**A systematic scoping review of crime location choice studies and its spatial unit of analysis**

# Abstract

This systematic scoping review examines the current body of research on crime location choice, focusing specifically on the decision-making processes of offenders, as analyzed through discrete choice models. By systematically reviewing quantitative literature, this study aims to map the spatial units of analysis utilized in these studies and identify gaps in existing research. The review emphasizes the importance of exploring how spatial scales are modeled as factors influencing the outcomes of discrete choice models in offender decision-making, including potential quantitative relationships between spatial scales and decision-making outcomes. The expected outcomes include a comprehensive mapping of spatial unit usage and recommendations for standardizing spatial scales in future research.

# Introduction

Crime location choice research has evolved from focusing on larger spatial units such as cities, states, and neighborhoods (Baumer et al., 1998; Loftin & Hill, 1974) to smaller spatial units like street segments and face blocks (Eck & Weisburd, 1995; Sampson & Groves, 1989). This shift towards micro-level analysis has been driven by the need to get better understanding of offenders' location choices. Advances in computational power and the rise of crime mapping technologies have also made it more feasible to analyze micro-level spatial units (Vandeviver & Bernasco, 2017), enabling researchers to extract granular insights into crime trends and offender behavior (Weisburd et al., 2004), enhancing theoretical development and enabling more precise crime prevention strategies.

Despite its increasing popularity micro spatial units, there is still no consensus on how spatial scales impact findings in crime location choice research. For example, micro-level studies might capture localized crime patterns that are not easily generalizable to broader contexts, while macro-level studies might overlook critical details of offender decision-making. This lack of clarity and comparability presents a significant challenge, as it undermines the development of universally applicable theoretical frameworks. Therefore, addressing the issue of spatial scale comparability is crucial for enhancing the practical applications of crime location choice research findings.

The introduction of micro place analysis marked a major shift in crime location choice research, focusing on more specific places like street segments, census blocks or grid cells (e.g., Bernasco, 2019; Bernasco et al., 2013; Bernasco & Jacques, 2015). This shift was not merely a change in the unit of analysis but provided an understanding of crime trends at the micro-level. However, there is a lack of clarity on how spatial units influence crime data and the interpretation of offender decision-making presents a challenge for developing theoretical frameworks. Understanding these influences is essential for advancing criminological theory and practical applications. Consequently, this scoping review seeks to systematically assess the use of spatial units in crime location choice studies, with a focus on quantitative analyses employing discrete choice models. By doing so, this review aims to map the spatial units of analysis used across various studies, identify gaps in the literature, and examine how different spatial scales impact the understanding of crime location choices.

Rationale for Review

Despite the significant growth of crime location choice research, there remains a lack of reviews that specifically address how different spatial scales impact the findings of discrete choice models used to explain offender decision-making. Discrete choice models offer a structured, quantitative method to analyze how offenders select targets and locations, but existing studies vary widely in their use of spatial units, from large-scale neighborhoods to individual street segments. The diversity in spatial scale also challenges the comparability and generalizability of findings across different spatial scales (Steenbeek & Weisburd, 2016; Weisburd et al., 2012).

This review aims not only to synthesize existing findings but also contributeto the literature by evaluating how the choice of spatial units affects the outcomes of discrete choice models in crime location choice research. By systematically mapping and analyzing the spatial scales used in these studies, the review clarifies how varying spatial boundaries can influence both model results and their interpretation. By addressing these aspects, the review adds value beyond mere synthesis, directly contributing to the advancement of knowledge in the field and offering practical guidance for researchers and policymakers.

# **Objective**

The primary objective of this systematic scoping review is to map the varied use of spatial scales in quantitative studies that analyze crime location choices using discrete choice models or related frameworks. This review aims to examine how different spatial units, from macro-level regions to micro-level , are applied in the literature. By identifying patterns in spatial scale usage, this review will highlight the strengths and limitations of different scales, offering guidance for future research.

# **Methods and Analysis**

## Inclusion Criteria

* **Population:** Studies that apply discrete choice models to analyze offenders’ location choice decisions across various crime types – including violent crimes, property crimes, and other offenses –
* **Concept:** The study must focus on the selection of locations or targets by offenders, with a particular focus on spatial scale usage in the analysis of crime location choices.
* **Outcomes:** The study must analyze crime location choices quantitatively, specifically examining the macro-micro spatial units (e.g., neighborhoods to grid cells) employed in the analysis.
* **Study Types:** Empirical, quantitative studies that utilize discrete choice models or similar decision-making frameworks to examine crime location choices. The review will prioritize peer-reviewed journal articles.
* **Language Restrictions:** Only studies published in English will be included

## ****Exclusion Criteria****

* **Non-Empirical Studies:** Papers that do not involve empirical analysis, such as purely theoretical works, opinion pieces, or narrative reviews.
* **Qualitative Studies:** Studies that rely solely on qualitative methods without a quantitative analysis of spatial scales in crime location choice.
* **Irrelevant Spatial Focus:** Research that does not explicitly address the spatial dimensions of crime location choice or does not utilize spatial scales in the analysis.
* **Lack of Discrete Choice Models:** Studies that do not employ discrete choice models or other quantitative frameworks related to spatial decision-making.

