Predicting Initiator and Near Repeat Events in Spatiotemporal Crime Patterns: An Analysis of Residential Burglary and Motor Vehicle Theft

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Key Takeaways

- Near-repeat patterns were observed for both motor vehicle theft and residential burglary
- ~28% of motor vehicle thefts and ~37% of residential burglaries were part of a near repeat chain
- Near repeat residential burglary patterns were most salient in the 4 days following an initiator event
- Near repeat motor vehicle theft patterns were equally salient in the 4-day and 7-day periods following an initiator event
- Social disorganization and geographic edge measures predicted whether events were part of near repeat chains for both motor vehicle theft and residential burglary
- Crime generators predicted whether events were part of near repeat chains for motor vehicle theft

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Research Summary:

Near repeat analysis has emerged as a method for identifying clusters of crime events that occur closely in both space and time. Recent research has classified crime events based upon their role in spatiotemporal clusters and identified locations most at risk of near repeat patterns.

This study sought to identify the environmental factors that predict whether a crime event is an initiator (first event in a near repeat chain) or near repeat (subsequent event in a near repeat chain) event. Accurately forecasting, and preventing, initiator events offers enhanced crime control benefits, as additional incidents that may have occurred subsequently are also prevented.

This study used data on motor vehicle theft and residential burglary events occurring in Indianapolis, IN during 2013. For both crime types, we conducted an analysis of spatiotemporal clustering using the near repat calculator (https://www.jratcliffe.net/near-repeat-analysis). We used a spatial bandwidth of 1-block in the analysis, and repeated the analysis using 3 different temporal bandwidths: 4 days, 7 days, and 14 days.

For residential burglary, near repeat patterns were most salient in the 4-day model. The strongest effects occurred in the 1-block band, with near repeat residential burglary patterns 78% higher than what is expected by chance. Out of the 11,536 residential burglaries, the near repeat calculator identified 2,536 (~22%) as initiator events and 1,712 (~15%) as near repeat events.

For motor vehicle theft, near repeat patterns were equally salient in the 4-day and 7-day models. The strongest effects occurred in the 1-block band with near repeat events more than 45% greater within 4-days and 53% greater within 7-days than what is expected by chance. Out of the 4,991 motor vehicle thefts, the near repeat calculator identified 802 (~16%) as initiator events and 592 (~11%) as near repeat events.

Multinomial logistic regression identified variables significantly related to the occurrence of initiator and near repeat events. For residential burglary, concentrated disadvantage, geographic mobility, housing density, and racial heterogeneity were significantly associated with an increased likelihood of a crime being a near repeat or initiator event. Proximity to railroad tracks was associated with a decreased likelihood of a residential burglary being a near repeat or initiator event while proximity to a river was associated with an increased likelihood.

For motor vehicle theft, incidents occurring in close proximity to ATMs & Banks were more likely to be near repeat or initiator events. Concentrated disadvantage, geographic mobility, housing density, and racial heterogeneity were each significantly associated with an increased likelihood of being a near repeat or initiator event. Close proximity to a river was associated with decreased likelihood of a motor vehicle theft being an initiator event.

Findings highlight the importance of spatial context to near repeat patterns. Theoretical concepts from environmental criminology play a role in understanding the occurrence of near repeat and initiator events, but in a much more nuanced manner than social disorganization theory. Overall, social disorganization measures predicted an increased likelihood of near repeat and initiator events while environmental criminology measures were associated with both increased and decreased likelihood.