Advances in Place-Based Methods: Editors' Introduction

Martin A. Andresen^{1,2} · Cory P. Haberman³ · Shane D. Johnson⁴ · Wouter Steenbeek⁵

Accepted: 13 May 2021 / Published online: 18 May 2021

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2021

For close to 30 years the crime and place literature has shown that micro-places—small areas that may be classified as street addresses, street intersections, street segments, or other small areas (Weisburd et al. 2009a)—are critical to understand the spatial patterning of crime. Specifically, a small proportion of micro-places account for a large proportion of crime in many cities (see Andresen et al. 2017a, 2017b; Braga et al. 2010; Sherman et al. 1989; Weisburd 2015; Weisburd and Amram 2014; Weisburd et al. 2004, 2009a, b, 2012; Umar et al. 2020). Recent research has shown that crime hot spots in micro-places are quite stable over time (Weisburd et al. 2004; Braga et al. 2010; Andresen and Malleson 2011; Curman et al., 2015; Steenbeek and Weisburd 2016; Rosser et al. 2017; Andresen et al. 2017a). Perhaps most importantly, these findings have informed place-based crime prevention initiatives which have had significant impacts upon crime (Weisburd and Green, 1995; Braga and Weisburd 2010; Haberman and Ratcliffe, 2015; Braga et al. 2014, 2019). While the development of this sub-field within criminology has led to the advancement of place-based methods, that needs to be continued if we are to move forward in the theoretical and empirical development of the crime and place literature and to realize the potential policy applications.

One of the limitations of analyzing small geographies is the limits to the theoretically informed variables that are available for analysis. The communities and crime literature in the past has relied heavily on administrative data like the census of populations. Census data are, however, too coarse for crime and place analyses. One census tract may include 10 census block groups, and each census block group may include 25 street segments and intersections. New or alternative sources of data, such as those extracted from social media and other sources, might address the limitation of relying on administrative data like the census. In addition, the application of methods used in ecology or spatial epidemiology and the development of new methods, such as spatio-temporal point patterns, the modifiable areal unit problem, or sentiment analysis, are key ingredients to successful continuation of the crime and place tradition.

✉ Martin A. Andresen
andresen@sfu.ca

¹ Simon Fraser University, Burnaby, BC, Canada

² Griffith University, Gold Coast, QLD, Australia

³ University of Cincinnati, Cincinnati, OH, USA

⁴ University College London, London, England

⁵ Netherlands Institute for the Study of Crime and Law Enforcement, Amsterdam, The Netherlands

There is a growing theoretical and empirical literature in place-based criminology, but there remain gaps in the current state of our knowledge of crime at places. As discussed in the articles in this special issue, place-based criminology forces scholars to investigate and evaluate criminological problems in different and new ways. This special issue of the *Journal of Quantitative Criminology* is devoted to advancing place-based methods, to consider advances in new forms of data, new methods and new crime types that allow for the continued development of the crime and place literature. The nine papers published in this peer-reviewed volume use new data, re-measure old concepts and consider new ones, and use state-of-the-art statistical models to examine timely and important empirical questions related to key elements of place-based criminology. These articles serve to inform our understanding of crime at places and ways to intervene at consistently high-crime problem places.

In the opening article, **Tucker, O'Brien, Ciomek, Castro, Wang, and Phillips** investigate the utility of geo-tagged Twitter data to identify “locals”, “commuters”, and “tourists” using a machine-learning algorithm to estimate their home locations. They then use this information to predict crime rates across census blocks for different times of the day. These authors use data from Boston, MA for public violence (various forms of assault, fights, person with knife, and emotionally disturbed person, injured or violent) and private conflict (break and enter in progress, landlord/tenant trouble, vandalism, and violation of restraining order) in addition to census and land use data in a multilevel model. Overall, they found that census blocks with more commuters and tourists had higher crime rates. However, this relationship is strongest during the daytime hours of weekdays. Their study uses estimates to connect the characteristics of the types of people who are actually likely to be in particular places, by knowing their typical home locations, usage patterns, and linguistic analysis. They conclude by noting that these particular data are no longer available (as of 2019), but other similar data sources may be instructive for similar analyses in other places.

