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Repenser la mobilité criminelle

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Repenser la mobilité criminelle

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Résumé

Notre compréhension de la mobilité criminelle repose presque exclusivement sur des études sur le *journey-to-crime* qui portent sur l'analyse des distances parcourues par les délinquants entre leur domicile et le lieu de leurs crimes. Dans cette thèse, nous nous demandons d'abord si la pertinence théorique et la validité méthodologique sous-jacente à la mesure de *journey-to-crime* ont été suffisamment démontrées pour justifier son influence dominante dans le domaine de la criminologie environnementale. Sur la base d'une analyse critique des recherches sur le *journey-to-crime*, nous soutenons que si l'intérêt pour la mesure est compréhensible, il existe de meilleures façons de mesurer la mobilité criminelle. Nous démontrons que certains postulats implicites qui la sous-tendent sont trompeurs et que de nombreux biais méthodologiques limitent son utilité. Nous suggérons que pour mieux comprendre la mobilité criminelle, le *journey-to-crime* devrait devenir complémentaire à de nouvelles mesures plus raffinées. Des implications pour les études futures sont proposées.

Nous quantifions ensuite de manière empirique les différents biais méthodologiques de la mesure de *journey-to-crime* en examinant dans quelle mesure ceux-ci affectent sa capacité à estimer le « véritable » trajet effectué par les délinquants lors de la perpétration de leurs crimes. À l'aide de données policières, d'entrevues et de technologies numériques de cartographie, l'itinéraire détaillé emprunté par 98 délinquants lors de 449 crimes de vol est reconstitué afin de tester certaines des hypothèses qui sous-tendent la mesure de *journey-to-crime*. Les données policières utilisées pour calculer les distances résidence-crime se sont révélées être suffisamment fiables au niveau du lieu du crime, mais peu fiables pour ce qui est du lieu de résidence du délinquant. Plusieurs raisons sont fournies pour expliquer pourquoi les policiers ont de la difficulté à identifier correctement où un délinquant réside réellement le jour d'un crime donné. La résidence des délinquants s'est distinguée comme un endroit important de leur parcours criminel, mais le trajet effectivement emprunté par ces derniers s'est avéré beaucoup plus complexe que l'itinéraire résidence-crime-résidence présumé par la mesure de *journey-to-crime*. Malgré ses nombreuses lacunes, nos résultats ont démontré que cette mesure pouvait quand

même être considérée comme une estimation valide et utile de la distance totale réellement parcourue lors d'un crime par les auteurs de vols qualifiés et d'autres vols, mais pas par les auteurs de cambriolages et de vols de véhicule à moteur. Les implications pour la recherche sur la mobilité criminelle et les études futures sont abordées.

Nous investiguons finalement le nomadisme criminel, soit la propension d'un individu à s'engager dans des déplacements interurbains continus ou intermittents comme moyen de faire face aux conséquences de son mode de vie criminel (p. ex., stigmatisation, pauvreté, désorganisation, etc.) et/ou comme stratégie d'adaptation à la réalité d'être un « criminel de carrière ». L'itinéraire des crimes commis au Canada pendant la carrière criminelle de 448 hommes reconnus coupables d'infractions sexuelles a été reconstitué grâce à des entrevues individuelles et à l'analyse détaillée de casiers judiciaires. Cinq composantes distinctes du nomadisme criminel (c.-à-d., nombre de trajets, nombre de points nodaux, longueur des routes, étendue géographique de la criminalité et superficie de la zone d'activité mesospatiale), inspirées de la théorie des patrons criminels (*crime pattern theory*), sont suggérées et analysées. Les résultats montrent que le nomadisme criminel est davantage la réalité de gens de race blanche, jeunes et éduqués, qui ont une carrière criminelle prolifique entrecoupée de longues peines d'incarcération. Les délinquants nomades n'errent pas au hasard, mais semblent plutôt chercher des opportunités et un retour à une certaine forme d'anonymat. Les variables relatives aux infractions sexuelles n'ont pas apporté une contribution significative aux modèles de prédiction, ce qui donne à penser que le nomadisme criminel est davantage un phénomène criminel général que spécifique aux infractions sexuelles. Nos résultats suggèrent qu'une carrière criminelle prolifique est généralement associée à un mode de vie nomade et géographiquement dispersé. Les implications pour les politiques publiques et les études futures sont abordées.

Mots-clés: *journey-to-crime*, mobilité criminelle, criminologie environnementale, comportements spatiaux, nomadisme criminel, théorie des patrons criminels

Abstract

Our collective understanding of criminal mobility relies almost exclusively on journey-to-crime research, which focuses on the distances traveled by offenders from their homes to the location of their crimes. In this thesis, we first ask whether the theoretical relevance and the methodological validity underlying the journey-to-crime measurement are sufficient for it to continue to be a leading influence in the field of environmental criminology. Based on a critical review of the foundations of journey-to-crime research, we argue that while the interest in the journey-to-crime measurement is understandable, there are better ways to assess criminal mobility. Some likely misleading implicit presuppositions and methodological biases are identified, and the manner in which they affect our comprehension of criminal mobility is discussed. We suggest that a better understanding of criminal mobility would come from complementing journey-to-crime with new, more refined, measures. Implications for future studies are proposed.

We then empirically quantify the methodological biases of the journey-to-crime measurement, by investigating the extent to which they affect its ability to estimate the itineraries offenders actually travel during the perpetration of their crimes. With the support of police-arrest records, interviews, and web-mapping technologies, the detailed route taken by 98 offenders during 449 theft-related crimes are reconstructed in order to test some of the key assumptions underlying journey-to-crime research. Police data used to compute home-crime distances have been found to provide satisfactorily accurate crime-location addresses, but poorly accurate offender home-addresses. Several explanations of why the police have problems correctly identifying where an offender is truly residing on the day of a given crime are presented. Even if the offender's residence was the most important node in their crime journey, the actual travel undertaken by offenders was much more complex than the home-crime-home itinerary assumed by the journey-to-crime measurement. Despite its numerous drawbacks, the traditional journey-to-crime measure is still a valid and useful proxy for the total distance actually traveled by offenders

in robbery and “other theft”, but not in burglary and motor-vehicle theft. Implications for criminal mobility research and future studies are discussed.

We finally investigate criminal nomadism — an individual’s propensity to engage in continuous or intermittent interurban travel as a way to cope with the consequences of their criminal lifestyle (e.g., stigma, poverty, disorganization, etc.) and/or as a strategy to adapt to the reality of being a “career criminal.” The criminal-career itinerary across Canada of 448 men convicted of sex offenses was reconstructed through individual interviews and analysis of detailed criminal records. Five distinct components of criminal nomadism (i.e., trips, nodes, paths, range, and mesolevel activity space), inspired by crime pattern theory, are suggested and analyzed. Results show that criminal nomadism is the reality of young and educated Whites who have a prolific criminal career interspersed with long incarceration sentences. Nomadic offenders did not wander freely and randomly, but rather seemed to be looking for opportunities and privacy. Sex-offending variables did not make a significant contribution to predictions, suggesting that criminal nomadism is more a general offending phenomenon than something specific to sex offending. This provides supporting evidence for the hypothesis that an extensive criminal career is generally associated with a geographically scattered and nomadic lifestyle. Implications for public policies and future studies are discussed.

Keywords: journey-to-crime, criminal mobility, environmental criminology, spatial patterns, criminal nomadism, crime pattern theory

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Science is a culture of doubt.

- Richard P. Feynman

Chapitre 1 - Introduction

1. Introduction

La relation entre le crime et la géographie intéresse les scientifiques depuis le début du 19e siècle. Adolphe Quételet et André-Michel Guerry sont souvent considérés comme les pionniers de cette criminologie dite « environnementale » (aussi appelée « géocriminologie ») puisqu'ils sont officiellement les premiers à avoir utilisé des cartes géographiques pour illustrer la répartition des crimes dans différents départements de France (Guerry, 1832; Quételet, 1842). À cette époque, ce qui intéressait les chercheurs se situait davantage à une échelle macrospatiale (p. ex., régions, départements, comtés). Plus tard, les travaux fondateurs de l'école de Chicago ont établi les bases de la théorie de la désorganisation sociale en démontrant la contribution de l'environnement urbain aux taux de criminalité des communautés (Burgess, 1925; Shaw & McKay, 1942). Cette « sociologisation » de la criminologie a permis de rompre avec l'idée selon laquelle le comportement délinquant était inné et biologiquement déterminé, afin de le considérer davantage comme une problématique sociétale et majoritairement urbaine. Les variables qui intéressaient les scientifiques se situaient alors à un niveau d'agrégation spatiale plus fin (p. ex., villes, quartiers).

Vers la fin du 20e siècle, les chercheurs ont commencé à s'intéresser à l'analyse de points micro-spécifiques à l'intérieur des villes ou des quartiers, comme des adresses, des segments de rues ou des intersections. Cette nouvelle approche, appelée la « criminologie des endroits » (*criminology of place*), cherche à mieux comprendre pourquoi les crimes sont commis dans certains lieux précis (Weisburd, 2015). Cinq principaux types d'études, regroupés en deux grandes familles en fonction de leur unité d'analyse, soit les endroits (*places*) ou les personnes (*people*), y sont associés (Eck & Weisburd, 1995). Parmi les recherches qui utilisent les endroits comme unité d'analyse, nous retrouvons celles qui cherchent à comprendre: 1) comment certains types d'installation influencent-ils le crime (p. ex., les endroits ou installations qui génèrent, attirent ou éloignent le crime, voir notamment les travaux de Brantingham & Brantingham, 1981, 1995; Kinney et al., 2008)?; 2) comment les caractéristiques physiques et sociales des endroits agissent-elles sur les opportunités criminelles (p. ex., les stratégies de

prévention du crime par le design de l'environnement, voir notamment les travaux de Cozens et al., 2005; Crowe, 2000)?; et 3) pourquoi le crime se concentre-t-il à certains endroits ou le long de certaines artères (p. ex., l'analyse spatio-temporelle des points chauds ou *hot spots* du crime, voir notamment les travaux de Andresen & Malleson, 2011; Boivin & de Melo, 2019; Curman et al., 2015; Weisburd & Amram, 2014)? Parmi les études qui utilisent les personnes comme unité d'analyse pour mieux comprendre le rôle des endroits dans l'explication du crime, nous retrouvons celles qui s'intéressent à: 1) la mobilité géographique des délinquants (p. ex., la distance qu'ils parcourent pour commettre leurs crimes, voir notamment les études sur le *journey-to-crime*, Ackerman & Rossmo, 2015; Rossmo, 2000; Wiles & Costello, 2000); et 2) la façon dont ceux-ci choisissent leurs cibles (voir notamment les travaux sur la modélisation des choix discrets dans la décision du lieu du crime, p. ex., Bernasco & Block, 2009; Bernasco & Nieuwbeerta, 2005; Townsley et al., 2016; Vandeviver & Bernasco, 2020).

Cette thèse s'inscrit dans ce désir de mieux comprendre pourquoi les crimes se produisent à certains endroits plutôt qu'à d'autres. Nous nous intéressons plus particulièrement à la mobilité criminelle, c.-à-d. à l'ensemble des déplacements spatiaux que les délinquants réalisent dans le cadre de la perpétration de leurs crimes. La « mobilité criminelle » (*criminal mobility*) se distingue de la « mobilité des criminels » (*mobility of criminals*) par la motivation à l'origine du déplacement. Dans la mobilité criminelle, on ne s'intéresse qu'aux déplacements qui sont motivés par le crime (p. ex. pour rechercher une cible, préparer l'équipement nécessaire au crime, rencontrer les complices, se rendre sur les lieux du crime, se déplacer pendant le crime, quitter les lieux après le crime, etc.). En contrepartie, l'étude de la mobilité des criminels englobe l'ensemble des comportements spatiaux de ceux qui commettent des crimes, qu'ils soient ou non motivés par le crime. Il peut alors s'agir de mobilité criminelle (p. ex. les déplacements pour commettre un crime), de mobilité non criminelle (p. ex. les déplacements pour se rendre au travail, à l'école, etc.) ou de mobilité résidentielle (p. ex. les déplacements pour changer son lieu de résidence).

1.1 Cadre théorique

Trois principales théories sont utilisées en criminologie environnementale pour expliquer la mobilité criminelle: 1) la théorie du choix rationnel (*rational choice theory*) (Cornish & Clarke, 1986); 2) la théorie des activités routinières (*routine activity theory*) (Cohen & Felson, 1979); et 3) la théorie des patrons criminels (*crime pattern theory*) (Brantingham & Brantingham, 1981, 1984, 2008). Ces théories sont distinctes, mais complémentaires. La théorie du choix rationnel s'attarde principalement à la teneur des décisions individuelles alors que la théorie des activités routinières s'intéresse plutôt au contexte écologique qui fournit les options à partir desquelles ces décisions individuelles sont prises. De son côté, la théorie des patrons criminels combine des éléments des deux premières théories (opportunités, motivations, perceptions) en y ajoutant des principes environnementaux pour parvenir notamment à expliquer comment les crimes se distribuent dans l'espace.

1.1.1 La théorie du choix rationnel

La théorie du choix rationnel est une théorie générale de l'action qui n'a pas été élaborée spécifiquement pour expliquer le comportement délinquant. Trouvant ses fondements en économie, cette théorie a été abondamment utilisée dans plusieurs autres domaines tels que la sociologie (p. ex., Boudon, 2003), les sciences politiques (p. ex., Ostrom, 1998), la philosophie (p. ex., Satz & Ferejohn, 1994), la psychologie comportementale (p. ex., Herrnstein, 1990), l'écologie (p. ex., Davies et al., 2012) et la criminologie (p. ex., Cornish & Clarke, 1986). En somme, cette théorie stipule qu'avant de prendre une décision, un acteur effectue une analyse des coûts et des bénéfices qui sont associés à une action donnée afin de lui permettre de choisir la solution la plus avantageuse pour lui sur la base de critères qui lui sont propres.

Appliquée à la mobilité criminelle, la théorie du choix rationnel propose que les délinquants prennent la décision de se déplacer dans le but de commettre des crimes seulement si leur calcul des coûts et des bénéfices est favorable à une telle action. Ce calcul devient avantageux lorsque

les bénéfices attendus du crime (p. ex., argent, honneur, prestige, succès) sont supérieurs aux coûts qui pourraient en découler (p. ex., risques, efforts, distance). Imbriqué dans cette notion de rationalité décisionnelle se trouve le principe du moindre effort (Zipf, 1965). Celui-ci postule que le comportement humain est gouverné par la propension de choisir l'option *ceteris paribus* qui nécessitera le moins d'efforts en termes de temps investi, d'énergie dépensée et de distance parcourue. Ainsi, dans un univers où toutes choses seraient égales par ailleurs, un délinquant favoriserait l'opportunité criminelle la plus proche géographiquement sous prétexte que celle-ci requérait un moindre effort de déplacement. Dans le même ordre d'idées, plus la distance qui sépare un délinquant d'une opportunité criminelle est grande, plus les coûts associés à la mobilité devraient être considérés élevés, et donc plus cette opportunité criminelle se doit d'être attrayante pour justifier un déplacement (Felson, 2006). En fonction de l'approche du choix rationnel, la mobilité criminelle est considérée comme un comportement stratégique qui est adopté comme un moyen en vue d'une fin (c.-à-d., commettre un crime).

1.1.2 La théorie des activités routinières

La théorie des activités routinières (*routine activity theory*) est d'abord une théorie sociologique proposant que les habitudes d'une population influencent les taux de criminalité des communautés urbaines (voir notamment Felson, 1987; Felson & Cohen, 1980). Un crime survient lors de la convergence dans le temps et l'espace de trois ingrédients de base constituant la « chimie du crime »: a) un délinquant motivé à commettre un délit, b) une victime vulnérable ou une cible attrayante, c) l'absence d'un gardien capable de prévenir le crime (Cohen & Felson, 1979). La théorie sera par la suite élargie pour considérer également l'influence des gens capables de contrôler le délinquant (*handlers*, comme les parents ou les collègues de travail) ou des gens capables de superviser les environnements (*place managers*, comme les commerçants ou les propriétaires des édifices) (Eck & Weisburd, 1995).

La convergence spatio-temporelle de ces ingrédients de la chimie du crime a aussi un effet individuel sur le délinquant, dans le mesure où cela augmente sa probabilité de commettre un

crime à cet endroit précis. Dans son appréciation de l'attrait d'une cible, le délinquant doit considérer quatre facteurs importants: 1) sa valeur ou sa désirabilité; 2) son inertie, c.-à-d. tout ce qui peut faciliter ou encombrer le transport de la cible (p. ex., poids, mobilité, résistance, verrou); 3) sa visibilité; et 4) l'accessibilité pour s'y rendre et pour fuir une fois le crime commis (Felson, 1998). En fonction de la théorie des activités routinières, les délinquants commettent des crimes aux aléas de leurs déplacements habituels qui les mènent à leurs activités quotidiennes (p. ex., travail, loisirs, résidence, etc.). La mobilité criminelle est donc considérée comme un comportement opportuniste influencé par les occasions qui ponctuent les déplacements routiniers d'un délinquant motivé.

1.1.3 La théorie des patrons criminels

La théorie des patrons criminels (*crime pattern theory*) est une théorie dominante en criminologie environnementale qui permet d'expliquer où les délinquants choisissent de commettre leur crime (Brantingham & Brantingham, 1981, 1984, 2008). Celle-ci combine des concepts d'opportunité, de motivation, de perception individuelle, et de mobilité géographique pour constituer un modèle qui suggère qu'un crime a plus de risque d'être commis dans les endroits qui présentent des cibles attrayantes potentielles faisant partie de la connaissance du territoire d'un délinquant. En d'autres termes, pour qu'un crime soit commis, l'endroit doit non seulement avoir des opportunités criminelles intéressantes, mais surtout, cela doit être connu par le délinquant. La théorie des patrons criminels ne sous-entend pas qu'un crime doit nécessairement être commis pendant les activités routinières habituelles (comme le postule la théorie des activités routinières), mais seulement que les délinquants apprennent au sujet de leur environnement au cours de ces routines; information qu'ils pourront utiliser plus tard pour commettre des crimes (Bernasco, 2014).

