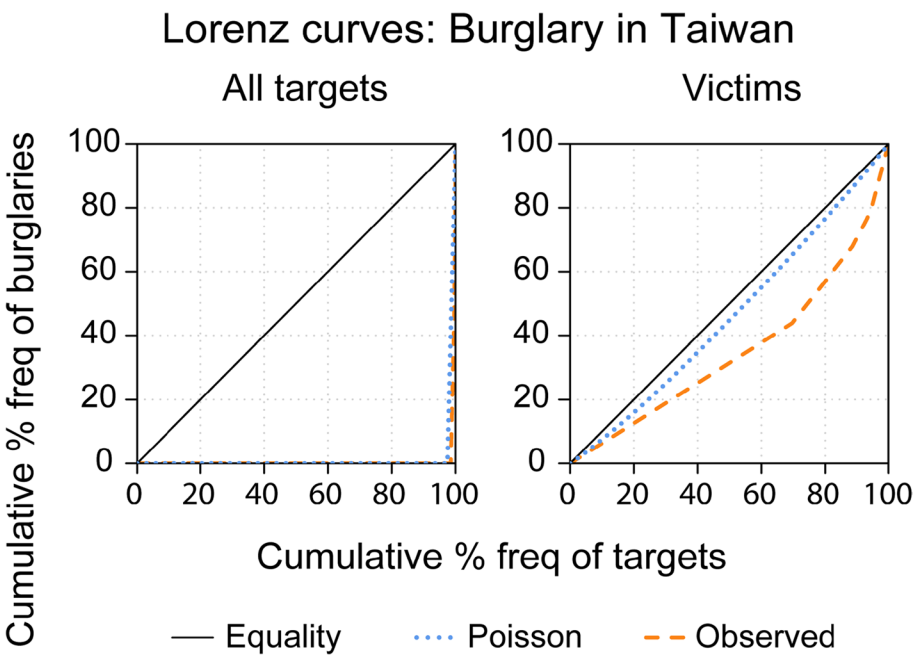

Fig. 1 Lorenz curves showing the observed and expected distributions of burglary victimization using the 2015 TAVS

be expected on the basis of chance. This finding is consistent with the dominant finding of previous research in both Asian and Western contexts.

Next, we explored patterns of RV in Taiwan by property type and accessibility. Table 3 presents the results of a series of Chi-square analyses (or Fisher's exact test when appropriate). It shows that detached houses in Taiwan were the most likely type (40%) to have experienced revictimization. However, except for semi-detached houses that suffered significantly lower frequencies of repeats than would be expected by chance (χ^2 (1) = 4.92, $p < 0.05$), repeat burglaries in Taiwan were not significantly related to dwelling type ($\chi^2(4) = 5.08$, $p = 0.23$).

Near-Repeat Burglary Victimization in Taiwan

Table 4 shows the results of the NRV analysis of burglary risk using police recorded crime data for Taoyuan city. The statistics in Table 4 represent the ratios of medians, i.e., the difference between the observed and the expected counts of data using 999 iterations. The higher the figure, the greater is the difference between the observed and the expected counts of burglaries for each space–time interval. The statistically significant values were found mostly in the top left of Table 4, indicating that elevated burglary risk in Taiwan is most likely within a range of 3 weeks and 400 m of where a burglary was previously committed.

Table 4 shows that the risk of repeat burglary victimization is significantly higher than would be expected by chance for 21 days after an initial burglary. The most significantly over-represented risk occurred at the same location (i.e., RV) between 0 and

Table 3 Risk of revictimization by different types of property in Taiwan, 2015 TAVS

Property characteristics		Repeats (% by house type)	
		Zero repeats	Revictimized
House type			
Bungalow/detached	Obs	21 (60.00%)	14 (40.00%)
	Exp	24	11
Semi-detached*	Obs	76 (76.77%)	23 (23.23%)
	Exp	69	30
Apartment	Obs	24 (63.16%)	14 (36.84%)
	Exp	26	12
High-rise building	Obs	10 (62.50%)	6 (37.50%)
	Exp	11	5
Other	Obs	4 (66.67%)	2 (33.33%)
	Exp	4	2
Easy access	Obs	34 (61.82%)	21 (38.18%)
	Exp	38	17

House type: Pearson $\chi^2(4) = 5.08$, Fisher's exact p-value = 0.23, Cramér's V = 0.16

Easy access: Pearson $\chi^2(1) = 2.19$, $p = 0.10$. Cramér's V = 0.11

* indicates cell frequencies that were significantly lower than expected, using a chi-square test with one degree of freedom, $p < 0.05$

Table 4 Near-repeat analysis of burglary risk using police recorded burglary data from Taoyuan city, Taiwan (n = 506) (999 iterations)