Khorshidi, Carter, Mohler, and Tita consider environmental and social mechanisms to predict crime diversity in places. These authors use data from the Google Vision API, a deep learning image tagging service, in order to gather information on objects found in Google Street View images at the census block level in Los Angeles, CA. From these data, the authors estimate indices of object diversity and diversity considering census variables. These variables are then analyzed in comparison to crime diversity calculated from police data. Considering both ordinary least squares and geographically weighted regression, the authors find that environmental diversity, household diversity, and population size predict crime diversity. However, environmental diversity, as measured using Google Street View data, was more predictive than diversity based on census variables. This proves to be instructive because such data (e.g. land use and characteristics) may be difficult or costly to obtain at large scale levels.

De Biasi and Circo analyze the impact of demolitions on crime in Detroit, MI. They consider the importance of identifying the most spatially appropriate buffer size for subsequent analyses. These authors use Ripley's bivariate K-function to identify this appropriate buffer size. This method allows the authors to identify the level of “attraction” a place has before and after an intervention: crime to abandoned properties, for example. This method allows for empirically derived buffer sizes that may be instructive for crime and place studies, but also a micro-place orientated methodology for identifying changes that occur when a crime generator or attractor is removed.

Ramos, Bráulio, Silva, Clarke, and Prates also analyze the importance of spatial scale in crime and place, but from a different perspective. The authors develop a method to identify the optimal level of granularity, or areal unit size, to analyze burglaries, robberies

and homicides in the city of Belo Horizonte, Brazil. This method considers both internal uniformity, or homogeneity, and predictive power to identify the optimal spatial scale of analysis. These authors show that the street segment may be too small to best understand spatial patterns of crime, but larger areas may mask important spatial patterns for the development of theory and policy.

Wheeler and Steenbeek use random forest models, a machine learning approach, in order to provide long-term predictions of crime at micro places. This methodology is compared to other commonly employed empirical techniques used in spatial crime analysis, namely, risk terrain modelling and kernel density estimation. Using robbery data from Dallas, TX, and 200 by 200 m grids, these authors find that their machine learning algorithm significantly outperforms both risk terrain modelling and kernel density estimation, but only slightly outperforms prior counts of crime. Additionally, these authors show that a number of predictors of crime have important non-linearities and that these variations vary across space. This all proves to be important when considering long term strategies to effectively reduce crime at places. Overall, the authors' analysis illustrates the importance of comparing different methods for predicting crime at place.

Kelling, Graif, Korkmaz, and Haran use data from Detroit, MI and Arlington County, VA to investigate the social dynamics that affect domestic and sexual violence in urban areas. These authors do so through the use of spatial generalized linear mixed models, adapted from spatial statistics, which are not commonly used in spatial criminology. They find that spatial effects and modelling are critical to better understanding spatial crime patterns, particularly commuting ties, or pathways between activity nodes. Specifically, these commuting ties between neighborhoods are shown to significantly improve their models. The authors speculate that if commuting ties allow for the transfer of norms, social support, resources, and behaviors between places then it is possible for crime prevention efforts to have some transferability as well.

Tillyer, Wilcox, and Walter consider violent, property, and drug crimes at the census block and census block group levels in a sequence of multi-level models in San Antonio, TX. These authors identified crime generators for violent, property, and drug crimes, and test whether neighborhood-level criminal opportunity moderates the relationship between these crime generators and block-level crime. Overall, they find that concentrated disadvantage and vehicle traffic exacerbated crime patterns, whereas high levels of civic engagement tempered the relationship between various generators and crime. As such, particular place types do not always generate the same relationships across space. In other words, crime generators do not exist in isolation, but remain fixed within their larger context showing the importance of considering smaller scale dimensions of land use and social characteristics when investigating crime patterns at larger scales.

Jackson, Brunton-Smith, Bradford, Oliveira, Pösch, and Sturgis test the relationship between police legitimacy and the willingness of people to cooperate with the police at the micro-place. They employ a multi-level model that considers individuals within neighborhoods in a large metropolitan area in the United Kingdom. They found that the willingness to cooperate with the police is clustered by neighborhoods. Moreover, they add to the developing literature by showing the importance of considering multiple scales of analysis to better understand criminological phenomena.

In the final article, **Kurland and Johnson** use data on micro-facilities (pubs, fast-food restaurants, and railway stations), super-facilities (soccer stadia), and the movement potential between these two types of facilities to predict area level counts of crime. These authors consider crime, street networks, and other points of interest in close proximity to five United Kingdom soccer stadia, and examine if and how patterns vary on match and

non-match days. They find the super-facilities are positively related to crime, particularly on match days, with a similar result for micro-facilities. As such, super-facilities (soccer stadia, for example) appear to have direct effects on crime in their local area as well as indirect effects by amplifying the effects of micro-facilities on match days.