Les trajets (*paths*) empruntés quotidiennement par les délinquants pour accomplir des activités criminelles ou non criminelles (*activity nodes*) leur permettent de développer leur connaissance du territoire (*awareness space*). Cette connaissance peut s'acquérir directement à partir des

déplacements effectués ou indirectement par l'entremise de sources secondaires d'information telles que les médias ou les relations criminelles (Brown et al., 1977). Les déplacements routiniers des délinquants leur permettent également de se représenter mentalement (sous forme d'images subjectives) les caractéristiques distinctives des milieux dans lesquels ils évoluent (Brantingham & Brantingham, 1981, 1993). Pour les délinquants, la connaissance de l'environnement et les cartographies cognitives (*cognitive maps*) afférentes facilitent la détection d'opportunités criminelles. L'exploration spatiale (*spatial exploration*), qui consiste à quitter la zone de confort des activités routinières et des secteurs familiers pour rechercher de nouvelles opportunités, serait un comportement assez rare chez les délinquants (Brantingham & Brantingham, 1998; Rengert & Wasilchick, 2000).

1.2 Revue de la littérature

1.2.1 Les déplacements criminels

La mobilité criminelle est un champ de recherche bien établi en criminologie environnementale. On trouve des études sur ce sujet dès les années 1930 (p. ex., White, 1932), mais c'est au cours des années 1970 que les géographes ont formalisé la notion de *journey-to-crime* (Capone, 1974; Capone & Nichols, 1975, 1976; Phillips, 1972, 1980). Cette mesure, qui correspond à la distance entre le lieu de résidence d'un délinquant et le lieu de son crime, demeure à ce jour l'indicateur de prédilection utilisée par les chercheurs pour quantifier la mobilité criminelle. Une conclusion récurrente de ce type d'études est que les délinquants commettent la plupart de leurs crimes près de leur domicile. En somme, les recherches positionnent la résidence des délinquants au centre de leur univers spatio-temporel. Elles supposent du même coup que ce lieu de résidence exerce une force d'attraction (*pull factor*) qui contraint les délinquants à adopter une criminalité locale caractérisée par la commission de crimes à proximité de celle-ci.

Selon Felson et al. (2012): « The journey to crime is one of the better general indicators that crime analysts have developed to date » (p.3). Une des raisons principales de l'intérêt des chercheurs

pour la mesure de *journey-to-crime* réside dans la disponibilité des données leur permettant de faire des analyses. Lorsqu'un crime est commis et qu'un suspect est identifié, la police enregistre systématiquement leur lieu de résidence et le lieu de leur crime. C'est pourquoi la grande majorité des études sur la mobilité criminelle ont utilisé des données policières comme source d'information (Bernasco, 2014). Malgré la difficulté d'avoir accès à des données sur la question, de rares études ont été en mesure d'examiner quelle était la mobilité des délinquants pendant le crime (*journey-during-crime*) (Beauregard & Businа, 2013; Hewitt & Beauregard, 2017; Martineau & Beauregard, 2016) ou après le crime (*journey-after-crime*) (La Vigne et al., 2000; Lu, 2003; Synnott et al., 2016; Tonkin et al., 2010; van Patten & Delhauer, 2007). Certains chercheurs ont également privilégié les entrevues avec des délinquants pour mieux comprendre leurs déplacements criminels, mais ces études demeurent peu nombreuses (p. ex., Cromwell et al., 1991; Polišenská, 2010; Rengert & Wasilchick, 2000; Summers et al., 2010; Wikström et al., 2010; Wiles & Costello, 2000). Jusqu'à maintenant, une seule étude a utilisé la technologie GPS (*Global Positioning System*) pour suivre les déplacements de délinquants en libération conditionnelle en Floride (Rossmo et al., 2012). Les résultats des études sur la mobilité criminelle sont habituellement rapportés de quatre façons différentes, soit en présentant: 1) les distances moyennes des déplacements criminels; 2) les cercles médians; 3) les triangles de mobilité; et 4) les fonctions de distance décroissante.

1.2.1.1 Distances moyennes des déplacements criminels (*mean crime trip distances*)

Les distances moyennes des déplacements criminels sont la façon la plus utilisée de rapporter les résultats des études sur la mobilité criminelle. Les données présentées prennent souvent la forme d'une moyenne arithmétique ou géométrique produite par l'agrégation de la distance parcourue lors de déplacements criminels impliquant plusieurs délinquants. La distance entre le domicile d'un délinquant et le lieu de son crime peut être estimée sous la forme d'une mesure euclidienne (c.-à-d. la distance en ligne droite ou à vol d'oiseau entre les deux points), Manhattan (aussi appelé distance-taxi, c.-à-d. la distance rectiligne que parcourrait un taxi entre les deux points dans une ville nord-américaine) ou en suivant le réseau routier (aussi appelé distance routière ou *wheel distance*, c.-à-d. la distance parcourue lors de l'itinéraire le plus rapide en

fonction du réseau routier). Dans son mémoire de maitrise, Vanier (2009) illustre que la distance euclidienne correspond à la mesure de l'hypoténuse d'un triangle rectangle, alors que la distance Manhattan concorde avec la mesure de ces deux cathètes. Rossmo (2000) indique que les distances Manhattan décrivent mieux les trajets empruntés dans la plupart des villes nord-américaines (plus cartésiennes, quadrillées), tandis que les distances euclidiennes correspondent davantage aux trajets parcourus dans les villes britanniques (moins cartésiennes). Bien que la mesure euclidienne tende à sous-estimer la distance routière (Ackerman & Rossmo, 2015; Rossmo, 2000), les trois mesures de distance sont équivalentes et restent donc comparables (Groff & McEwen, 2005; Vanier, 2009).

Les distances moyennes parcourues par les délinquants pour commettre leurs délits varient considérablement en fonction du type d'étude et du type de crime (voir notamment le tableau résumé 7.1 de Rossmo, 2000, pages 105-110; et les adaptations de Beauregard et al., 2005 et de Vanier, 2009). Au niveau des homicides, les distances résidence-crime moyennes varient selon les études de 0.18 km (White, 1932) à 46.39 km (Canter et al., 2000). Au niveau des vols qualifiés, les distances résidence-crime moyennes varient selon les études de 0.97 km (Reppetto, 1976) à 19.20 km (van Koppen & Jansen, 1998). Au niveau des cambriolages, les distances résidence-crime moyennes varient selon les études de 0.56 km (Gabor & Gottheil, 1984) à 3.99 km (Pyle, 1974). En ce qui a trait aux agressions sexuelles, parmi les treize études recensées par Beauregard et al. (2005) pour lesquelles une distance moyenne résidence-crime était disponible, le trajet moyen entre le lieu de résidence du délinquant et le lieu de son crime sexuel était de 3.35 km. Dans une des études les plus exhaustives sur le *journey-to-crime*, Ackerman et Rossmo (2015) ont trouvé que les distances résidence-crime relatives à 25,154 crimes (peu importe le type) variaient d'un minimum de 0 km à un maximum de 47.3 km (*M* = 10.1 km; *Md* = 8.5 km; *SD* = 8.2 km).

1.2.1.2 Cercles médians (*medial circles*)

Les études sur la mobilité criminelle qui utilisent une mesure de cercle médian définissent d'abord une distance à partir de la résidence d'un délinquant qui agira comme le rayon d'un

cercle qui est tracé autour de celle-ci. Les résultats sont alors présentés sous la forme d'un pourcentage de crimes commis à l'intérieur de ce cercle. Par exemple, dans une étude sur la mobilité d'auteurs de vol qualifié (*robbers*) à Boston, Reppetto (1976) a trouvé que 90% des crimes avaient été perpétrés à l'intérieur d'un rayon de 1.5 mile autour de la résidence de leur auteur. Canter et Larkin (1993) se sont également inspirés d'une mesure de cercle médian pour proposer leur hypothèse du « maraudeur » (*marauder*) et celle du « voyageur » (*commuter*). En traçant une ligne entre les deux crimes les plus éloignés d'une série commise par un même délinquant, il est possible de former le diamètre d'un cercle à l'intérieur duquel tous les crimes perpétrés par ce délinquant se retrouvent. Si la résidence du délinquant se situe également à l'intérieur de ce cercle, il est présumé être un maraudeur, c.-à-d. qu'il utilise sa résidence comme base à partir de laquelle il commet localement la majorité de ces crimes (c.-à-d., dans sa zone résidentielle ou *home range*). Si au contraire, la résidence du délinquant se trouve à l'extérieur de ce cercle, il est présumé être un voyageur, c.-à-d. qu'il se déplace pour commettre la majorité de ses crimes à l'extérieur de sa zone résidentielle, dans ce que les auteurs nomment le *criminal range* (ou zone criminelle). Parmi les 45 violeurs en série de l'étude de Canter et Larkin (1993), 87% d'entre eux avaient commis leurs crimes exclusivement dans leur zone résidentielle et étaient donc considérés des maraudeurs. Des proportions similaires de maraudeurs ont également été retrouvées dans d'autres études portant sur des violeurs en série (87%; Canter & Gregory, 1994), des auteurs de crimes sexuels (93%; Meaney, 2004) et des incendiaires (70%; Tamura & Suzuki, 2000).

1.2.1.3 Triangles de mobilité (*mobility triangles*)

Le triangle de mobilité est la zone formée par le tracé d'une ligne droite entre le lieu de résidence du délinquant et le lieu de résidence de la victime, entre le lieu de résidence de la victime et le lieu du crime, et entre le lieu du crime et le lieu de résidence du délinquant. Ces trois emplacements représentent l'origine présumée du déplacement d'un délinquant et d'une victime convergeant vers le lieu d'un crime. Burgess (1925) a été le premier à identifier trois types de triangles de mobilité: 1) le triangle de délinquance (*delinquency triangle*, aussi appelé *neighbourhood triangle*), lorsque les trois emplacements sont dans le même quartier; 2) le

triangle de mobilité (*mobility triangle*, aussi appelé *offense triangle*), lorsque la résidence du délinquant et celle de la victime sont dans le même quartier, mais que le lieu du crime est dans un autre quartier; et 3) le triangle de promiscuité (*promiscuity triangle*, aussi appelé *total mobility triangle*), lorsque les trois emplacements se trouvent dans des quartiers différents.

Dans son étude sur les viols à Philadelphie, Amir (1971) a trouvé que la plupart des crimes (68%) correspondaient au triangle de délinquance (*neighbourhood triangle*). De son côté, Rand (1986) a trouvé beaucoup de variabilité dans le pourcentage de crimes qui correspondent au triangle de délinquance (*neighbourhood triangle*) dans neuf différents types de crime. Le pourcentage variait de 15% pour les crimes de vol (*larceny*) à 53% pour les crimes d'homicide et de viol. Groff et McEwen (2007) ont entrepris d'intégrer une mesure de distance dans leur analyse des triangles de mobilité des crimes d'homicide afin de mieux représenter ce qui doit être considéré comme proche (< .25 miles) et loin (>= .25 miles) pour le délinquant (ce que les auteurs ont appelé le *social-area mobility triangle*). Ces auteurs ont trouvé que le meurtrier et la victime vivaient dans la même zone sociale (*social area*) dans 30.7% des crimes. Arguant avec raison que les études sur le triangle de mobilité avaient jusqu'à maintenant négligé de considérer la co-délinquance et la co-victimisation, Andresen et al. (2012) ont proposé le « polygone de mobilité » (*mobility polygon*). Aux trois emplacements déjà prévus (résidence du délinquant, résidence de la victime, lieu du crime) se sont alors ajoutées la résidence des complices ainsi que celle d'autres victimes d'un même crime, pour former un polygone à quatre côtés ou plus. Dans leur étude, ces auteurs ont été en mesure de démontrer que l'aire du polygone de mobilité variait d'une médiane de 0.83 km² pour les voies de fait à 3.33 km² pour les vols d'un véhicule à moteur. Finalement, Chopin et Caneppele (2019) ont démontré que 42.8% des agressions sexuelles extrafamiliales de leur échantillon correspondaient au *total mobility triangle* (les trois emplacements sont distancés l'un de l'autre de .25 miles ou plus).

1.2.1.4 Fonctions de la distance décroissante (*distance-decay functions*)

Les graphiques représentant la distance parcourue par les humains pour accomplir des tâches quotidiennes (travailler, manger, magasiner, etc.) suivent généralement une courbe asymétrique

positive suggérant une préférence marquée pour les courts trajets au détriment des longs voyages (Haynes, 1974). Ce phénomène, appelé la fonction de la distance décroissante (*distance-decay function*), établit que plus on s'éloigne d'un point de base donné (p. ex., son lieu de résidence), moins il y a de chance qu'un événement se produise. Transposé à la mobilité criminelle, cela signifie que plus un délinquant s'éloigne de son domicile, moins il a tendance à commettre de crimes (p. ex., Baldwin & Bottoms, 1976; Brantingham & Brantingham, 1984; Capone & Nichols, 1976; Chopin & Caneppele, 2019; Phillips, 1980; Rhodes & Conly, 1981; Rossmo, 1995; van Koppen & de Keijser, 1997).

Une zone tampon (*buffer zone*) est parfois observée autour de la résidence d'un délinquant. À l'intérieur de cette zone, les opportunités criminelles sont considérées comme moins désirables en raison du niveau de risque associé au fait de commettre un crime trop près du domicile (Rossmo, 2000). Cette tendance serait plus souvent remarquée dans les crimes de prédation ou de confrontation dans lesquels un délinquant voudrait éviter d'être reconnu et/ou identifié par une victime qui habite dans le même secteur que lui. Toutefois, il existe peu de preuves empiriques de l'existence d'une zone tampon. Si quelques études ont été en mesure de le constater (Canter & Hodge, 1997; Canter & Larkin, 1993), plusieurs autres n'en ont pas observé (Bernasco & Kooistra, 2010; Canter & Gregory, 1994; Kent et al., 2006; Lundrigan & Canter, 2001; Rengert et al., 1999; van Koppen & de Keijser, 1997).

Certains auteurs ont toutefois émis des réserves quant à la validité de la fonction de la distance décroissante au niveau individuel (Smith et al., 2009; Townsley & Sidebottom, 2010; van Koppen & de Keijser, 1997). Ces chercheurs prétendent que la majorité des études sur la mobilité criminelle utilisent des données imbriquées (*nested*) — chaque délinquant contribuant à plusieurs déplacements criminels — sans recourir à des analyses statistiques permettant de tenir compte de cette réalité. Selon van Koppen et de Keijser (1997), un comportement individuel ne peut pas être inféré avec confiance à partir de données agrégées, une faute communément appelée l'erreur écologique (*ecological fallacy*). En désaccord, Rengert et al. (1999) ont répondu que puisque la distribution des déplacements criminels (au niveau agrégé) n'est en fait qu'un

regroupement de déplacements criminels au niveau individuel, il est méthodologiquement correct de faire des inférences à ce niveau inférieur d'agrégation. Les analyses effectuées d'abord par Smith et al. (2009) et ensuite Townsley et Sidebottom (2010) ont toutefois démontré qu'une fois l'effet des données imbriquées contrôlé, seulement quelques délinquants prolifiques avaient des déplacements criminels qui suivaient une fonction de distance décroissante.

1.2.2 Moyens de transport utilisés

Il existe une grande variabilité dans le recours des délinquants à un mode de transport (autre que la marche) pour commettre leurs crimes: 9.5% des consommateurs de crack (Pettiway, 1995), 15% des violeurs en série (Warren et al., 1995), 40.1% des cambrioleurs en série (Snook, 2004), 46% des cambrioleurs (Clare & Ferrante, 2007), 70.7% des auteurs de vol qualifié (van Koppen & Jansen, 1998), 76.1% des meurtriers en série (Snook et al., 2005) et 80.8% des meurtriers sexuels (Ressler et al., 1986). Comme on pourrait s'y attendre, les délinquants qui utilisent un véhicule ont tendance à commettre leur crime plus loin de leur domicile que les délinquants qui marchent vers leur crime (Snook, 2004; Snook et al., 2005). Mais les modes de transport moins rapides ne sont pas nécessairement corrélés à des distances parcourues plus courtes. Par exemple, van Koppen et Jansen (1998) ont constaté que les auteurs de vol qualifié (*robbers*) voyageant à moto ou à bicyclette avaient tendance à commettre des délits plus près de chez eux que ceux marchant vers le lieu de leur crime. Bien qu'il existe une propension à utiliser des véhicules motorisés pour parcourir de longues distances, cette tendance n'est pas nécessairement présente lorsque les distances sont courtes (p. ex., un trajet de deux kilomètres peut être réalisé avec n'importe quel mode de transport), ce qui semble être le cas pour la plupart des déplacements criminels (voir Ackerman & Rossmo, 2015).

À notre connaissance, aucune étude n'a examiné directement les raisons qui sous-tendent les décisions des délinquants de recourir ou non à un mode de transport pour commettre leur crime. Les hypothèses qui ont été formulées dans la littérature identifient principalement l'âge du délinquant (Bernasco & Nieuwbeerta, 2005; Snook, 2004; Wiles & Costello, 2000) et les

ressources socioéconomiques disponibles (Rengert et al., 1999; Rossmo, 2000). Cependant, indépendamment de la disponibilité matérielle de modes de transport spécifiques, le choix d'un véhicule par un délinquant peut être influencé par de nombreux autres facteurs, notamment les caractéristiques des moyens de transport disponibles (p. ex., la vitesse, les exigences en matière de permis), les caractéristiques de la ville (p. ex., la proximité d'opportunités, l'efficacité du réseau routier, le flux de trafic, la disponibilité d'alternatives de transport), les considérations spatio-temporelles (p. ex., l'heure de la journée, le moment de la semaine, la météo, la saison) et les particularités du trajet à parcourir après le crime (p. ex., la fuite rapide du lieu d'un crime, le transport d'un butin encombrant, le déplacement d'un cadavre).