# Information Sources and Search Strategy

**Naive Search**:

We will conduct an initial search using Web of Science (WOS), Scopus, and ProQuest Criminal Justice Database. The search will target studies on location choice, discrete choice models, and offender behavior

**Naive Search Term**:

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| --- | --- |
| Source | Navie search term |
| WOS | TS=(((offend\* OR crim\* OR burglar\* OR robb\* OR co-offend\* OR dealer\*) AND ("discret\* choic\*" OR "choic\* model\*" OR "rational choice" OR "awareness space" OR "journey to crime" OR "mobility" OR "opportunity" OR "accessibility" OR "attractiveness" OR "crime pattern\*" ) AND ("crime locat\* choic\*" OR "offend\* locat\* choic\*" OR "robber\* locat\* choic\*" OR "burglar\* locat\* choic\*" OR "target area\*" OR "target selection" OR "crime site selection" OR "spatial choic\* model\*" ) )) |
| Scopus | TITLE-ABS-KEY ( ( ( offend\* OR crim\* OR burglar\* OR robb\* OR co-offend\* OR dealer\* ) AND ( "discret\* choic\*" OR "choic\* model\*" OR "rational choice" OR "awareness space" OR "journey to crime" OR "mobility" OR "opportunity" OR "accessibility" OR "attractiveness" OR "crime pattern\*" ) AND ( "crime locat\* choic\*" OR "offend\* locat\* choic\*" OR "robber\* locat\* choic\*" OR "burglar\* locat\* choic\*" OR "target area\*" OR "target selection" OR "crime site selection" OR "spatial choic\* model\*" ) ) ) |
| ProQuest | noft(((offend\* OR crim\* OR burglar\* OR robb\* OR co-offend\* OR dealer\*) AND ("discret\* choic\*" OR "choic\* model\*" OR "rational choice" OR "awareness space" OR "journey to crime" OR "mobility" OR "opportunity" OR "accessibility" OR "attractiveness" OR "crime pattern\*") AND ("crime locat\* choic\*" OR "offend\* locat\* choic\*" OR "robber\* locat\* choic\*" OR "burglar\* locat\* choic\*" OR "target area\*" OR "target selection" OR "crime site selection" OR "spatial choic\* model\*"))) |

**Focused Search**:

Following the initial search, we refined the search terms using the litsearchR (see script attached) package in R (Grames et al., 2019). This package generates keyword co-occurrence networks from the articles retrieved in the naive search. By extracting keywords from the titles, abstracts, and keywords of the articles, the search terms were refined to improve precision.

**Refined Search Term**:

|  |  |
| --- | --- |
| Source | Refined search term |
| WOS | TS=(((offend\* OR crim\* OR burglar\* OR robber\* OR dealer\*) AND ("choic\* model\*" OR "discret\* choic\*" OR "ration\* choic\*" OR "spatial\* choic\*" OR mobil\*) AND (pattern\* OR "locat\* choic\*" OR "target\* select\*"))) |
| Scopus | TITLE-ABS-KEY ( ( ( offend\* OR crim\* OR burglar\* OR robber\* OR dealer\* ) AND ( "choic\* model\*" OR "discret\* choic\*" OR "ration\* choic\*" OR "spatial\* choic\*" OR mobil\* ) AND ( "locat\* choic\*" OR "target\* select\*" OR pattern\* ) ) ) |
| ProQuest | noft(((offend\* OR crim\* OR burglar\* OR robber\* OR dealer\*) AND ("choic\* model\*" OR "discret\* choic\*" OR "ration\* choic\*" OR "spatial\* choic\*" OR mobil\*) AND ("locat\* choic\*" OR "target\* select\*" OR pattern\*)))  scopus |
| Google scholar | ("offender" OR "offenders" OR "crime" OR "criminal" OR "criminals" OR "burglar" OR "burglars" OR "robber" OR "robbers" OR "dealer" OR "dealers")  ("choice model" OR "discrete choice" OR "discrete choice model" OR "rational choice" OR "spatial choice" OR "mobility")  ("pattern" OR "location choice" OR "target selection" OR "behavior pattern" ) |

**Database Application**:

The refined search terms will be used to identify relevant studies in the Web of Science (WOS), Scopus, and ProQuest Criminal Justice Database. We expanded the refined search term for Google Scholar to fit its search requirements.

# Study Selection

Inclusion criteria will guide the selection process. Two independent reviewers will screen the titles, abstracts, and full texts.

# Data Extraction

The following data will be extracted from each study:

* **Study Details:** Title, authors, and year of publication.
* **Sample Characteristics:** Sample size and type of offender/crime.
* **Unit of Analysis:** Level of analysis (e.g., individuals, neighborhoods, street segments), size of spatial scale and number of units
* **Methodological Approach:** Type of discrete choice model used (e.g., multinomial logit, nested logit) and any spatial regression techniques.
* **Findings:** Main results including all variables included in the regression models, their respective estimates, and any reported significance levels.

# Synthesis and Presentation

Results will be synthesized and presented using tables and figures. A PRISMA flow diagram will illustrate the selection process. Findings will be grouped based on the size of the spatial unit of analysis.

# **Conclusion**

This systematic scoping review will map the varied use of spatial scales in crime location choice studies, focusing on quantitative research employing discrete choice models. By identifying the strengths and limitations of different spatial units in explaining offenders’ location choices, the review aims to highlight key gaps in the literature. The findings will offer recommendations for standardizing spatial scales in future research.

# References

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