Overall, the articles in this special issue illustrate contemporary debates, showcase emerging analytic techniques and offer strong support for continued place-based criminology research. Not only does place-based criminology open the door for the utilization of new data, new measurements (the importance of scale, in particular), new techniques (newly developed or imported from other fields), and new research questions, but place-based scholars are forced to think in different ways and ask new questions. Can we test our existing theories at large spatial scales? How do we measure the presence and characteristics of our populations of interest (at risk of offending or victimization) at the micro-place? Which methods should we use to answer established questions using data measured at the micro-place or to answer these new questions that have been generated as a result of our thinking in different ways? All of these dimensions, no pun intended, allow us to move social science forward in efforts to analyze, understand, and prevent criminal events for the purposes of a safer society.

Place-based criminology has proven to be influential in the wider context of criminological enquiry. However, there are many research questions that still need to be asked and answered. What follows from these articles in this special issue is that researchers must continue to advance data collection, measurement, and analysis techniques in crime and place studies.

References

- Andresen MA, Malleson N (2011) Testing the stability of crime patterns: implications for theory and policy. *J Res Crime Delinq* 48(1):58–82
- Andresen MA, Curman ASN, Linning SJ (2017a) The trajectories of crime at places: understanding the patterns of disaggregated crime types. *J Quant Criminol* 33(3):427–449
- Andresen MA, Linning SJ, Malleson N (2017b) Crime at places and spatial concentrations: exploring the spatial stability of property crime in Vancouver BC, 2003–2013. *J Quant Criminol* 33(2):255–275
- Braga AA, Weisburd D (2010) *Policing problem places: crime hot spots and effective prevention*. Oxford University Press, New York
- Braga A, Hureau DM, Papachristos AV (2010) The concentration and stability of gun violence at micro places in Boston, 1980–2008. *J Quant Criminol* 26(1):33–53
- Braga AA, Papachristos AV, Hureau DM (2014) The effects of hot spots policing on crime: an updated systematic review and meta-analysis. *Justice Q* 31(4):633–663
- Braga AA, Turchan BS, Papachristos AV, Hureau DM (2019) Hot spots policing and crime reduction: an update of an ongoing systematic review and meta-analysis. *J Exp Criminol* 15(3):289–311
- Curman ASN, Andresen MA, Brantingham PJ (2015) Crime and place: a longitudinal examination of street segment patterns in Vancouver, BC. *J Quant Criminol* 31(1):127–147
- Haberman CP, Ratcliffe JH (2015) Testing for temporally differentiated relationships among potentially criminogenic places and census block street robbery counts. *Criminology* 53(3):457–483
- Rosser G, Davies T, Bowers KJ, Johnson SD, Cheng T (2017) Predictive crime mapping: Arbitrary grids or street networks? *Journal of Quantitative Criminology* 33(3):569–594
- Sherman LW, Gartin PR, Buerger ME (1989) Hot spots of predatory crime: routine activities and the criminology of place. *Criminology* 27(1):27–56
- Steenbeek W, Weisburd D (2016) Where the action is in crime? An examination of variability of crime across different spatial units in The Hague, 2001–2009. *J Quant Criminol* 32(3):449–469
- Umar F, Johnson SD, Cheshire JA (2020) Assessing the spatial concentration of urban crime: an insight from Nigeria. *J Quant Criminol*. <https://doi.org/10.1007/s10940-019-09448-3>

- Weisburd D (2015) The law of crime concentration and the criminology of place. *Criminology* 53(2):133–157
- Weisburd D, Amram S (2014) The law of concentrations of crime at place: the case of Tel Aviv-Jaffa. *Police Pract Res* 15(2):101–114
- Weisburd D, Green L (1995) Policing drug hot spots: the Jersey City drug market analysis experiment. *Justice Q* 12(4):711–735
- Weisburd D, Bushway S, Lum C, Yang S (2004) Trajectories of crime at places: a longitudinal study of street segments in the city of Seattle. *Criminology* 42(2):283–322
- Weisburd D, Bernasco W, Bruinsma G (2009a) Putting crime in its place: units of analysis in geographic criminology. Springer, New York
- Weisburd D, Morris NA, Groff ER (2009b) Hot spots of juvenile crime: a longitudinal study of street segments in Seattle Washington. *J Quant Criminol* 25(4):443–467
- Weisburd D, Groff ER, Yang S (2012) The criminology of place: street segments and our understanding of the crime problem. Oxford University Press, New York

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.