1.2.3 Corrélats de la mobilité criminelle

Qu'est-ce qui influence la distance parcourue par les délinquants pour commettre leurs crimes? De façon générale, il a été démontré que les délinquants parcourent généralement une plus longue distance pour commettre un crime contre la propriété que pour commettre un crime contre la personne (Amir, 1971; Baldwin & Bottoms, 1976; Brantingham & Brantingham, 1981; Pyle, 1974; Reppetto, 1974; Rhodes & Conly, 1981; White, 1932). D'autres études ont démontré qu'une plus grande mobilité criminelle était associée à de plus importants revenus criminels (Baldwin & Bottoms, 1976; Capone & Nichols, 1975; Capone & Woodrow, 1976; Gabor & Gottheil, 1984; Morselli & Royer, 2008; Phillips, 1980; Pyle, 1974; Reppetto, 1974; Snook, 2004; van Koppen & Jansen, 1998). Habituellement, les délinquants auraient tendance à voyager plus loin pour commettre des crimes dans les banlieues ou milieux plus ruraux que dans les grandes villes (Chainey, 2021; Townsley et al., 2015).

L'âge du délinquant est également une variable qui influence sa mobilité (Baldwin & Bottoms, 1976; Gabor & Gottheil, 1984; Warren et al., 1995). Les jeunes étant généralement plus impulsifs que les adultes, ils sont plus enclins à saisir les opportunités criminelles les plus facilement accessibles (soit celles près de leur domicile). Les adultes, quant à eux, ont plus de ressources pour se déplacer (notamment une voiture) et ont eu davantage le temps de développer leur

connaissance du territoire pour dénicher les meilleures opportunités criminelles. Cependant, certaines études ont démontré que la relation âge-distance n'était pas linéaire, mais plutôt quadratique; les distances résidence-crime augmentent jusqu'à l'âge de 18-20 ans, pour ensuite diminuer jusqu'à la mort (Andresen et al., 2014; Chainey et al., 2001; Clarke & Eck, 2003; Groff & McEwen, 2006).

Au niveau du genre, certaines études ont montré que les hommes commettent leurs crimes plus loin de leur résidence que les femmes (Nichols, 1980; Rengert, 1975), alors que d'autres études ont trouvé un résultat inverse (Chainey et al., 2001; Clarke & Eck, 2003; Hayslett-McCall et al., 2008; Phillips, 1980). Les recherches sur la relation race-distance présentent toutefois des résultats plus concluants, les blancs parcourant traditionnellement de plus longues distances pour commettre leurs crimes que les non-blancs (Canter & Gregory, 1994; Nichols, 1980; Pettiway, 1995; Warren et al., 1998). L'intensité de la carrière criminelle constitue également une autre hypothèse permettant d'expliquer la mobilité criminelle des délinquants. En fait, il a été démontré que les délinquants qui ont un casier judiciaire voyagent plus loin pour commettre leurs crimes que ceux qui n'en ont pas (Gabor & Gottheil, 1984; Warren et al., 1998).

Plutôt que de s'attarder aux variables individuelles associées à la mobilité criminelle des délinquants, certains auteurs se sont concentrés sur l'identification et l'analyse des typologies de comportements géographiques (p. ex., Canter & Larkin, 1993; Egger, 1990; Hazelwood & Warren, 2000; Hickey, 1991; Holmes & de Burger, 1985, 1988; Newton, 1992; Ressler et al., 1988; Rossmo, 1997). Ces taxinomies ont été élaborées majoritairement à partir d'échantillons de meurtriers sexuels sériels. Dans chacune des typologies, il est possible de dichotomiser les groupes en fonction du type de comportements géographiques qui les caractérise globalement: 1) le délinquant « géographiquement stable » et 2) le délinquant « géographiquement mobile ». En fonction de la synthèse effectuée par Beauregard et al. (2005), le délinquant géographiquement stable est habituellement plus jeune, socialement immature, avec une intelligence moyenne, une personnalité psychopathique et des habitudes de vie (travail, couple, loisirs) assez stables. Au niveau spatial, il commet des crimes à l'intérieur d'une zone géographique restreinte, mais

urbanisée, souvent à l'intérieur de sa résidence ou sinon à proximité des lieux ponctuant ses activités routinières. De son côté, le délinquant géographiquement mobile est généralement plus âgé, socialement compétent, avec un faible niveau d'éducation formelle, mais une intelligence supérieure à la moyenne. Au niveau spatial, il se déplace sur de longues distances pour commettre ses crimes, souvent à l'extérieur de son rayon d'action habituel et parfois même à l'extérieur de sa ville natale.

1.3 Problématique

Après plusieurs décennies de recherche, force est d'admettre qu'on sait bien peu de choses sur la mobilité criminelle des délinquants en dehors de la distance que l'on croit qu'ils parcourent à partir de leur résidence pour commettre leurs crimes. Les objectifs de la présente thèse sont de pallier cette lacune en raffinant notre compréhension de la mobilité criminelle, en repensant la façon de conceptualiser et d'opérationnaliser le phénomène et en proposant de nouvelles méthodes de recherche sur la question. Quel trajet les délinquants empruntent-ils réellement pour commettre leurs crimes? D'où partent-ils avant leurs crimes? Où vont-ils se réfugier après leurs crimes? Quelles distances parcourent-ils véritablement? Quel est l'impact de la recherche d'une cible dans leurs déplacements? Est-ce que la mobilité est uniquement une question de distance parcourue? Quelles méthodes pouvons-nous employer pour étudier plus justement la mobilité criminelle? Voilà des questions auxquelles nous tenterons de répondre tout au long de cette thèse.

Puisque la majorité des crimes requiert une convergence spatio-temporelle d'un délinquant et d'une cible/victime, des déplacements sont habituellement nécessaires pour qu'une rencontre entre les deux s'actualise. Comme le souligne Brantingham et al. (2020): « Movement is a critical component in hot spot formation » (p. 72). Mieux comprendre les déplacements des délinquants permet de développer des stratégies de prévention du crime (p. ex., réduire l'accessibilité à des cibles potentielles, augmenter la supervision à certains endroits plus criminogènes), d'améliorer l'efficacité des techniques d'enquête utilisées par les policiers (p. ex., priorisation des suspects,

profilage géographique) et de proposer de nouveaux mécanismes de contrôle et de surveillance des délinquants qui retournent dans la communauté (p. ex., bracelets électroniques, registre de délinquants sexuels).

Cette thèse s'articule autour de trois articles scientifiques, tous rédigés en anglais. Dans le premier article intitulé « *Should we stay or should we go? A critical review of journey-to-crime research* » (Michaud, 2022), présenté au chapitre 2, nous effectuons une revue critique de la littérature scientifique s'étant intéressée à la notion de *journey-to-crime* depuis les cinquante dernières années. En particulier, nous cherchons à savoir si la pertinence théorique et la validité méthodologique sous-jacente à cette mesure ont été suffisamment démontrées pour justifier son influence dominante dans le domaine de la criminologie environnementale. Ce chapitre forme la base argumentative de la thèse qui suggère de « Repenser la mobilité criminelle » (c.-à-d., quel est le problème?). Dans un second article intitulé « *Deconstructing journey-to-crime's questionable validity in theft-related crimes* » (Michaud & Proulx, 2022), présenté au chapitre 3, nous entreprenons de quantifier empiriquement l'impact des différentes lacunes propres à la mesure de *journey-to-crime* que nous avons relevées au chapitre 2. Pour ce faire, nous reconstruisons le trajet détaillé que 98 délinquants ont effectué lors de la commission de 449 crimes de vol afin de tester certaines propositions propres à cet indicateur de mobilité criminelle. Ce chapitre constitue la démonstration empirique de la thèse qui justifie la nécessité de « Repenser la mobilité criminelle » (c.-à-d., pourquoi est-ce un problème?). Dans un dernier article intitulé « *Criminal nomadism: A neglected dimension of spatial mobility in sex offending* » (Michaud, Beauregard, & Proulx, 2022), présenté au chapitre 4, nous analysons la mobilité criminelle sous un angle plus « macro » au sein d'un échantillon de 448 délinquants sexuels. Un nouveau concept est proposé, soit le nomadisme criminel, pour témoigner de la propension des délinquants à changer de villes pour commettre des crimes au cours de leur carrière criminelle. Ce chapitre est la contribution novatrice de la thèse qui propose une méthodologie pour « Repenser la mobilité criminelle » (c.-à-d., comment peut-on contourner ce problème?). Une conclusion générale de la thèse suivra la présentation de ces trois articles scientifiques au chapitre 5.

Chapitre 2 - Should we stay or should we go? A critical review of journey-to-crime research

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2. Should we stay or should we go? A critical review of journey-to-crime research

Criminal-mobility research, which investigates the spatial behaviors of offenders during the perpetration of their crimes, is an influential subfield of environmental criminology. Studies on this topic can be found as far back as the 1930s (e.g., White, 1932), but it was during the 1970s that geographers formalized a measure of criminal mobility: *journey-to-crime* (Capone, 1974; Capone & Nichols, 1975, 1976; Phillips, 1972, 1980). This officially marked the beginning of an ongoing research focus on the distance offenders travel between their homes and crime sites.

Journey-to-crime's popularity spread quite rapidly. Data availability, ease of rating, convenience, ecological validity, consistent results across studies, practical relevance, and numerous implications for criminological theories in general and for geographic offender profiling in particular have certainly contributed to its unanimous acceptance by the scientific community. Our collective knowledge and overall understanding of the spatial behaviors of offenders have been gradually forged by studies examining home-crime distances, which form the bulk of the empirical evidence regarding criminal mobility (Townsley, 2017). While the literature has repeatedly addressed some of the limitations of journey-to-crime research — albeit often merely as caveats in the discussion sections of articles — it has failed to clarify the extent to which they affect the validity and overall usefulness of this measurement. Nowadays, journey-to-crime remains the proxy of choice to quantify criminal mobility.

This paper presents a critical review of the foundations of journey-to-crime research. Its main objective is to determine if criminal mobility is best measured in the almost exclusive terms of journey-to-crime. In particular, we ask whether the theoretical relevance and the methodological validity underlying the journey-to-crime measurement are sufficient for it to continue to be a leading influence in the field of environmental criminology. By doing so, we look for answers to a fundamental question about criminal mobility: do we stand pat with the journey-to-crime measure or should we start moving towards something else?

2.1. Theoretical assumptions underlying criminal-mobility research

Research hypotheses concerning criminal mobility are fundamentally based on the assumption of the frictional effect of distance and on the universal principle of least effort. The frictional-effect-of-distance assumption posits that distance requires an investment of money, time, and energy (Mayhew & Penny, 1992). The least-effort principle assumes that individuals confronted with various possibilities for action will, all things being equal, select the one requiring the least investment in terms of effort (Zipf, 1965). Interpreted in terms of criminal mobility, this means that, when confronted with opportunities of equivalent desirability, an offender will select the closest one. Like other forms of human spatial behaviors, distances traveled from home to the crime location are assumed to follow a Pareto distribution, displaying a disproportionate number of short trips (Brantingham & Brantingham, 1984; Rossmo, 2000). Three distinct but interrelated hypotheses have been formulated to provide explanations for criminal mobility.

The cost-effective hypothesis. Offenders have an inclination towards short crime trips because efforts associated with increasing distance make a more distant criminal opportunity less cost-effective. This is consistent with Cornish and Clarke's (1986) rational choice theory, which proposes that offenders will travel for the purpose of committing a crime. Criminal mobility is therefore considered a decision-making process where the benefits (gains) of the crime are weighed against the costs (efforts) of the travel required. Decisions will however be based on readily available information, by virtue of “the principle of the most obvious” (Felson, 1987) or an offender's “bounded rationality” (Johnson & Payne, 1986). Ultimately, this leads offenders to combine processes of effort minimization and opportunity maximization in the perpetration of their crimes (Harries, 1980).

The daily-routine hypothesis. Offenders have an inclination towards short crime trips because spatial interactions (and subsequent criminal opportunities) characterizing daily routine activities decline with increasing distance. This hypothesis is consistent with Cohen and Felson's (1979)

routine-activity approach, which suggests that offenders will commit crime while day-to-day traveling for non-criminal purposes. A crime is assumed to occur in daily-routine settings when there is spatial and temporal convergence of the three ingredients of the "chemistry of crime": 1) a motivated offender; 2) a vulnerable victim or a suitable target; and 3) the absence of capable guardians, handlers or place managers against crime (Eck & Weisburd, 1995; Felson, 1998). Research on large-scale human-mobility patterns has revealed that individual trajectories are characterized by a remarkable heterogeneity that coexists with a striking spatial and temporal regularity (Pappalardo et al., 2015). On a daily basis, around 90% of the general population visit fewer than seven locations, and most visits are restricted to a bounded territory of 1 to 10 kilometres, with only a few regularly covering hundreds of kilometres (Schneider et al., 2013; Song et al., 2010). Among burglars, robbers, and extrafamilial sex offenders, considerable differences have been observed in individual routine-activity patterns, suggesting a high degree of distinctiveness (Curtis-Ham et al., 2021).

The local-knowledge hypothesis. Offenders have an inclination towards short crime trips because crime commission is facilitated by better practical knowledge of nearer, familiar zones than of farther, unfamiliar or unexplored areas. It is postulated that such functional awareness, derived from a familiar environment, allows offenders to minimize the effort required to locate attractive criminal opportunities and to reduce the risks associated with criminal involvement. This hypothesis is consistent with the Brantinghams' (1981, 1993) geometry of crime, which argues that each offender has an activity space (i.e., their physical environment) in which most of their daily or weekly activities are carried out. These activity spaces are made up of routinely visited nodes (or centers of activity) that are linked together by numerous paths (or routes), thus composing an offender's awareness of space (i.e., what they know about their physical environment). The Brantinghams' crime-site selection model suggests that crimes are most likely to occur in areas where the awareness of space of both the offender and the victim intersect. Menting et al. (2020) showed that offenders have a strong inclination to commit crimes near frequently visited activity nodes, such as work, school, friends' homes, and leisure locations. Bernasco (2010a) found that offenders were more likely to commit crimes in their current or

former residential areas than in comparable areas they never lived in. This finding thus introduced a temporal dimension to the concept of awareness of space. Other studies also highlight the importance of considering prior crime-location sites (Bernasco et al., 2015; Kuralarasan & Bernasco, 2021; Lammers et al., 2015; Long et al., 2018) and current residential areas of family members (Menting et al., 2016) in an offender's awareness space.

The theoretical principles and underlying hypotheses of journey-to-crime research are influenced by four *implicit* assumptions: 1) criminal mobility is only a matter of distance traveled; 2) distances traveled by offenders are proportional to the real efforts they invest in traveling; 3) criminal-mobility efforts are assessed equivalently by all offenders; and 4) criminal mobility is necessarily a cost for an offender. However, these assumptions are often unreasonably optimistic, and may lead to conclusions that do not fully reflect the true situation. Each of them will be critically reviewed below.

2.1.1 Conceptualization issues

Scholars have traditionally defined criminal mobility in terms of the distances traveled by offenders to commit their crimes. However, defining a concept solely in terms of the assessment of its substance (i.e., a measure of distance) runs the risk of reducing a concept to its measure, which in turn may limit the scope of conceptualization. Hence the important question: is criminal mobility only a question of distances traveled?

The broad concept of *spatial mobility* can be defined straightforwardly as a change of place from one point to another in a given geographical space, regardless of the rationale that motivates or compels this change. The geographical space in which the change of place occurs can be at the micro- (or intracity), meso- (or intercity / intranational) or macro- (or international) level of spatial resolution. Research on human-mobility patterns generally relies on three widely recognized indicators: 1) the trip distance distribution; 2) the radius of gyration (i.e., distance an

individual travels during a given period); and 3) the number of locations visited over time (Schneider et al., 2013).

Inspired by research in biology and medicine on the movement of non-human organisms, urban sociologists (Canzler et al., 2008; Flamm & Kaufmann, 2006) have proposed dividing the concept of spatial mobility into two important dimensions, *movements* (or mobility performances) and *motility* (or mobility potentials). On the one hand, movements are the visible (or concrete) part of mobility. They have a directional component, an origin and one or several destinations, and are measurable on a map. The distance traveled from one point to another, the number of bus stops on the way to work, the number of different cities visited in a given trip, and the area covered during daily-routine activities are examples of measurable indicators of movements. On the other hand, motility is the invisible (or abstract) part of mobility. It is non-directional and cannot be measured on a map. It represents the ability (skills, perceptions, knowledge), capacity (networks, accessibility, resources), motivations, and decisions of an actor to move spatially (Flamm & Kaufmann, 2006). Speaking five languages, having extensive financial resources, owning a car, and being able to adapt to short-term changes are examples of measurable indicators of motility. While mobility potential is an at least partial determinant of mobility performance, its mere existence does not necessarily imply translation into effective travel. Hence the importance of studying both dimensions of criminal mobility, which is manifestly not only a question of distances traveled by offenders to commit their crimes.

2.1.2 The "longer distance as increasing effort" deductive fallacy

Hypotheses underlying criminal-mobility research are rooted in an axiom of proportionality between distances traveled and efforts spent. One generally accepted interpretation of offenders' inclination towards shorter crime trips is that it costs money, time and energy to overcome distance. A deductive fallacy arises if one explicitly considers distance traveled as an effort (or a cost) without taking into account these three inherent components. While travel cost is almost a perfect function of distance traveled in animals (in whom it corresponds to the energy

expended), it is intrinsically linked to other vital considerations in humans. As recognized by Rossmo (2000): “As it is not just a question of minimizing distance, but of reducing time, effort, and costs, the layout of a city, an offender's mode of transportation, and any significant mental or physical barriers must also be considered in the spatial analysis of crime patterns” (p. 88).

For example, one cannot presume, simply because the distance traveled is greater, that a 4-mile crime trip necessarily requires more effort—and thus represents a higher cost for an offender—than a 2-mile crime trip. If the 4-mile crime trip is realized by car, a normally constituted offender will need to invest less than a dollar in gas, around 15 minutes in time and an insignificant number of calories in energy. If the 2-mile crime trip is carried out on foot, the same offender will spend no money but will need to invest around 40 minutes in time and 150-200 calories in energy. In this example, we can objectively conclude that, all other things being equal, the 2-mile foot trip may constitute a more “expensive” option for most offenders, in terms of efforts spent in traveling, than the 4-mile car trip.