Spatial unit (m)	Temporal unit (day)					
	0 to < 7	7 to < 14	14 to < 21	21 to < 28	28 to < 35	35 to < 42
Same location	32.00**	4.00**	4.00**	0.00	0.00	0.00
0.1 to < 100	2.00	0.00	0.00	0.00	0.00	2.00
100 to < 200	4.00**	3.00*	2.00	1.00	0.00	1.00
200 to < 300	5.33**	2.00	2.00	1.00	1.00	0.00
300 to < 400	4.00**	1.33	0.67	0.00	2.00	0.67
400 to < 500	0.00	5.33**	0.67	0.00	0.00	0.67
500 to < 600	1.20	0.80	1.00	1.00	1.50	0.50
600 to < 700	1.67	3.20**	0.40	0.40	1.60	1.00
700 to < 800	0.67	1.60	0.50	0.40	2.50*	1.00
800 to < 900	2.29**	1.14	0.67	1.33	1.00	2.00*
900 to < 1000	1.25	2.29**	0.00	1.14	0.67	0.33

*Significant at $p < 0.05$. **Significant at $p < 0.01$

7 days following the initial incident, during which time there was a 32 times greater chance of another burglary incident occurring than would otherwise be expected. The greatest risk of NRV occurred in the zone from 200 to less than 300 m and within 7 days from an initial event. The chance of another event occurring at this spatio-temporal interval was about 5.3 times greater than would be expected by chance. One thing

Table 5 The proportion of near repeats for different definitions of near in space and time

Near repeat definition	Number of near repeats and % of all burglaries	
	0–7 days	0–14 days
Within 100 m	17(3.36%)	19(3.75%)
Within 200 m	21(4.15%)	26(5.14%)
Within 300 m	29(5.73%)	36(7.11%)

to note is that within the range of 100 m, the risk of burglary risk was not statistically significant.

Table 5 summarizes the number and accumulated proportion of near repeat burglaries for different spatial and temporal bands. It shows that less than 5% of all recorded burglaries were near repeats occurring within 200 m and 7 days of an originator incident. Moreover, although the risk of NRV significantly communicated within 3 weeks and 400 m, the accumulation of cases was small. That is, within a temporal range of 14 days, only around 5% of burglaries accumulated within 200 m while 7% within 300 m.

Discussion

This study offers three main insights into repeat and near-repeat burglary victimization in Taiwan. First, consistent with the consensus in the research literature, our analysis shows that in Taiwan where burglary occurs, RV is common — 56% of self-reported burglaries being repeats — and more concentrated than would be expected on the basis of chance. The extent of burglary concentration observed here is also greater than in many other countries. As shown by the Lorenz curves in Fig. 1, in our data the top 10% of most burgled households accounted for about 30% of all reported burglaries over the surveyed period, whereas in the UK, for example, the same proportion of households accounted for 20% of total burglaries (Tseloni & Pease, 2005). Further research is of course needed to help explain the high levels of burglary concentration observed in Taiwan. It is possible that these differences might relate to the low prevalence of burglary in Taiwan, for which a smaller body of vulnerable targets (serving here as the denominator) exaggerates the concentration of repeats.

The second key insight relates to near-repeat burglary victimization. Using police data from one Taiwanese city, we found that the risk of burglary is not consistently spread over space and time. In line with the research literature, although we found that burglary risk in Taiwan was elevated within 3 weeks and 400 m of an original burglary incident, we observed no statistically significant risk elevation within 100 m of the original incident. There are two possible explanations for this finding. First, it may be that houses located close to a previous burglary take greater preventative measures (for example, locking doors and windows) compared to those located further away, thereby increasing the (perceived) risk and effort involved in committing burglary against houses in close proximity to a burglary victim. The second possible explanation relates to the use of event dependence ("boost") over risk heterogeneity ("flag") in explaining NRV in Taiwan. Risk heterogeneity suggests that households nearby to the initially burgled house would experience a higher risk of burglary than those located further away, based on the assumption that the households nearby often flag a similar vulnerability (say, layout or escape routes) than those

located further away. The inconsistent risk of NRV within 100 m of the original incident, however, conflicts with the risk heterogeneity argument. The inconsistency might otherwise be taken as an effect of event dependence over that of risk heterogeneity. The homogeneity of vulnerability (or proximity) to the initial victimized targets is less influential in deciding the risk of burglary. Instead, the risk of NRV within the 100-m range depends more on the success of the originator incident — where the highest risk is shown as the same locations. Put differently, when burglars forage in the area very close to the originator incident (i.e., within the range of 100 m), their choice of targets relies more on their prior success of the same target than other targets with similar suitability. Nevertheless, we need further evidence to assess these proposed explanations.

