RUTGERS
Center on Public Security

BRIEF

Risky Repeats: Using RTM and the Near Repeat Calculator to Analyze Urban Residential Burglary

William D. Moreto, Eric L. Piza & Joel M. Caplan

Full article:
Moreto, W. D., Piza, E. L., & Caplan, J. M. (2013, online first). "A Plague on Both Your Houses?": Risks, Repeats and Reconsiderations of Urban Residential Burglary. *Justice Quarterly*.

Introduction

Research assessing the near repeat phenomenon has tended to focus upon the event-dependent nature of near repeat pairings. Akin to the contagion effect of disease, previous researchers have attributed the 'communicability of risk' (Bowers, Johnson & Pease, 2004; Johnson & Bowers, 2004a, 2004b; Townsley, Homel & Chaseling, 2003)[i] for burglary incidents to be a key factor in determining where *and* when a future incident may occur. Simply put, it has been found that the presence of an instigator (or originator) burglary incident elevates the risk for nearby residences to be victimized within a specific period of time. Although the communicability of risk may explain why a near repeat incident occurred, it does not explain why the *instigator* incident came to pass. The study summarized here sought to address this issue.

The environmental backcloth or the risk heterogeneity for residential burglary was operationalized for the urban city of Newark, New Jersey. The aim was to contribute to the literature by testing whether different forms of residential burglary had varying baseline-levels of risk. In general, the study assessed whether instigator and near repeat incidents were more prone to 'sickness' due to elevated levels of risk compared to other burglary incidents.

Study Setting

The setting for this study is Newark, New Jersey. Newark is the largest city in New Jersey and is considered to be one of the most culturally diverse cities in the United States, both in terms of land use and population. In terms of burglary rates, Newark has more than double the national average rate (1,947 compared to 716.3 burglaries per 100,000 people in 2009). Notably, areas included within Newark Liberty International Airport and Newark Port Authority were excluded from the current study as these areas did not fall within the jurisdiction of the Newark Police Department. Further, given the land use of such areas (e.g. commercial establishments, highways and industrial parcels), it was unlikely that residential burglary would occur in such areas.

Research Objectives

The study had two objectives:

1) The first objective was to use risk terrain modeling (RTM) to operationalize the environmental backcloth for residential burglaries to establish risk heterogeneity and a baseline-level of risk for Newark, NJ. Like prior studies using the RTM approach, it was expected that residential burglaries would occur in areas with elevated levels of risk.
2) The second objective involved a two-pronged test: The near repeat calculator was first used to determine whether the near repeat phenomenon was present in Newark, NJ. If present, the second test was to distinguish between different types of burglaries (e.g. instigator burglaries, near repeat burglaries, non-instigator/non-near repeat burglaries) and overlay such incidents on the risk terrain map developed in the first objective. As the majority of prior literature has attributed near repeats to heightened risk communicated by an instigator incident, the second objective sought to determine whether baseline levels of risk varied between different types of burglaries.

Objective 1 Methodology

Using empirical evidence and discussions with personnel from Newark Police Department's CompStat unit, six risk factors were originally identified to be used for the risk terrain map: land use, at-risk housing, pawn shop, burglar residence, drug market (based on 2009 drug arrests) and public transportation nodes. Once the spatial influence of each risk factor was operationalized and mapped using ArcGIS 10 software (see original article for how these factors were operationalized and mapped), negative binomial regression analyses were conducted to decipher which risk factors were statistically related to residential burglaries; thus enabling the creation of a 'best' risk terrain model and map. Results from the regression analyses found that at-risk housing, burglars' residences, drug markets, land use, and pawn shops were significantly associated with residential burglaries and were therefore included in the final composite risk terrain map. The unit of analysis was 145 foot by 145 foot raster cells (N = 13,801) with the independent variable being the risk value of each raster cell. The dependent variable was all reported residential burglaries in Newark, NJ in 2010. It should be noted that as spatial autocorrelation was found to be present, a spatial lag variable was included as a control in all subsequent statistical models.