Hence, the evaluation of the objective effort (money, time, energy) involved in traveling is inaccurate without a consideration of the mode of transportation used in the process. Although there is a strong bias towards using motorized vehicles to travel long distances (Snook et al., 2005), this tendency is not necessarily present when the distances are short (e.g., a 2-mile trip can be realized with any mode of transport), which seems to be the case for most crime trips (Ackerman & Rossmo, 2015). Most (72%) of the interviewed offenders in Wiles and Costello's (2000) study said they had access to a motorized vehicle prior to their crimes. Empirical studies suggest extensive variability in offenders' reliance on a mode of transport (other than walking) to commit their crimes: 9.5% of crack users (Pettiway, 1995), 15% of serial rapists (Warren et al., 1995), 40.1% of serial burglars (Snook, 2004), 46% of burglars (Clare & Ferrante, 2007), 70.7% of robbers (van Koppen & Jansen, 1998), 76.1% of serial murderers (Snook et al., 2005), and 80.8% of sexual murderers (Ressler et al., 1986). As one would intuitively expect, offenders who use a vehicle tend to commit their crimes further from home than walking-to-crime offenders (Snook, 2004; Snook et al., 2005). But slower modes of transport are not necessarily correlated to shorter

distances traveled. For example, van Koppen and Jansen (1998) found that robbers traveling on motorcycles or bicycles tended to offend closer to home than robbers walking to their crime site.

To our knowledge, no study has directly investigated the rationale behind offenders' decisions to rely on a mode of transportation to commit their crime. Hypotheses that have been formulated generally focus on offender age (Bernasco & Nieuwbeerta, 2005; Snook, 2004; Wiles & Costello, 2000) and available socioeconomic resources (Rengert et al., 1999; Rossmo, 2000). However, independently of the material availability of specific modes of transportation, an offender's choice of vehicle can be influenced by many other factors, including the features of the available conveyances (e.g., velocity, license requirements), characteristics of the city (e.g., proximity of opportunities, road-network efficiency, traffic flows, availability of transportation alternatives), spatiotemporal considerations (e.g., time of the day, time of the week, weather, seasonality) and journey-after-crime particularities (e.g., rapid exit from the crime scene, transportation of a cumbersome loot, displacement of a dead body). Because journey-to-crime research does not consistently take into account the mode of transportation associated with each measure of crime-trip distance, it cannot be considered an accurate estimate of the actual efforts offenders exert in criminal mobility.

While an offender may accurately evaluate the objective efforts related to spatial mobility, their subjective appraisal of these efforts may be different. Individual-specific preferences may be the only determinant of choices between economizing money, sparing time and saving energy. For example, an indolent or physically unfit offender could give much more decisional weight to preserving their energy than to anything else, thus leading them to perceive short walks as more strenuous than long drives. Similarly, paying for public transport could be a deterrent for someone struggling to find the money to eat every day, and could lead them to consider a 1-hour walk a better alternative than a 15-minute bus ride. Furthermore, given the dearth of research on the geography of group offending — either studying only lone offenders or considering co-offenders the same as solitary offenders (Lammers, 2018) — the possible mitigating impact of the group on an individual's perception of travel effort has not been investigated. For example,

the perceived effort associated with a crime trip could depend on whether the offender has to drive to pick up all their accomplices or be passively escorted by a driver from their home to the crime location. In any case, in group offenses, the distance traveled to the crime site may be more an indication of the group's knowledge of criminal opportunities than of the physical constraints imposed on individual offenders (Townsley, 2017). Finally, numerous studies have shown that people are usually inaccurate estimators of distance and travel time (e.g., Allan, 1979; Canter & Tagg, 1975; Stea, 1969; Walmsley & Jenkins, 1992), which biases their overall evaluation of the necessary mobility efforts. In the final analysis, it is the offender's idiosyncratic perception of the objective effort involved in traveling that will guide their corresponding spatial mobility decisions.

The above caveats notwithstanding, an important question remains: to what extent has the impact of criminal mobility efforts on individual offenders' decision-making been overestimated? Nowadays, travel has been made quicker and more reliable by significant improvements in telecommunications technology and transportation infrastructure (Panayides, 2010). This has undeniably promoted human mobility, including offenders' journeys to crime. In a study of burglars and auto theft in Sheffield (England), Wiles and Costello (2000) found that distance-to-crime traveled by offenders had substantially increased between 1966 and 1995. Although temporal constraints remain a major determinant of the patterning of crimes (Ratcliffe, 2006), the "friction" of distance may have lost some of its influence on individual decisions about criminal mobility, especially at the micro-level of spatial resolution, where there is a strong bias towards short trips.

Indeed, most of the effort expended in the pursuit of spatial mobility seems to be invested in overcoming inertia (Walmsley, 1988). Applied to criminal mobility, this suggests that offenders, once in movement, may consider ranges of short distances to require a relative equivalent amount of effort. This is consistent with the hypothesis that there may be some sort of criminal range (or distance-undifferentiated zone) in which an offender will operate without really considering distances traveled, still believing they are maximizing their benefits from crime (Brantingham & Brantingham, 1981; Canter & Larkin, 1993; Capone & Nichols, 1975). In

summary, because the objective complexity and the subjective richness of the efforts involved in traveling are not taken into account, the journey-to-crime measure is hindered by its inability to reliably estimate the true costs and effort associated with criminal mobility.

2.1.3 A typology of spatially mobile offenders

Offenders do not constitute a homogenous group with regard to their level of criminal planning (Bernasco, 2018). However, another implicit assumption observed in the journey-to-crime literature is that criminal mobility efforts are equivalently appraisable by all offenders. A similar problem arises with applications of rational-choice theory that disregard the impacts of individual and situational distinctness on reasoning. We extend the analysis and implications of Bennett and Wright's (1984) and Elffers' (2004) clinical/theoretical classifications of spatially mobile offenders to argue that criminal-mobility efforts are not always taken into account in offenders' criminal-involvement decisions. Depending on offenders' initial motivation to be spatially mobile, the efforts involved in criminal mobility can be: 1) entirely appraised (by *planners* or *planning offenders*); 2) partially appraised (by *searchers* or *wandering offenders*); or 3) ignored (by *opportunists* or *haphazard offenders*).

2.1.3.1 Criminal mobility efforts are entirely appraised

Planners, or planning offenders, are the typical "reasoning criminal" of Cornish and Clarke (1986), who, after a crime-favorable cost-benefit calculation, deliberately chooses to travel to commit a crime. The journey-to-crime is therefore a consequence of the offender's commitment to offend. Crime-site selection is made beforehand, after a mental screening search of vulnerable victims or desirable targets in the offender's awareness space. The planner may consider multiple targets before choosing the one that seems to maximize their benefits. The crime journey's origin and destination being known in advance, criminal-mobility efforts can be entirely taken into account in the decision-making of the planning offender. Because the target or victim is selected before the journey-to-crime has begun, the expected benefits of offending will generally exceed the cost associated with criminal mobility. This is why planners may be more inclined to travel long

distances to a crime site that is presumed to contain interesting booty (see Felson's "strategic foraging," 2006). As noted by Elffers (2004): "The resulting journey length is dependent on the particular parameters of the crime chosen and does not necessarily display distance decay" (p. 186).

2.1.3.2 Criminal mobility efforts are only partially appraised

Searchers, or wandering offenders, are a mix of Cornish and Clarke's (1986) reasoning criminal and Cohen and Felson's (1979) opportunistic criminal. Like planners, searchers are crime-led, which means that they have the intention of committing a crime before embarking on a crime journey. But, unlike planners, they do not precisely choose their target before traveling. Searchers generally rely on a two-step target-search procedure composed of both a mental and a physical component (Wright & Decker, 1996), also referred to as *mixed scanning* (Brantingham & Brantingham, 1984). This is in accordance with Bernasco and Block's (2009) application of the optimal foraging theory to robbers: "When searching for a target, the robber first selects a suitable area and subsequently in the chosen area selects a suitable target. In terms of foraging, offenders must find a good hunting ground before starting to chase prey" (p. 96) (for a review of the foraging perspective in criminology, see Vandeviver et al., 2021).

Searchers' first step is the mental search of the starting node from which the criminal foraging will be carried out. In this phase — often realized mentally before the beginning of the journey-to-crime — the offender has to decide whether to start their physical search for a specific target from their departing node (e.g., home, work, leisure) or from another selected zone located elsewhere in their activity space (e.g., a high-crime neighborhood). Searching from the departing node corresponds to the victim-search method of Rossmo's (2000) *hunter* offender, while searching from elsewhere corresponds to the method of his *poacher* offender.[1] The effort

[1] For Rossmo (2000), however, the hunter is an offender who bases the search for a victim exclusively on their own home, whereas the poacher is an offender who situates the search for a victim on an activity site other than their home or who travels to another city during the foraging process.

involved in the travel abroad to start the physical search for a suitable target represents the "known" cost of criminal mobility for a searcher.

After having chosen and/or moved to the starting node from which the criminal foraging will be carried out, searchers commence the second step of their physical search for a specific opportunity. In their assessment of the suitability of a target, an offender looks for high desirability, low inertia, poor visibility, and easy access to — and quick escape from — the crime scene (Felson, 1998). This stage intrinsically implies traveling, but the extent of the efforts involved are "unknown" to the offender until they find the "right" target. The indeterminacy of the efforts characterizing the physical search process is the rationale for our assumption that the cost of criminal mobility can only be partially appraised by searchers. Efforts involved in traveling during this phase depend primarily on the availability of targets and the level of selectiveness of the offender. Target selections that are specific or based on atypical criteria generally require longer journeys-to-crime because of the more meticulous foraging involved (Fritzon, 2001; Holmes & de Burger, 1988; Wiles & Costello, 2000). Thus, the more target-specific an offender is, the more efforts in traveling they generally need to invest during their search for a target.

Because crime opportunities are not randomly distributed in time and space, and tend to cluster in certain areas (e.g., Curman et al., 2015; Sherman et al., 1989; Weisburd, 2015), traveling efforts involved in the physical search of a searcher will depend on the efficacy of their previously realized mental search for a proper foraging ground. The more appropriate the chosen zone, the better the chances of promptly finding a suitable target or a vulnerable victim, thus minimizing the effort involved in the physical search. Earthbound foraging is characterized by a hierarchical and sequential decision-making process in which many potential targets are screened for suitability (Cornish & Clarke, 1986). During this phase, a dynamic cost-benefit calculation is concurrently performed, to ensure that the expected benefits from the impending crime are not outweighed by the increasing costs underlying the physical search efforts. If such situation does occur, an offender can either choose to: 1) stop the search (unfruitful search); 2) persist in the search with the same level of selectiveness (desperate search); 3) persevere with the search by

reducing their selectivity (compromise search); or 4) travel back to seize a previously screened less desirable target.

2.1.3.3 Criminal mobility efforts are ignored

Opportunists, or haphazard offenders, are the personification of Cohen and Felson's (1979) opportunistic criminal. Even though they have some predisposition to offend, opportunists have no intention of committing a crime before becoming spatially mobile. They first undertake a journey for non-criminal reasons (e.g., to go shopping, visit a friend, go to work), encounter interesting targets without really noticing them, and are finally confronted with a high-value desirable criminal opportunity. They then fail to resist the temptation. For this type of offender, spatial mobility is initially a consequence of a non-criminal decision (e.g., going to work) and only subsequently a cause of a criminal decision (e.g., passing by an unguarded luxury car triggering their desire to steal). The former is influenced by an offender's daily routine activities, whereas the latter is determined mostly by the availability of attractive criminal opportunities. The distance traveled by opportunists from the departing node to the location of their crime cannot be considered a criminal cost (or an effort associated with criminal mobility), because the trip was initially undertaken for non-criminal reasons and the distance has already been covered when the opportunity arises. This is why we postulate that criminal-mobility efforts are ignored in the decision-making of opportunists.[2]

2.1.4 The neglected benefits of criminal mobility

Research on criminal mobility has mostly focused on the costs of travel, without thoroughly examining its benefits. Townsley and Sidebottom (2010) have presented a detailed definition of

[2] It is however true that the expected "distance-after-crime" and the potential fatigue induced by the distance already covered could have an impact on the criminal-involvement decision of opportunists. Consider, for example, an offender who, after traveling five miles on their way to work, encounters an attractive criminal opportunity (e.g., an unguarded apartment to burgle). Although the five miles already traveled to the location of the opportunity will have no impact on the decision to commit the burglary, the engendered weariness and the estimated distance that must be traveled afterwards with the loot (not necessarily a 5-mile trip) might.

the least-effort principle so predominant in traditional theorization of criminal mobility: "[process in which an individual] will strive to solve his problems in such a way as to minimize the total work that he must expend in solving both his immediate problems *and his probable future problems*" (Zipf, 1965, p. 1, emphasis added). This unconventional detail — that individuals also work to minimize their probable future problems — introduces the notion of *preventive efforts* into the least-effort principle. Preventive efforts can be defined as a strategic behavior in which someone purposefully spends greater-than-necessary efforts at a given point in time in order to generate more-than-normally-expected benefits and/or less-than-normally-expected costs in the future. Applied to criminal mobility, this means that offenders may be inclined to travel longer distances if they believe it will increase their expected benefits or diminish their overall rate of effort in the future. Decisions in favor of criminal mobility fall into two categories. First, when the benefits of crime outweigh the costs of travel, criminal mobility can be seen as a factor of *criminal achievement*. Second, when the benefits of travel outweigh its costs (independently of crime benefits), criminal mobility can be seen as a factor of *restrictive deterrence*.

Criminal achievement is the consideration of the rewards of crime from the offender's point of view. It is assessed essentially through monetary attainment, but also through formal and informal recognition of accomplishments, self-satisfaction with one's performance or abilities, and avoidance of unwanted outcomes such as detection, arrest and incarceration (McCarthy & Hagan, 2001; Morselli & Tremblay, 2004). Therefore, the more rewarding a crime is from a criminal-achievement perspective, the more trivial the travel costs become. There is empirical evidence that longer crime trips may be more monetarily rewarding than shorter ones (e.g., Capone & Nichols, 1975; Gabor & Gottheil, 1984; Morselli & Royer, 2008; Reppetto, 1974; Snook, 2004). Given the high rewards associated with a single crime, these criminally efficient offenders traveling longer distances may, in the long term, spare some efforts by requiring less frequent offending to obtain similar benefits from crime.

Restrictive deterrence refers to any strategies employed by an offender to avoid detection (Gibbs, 1975). Unlike other forms of human spatial behaviors, the purpose of criminal mobility is

a socially reprehensible illegal act. Offenders may consider the costs underlying possible recognition (e.g., apprehension, conviction, incarceration) so high that they see the extra effort they could invest in concealing movements and embarking on a covert operation as negligible. In such a situation, the lower risk of detection compensates for the increased costs of travel (Vandeviver, van Daele, & Vander Beken, 2015). While insiders have tangible advantages in committing covert crimes in their vicinity (e.g., familiarity with routes, better knowledge of opportunities, ability to stay inconspicuous), they are also more vulnerable to recognition if noticed (Felson, 2006). This is why keeping a buffer zone around their home or traveling over long distances to commit a crime is sometimes preferred by offenders, as it helps them avoid being spotted by neighbors, bystanders, victims or guardians on their way to, way into, and way from the crime scene. It has been demonstrated that the probability of arrest of an offender decreases as the number of police regions in which they perpetrate their crimes increases or as the number of times they commit a crime in a different region from their previous crime increases (Lammers & Bernasco, 2013). Also, offenders may purposefully separate crime locations to delay and/or facilitate evidence destruction, or force the involvement of other police forces, thus complicating the investigation process (Rossmo, 2000). For example, Keppel and Weiss (1994) found greater murder-case clearance rates to be associated with shorter distances between crime sites (i.e., victim-last-seen site, initial-contact site, initial-assault site, murder site, body-recovery site). The clearance rate was 86% if this distance was no more than 200 feet, and dropped to 50% if it was greater. Other empirical evidence that offenders may use spatial mobility as a tactic to circumvent apprehension is found in Davies and Dale's (1996) study on stranger rapists. Their results show that 3 of the 22 prolific stranger rapists they interviewed explicitly confessed to having used such avoidance strategies in the commission of their crimes.

2.2 Methodological validity of the journey-to-crime measure

Construct validity is the extent to which a measure truly assesses the concept it is deemed to measure (Strauss & Smith, 2009). To our knowledge, no study has ever evaluated the ability of

journey-to-crime to properly estimate criminal mobility. The construct validity of journey-to-crime seems to have been assumed, probably fostered by its intuitive *face validity* (i.e., the fact that “it looks like” a good measurement). In this section, we will critically review the construct validity of the journey-to-crime measurement by asking to what extent it actually measures the “real” crime journey.

According to Rengert (2004), a crime journey has the following components: a trip *origin* (i.e., reference point where the journey starts), a trip *direction* (i.e., spatial orientation of the journey), and a trip *distance* (i.e., distance from the trip origin to the trip destination). An obvious non-inclusion in Rengert's enumeration is a fourth component, namely a trip *destination* (i.e., reference point where the journey ends), “crime places” being indisputably as important as the other three components to our global understanding of crime patterns and offenders' spatial behaviors (Weisburd, 2015). Given journey-to-crime's reliance on only two components of the crime journey (i.e., distance and destination), most researchers have ceased to use this terminology. Instead, they have started referring to “home-to-crime” (e.g., Snook et al., 2005), “travel-to-crime” (e.g., Wiles & Costello, 2000), “residence-to-crime” (e.g., Ackerman & Rossmo, 2015) or “distance-to-crime” (e.g., Rengert, 2004).

2.2.1 Domocentricity and the presumed origin of the crime journey

Domocentricity can be defined as “the tendency for the spatial distribution of an offender's crimes to be heavily related to, or influenced by, their home and its relative positioning” (Canter & Youngs, 2009, p. 430). This is an underlying behavioral premise of geographic offender profiling, and presumes that an offender's home is usually located at the center of their routine and criminal activities. The importance of offenders' homes is strengthened by the belief that this is the main anchor point from which most of them start their daily activities and to which they must return for the night. Because people are more aware of what exists around them, it infers concurrently that an offender's knowledge of their surrounding environment tends to decrease in concentric circles away from their residence.