Third, the levels of near-repeat burglaries reported here are much lower than that observed in both many Western countries and in Chinese settings. For example, the proportion was 23% within 200 m and 7 days in Newcastle, UK (Chainey, 2014) and 26% within 120 m and 14 days in Wuhan city, China (Wu et al., 2015). By contrast, we find that in Taiwan the same spatial and temporal range accounted for around only 5% of all burglaries. This suggests that (near) repeat burglaries may be less concentrated in Taiwan than in the aforementioned cities. Drawing on our findings from both the TAVS and police data, it seems that the issue of actual repeats is more serious in Taiwan than in other settings, whereas the extent of near repeats is contrarily lower in Taiwan than is the case elsewhere. Variations in the extent of (near) repeats may reflect variations in the prevalence of crime and opportunities across contexts. Further research is hence needed using different police datasets in Taiwan to determine whether the low level of near repeats observed here is generalizable.

In the case that the low extent of near repeats is generalizable across Taiwan, any crime prevention programs designed to reduce near repeats in the short term and over a limited geographic area should be carefully reviewed. The cost-effectiveness should be taken into consideration since such programs against near repeats would only yield an overall burglary reduction of roughly 5%. However, the argument of cost-effectiveness conflicts with what we have found in the TAVS. Our analysis of the TAVS suggests that the allocation of crime prevention resources across the 10% most heavily victimized households may lead to a potential reduction of 30% of burglary incidents. As mentioned above, only around 40% of burglary cases were reported to the police according to the three sweeps of the TAVS (Central Police University, 2015). The under-reporting of burglary by victims, along with the under-recording practice of police, might account for the inconsistency in the extent of repeats between the victim survey and police data (Sparks, 1981; Thornberry & Krohn, 2000). The dark figures caused by victim reporting and police recording go beyond the scope of the current study. Nevertheless, more police datasets across crime types and regions are required to examine if such an underrepresentation of (near) repeats is only for burglary victimization or a regional issue that merely occurs in Taoyuan city.

Overall, the findings reported here on the extent of actual repeats and near repeats vary greatly with that reported in the literature. On the one hand, burglary was found to be more concentrated over actual repeat targets. The top 10% of most burgled households accounted for about 30% of all reported burglaries over the surveyed period and same-location targets experienced an over-represented risk within 6 days from an initial incident. On the other hand, the levels of near-repeat burglaries were lower than that reported in the literature. Those differences might reflect both (a) actual differences (such as variations in the prevalence of crime and opportunities), and (b) measurement/operationalization differences (such as the diversity in data of use, survey items or even police recording practices). We welcome future research using standardized

measurements/operationalizations of repeat burglaries across more Asian regions to examine if the difference observed in Taiwan can be generalized to other Asian contexts.

Limitations and Future Research

Three main limitations of this study warrant mention. The first concerns the capping of victimization incidents in the TAVS. As indicated previously, the 2015 TAVS allowed survey respondents to report a maximum of six victimizations per crime type over the 1-year survey period. Such counting conventions are common in national victim surveys (Lauritsen et al., 2012). However, researchers have demonstrated that such capping conventions underestimate the true count of crime and, in particular, the extent of repeat victimization (Farrell & Pease, 2007). Although not quantitively examined here, we expect that the capping conventions of the TAVS will similarly underestimate the extent of crime more generally and repeat victimization in particular. The second limitation concerns our inability to reliably explore the boost account of repeat victimization. An examination of the "boost" mechanism requires data on the time intervals between crimes against the same target (see Estévez Soto, 2020). Unfortunately, the data used in this study did not contain such information. We were therefore unable to analyze the time-course of repeat victimization. The third limitation concerns the small volume of local police data analyzed here, containing only 506 burglaries over a 40-month period. This figure is considerably lower than the burglary counts in existing studies. Future research is needed using a larger dataset to determine the generalizability of the findings reported here.

In awareness of the limitations outlined above, this study nevertheless found clear evidence for a statistically significant overrepresentation of repeat burglaries, more so than is often observed in Western Industrialized settings. In terms of practical implications, these findings suggest that there may be value in pursuing a crime prevention strategy oriented towards the reduction of repeat burglary victimization. If successful, such an approach would lead to sizable reductions in reported burglary overall. Despite a large body of literature on the implementation and effectiveness of measures to reduce (near) repeat burglary (Fielding & Jones, 2012; Grove et al., 2012; Stokes & Clare, 2019), to the authors' knowledge there are currently no available studies on efforts to reduce repeat victimization in Taiwan. We believe this represents a fruitful avenue for future research.

Availability of data and material Police data is publicly available.

Code availability Code for near-repeat analysis is publicly available via GitHub (tobydavies/NearRepeat).

Declarations

Conflict of interest Not applicable.

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