Objective 1 Results

The results from the negative binomial regression analysis suggests that for every one unit increase of risk, the likelihood of residential burglary incidents increased by 22% (IRR = 1.22; $p < .001$), given that the spatial lag is held constant. The risk terrain model is statistically valid.

Objective 2 Methodology

The second objective was a two-pronged test that first required determining whether the near repeat phenomenon was present in Newark, NJ. Using Temple University's near repeat calculator[ii], the near repeat phenomenon was indeed found to be present for burglaries. The calculator was also used to distinguish specifically which burglary incidents were part of a near repeat pairing (instigator or near repeat). Once identified, near repeat pairings and non-instigator/non-near repeat incidents were distinguished from the initial list of all reported residential burglaries in 2010 and mapped on top of the risk terrain map created from the first objective. The unit of analysis and the independent variable remained the same as the first objective, while the dependent variables for the second objective were: instigator burglaries, near repeat burglaries or non-instigators/non near-repeat burglaries. As with the first objective, a spatial lag was included as a control to account for spatial autocorrelation.

Objective 2 Results

As shown in Table 1, the predictive validity of the risk terrain map used in the first objective was found to be significant for all three burglary incident types. Results from the Poisson regression model suggest that for every one unit increase of risk, the likelihood of a non-instigator/non-near repeat burglary increases by at least 16% (IRR = 1.16; $p < .001$); while results from the negative binomial models suggest that an instigator burglary increases by 45% (IRR = 1.45; $p < .001$) and near repeat burglary increases by 42% (IRR = 1.42; $p < .001$). Additionally, when controlling for both the presence of instigator incidents and a spatial lag, near repeat burglaries remained significant with every one unit increase of risk resulting in a 39% increased likelihood of a near repeat incident (IRR = 1.39; $p < .005$).

Table 1. Risk Terrain Explaining Locations of 2010 Residential Burglaries with Spatial Lags Included as Control Variable*

Incident Group	Model Type	IRR (Std. Err.)	95% C.I. Lower	95% C.I. Upper
All Non-Instigators/Non Near Repeats	Poisson	1.16 (.03)**	4.18	8.75
Only Instigators	Negative Binomial	1.45 (.15)**	1.18	1.78
Only Near Repeats	Negative Binomial	1.41 (.15)**	1.14	1.74

*Due to space constraints, spatial lags which were used as a control for all variables is not presented; however, all spatial lags were statistically significant for all variables ($p < .001$). All tests were run independently. ** $p < .001$

Discussion

The findings of the current study suggest that the communicability of risk is but part of the story in understanding the existence of the near repeat phenomenon. As demonstrated, near repeat pairings were found to be located in places with higher levels of risk compared to their non-near repeat counterparts. While the presence of instigator events may elevate the risk of nearby places as shown by previous research, the study discussed here contends that such increase may be especially problematic in places with already elevated levels of (environmental) risk. In other words, it may be possible that such areas were more prone to communicating risk or spreading 'sickness' and that the existence of an instigator incident was simply the tipping point for nearby repeats and/or clusters. From a practical perspective, the study highlights the importance of better understanding place-based characteristics that are conducive for all different types of burglaries. Indeed, by definition as a near repeat incident requires an instigator incident to occur, any response to a near repeat pairing is still reactive in nature. By recognizing that the underlying baseline level of risk for residential burglaries varies, appropriate responses can be taken that prevent not only near repeat incidents, but instigator incidents as well.

Endnotes

[i] Bowers, K.J., & Johnson, S.D., & Pease, K. (2004). Prospective hot-spotting: The future of crime mapping. *British Journal of Criminology, 44*, 641-658; Johnson, S.D., & Bowers, K.J. (2004a). The burglary as a clue to the future: The beginnings of prospective hot-spotting. *European Journal of Criminology, 1,* 237-255; Johnson, S.D., & Bowers, K.J. (2004b). The stability of space-time clusters of burglary, *British Journal of Criminology, 44,* 55-65; Townsley, M., Homel, R., & Chaseling, J. (2003). Infectious burglaries: A test of the near repeat hypothesis. *British Journal of Criminology, 43*, 615-633

[ii] The near repeat calculator can be downloaded from: http://www.temple.edu/cj/misc/nr/