However, there is some empirical evidence against domocentricity that suggests an offender's home location is eccentric (i.e., off-center) in relation to their crime sites (Canter & Larkin, 1993; Kocsis & Irwin, 1997; Tonkin et al., 2010). The fact that journey-to-crime research has repeatedly found most crimes to be situated near offenders' homes does not mean that most offenders' homes are located near their crime sites (which would suggest domocentricity). Even if this were the case, it is not because a phenomenon is observed at the aggregate level that its existence can be inferred at the individual level (for a discussion of the ecological fallacy, see Rengert et al., 1999; Townsley & Sidebottom, 2010; van Koppen & de Keijser, 1997). Also, daily routine activities are not characterized exclusively by round trips from home (i.e., circular journeys), but more effectively by a succession of trips and stopovers en route to the many other important nodes in one's activity space. Finally, although home is the origin in the morning and the destination in the evening of most people's daily routine activities, this is not necessarily the case for criminals. Persistent offenders' propensity for sensation seeking and a festive way of life (Zuckerman, 2007), nocturnalism (Cusson, 2005) and unemployment (Hagan, 1993) probably weaken the night "pull" factor and the morning "push" factor exerted by the place of residence. Still, the hypothesized conceptual centrality of offenders' homes — coupled with the accessibility of police data on offenders' address of residence — have led journey-to-crime researchers to rely almost exclusively on this anchor point when measuring offenders' distances-to-crimes, regardless of whether this was really the case.

Unequivocally, current place of residence is not the only anchor point from which an offender can start a crime journey. Even though home is a major node in most people's activity space, other significant places exist; these include work sites, schools, residences of partners, family members and friends, entertainment locations (e.g., restaurants, shopping malls, bars, sites of sporting events), places of worship, and even criminogenic environments (e.g., drug-selling spots, prostitution areas, nightclubs, pawn shops, co-offenders' homes). Homeless offenders do not have a fixed home address and thus must base their criminal activities from other social-activity locations such as bars and pool halls (Rengert, 1996). A crime location can also be considered a

possible origin for a crime journey in situations where several crimes are committed one after another in a criminal spree. The consideration of the offender's home as the exclusive platform from which crimes can be committed is even more surprising given that most people spend approximately half their day outside the home. For example, the average Canadian adult spends 51.3% of their active daily time outside their residence (Statistics Canada, 2006). Similarly, Wikström et al. (2010) found that the juveniles in his longitudinal sample spent 45.8% of their "awake" time outside of their home. Other evidence was also found in a sample of 17 parolees whose movements were recorded in real time using an electronic monitoring device coupled with a global positioning system (Rossmo et al., 2012). Results indicate that the parolees spent an average of 11.6 hours per day outside their home and visited an average of four other locations daily. Still, little is known about what offenders do when they are not in their residence.

Journey-to-crime research's exclusive reliance on offenders' homes as the origin of crime journeys is comprehensible given the ready availability of data about offenders' address of residence, but is not supported by empirical evidence of the proportion of offenders truly departing from their residence when committing their crimes. The extent to which this affects our global understanding of criminal mobility is unknown. To our knowledge, Pettiway (1995) is the only author to have validated, through interviews, the true origin of offenders' journey-to-crime. He found that only 26% of crack-purchasing trips originated from respondent's place of residence.[3] What is certain, however, is that the journey-to-crime measure is an inaccurate trip-distance estimator for the significant proportion of crimes that do not originate from offenders' homes.

Even when a crime journey effectively starts from an offender's residence, researchers using a journey-to-crime indicator are forced to take for granted the accuracy of the addresses provided. As pointed out by Bernasco (2017), secondary data like police records are generally not collected for the purpose of scientific research. In cop culture, "patrolling the facts" such as filling up forms or writing down police reports may be considered donkey work or even a nuisance that hinders

[3] It should be noted, however, that 37.5% of crack users in Pettiway's (1995) sample were homeless.

“real” police work (Ericson & Haggerty, 1997; Manning, 1977). Obviously, this can jeopardize the quality of police data, including offenders' home addresses.

In addition, identifying an offender's home is probably not as straightforward as we may think. Is this the place where the offender sleeps most days in a given week? The place where they receive their mail? The place written on their (hopefully valid) driver's license? The place they are supposed to stay during their parole or probation (e.g., parents' home)? The place they told the police they live? One cannot assume the term “home” has the same meaning for everyone, especially for the persistent offenders whose life may be stuck in a dynamic of carceral impoverishment (Marchetti, 2002). When interviewing street and imprisoned offenders, Fleisher (1995) discovered they made a semantic distinction between “live” and “stay.” At the time of arrest, most of them were staying temporarily with someone and did not have a place they could call home (i.e., in which they were living permanently). This condition, in which someone has to temporarily stay with relatives or friends because they have nowhere else to live, has been referred to “involuntary doubled-up housing” (Wright et al., 1998) and can be considered a form of concealed or hidden homelessness (Rodrigue, 2016).

Among journey-to-crime researchers, there seems to exist a priori credence that police data provides satisfactorily accurate home addresses of offenders. However, this presupposes that the police are conducting concurrent investigations to confirm the accuracy — or even the existence — of each offender’s home address. Even in cases where the offender's home address is verified by the police during the criminal investigation, we don't know if the address was recorded at the time of crime commission, at the time of suspect identification, at the time of arrest, or at the time of the police report. Except in the rare cases in which offenders are caught red-handed or while fleeing the crime scene, there is generally a significant time gap between the commission of a crime and the arrest of a suspect. Lammers et al. (2012) estimated that, among the offenders identified by the police during their follow-up period, the average time between the commission of a crime (during which a DNA trace was left) and the identification of a suspect was 26.3 months. Time gaps are also observed in cases of late reporting of sexual

crimes. In such situations, do the police record the home of the offender retrospectively at the time of crime commission? If not, then the police are presuming that the offender has not moved during the criminal investigation. Persistent offenders are not a population reputed to exhibit residential stability (La Vigne & Parthasarathy, 2005; Steiner et al., 2015), especially when criminally active and attempting to evade police scrutiny. For example, 43% of the offenders interviewed by Wiles and Costello (2000) reported they had been living at their most recent address for less than twelve months. It is therefore fair to say that the validation and/or discussion of the accuracy of offenders' home addresses in the journey-to-crime literature is lacking.

2.2.2 The overlooked direction of the crime journey

The journey-to-crime measurement does not take into account the direction of the crime journey, despite empirical evidence suggesting offenders' movement over space is directionally skewed (Rengert & Wasilchick, 2000; van Daele & Bernasco, 2012). People living in cities are confronted with anisotropic surfaces, on which movement is easier in some directions and harder along others (Rossmo, 2000). In particular, spatial mobility is restricted by physical barriers and facilitated by connectors. Peeters (2007) showed the presence of dense barriers such as watercourses reduces the probability of travel in their direction, whereas more porous barriers like parkland did not. He also found that the influence of barriers on movement decreased as distance from home increased. Additionally, offenders residing close to each other have a propensity to travel in similar directions to commit their crimes; however, offenses clustered at adjacent locations are not necessarily the work of criminals originating from analogous directions (Costanzo et al., 1986). Daily routine activities and the abundance of criminal opportunities is said to encourage more offenders to move towards the city center than away from it (Fisher, 2021; Rengert, 2004). Finally, Frank et al. (2012) showed a strong directionality preference in their sample of 2622 burglars in British Columbia, suggesting that directionality matters in the overall understanding of offenders' spatial behaviors.

Two hypotheses underlying criminal-mobility research are characterized by an implicit assumption of direction. First, the daily-routine hypothesis presumes crime trips to be necessarily oriented along the nodes and paths of the day-to-day activities of offenders. Second, the local-knowledge hypothesis supposes offenders' knowledge of their surrounding environment (awareness of space) to decrease linearly as distance from their residence increases. However, crime trips can obviously be oriented towards territories that are not part of an offender's activity space (also termed *spatial exploration*; see Rengert & Wasilchick, 2000) and awareness of space — like movements over space — is also directionally biased (also termed *composite activity space*; see Brantingham & Brantingham, 1984). Accordingly, one cannot assume that a criminal opportunity situated, for example, 1 mile away from an offender's home is necessarily known to them (a river may prevent them having this zone in their awareness of space), or that a criminal opportunity situated 20 miles away is not (it may be near their daily workplace). Consequently, the daily-routine and local-knowledge hypotheses are both non-testable using a measure of home-crime distance that does not consider the directional component of the crime journey.

2.2.3 A qualitatively approximated and quantitatively estimated crime journey

The distance between an offender's home and the location of their crime can be estimated as a Euclidean distance (i.e., straight line or as-the-crow-flies), a Manhattan distance (i.e., taxicab or rectilinear) or a “wheel” distance (i.e., quickest temporal path through the street network). Rossmo (2000) has argued that Manhattan distances better describe the grid-layout pattern of most North American cities, whereas Euclidean distances better fit the less Cartesian layout of British cities. But concretely, all three measures of distance are equivalent and shared an almost perfect linear relationship (Groff & McEwen, 2005; Vanier, 2009). Nevertheless, while this estimation of home-crime distance provides some indication of the extent of an offender's movement before the crime, it says little about the *real crime journey* involved.

Real crime journey refers to the detailed itinerary traveled by an offender from the moment they decide to embark on a crime journey on the day of the crime to the moment they come back to

a safe location after the perpetration of their crime. This includes all the stopovers and/or detours made throughout this time span, the extent of an eventual target search and any movements realized during the crime (e.g., change of crime location) (Bernasco, 2014). By quantifying criminal mobility in terms of a fragmentary measure of home-crime distance that disregards most aspects of a crime journey, journey-to-crime research has been constrained to assume that: 1) the home-crime trip is direct; 2) the search-for-a-target, if any, is carried out during the home-crime trip; 3) there is only one crime location per criminal event; and 4) the crime location is the destination of the crime journey.

Assuming that offenders travel directly from their home (or any other departing node) to the crime site without making any intermediate stops and/or detours also assumes that they embark on their crime journey fully prepared and equipped, and already teamed up with their co-offenders. But this is in fact not always the case. While it is true that most crimes are perpetrated by lone offenders (van Mastrigt & Farrington, 2009) and with minimal planning (Felson, 2006), the journey-to-crime measure overlooks all the relevant places an offender may stop at before committing their crime (e.g., a store to buy equipment or tools, a co-offender's residence or meeting point to band together, a previous crime location to steal a getaway car, a bar or drug house where they can become intoxicated). Moreover, it is unjustified to presume that these intermediate stops are necessarily located along the offender's route to the crime.

Journey-to-crime research also has had to presume that any search for a target is performed during the trip to the crime location, which in turn suggests that offenders systematically find a suitable target along their traveled path and, incidentally, that the target search does not require extra travel. But an offender may spend two hours foraging in circles around their home (on foot, equivalent to approximately 6 miles traveled) before finding a suitable house to burgle a couple of blocks ahead of their residence (in which case, journey-to-crime = 0.25 miles). In the absence of knowledge about key elements of the offender's target search (e.g., home-based versus area-based search, foraging time, mode of transport used), journey-to-crime is at best an estimate of the distance traveled from home to the right target.

Another presupposition of journey-to-crime literature is that there is only one crime location per criminal event. However, this ignores the eventuality that movement is involved in some crimes. In geographic offender profiling, an EAMD classification (i.e., encounter, attack, murder, body dump sites) is typically used to help identify the locations of primary interest in murder cases (Rossmo, 2000). In contrast, an EARR classification (i.e., encounter, attack, rape, victim release sites) has been used in cases of sexual assault (LeBeau, 1987). Studies of the "journey-during-crime" in sexual offenses have reported that at least one change of crime location occurred in 56.5% of sexual assaults (Beauregard & Busina, 2013; Hewitt & Beauregard, 2017) and 49.4% of sexual homicides (Martineau & Beauregard, 2016). Journey-to-crime's failure to take into consideration multiple crime sites may distort the resulting estimation of the criminal mobility involved in the process. For example, an offender may have encountered a woman in a bar, moved to a hotel room where he raped and killed her, and finally returned home with the dead body in order to dispose of her body parts in garbage bags. Police data will record the address where the body parts were found (i.e., offender's residence; journey-to-crime = 0 miles), thus greatly underestimating the criminal mobility that was involved in the process.

Finally, in the absence of readily available data on where offenders go after their crime, criminal-mobility research has been compelled to treat the crime location as if it were the final destination. While the crime scene is obviously the endpoint of the first part of the trip (i.e., the journey-to-crime), it represents only a stopover in the overall crime journey (Bernasco, 2014). Indeed, no rational offender plans to terminate their journey at the crime location or commits a crime without considering — at least vaguely — where they will be heading afterwards. The location of the offender's final destination in their crime journey has undeniable implications for their decision-making and their perception of the costs, efforts, and risks associated with their criminal involvement. The abundance of studies on the outbound crime trip (i.e., the journey-to-crime) — coupled with the lack of information about the inbound crime trip (i.e., the journey-after-crime) — has created an enabling environment for the generally acknowledged supposition that, because offenders presumably start their crime journey from home, they simply go back

there after their crime. However, the rare studies having investigated the journey-after-crime suggest that that the places offenders return to after the crime are not necessarily the same as the ones they departed from before the crime (La Vigne et al., 2000; Lu, 2003; Synnott et al., 2016; Tonkin et al., 2010; van Patten & Delhauer, 2007). In particular, some crimes have aftermath conditions necessary for successful fulfillment of their underlying motivation. For example, car thieves, shoplifters, and burglars, who commit crimes to make money, may want to stop by a place to sell their stolen goods (e.g., chop shops, pawnbrokers, fences) before returning to their residence. Similarly, offenders committing crimes to assuage their drug addiction may want to pass by their dealer's spot or drug house prior to going back home (Langworthy & LeBeau, 1992). In summary, given that journey-to-crime neglects most features of a crime journey, it is likely to qualitatively and quantitatively underestimate the extent of the real crime journey undertake by offenders.

2.3 Discussion and implications

Having critically reviewed the theoretical relevance and methodological validity of journey-to-crime research, we suggest that while the interest in the journey-to-crime measurement is understandable, there are better ways to assess criminal mobility. Despite its popularity among environmental criminologists, many limitations have been identified. From a theoretical perspective, hypotheses that have been formulated to explain criminal mobility are influenced by some debatable and likely misleading implicit presuppositions. As we have shown: 1) criminal mobility *is not* only a matter of distances traveled; 2) distances traveled by offenders *are not* necessarily proportional to the real efforts they invested in traveling; 3) criminal mobility efforts *are not* equivalently appraisable by all offenders; and 4) criminal mobility *is not* only a cost for an offender. The overwhelming influence of distance-to-crime has deprived research into other measures of criminal mobility of the oxygen it needs to make significant and innovative contributions to existing knowledge in the field. Methodologically, the journey-to-crime measure is an empirically untested proxy of the general concept of criminal mobility. Its construct validity is limited by a sometimes unwarranted presumption of domocentricity, and by the fact that the

measure disregards: 1) the real trip origin; 2) the direction of travel; 3) the actual journey involved; and 4) the true distance covered. This has confined the measurement of criminal mobility to a roughly estimated indicator of the movements of offenders at the micro- or intracity level of spatial resolution during the pre-crime phase of the criminal event. In the end, the numerous assumptions inherent in journey-to-crime raises questions about what precisely it actually measures.

The purpose of this paper was not to launch a holistic, undiscerning attack on researchers' use of an imperfect measure. Of course, we acknowledge that no measure is perfect and that each one has, to various extents, its own intrinsic biases and limitations. Instead, our objective was to review the intellectual foundation of the concept and return journey-to-crime to its rightful place, by reassessing its hegemony in the measurement of criminal mobility and by re-emphasizing what it really is: *a basic measure of distance between the location of a crime known to the police and where we think the perpetrator lives at the time of commission.* Given the many limitations of journey-to-crime research, it is surprising that no formalized attempt had been made to test the validity of the measurement or to propose better conceptual or operational alternatives to the assessment of criminal mobility. After several decades of research, we still don't know much about the criminal mobility of individual offenders apart from the distances we *suppose* they traveled from home to their crime sites. We believe that a better understanding of criminal mobility would come from complementing journey-to-crime with new, more refined, measures.

2.3.1 Beyond "journey-to-crime": Implications for future studies

To date, criminal mobility has mostly been studied using readily available aggregate-level data compiled from official sources such as police arrest records. Less accessible individual-level data extracted from surveys, GPS monitoring devices, or interviews with offenders has been significantly neglected (with a few exceptions: e.g., Clare & Ferrante, 2007; Polišenská, 2010; Rengert & Wasilchick, 2000; Reppetto, 1974; Rossmo et al., 2012; Sarangi & Youngs, 2006; Summers et al., 2010; Wikström et al., 2010; Wiles & Costello, 2000). Undeniably, interviewing

criminals is a challenging and time-consuming research procedure that is itself subject to its own biases and limitations (Bernasco, 2010b; Bernasco et al., 2020; Copes et al., 2015). But we believe the best way to appraise criminals' distinctiveness in their spatial behaviors and underlying decision-making processes is to hear it straight from them. Offenders could certainly help us elevate criminal-mobility research to an even higher level of scholarship.

2.3.1.1 Reconstructing crime journeys with the support of web-mapping technologies

Environmental criminology in general, and criminal-mobility research in particular, would benefit from an increased uptake of promising advances in web-mapping technologies, such as Google Maps and Google Street View. These prevalent, accessible, exhaustive, and costless online platforms are powerful and convenient tools that can help researchers learn about the spatial behaviors of offenders from offenders. Traditionally, environmental criminologists have used hand-drawn sketch maps and conventional cartographic maps during their interviews with offenders to collect information, such as spatial awareness and activity patterns, that was hardly obtainable otherwise. However, these data-gathering instruments have important drawbacks (Canter & Hodge, 2008; Summers et al., 2010). For example, the utility of sketch maps depends on the offender's drawing abilities and capability to understand the task, as well as the size of the paper provided, and the utility of cartographic maps is dependent on a scale that offers a sufficient extent while remaining detailed enough to provide the exact relevant information. The Google Maps environment offers a solution to most of these problems, by removing the burden of paper, allowing researchers to freely change the scale of maps that cover most part of the world with very detailed spatial information, and allowing the combination of sketch and cartographic maps with Google's custom-map feature (Vandeviver, 2014).

Google Maps and Google Street View could also be used to support interviews with offenders, by assisting them in reconstructing their crime journeys. Such endeavours are more likely to be successful with incarcerated offenders, who would be talking about crimes for which they have already been convicted, than with active offenders, who would be talking about unrecorded crimes. In addition, researchers could exploit the information in police arrest records (e.g., crime-

location address, perpetrator's presumed home address, date of crime, type of crime) to trigger the offender's episodic memory of specific criminal events. A Google Street View photo of the crime location and/or the presumed home address — approximately synchronized with the crime date using the Time Travel feature — could even be shown, to foster reminiscence. When someone is able to sharply recall a personally experienced event, they often also remember its rich spatiotemporal context (Burgess et al., 2002). So, if an offender has a good recollection of a given crime, the researcher could take the opportunity to question them about where they woke up on that day, where they took the decision to commit the crime, where they headed after the crime, and any intermediate stops they made during that time frame. If a target search was involved prior to the crime, offenders could be asked to estimate the time invested in foraging for an opportunity, the area(s) in which this took place, and the mode of transportation used in the process. Based on this information, the researcher could subsequently simulate itineraries on Google Maps in order to roughly approximate the distance travelled by the offender during their search for a target.

These web-mapping technologies also provide researchers with features to help offenders pinpoint the many places involved in their crime journey. The precise address of public locations (e.g., restaurants, schools, stores) could be found straightforwardly by typing their name in the Google Maps search bar during or after the interview. If an offender does not recall the exact address of a private place, they could be requested to provide a nearby landmark (e.g., a bridge, a shopping centre, a park) in a constrained zone (e.g., in this neighbourhood, near this subway station). Once the landmark is discovered, the researcher could enter Google Street View immersive mode, and follow the offender's directions until they virtually arrive at the exact destination. When the offender is unaware of an exact address and unable to find it with the support of Google Maps or Google Street View, they could be simply asked to provide an approximate location such as a street corner. While this proposed research procedure is not without limitations (e.g., over-representation of well-recalled crimes, limited ways of corroborating offenders self-reported itineraries), it still is a promising avenue for unravelling something closer to the “real” journey-to-crime of offenders.

2.3.1.2 Empirically quantifying journey-to-crime's shortcomings

Web-mapping technologies could also be used to empirically quantify the many shortcomings of journey-to-crime. How serious are these weaknesses? To answer this question, researchers should validate with offenders the key assumptions of journey-to-crime research that have up to now been largely taken for granted. First, to what extent are offenders' home addresses recorded in police data — the principal source of information in this field of study — accurate (i.e., correspond to a place the offender was living in on the day of the crime)? Second, to what extent is home an important location in an offender's crime journey (i.e., as posited by the domocentric assumption)? Third, to what extent is an offender's crime trip direct, and what is the nature and prevalence of the stopovers and detours they make along their route? Fourth, what is the prevalence and extent of the search for a target in an offender's crime journey? Fifth, to what extent is the outbound crime journey (i.e., journey-to-crime) comparable to the inbound crime journey (i.e., journey-after-crime)? Finally and more importantly, to what extent is the basic measure of home-crime distance correlated to the total distance travelled by offenders during their crime journey (i.e., from the moment they decide to embark on a crime journey to the moment they come back to a safe location after the perpetration of their crime, including all intermediate stops, and detours, target searches, and changes of crime location)? Once these questions have been answered, we will have a better idea of the true validity and reliability of journey-to-crime as a proxy of the distances travelled by offenders during their crime.

One conclusion of the analysis outlined above could be that journey-to-crime is an excellent estimator of the movements of offenders, and therefore that its many shortcomings are negligible and do not affect its overall validity. Another could be that journey-to-crime is a proxy measure that needs to be refined (e.g., by using other sources of information) or used with circumspection (e.g., with only certain types of crimes). And yet another could be that journey-to-crime is a poor estimator of the movements of offenders, and should be abandoned in favour of novel and better indicators. In all cases, however, distances travelled by offenders during their

crime would remain a major component of criminal mobility, but researchers would have to ascertain they are using a valid and reliable way to quantify its extent.

2.3.1.3 Developing alternative measures of criminal mobility

Environmental criminologists should be encouraged to develop new measures of criminal mobility that go beyond distances travelled, the criminal event, and the micro-level of spatial resolution. Some researchers have already taken this path off the beaten track of journey-to-crime, by analyzing an individual's offending perimeter (Morselli & Royer, 2008) or their use of multiple locations during a crime (Beauregard & Businа, 2013; Leclerc et al., 2010). But more research is needed outside the traditional focus on home-crime distances, and three areas appear particularly promising.

Propensity over time. The spatial mobility of offenders has been almost exclusively studied as single-event performances rather than as a propensity over time. The observation of an individual's trait or ability over the very short term, such as the mobility displayed by an offender during a crime journey, usually offers a limited insight into its overall understanding. Even when multiple observations are available, generalization remains conjectural. In light of this, researchers might be well advised to prefer longer-term measures of propensity when studying the spatial behaviors of offenders, such as the number of places visited daily over a prolonged period of time or the number of cities in which a crime was committed during a criminal career.

Spatial exploration. A large-scale study having used both mobile-phone and GPS data to reconstruct individual trajectories has uncovered the existence of two clearly distinct categories of persons: returners and explorers (Pappalardo et al., 2015). Returners are characterized by recurrent trips between a few preferred locations, whereas explorers have an inclination to travel between a large number of different places. This work could inspire criminal-mobility research to attempt to distinguish offenders who tend to stick to routinely visited areas to commit their crimes from those more willing to venture into new and unexplored territories. Environmental criminologists would benefit from learning more about the extent, prevalence, and function of

spatial exploration in offenders' mobility, as these have direct implications for some key hypotheses regarding criminal mobility. In an interview context, this could be accomplished by asking offenders to retrospectively rate on a scale their level of spatial knowledge of the street block or street segment of each of their recent crime locations (e.g., from “absolutely no knowledge, first time in the area” to “almost perfect knowledge, routinely frequented area”). Clustering methods could then be used to unravel the relevant profiles and proceed with further comparative analysis.

Motility. We need better knowledge of the mobility potential of offenders and how it translates into effective travel. What makes an offender more prone to spatial mobility than somebody else? What affects an offender's decision to rely on a given mode of transportation to commit their crime? How does an offender perceive the effort invested in traveling, and how does this perception impact their resulting crime journey? What are the benefits of spatial mobility for an offender, and how do they influence decision-making? Answers to these questions would certainly improve our understanding of the spatial behaviors of offenders.

2.3.1.4 Distinguishing opportunistically- from strategically-mobile offenders

It is offenders themselves who hold the key to clarifying the debate about the distance-decay function at the individual level. And we think that the roots of the explanation reside in the motivation of offenders to be spatially mobile. By combining crime-trip distances of *opportunistic* offenders, who commit crimes while traveling for non-criminal purposes (haphazard criminals) with those of *strategic* offenders who decide to travel to commit crimes (planning criminals and wandering criminals), we are unwittingly combining the measurement of two different things. On the one hand, we are measuring the extent of the daily routine of opportunistic offenders; on the other hand, we are estimating the outcome of a cost-benefit calculation performed for each of multiple possible targets in a strategic offender's awareness of space. Offenders are not purely strategic or opportunistic by nature. Instead, each of them perpetrates, to different degrees, a mix of strategic and opportunistic crimes that could blur the overall distribution of their crime-trip distances at the individual level.

The only way to differentiate strategically-driven crimes from opportunistically-triggered ones is by asking offenders about their motivations to be spatially mobile in the first place. One way of actualizing this in an interview context could be to ask them three specific questions while reconstructing a given crime journey: 1) “Were you in the crime area for the purpose of committing a crime?”; 2) “On the day of the crime, where did you make the decision to commit this particular crime (i.e., the decision location)?”; and finally 3) “When did this decision take place?” If the offender was in the crime area for a reason other than to perpetrate an offense and decided to commit the crime at or near the crime location and/or seconds before its perpetration, this would indicate an opportunistically-triggered crime. If, on the contrary, the offender was primarily in the crime area to commit a crime and had been able to identify a decision location (even without an address — e.g., in a bus on his way to work) that is both geographically distinct from the crime location and temporally discrete from the moment of its commission, this would suggest that the crime is strategically-driven.

2.3.1.5 Understanding strategically-mobile offenders

That brings us to our final point, which is to emphasize the importance of finding, analyzing and understanding strategically-mobile offenders and their underlying spatial decisions. Up to now, criminal-mobility research has been inclined to portray offenders as look-alike automatons whose travel behaviors are essentially influenced by the friction of distance. This focus on criminal mobility *as an imposed constraint* of efforts, rather than *as a rational-decision tool* with advantages and drawbacks, has systematically underestimated the role of offenders' decisional alternatives. With the promising work applying a discrete-choice framework to crime-location decision (e.g., Bernasco & Block, 2009; Bernasco & Nieuwbeerta, 2005; Townsley et al., 2016; Vandeviver & Bernasco, 2020; Vandeviver, Neutens, et al., 2015), we are just starting to understand the rationale underlying offenders' choices about where and when to commit crimes. What is still missing, however, are more accurate estimates of how they get there and the extent to which their mobility genuinely represents a component of their decision to offend.

Chapitre 3 - Deconstructing journey-to-crime's questionable validity in theft-related crimes

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3. Deconstructing journey-to-crime's questionable validity in theft-related crimes

The distance between an offender's home and their crime location — the *journey-to-crime* — has been the measure of choice to estimate criminal mobility since the 1930s. Readily available data, consistent results across studies, and numerous implications for criminological theories in general, and for geographic offender profiling in particular, have certainly contributed to its ubiquity in the offender-mobility literature. Established scientific knowledge about the spatial behaviors of offenders has been — and still is — strongly influenced by empirical research examining home-crime distances. Even though these studies have repeatedly addressed most of the drawbacks of the journey-to-crime measurement, they have failed to quantify how these flaws affect its validity and overall usefulness.

The purpose of this paper is to assess the extent to which the limitations associated with the journey-to-crime measure affect its construct validity. How serious are its methodological weaknesses and to what extent do they influence the estimates it gives of the offenders' actual travel during the perpetration of their crimes? By relying on interviews with theft-related offenders and with the support of web-mapping technologies, past crime journeys have been reconstructed to estimate the validity of some of the key assumptions of journey-to-crime research.

3.1 Literature review

The main findings in journey-to-crime research are that most crimes are committed a short distance from the offender's residence, and that the number of crime occurrences decreases the further the offender is from their home — a phenomenon called the distance-decay function (Rossmo, 2000). These results are consistent with the least-effort principle, which postulates that individuals have a propensity to choose the closest opportunity among a pool of equivalently desirable ones (Zipf, 1965). In general, adult offenders tend to travel more than juvenile offenders to commit their crimes, the latter being more likely to choose a target in the vicinity of

their residence (Levine & Lee, 2013). Journey-to-crime distance also varies by crime type, with violent crimes generally occurring closer to the offender's home than is the case with property offenses (Ackerman & Rossmo, 2015; Beauregard et al., 2005). However, what are these results really telling us about the mobility of offenders?

Construct validity is the extent to which a measure genuinely assesses the concept it is deemed to measure (Strauss & Smith, 2009). To our knowledge, no study has ever evaluated the ability of the journey-to-crime measurement to accurately estimate the real trip undertaken by offenders in the perpetration of their crimes. Its construct validity seems to have just been taken for granted, probably fostered by its apparent *face validity* (i.e., the fact that “it looks like” a good measurement). However, as suggested in chapter 2, the construct validity of the journey-to-crime measurement is called into question by the fact that it disregards the real trip origin, the actual itinerary involved, and the true distance covered by offenders.

The journey-to-crime measurement presupposes that all crime journeys start at the offender's home. This is obviously not always the case, but almost no empirical research has been able to provide a reliable estimate of the proportion of offenders truly departing from their residence to commit their crimes. To our knowledge, the only exception is Pettiway (1995), who was able to confirm directly with offenders the true origin of their crime journey, and who found that only a minority started their trip from home. Furthermore, homeless offenders who do not have a fixed home address have no choice but to base their criminal activities from other social-activity locations such as bars and pool halls (Rengert, 1996) or from a relative's or friend's home where they are temporarily staying (Fleisher, 1995).

The validity of the presumption that home is the origin of all crime journeys is also weakened by the fact that most people, including offenders, seem to spend approximately half their day outside their residence (Statistics Canada, 2006; Wikström et al., 2010). Daily-routine activities are not characterized exclusively by round trips from home, but more accurately by a succession of trips and stopovers en route to the many other nodes in one's activity space (e.g., workplace,

school, friends' or family members' dwelling, entertainment location, drug-selling spot, prostitution area). Even if home is the origin in the morning and the destination in the evening within most people's daily routine, this is not necessarily the case for active offenders. Because the journey-to-crime measurement exclusively considers the offender's residence as the origin of the crime journey, most researchers have started to use other terms, such as *home-to-crime* (e.g., Snook et al., 2005). Even when a crime journey effectively begins at the offender's home, researchers using a journey-to-crime measure are forced to take for granted the accuracy of the addresses provided. Because secondary data like police arrest records — the principal source of information in this field of study — are generally not collected for the purpose of scientific research (Bernasco, 2017), the reliability of information regarding offenders' home addresses coming from such sources remains to be seen.

Even if the distance between an offender's home and their crime location could provide some indication of the extent of their mobility before the crime, it says little about the *real crime journey* involved. The real crime journey is the detailed itinerary traveled by an offender from the moment they decide to embark on a crime journey on the day of the crime to the moment they return to a safe location after the perpetration of their crime. This includes all the stopovers and/or detours made over this time span, the geographical extent of target searches, and any movements made during the crime (e.g., change of crime location, also called *journey-during-crime*) (Bernasco, 2014). By quantifying criminal mobility in terms of a fragmentary measure of home-crime distance that disregards most aspects of a crime journey, journey-to-crime research has been constrained to assume that: 1) the home-crime trip is direct; 2) the search-for-a-target, if any, is carried out during the home-crime trip; 3) there is only one crime location per criminal event; and 4) the journey-to-crime mirrors the journey-after-crime. However, no study has ever validated these assumptions or verified the extent to which they actually reflect the itinerary and true distance traveled by an offender during a crime journey.

3.2 Current study

The main objective of this study was to empirically test some of the key assumptions of journey-to-crime research that have hitherto been largely taken for granted by scholars. Given the leading influence of journey-to-crime in the field of environmental criminology, it appears essential to make sure the measurement actually estimates what it is supposed to. Ultimately, the question is whether the traditional journey-to-crime measurement is able to provide researchers with accurate information about the true distances traveled by offenders during the commission of their crime. In simple terms, is journey-to-crime a valid indicator of criminal mobility?

This study relies on an original research design applied to a unique sample of theft-related offenders to constitute what we believe to be the most exhaustive investigation of offender mobility to date. We consider that the geographical accuracy of our reconstructed itineraries comes close to the GPS-monitored ones that have been studied by Rossmo et al. (2012), with the benefit of not having the "noise" of the individual's daily travel for non-criminal purposes. Moreover, our study stands out by relying on a significant sample and by having access to the rich personal account of offenders, especially with regard to their mode of transportation, criminal motivation, and target selection. More specifically, this study tested the following hypotheses.

Hypothesis 1: Police arrest records provide researchers with satisfactorily accurate offender home- and crime-location address data.

Hypothesis 2: Home-to-crime corresponds to the itinerary taken in most crimes, because the offender's home is the most important node in a crime journey, the itinerary is usually direct (without any detours and/or stopovers), and the outbound trip (i.e., journey-to-crime) generally mirrors the inbound trip (i.e., journey-after-crime).

Hypothesis 3: Home-crime distance computed from raw police data is a valid proxy of the home-crime distance validated by the offender, and of the true distance traveled by an offender during the pre-crime phase, post-crime phase, and entire crime journey.

3.3 Data and methods

3.3.1 Participants

The Correctional Service of Canada (CSC) supplied the names, identification numbers, dates of birth, and criminal convictions of the entire population of 3,356 adult males having received a federal sentence of two years or more in the province of Quebec (Canada) between January 1, 2010, and December 31, 2012. A list was drawn up of all 833 offenders having been convicted for at least one theft-related crime, namely robbery (any type), breaking and entering (any type with an intent to steal), motor-vehicle theft, and "other theft" (any type).

Recruitment of participants took place in 2013 in ten distinct correctional institutions located in the province of Quebec. A written invitation for an individual face-to-face meeting was sent to 453 (54.4%) of the 833 offenders. The remaining 380 offenders were not solicited because at the time of recruitment they: 1) had been released on parole and/or had terminated their federal sentence (72.1%); 2) had been transferred to a correctional institution we did not visit, mainly because of its geographical remoteness (21.6%); or 3) were physically or mentally unavailable for a research project (e.g., in court, in hospital, suffering from serious mental health issues) (6.3%). The aim of this one-on-one session was to briefly (i.e., in 10–15 minutes) present the research project, determine the offender's willingness to participate, and have them sign a consent form if they were willing to participate. Offenders were informed that their participation was totally voluntary and that they would not receive any compensation and/or preferential treatment for their involvement.

Among the 453 called-upon offenders, 172 (38.0%) initially agreed to take part in the study. The others either verbally refused to participate (49.9%) or did not attend the meeting after being invited on two separate occasions, on two separate days (12.1%). Two hypotheses can be formulated to explain such a low participation rate. First, several offenders may have been

dissuaded from participating in this non-mandatory research project because of the highly demanding nature of their potential participation (e.g., lengthy duration of interview, unknown number of meetings, intrusive questioning), which did not provide any apparent benefits. Second, despite our explanations and reassurances, some offenders remained suspicious, and reluctant to participate in a study in which their spatial behaviors were scrutinized (e.g., they questioned whether this was an undercover attempt to link them to unresolved crimes).

Before conducting the research interview(s), the correctional file of each participant, including all the available police reports concerning theft-related crimes committed since January 1, 2005, was systematically reviewed and annotated. The decision to restrict our analysis to crimes perpetrated after this date was made to limit the number of criminal events to analyze while ensuring a sufficient pool of "fresh-in-memory" crimes to revisit with offenders. The Quebec provincial police database (*Centre de renseignements policiers du Québec*) was also consulted to extract, for each theft-related crime in the study, addresses of both the offender's home and the crime location. Even though most of this information was already available in the police reports, it was compiled for comparative purposes and to question offenders in the event of discrepancies.

The preparation phase (i.e., the time between an offender's recruitment and first interview) for this study lasted between several weeks to over a year, and 43 offenders initially interested in participating in the study decided to quit over this period for various reasons. Another 19 offenders were either unreachable because they had completed their federal sentence or had been transferred to a remote correctional institution. Four offenders were also excluded from the study because no police report involving a theft-related crime committed after 2005 was found in their file. Five offenders who were met with during the preparation phase exclusively to help out in testing and clarifying our interview questions and in adapting and standardizing our procedures were not included in the final sample. Finally, three offenders were excluded because of a blatant lack of cooperation during the interview phase of the research project. The final sample thus consisted of 98 offenders.

At the time of admission, the 98 offenders were between 18 and 60 years old (*M* = 36.2; *SD* = 10.5) and were serving an average prison sentence of 3.8 years (*SD* = 1.8). The majority were White (82.7%), chose French as their preferred official language (93.9%), and had a criminal record prior to admission (89.8%). On average, offenders had been previously sentenced on 13.4 occasions (*SD* = 9.8) and had accumulated 46.0 criminal convictions (*SD* = 40.2). Independent-sample *t*-tests and chi-square tests of independence were conducted to compare the 98 "included" offenders to the 735 "excluded" offenders on five different control variables.[4] No significant differences were found between the two groups, suggesting that the offenders included in this study could be reasonably considered to be a representative sample of the overall population of theft-related federal convicts imprisoned in Quebec.

3.3.2 Procedures

A face-to-face interview was conducted with the 98 offenders between October 2013 and June 2014. Offenders were questioned for a total of 2.0 to 11.3 hours (*M* = 4.5; *SD* = 1.8) divided into one to five sessions (*M* = 2.0; *SD* = 0.9). Interviews were conducted either in French or English by two experienced clinical criminologists (including the first author). Most interviews (80.8%) took place in a correctional setting. The remainder (19.2%) were conducted in the community while offenders were on parole — either in a parole office, in a community-based residential facility (i.e., halfway house), or at the offender's residence. See "Annexe 1" for the geographic distribution of the 98 offenders according to their last city of residence prior to incarceration.

Interviews were divided into two parts. The first part consisted of a semi-structured interview during which offenders were questioned on different topics, including their childhood, education, employment, substance-abuse history, criminal activities, and geographic behaviors. With the support of a list of their potential home addresses and precise periods during which they were

[4] Control variables were: White (0/1), mother tongue is French (0/1), age of offender at admission, number of days of incarceration in the current sentence, total number of criminal convictions in the criminal career.

incarcerated versus free in the community (compiled during the preparation phase), offenders were also asked to reconstruct their residential history timeline since 2005. The second part of the interview was dedicated to the revisitation of all the theft-related crimes they had been convicted of since 2005 (and for which a police report was available). The objective was to unravel their detailed itinerary and underlying decisions from the moment they woke up on the day of the crime to the moment they came back to a safe place after its perpetration. Extensive verbatim notes were taken during both parts of the interview.

As a group, the 98 offenders had been convicted for a total of 956 theft-related crimes perpetrated since 2005. A police report was available for 680 (71.1%) of these crimes.[5] For each crime supported by a police report, the offender was asked to rate his level of recollection of that particular event and its surrounding circumstances on a scale from 0 (absolutely no recollection) to 6 (perfect or almost perfect recollection).[6] Because helping people to sharply recall a personally experienced event has been reported to help them remember its rich spatiotemporal context, even several years later (Burgess et al., 2002), a vignette with key characteristics of the criminal event (produced during the preparation phase) was read out loud by the interviewer and a Google Street View photo of the crime location was shown. Crimes were reviewed successively, in chronological order, from the oldest crime to the most recent one committed by each individual offender. Only the 449 crimes (66.0%) offenders admitted having committed and of which they still had a good recollection (i.e., scale scores of 3 to 6) were kept for further questioning. See “Annexe 2” for the effect of time on an offender's recall of their crimes. Each well-recalled crime was then revisited exhaustively, individually, and in chronological order, with the offender. The number of crimes to review ranged from 1 to 18 per offender (M = 4.6; SD = 3.6). This included 162 robberies (by 58 offenders), 198 burglaries (by 49 offenders), 21 motor-

[5] Police reports concerning older crimes, crimes committed as a juvenile, crimes involving co-offenders still facing their trial, crimes perpetrated in another Canadian province, and less-serious crimes (e.g., no prison sentence, no direct victim, no violence) were generally more difficult to obtain.

[6] Offenders were questioned about all of their crimes, with the exception of three participants who had committed more than 25, who were only questioned about the 10 most recent ones.

vehicle thefts (by 12 offenders), and 68 "other thefts"[7] (by 27 offenders). See "Annexe 3" for the number of offenders for each crime count.

Independent-sample t-tests and chi-square tests of independence were performed to compare the 449 "included" crimes to the 231 "excluded" crimes on five different control variables.[8] Results showed that the most recent and lucrative crimes were overrepresented in the sample of included crimes. Offenders were more inclined to remember robberies (compared to burglaries or "other thefts"), and crimes which led to an expeditious arrest by the police (i.e., the offender is arrested at the crime location or during their flight from the scene of the crime). The proportion of excluded crimes per offender was also higher in those who committed a greater number of offenses.

3.3.3 Variables

For each of the 449 crimes included in the study, 10 variables were coded. When it was possible to use a computer during the interview (85.4% of interviews), Google Maps and Google Street View were used for support. When a computer was either not available or not authorized, a detailed street atlas (1:25,000 scale) and Google Street View photo prints of the crime location and offender's presumed home address were used instead.

1) *Awakening location.* This is the place where the offender claimed to have woken up on the day of the crime. This location was asked specifically to help offenders remember where they were residing on the day of the crime, even though we acknowledge that many offenders may have slept elsewhere. When the offender was living on the street, he was asked to provide the

[7] "Other theft" included all thefts not fitting into the three previous categories, such as shoplifting, theft in cars, pickpocketing, purse snatching, and all other forms of non-violent simple theft.

[8] Control variables were: number of days between the date of the crime and the date of the research interview, estimated value (in Canadian dollars) of the stolen goods according to the police, type of crime (robbery, burglary, motor vehicle theft, "other theft"), whether the perpetrator was arrested by the police before reaching a safe house (0/1), and the number of official theft-related crimes perpetrated by the offender since 2005.

approximate location where he woke up, even if he could not provide an exact address (e.g., under that bridge, in that park, near that street corner).

2) *Offender-home location.* This is the place where the offender alleged he had his primary home address (PHA) on the day of the crime — i.e., the place where he generally slept the equivalent of four nights or more during a given week. If the offender had been homeless, sleeping in motels or hotels, temporarily sheltered in community resources, or transiently staying for a few days with people such as family or friends, or was unable to designate a single place where he normally slept four nights or more in a given week, he was considered to have had "no fixed abode" (NFA).

3) Decision location. This is the place that the offender identified as the location at which he made the decision to *embark on a crime journey* on the day of the crime. In this context, "embarking on a crime journey" means departing from a location for criminal purposes (i.e., subsequent trips had to have been linked directly or indirectly to the criminal event). Even if the decision to commit the crime had been made several days or weeks before its perpetration, the decision location is the place where the offender embarked on a crime journey *on the day of the crime* that was recorded. The location of another crime could be considered a decision location when the outcome of one crime directly influenced the decision to immediately and suddenly perpetrate a subsequent crime (e.g., the initial crime failed or was disappointing, so another crime was perpetrated right after). If the decision to commit a particular crime was made "on the spot" (e.g., the spontaneous encountering of a criminal opportunity), the address of the crime was recorded as the decision location.

4) Choice of target. When leaving the decision location, did the offender know his precise target and its location (i.e., a planned target), did he need to investigate to find the right target (i.e., a searched target), or was he unaware that he was about to perpetrate a crime (i.e., an opportunistic target)? In crimes with a planned target, the exact crime location is chosen before embarking on a crime journey (e.g., to commit a crime at this specific bank or this particular

house), even though the precise routes to get there may still be undetermined. In crimes with a searched target, the offender is also crime-driven when leaving the decision location, but the target is unknown and needs to be found based on specific criteria. In crimes with an opportunistic target, offenders are in movement for non-criminal reasons (e.g., to go shopping, go visit a friend, go to work) until they are confronted with a high-value desirable criminal opportunity. These offenders may have a general predisposition to perpetrate crimes, but when they leave their last location on the day of the offense, they have no specific intention of committing a crime.

5) Distance traveled in the search for a target (if any). When the crime involved a search for a target, the offender was asked to estimate the time (in minutes) he spent searching for a criminal opportunity, along with the mode of transportation (e.g., car, bicycle, walking) used during the process. This information was subsequently used to approximate the distance traveled (in kilometers) during this particular search for a target. For each situation, three simulations of itineraries with the mode of transportation used by the offender were performed in Google Maps. Destinations were chosen randomly and manually directly on the web-mapping platform, in the search area given by the offender, until the overall trip time reached the time estimated. The average distance after three simulations was then used as the approximation of the distance traveled by the offender during the search for a target of this specific crime.[9]

6) Crime location. This is the place the crime occurred. When an offender was unsure of the exact crime-location address (e.g., in cases of multiple residential burglaries), the crime location recorded by the police was chosen. When the crime-location address was obviously incorrect (e.g., the crime was a bank robbery and the address recorded by the police was a residence) and/or the offender was convinced that the crime location address was erroneous, the correct location was found after consulting other sources, and this address was used instead.

[9] For example, an offender declares having searched by car a house to burgle for approximately 30 minutes in a residential area. As the three simulations of itineraries carried out in this residential area on Google Maps give distances of 14.9 km, 11.8 km and 12.8 km, the mean of 13.2 km was recorded as the distance traveled by the offender in the search for a target in this particular crime.

7) Safe-house location. This is the place the offender indicated having sought refuge after committing the crime. To be considered a safe house, the location had to provide the offender with both shelter and a sense of safety for a significant amount of time (e.g., generally more than 30 minutes). The suitability of each safe-house location was assessed on a case-by-case basis along with the offender.

8) Intermediary stops (if any). These are all the transitory places the offender visited between the decision location and the crime location, and between the crime location and the safe-house location. A crime location could be considered an intermediary stop when the offender committed more than one crime in the same crime journey (i.e., from the decision location to the safe-house location).

9) Home-crime distance. For each crime, two variations of the home-crime distance were calculated. The first measure (*traditional home-crime distance*) was computed from raw police data. The offender's home and crime location addresses were taken directly from police reports; when one of these was missing or unknown, the Quebec provincial police database was searched for any existing addresses linked to this specific crime. The second measure (*offender's validated home-crime distance*) was computed from double-checked and cross-validated data. The offender's home address at the time of crime was given by the offender himself and the crime-location address was corroborated by consulting other sources, including the offender. When the offender was NFA on the day of the crime, the address of the awakening location was used instead. Both measures of home-crime distance were calculated in kilometers with Google Maps.

10) *Distance traveled during the crime journey.* For each crime, three measures of distance traveled by offenders were estimated. First, the *distance traveled during the pre-crime phase* corresponds to the distance covered by the offender from the decision location to the crime location, including all detours and stopovers, and any searches for a criminal target. Second, the *distance traveled during the post-crime phase* corresponds to the distance covered

from the crime location to the safe-house location (or the arrest location, if the offender was apprehended by the police before reaching a safe house), including all detours and stopovers, and any searches for a criminal target. Finally, the *distance traveled over the entire crime journey* corresponds to the sum of the distances covered by the offender in the pre-crime phase and in the post-crime phase. Distances were calculated in kilometers with Google Maps, using the mode of transportation indicated by the offender and the fastest route available (without traffic).

3.3.4 Address accuracy

The 449 crime journeys reconstructed with offenders yielded a total of 1,743 places and/or stopovers. With the support of various official and non-official sources, it was possible to find the exact address (i.e., civic number, apartment number if any, street name, city, province, and postal code) of 78.9% of these locations. The precise address of public places (e.g., restaurants, schools, stores) was usually easy to find by typing their name in the Google Maps search bar. When an offender did not recall the exact address of a private place, he was asked to provide a nearby landmark (e.g., a bridge, a shopping center, a park) in a constrained zone (e.g., in this neighborhood, near this subway station). Once the landmark was discovered, we entered Google Street View's immersive mode and followed the offender's directions until we virtually arrived at the exact destination.[10]

When the offender was unaware of the exact address and was unable to find it with the support of Google Maps or Google Street View, he was asked to provide an approximate location (generally a street corner); this had to be located within 0.25 km² (500 meters by 500 meters) of the real location. Approximate locations accounted for 18.4% of the places and/or stopovers composing crime journeys. When the offender was unable or unwilling to provide a sufficiently precise location, the address was considered missing (2.8% of the places and/or stopovers). When the decision-location, the crime-location, or the safe-house location address was missing,

[10] This strategy was not feasible in the 14.6% of interviews (involving 14 offenders and 51 crimes) during which a computer was either not available or not authorized.

or when it referred to an intermediary stop representing a detour for the offender, the phase of the crime journey to which it belonged (pre-crime and/or post-crime) was excluded from further analysis. However, if the offender was able to confirm that the missing intermediary stop was located "on his way" to the crime scene or to the safe house (i.e., no detour), the place was simply removed from this particular phase of the trip.

3.4 Results

3.4.1 Address accuracy in police data

An implicit assumption in journey-to-crime research is that addresses derived from police data are satisfactorily accurate. For each criminal event, the accuracy of both the offender's home and crime-location addresses were assessed by comparing those extracted from raw police data to those verified and cross-validated with offenders and other official documents. When the addresses matched, police data was considered to be "accurate." Spelling errors or incorrect postal codes were not sufficient to classify an address as false or erroneous. To be considered "inaccurate," the address supplied by police data had to refer to a different geographical location than the one given by the validated address. Results are presented in Table 1.

Table 1. Accuracy rate of offender's home and crime-location addresses in police data, by crime type

Type of address	*N*	Accuracy rate[a]										
		All crimes		Robbery		Burglary		MV theft		Other theft		χ^2 (3)
		n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	
Offender's home	396[b]	197	49.7	75	55.6	85	47.0	5	31.3	32	50.0	4.58
Crime location	428	414	96.7	156	96.3	173	97.7_c	18	85.7_d	67	98.5	9.42*

Note. MV = motor vehicle.

[a] Accuracy rate refers to the percentage of crimes for which the address extracted from raw police data is the same as the verified and cross-validated one. Percentages with different subscripts differ significantly at $p < .05$ based on Bonferroni adjusted z-tests for independent proportions.

[b] There were 53 crimes for which the offender's home address was missing or undetermined in police data.

*$p < .05$.

In our sample, the accuracy of the offender's home address as supplied by police data was strikingly low, with as much as 50.3% of crimes being recorded with a wrong perpetrator residential address. This low accuracy rate was comparable across the four crime types. Crime-location addresses, however, were overwhelmingly accurate (96.7%) and the accuracy rate was significantly better for burglary than for motor-vehicle theft (97.7% versus 85.7%; χ^2 [3] = 9.42, p < .05; Cramer's V = .148). The crime location of three (15.0%) of the 21 motor-vehicle thefts were wrongly recorded as having occurred at the owner's home or vehicle-recovery address rather than the real location of the crime. On average, the street-network distance between the incorrect and the accurate address was 26.9 km (*SD* = 33.6) for the offender's home (*n* = 198) and 4.4 km (*SD* = 3.9) for the crime location (*n* = 14). Almost half (48.5%) of the inaccurate home addresses and 21.4% of the inaccurate crime locations were in an inaccurate city. Additional verification was undertaken to exclude the possibility of a police coding bias in the recording of addresses.[11]

The startling discovery that more than half of offenders' home addresses extracted from police data correspond to a place they were not living at on the day of the crime calls for an in-depth examination. During the interview, each time an offender claimed he was not residing at the address recorded by the police on the day of a given crime, he was asked to provide justification for the discrepancy (was this a former residence? If yes, since when did he move from this place? If no, what is this address? etc.). Results are presented in Table 2.

The three main causes of inaccuracies in offenders' home addresses were that the police mistakenly: 1) believed the offender was living at the residence location of his mother and/or father (36.2%); 2) used an offender's PHA (i.e., primary home address) that did not correspond to the place he was residing at on the day of the crime, because he had either ceased to live there or not yet started to do so (18.6%); and 3) recorded the address of a correctional institution,

[11] Twenty-three distinct police forces were involved in the investigation of the 449 crimes included in this study. The accuracy rate of the three most frequently involved police forces (i.e., having led the investigation of 69.7% of the crimes) was comparable for both offender's home (from 44.3% to 58.3%; χ^2 [2] = 2.45, p = .294) and crime-location (from 94.4% to 97.9%; χ^2 [2] = 2.07, p = .356) addresses.

given that this was the place the offender was "living" at when they arrested him for this particular crime (17.6%). Among all the inaccurate addresses, only 49.2% had already been a PHA for the offender and 25.1% could have been considered their last valid one (i.e., the last PHA an offender had prior to the current one, excluding incarceration terms and NFA periods). These wrong PHAs were out of date by 374.9 days on average (*SD* = 472.4), with 23.8% out of date by two years or more. How can the police's significant difficulty correctly identifying where an offender was truly residing on the day of a given crime be explained? Our analyses have identified five noteworthy problems that can directly influence the accuracy of police data on offenders' home addresses.

Table 2. Nature of inaccurate police data on offenders' home addresses

Nature of inaccurate address	*n*	*%*
Offender's former or future personal residence	37	18.6
Offender's mother's and/or father's home address	72	36.2
Offender's other relative's, friend's, or current or ex-partner's home address	23	11.6
Offender's alternative address (stash, drug house, fake apartment)	12	6.0
Therapy center or halfway house	12	6.0
Correctional institution address	35	17.6
Other	8	4.0
Total	199	100.0

3.4.1.1 Definition and standardization issues

First of all, there is the question of how individual police officers from different forces understand, interpret, and codify primary home addresses (PHAs). The present study relied on the same standardized definition for all 449 crimes in the sample, namely, the place the offender generally sleeps, at the time of the crime, the equivalent of four nights or more during a given week. No interview was conducted with police officers to provide insights into how they precisely

determine an offender's PHA, but our preliminary analysis of police reports suggests considerable variability in the way this information is recorded by them.

In some police reports, an offender's name on a rental lease, a residential address on a probation order, or a credible third party pretending to live with the offender was sufficient to settle his PHA, regardless of the number of days he really slept there in a given week. In others, additional evidence was needed to make sure the offender was really living there. In some situations, the recorded PHA was the offender's "current home address" while in others, it was the offender's "last known address"; most of the time, no such distinction was made in the police report. When the perpetrator was arrested for a given crime while incarcerated (10.9% of crimes), the offender's PHA was usually recorded as the correctional institution (67.3% of the time), but sometimes as his last known address (24.5% of the time), or as missing or unknown (8.2% of the time). Unknown addresses, missing addresses, and being NFA were often used interchangeably, but sometimes they had different meanings. In most police reports, not having a PHA (or being NFA) was limited to homeless people living on the streets, individuals sleeping in motels or hotels, or individuals temporarily sheltered in community resources. In most cases, the police's definition of NFA excluded individuals who were house-hopping every few days between their relatives' and/or friends' homes because they had nowhere else to live. However, our definition did include individuals living in this situation, which is often considered a form of hidden homelessness (see Wright et al. 1998; Rodrigue, 2016). The lack of clarity, consistency, and standardization regarding the definition and the coding of an offender's PHA in police data certainly jeopardized the accuracy of some offenders' home address in our sample.

3.4.1.2 Police-investigation bias

More detailed analyses (not shown here) have revealed that 23.6% of inaccurate offender home locations were erroneous at the time of crime, but accurate at the time of arrest, and that 7.0% of wrong addresses corresponded to an offender's future PHA. These results are an indication that the duration of the police investigation can have an impact on the addresses' accuracy. In our sample, 23.6% of crimes for which the perpetrator was arrested at the crime location or

minutes later while fleeing the crime scene were not subjected to that kind of police-investigation bias in the recording of the offender's home address. In these situations, the perpetrator's place of living at the time of crime was obviously the same as at the time of arrest. However, in the 76.4% of crimes for which a police investigation was needed to identify, find, and/or arrest the perpetrator(s), that person's residential stability over that time period had to be assessed. Results are presented in Table 3.

The average duration of a police investigation for a theft-related crime — from the offender's commission of the crime to his arrest — was 54.9 days (*SD* = 63.1). Most investigations were generally concluded within days or weeks, but 22.4% had a duration exceeding three months. Due to a violation of the normality assumption, a Kruskal-Wallis non-parametric analysis of variance (ANOVA) was performed on the mean rank duration of the police investigation by crime type, and it revealed significant variation (χ^2 [3] = 30.83, $p < .001$). Police investigations of burglaries (*M* = 80.9; *SD* = 73.4) were, on average, almost three times longer than of robberies (*M* = 29.8; *SD* = 38.8). As many as 109 criminal events (31.7%) included a residential change by the perpetrator during the police investigation (i.e., a change of PHA or residential status — domiciliated, NFA, incarcerated — during that time period). This proportion was comparable across the four crime types. In these situations, where the offender's PHA at the time of crime was different than at the time of arrest, the PHA at the time of arrest was accurately recorded in 46.4% of cases, but this fell to 19.6% for the PHA at the time of crime (in the rest, an inaccurate address was recorded for both times). These results not only suggest that a police-investigation bias exists in the police recording of offenders' home addresses, but also that perpetrators tend to exhibit a high residential mobility that may complicate the identification of their current PHA by the police.

Table 3. Duration of police investigation (in days) and percentage of crimes with a residential change by the perpetrator during that interval, by crime type

Police investigation	Crimes with a police investigation[a]									
	All crimes (*N* = 344)		Robbery (n = 136)		Burglary (n = 149)		MV theft (n = 16)		Other theft (n = 43)	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Duration[b]										
Within 24 hours	25	7.3	13	9.6	9	6.0	1	6.3	2	4.7
From 1 day to 1 week	77	22.4	38	27.9	28	18.8	5	31.3	6	14.0
From 1 week to 1 month	75	21.8	37	27.2	18	12.1	4	25.0	16	37.2
From 1 to 3 months	90	26.2	39	28.7	36	24.2	2	12.5	13	30.2
More than 3 months	77	22.4	9	6.6	58	38.9	4	25.0	6	14.0
M	54.9		29.8_d		80.9_e		47.0		47.0	
Md	27.3		18.5		60.0		14.7		26.0	
SD	63.1		38.8		73.4		59.7		53.4	
Residential change by the perpetrator during that interval[c]	109	31.7	35	25.7	55	36.9	6	37.5	13	30.2

Note. MV = motor vehicle. Extreme values (>= 90th percentile) were recoded to a common value corresponding to their 89th percentile.

[a] Crimes in which the perpetrator was arrested at the crime location or minutes later while fleeing the crime scene were excluded (*n* = 105).

[b] Number of days between offender's crime commission and arrest. Due to a violation of the normality assumption, a Kruskal-Wallis non-parametric analysis of variance (ANOVA) was performed on the mean rank duration by crime type (χ^2 [3] = 30.83, $p < .001$). Means with different subscripts differ significantly at $p < .05$ based on Bonferroni corrected post-hoc tests.

[c] Perpetrator's "place of living" at the time of crime is different than at the time of arrest. Includes any change of primary home address or residential status (domiciled, NFA, incarcerated) during that time period. Chi-square test for independence among crime types is non-significant (χ^2 [3] = 4.40, $p = .222$) and percentages do not differ significantly at $p < .05$ based on Bonferroni adjusted z-tests for independent proportions.

3.4.1.3 Offenders' residential mobility

Offenders were asked to reconstruct their residential-history timeline from the beginning of the study period (January 1, 2005) to their last incarceration date prior to the interview. Depending on the participant, this interval varied from 1208 to 3099 days (*M* = 2381.7; *SD* = 355.9). With the support of official documents, each offender was asked to provide the total number of different PHAs they had had during that time span, along with all NFA episodes and prison stays. These numbers were subsequently summed to yield the total number of residential changes made during the study period. Offenders' residential mobility was estimated by dividing the number of

days in the study period by the total number of residential changes. Results are presented in Table 4, along with corresponding accuracy rates for offenders' home addresses in police data.

Table 4. Offenders' residential mobility during the study period and its effect on the accuracy rate of offenders' home address in police data

Perpetrator-level (*N* = 98)			Crime-level (*N* = 396[b])		
Average number of days before a residential change during the study period[a]	***N***	***%***	**Number of crimes committed**	**Correct PHA in police data[c]**	
				n	***%***
Less than 4 months	14	14.3	51	15	29.4_d
From 4 to 6 months	30	30.6	165	82	49.7_d
From 6 to 12 months	35	35.7	107	49	45.8_d
From 1 to 2 years	11	11.2	49	28	57.1_d
More than 2 years	8	8.2	24	23	95.8_e
M	253.7				
SD	148.9				

[a] Number of days in the study period (range = 1208-3099; *M* = 2381.7; *SD* = 355.9) divided by the total number of residential changes by the perpetrator during that interval (range = 1-30; *M* = 12.3; *SD* = 6.6). The latter corresponds to the sum of all different PHAs (range = 1-16; *M* = 7.0; *SD* = 3.5), NFA periods (range = 0-8; *M* = 1.8; *SD* = 2.3), and prison stays (range = 0-11; *M* = 3.3; *SD* = 2.8).

[b] There were 53 crimes for which the offender's home address was missing or undetermined in police data.

[c] Accuracy rate refers to the percentage of crimes for which the address extracted from raw police data is the same as the verified and cross-validated one. Chi-square test for independence among the five categories is significant (χ^2 [4] = 30.57, $p < .001$; Cramer's V = .278) and percentages with different subscripts differ significantly at $p < .05$ based on Bonferroni adjusted z-tests for independent proportions.

In this sample, the average number of days before a residential change during the study period was 253.7 days (*SD* = 148.9), with 80.6% of offenders having switched their place of living — voluntarily or involuntarily — more frequently than once a year during that interval. On average, offenders had 7.0 different PHAs (*SD* = 3.5), 1.8 NFA episodes (*SD* = 2.3), and 3.3 prison stays (*SD* = 2.8) throughout the period. Half (50.0%) of the offenders declared having used their mother and/or father's home as their PHA for at least one month during the study period. Eighteen (36.7%) of them lived with their parents permanently for some time because they were minors at the beginning of the study period; most of the others had stayed there temporarily following an incarceration sentence, a breakup, and/or financial struggles. Our results suggest that the residential mobility exhibited by offenders affects the police's ability to correctly identify their place of living. For example, the accuracy rate of offenders' home addresses in police data was

29.4% for the crimes committed by the most nomadic offenders (i.e., residential change every 4 months or less, on average) and 95.8% for those perpetrated by the most sedentary ones (i.e., residential change every 2 years or more, on average) (χ^2 [4] = 30.57, p < .001; Cramer's V = .278).

3.4.1.4 Reliability of police sources

After having identified and/or arrested the suspect of a crime, the police use different techniques and sources of information, such as police and governmental databases, to locate their residential address. In most jurisdictions, given that the driver's license is a renewable privilege that is associated with an obligation to declare promptly any change of residence (generally under penalty of a fine), it is often considered one of the most up-to-date sources of information regarding an individual's current home address. However, among the 98 offenders interviewed in this study, 28.6% had never had a driver's license, 43.9% had had a driver's license that was not valid at the time of last arrest, 12.2% had had a valid driver's license with an inaccurate PHA at the time of last arrest, and only 15.3% had had a valid driver's license with an accurate PHA at the time of last arrest. These results not only challenge the utility of the driver's license in corroborating the current home address of an active offender, but also emphasize the importance of verifying the presumably accurate information coming from official sources.

Police regularly questioned suspects to corroborate their place of residence. Almost all (98.0%) offenders in our sample declared having already been questioned about where they were living by the police. Depending on the importance of this information to the overall investigation, this could take many forms, varying from a basic yes or no validation question at the time of arrest (e.g., "Do you still live at this address [e.g., written on their driver's license]?") to a central theme questioned deeply during a formal police interview. Being the most directly concerned, it is legitimate to consider offenders as a potential source of information regarding where they are living. But to what extent they should they be considered a trustworthy source in that matter?

When questioned about the importance of keeping their true PHA confidential and unknown to the police, most offenders in this study (54.0%) answered that the importance was "crucial" or

"high," and only 25.3% declared that it was "not important at all." The accuracy rate of offenders' home addresses in police data was 38.9% for the crimes committed by offenders who declared PHA secrecy to be of "crucial" importance and 63.7% for crimes perpetrated by those who declared that PHA secrecy is "not important at all" (χ^2 [4] = 15.69, $p < .01$; Cramer's V = .214). This shows that an offender's desire to preserve the secrecy of their PHA significantly affects the accuracy of their recorded home address in police data. The majority (61.1%) of offenders admitted to having lied to the police regarding their true home address, with almost half (48.9%) confessing to having been deceitful "always" or "often". The interviews with offenders revealed four different tactics they used to mislead the police regarding their true home address.

Twenty-six (26.5%) offenders confessed to regularly giving officials (e.g., police, government, court) the residential home address of their mother and/or father even if they were not really residing there. Some explained that they exhibit so much residential instability or are so frequently incarcerated that they prefer to use their parents' home as a fixed and reliable address to receive their important mail, such as social assistance cheques and court orders, rather than risking losing track of it and/or sacrificing time constantly updating their addresses. Others believed that by living (or pretending to live) with a parent, they improved their credibility in the eyes of the authorities when asking for parole or with regard to their ability to respect their conditions during a granted bail or probation. Others explicitly stated that falsely indicating their residence at a parent's home address was a strategy to continue committing crimes with the feeling of being "one step ahead." As participant #85 illustrated: *"Because I always use my mother's home address in all my paperwork, when the police are looking for me, they are coming to her house... and this is a red flag... it means that they suspect me of having done something wrong, so I have to start watching my back, they are on my tail... maybe it is time for me to disappear for some time."* Having a parent to cover up for you if questioned by the police and some personal belongings (clothing, mail) to show as evidence certainly improves the effectiveness of this technique (*"My parents have kept my room in the basement 'as is' even if I have not lived there for 7 years, so they* [i.e., the police] *could easily think I currently live there"*; participant #67). The fact that more than one quarter of offenders stated that they regularly used

this strategy may explain, at least in part, why the most common cause of inaccurate offender home addresses in the sample was the mistaken beliefs of the police that the offender was living at his mother and/or father's home at the time of crime (i.e., 36.2% of inaccurate addresses, see Table 2).

A second method, which nine (9.2%) offenders confessed to frequently employing to protect the secrecy of their true home location, was to falsely claim that they were homeless or NFA. But as noted by participant #9: *"You have more chances to be believed* [by the police] *if they think you are a drug addict and if you commit your crimes in a big city... telling them you are homeless in a small village is not really credible and you may look [even more] suspicious."* Among the 53 crimes for which the offender's home address was missing or undetermined in police data, only 32.1% had in fact been perpetrated by individuals who admitted during the interview to having been NFA on the day of the crime; the rest (67.9%) were committed by offenders who did had a PHA, but one which was, manifestly, unknown to the police.

A third tactic, which eight (8.2%) offenders confessed to having relied on during the study period, is an agreement with a third party, such as a friend or a family member (other than their mother/father), who would pretend that the offender was living with them in exchange for money, drugs, and/or other services (e.g., protection, sex). For example, participant #150 gave $50 per month to a friend to cover for him in case of questioning and to be able to receive his social assistance cheque at his residence (because he was not living there). Another example is participant #124 who was paying a "clean" (i.e., with no criminal record) friend to use his name to rent an apartment and have access to public services (electricity, cable). Among the 23 crimes for which the police inaccurately recorded the home address of a relative, friend, or partner (or ex-partner) as the PHA of the offender (see Table 2), 8 (34.8%) involved this kind of agreement.

The last strategy, employed by seven (7.1%) of the interviewed offenders, was to have an alternative address they visited regularly to make the people think they were living there, such as a drug house, a stash house, or a fake apartment: *"When you are in the drug business, you*

need to separate the place where you deal your dope and the place where you live... you don't want to have junkies coming anytime for their fix at your real home... Also, if I get busted there by the police or other bandits, at least my family will not be traumatized, and my home will not be damaged" (participant #104). Another offender added: *"My [drug dealer] office is a small apartment I rent with no lease and pay for in cash each month... there is some basic furniture, a couch, a television, a small fridge, a mattress on the floor... no stove, no dishes, no decoration... I do not live there, I work there"* (participant #72). Inaccuracies in offenders' home addresses due to the police mistakenly recording that the offender was residing at such an alternative address were present in 6.0% of the crimes analyzed (see Table 2).

Offenders' motivations to keep the police away from their real home location were diverse: preventing the finding of new evidence linking them to unsolved crimes, avoiding being easily arrested at home as soon as they became suspected of another crime, keeping their relatives unaware of their criminal involvement, avoiding attracting the attention of neighbors and/or other criminals. Some offenders even told us that a "burned" (i.e., known to the police) home address was their main reason to move to another place. Offenders exhibiting a propensity to lie about their PHA pointed out the ease with which they could generally provide the police with a misleading home address *("The police's job is to bust criminals, not to check for their home addresses... if they already have everything they need to put you in prison, which is by the way often the case when they arrest you, they won't really care about where you [really] live"*; participant #99), the difficulty of proving that someone is truly living or not living at a given location (*"When I told the police I live somewhere and they don't believe me, I'm saying to myself, well, prove it!"*; participant #163), and the few dissuasive consequences of being caught lying about it (*"The worst thing that could happen if I get caught lying about that* [i.e., offender's home address] *is maybe a new criminal charge? I don't even know if the police could do that? Anyway, I don't care... With all the criminal stuff I have at home* [e.g., fake gun, illegal drugs, dirty money, stolen goods], *do you think I want them to come and have a look?"*; participant #60). Hence, to what extent do the police diligently verify the validity and accuracy of the addresses coming from these different sources?

3.4.1.5 Police on-site validation

Police validated the offender's home address "on-site" in only 32.7% of the 449 crimes in the sample. This includes all the situations in which the police followed the suspect or surveilled his whereabouts thoroughly enough to presume his home location (15.5% of crimes), arrested him at a place they considered to be his residence (12.6% of crimes), and/or conducted a house-search warrant at this location (18.6% of crimes).[12] Police on-site verification of offenders' PHA during the investigation was significantly more prevalent in robberies (38.9%) than in motor-vehicle thefts (9.5%), but comparable in burglaries (27.8%) and "other thefts" (22.1%) (χ^2 [3] = 12.78, $p < .01$; Cramer's V = .169).

These results suggest that in most theft-related crimes, the police did not confirm *in situ* the offender's PHA, either because: a) they did not know where the offender was residing, generally after having verified he was no longer living at his last known address; b) the offender was in prison at the time of identification and/or arrest; or c) they did not consider the offender's home to contain relevant new evidence for their investigation, so they took for granted the accuracy of the offender's last known address (e.g., from a police database, a driver's license) or were satisfied with a less rigorous verification approach (e.g., cross-referencing this address with other sources of information, such as the offender). Even when the offender's home address was physically validated by the police, the corresponding location was not a guarantee of accuracy, with 19.1% of addresses still referring to an inaccurate offender PHA at the time of crime.[13] According to several interviewed offenders, the police's willingness to locate an offender's home address is highly related to the gravity of the crime in question: *"If the police really want to find your home address, they will find it... This is all about the importance you have in their eyes... If they suspected you of robbing banks with a loaded gun, trust me, they will put the resources and*

[12] These procedures were coded if they were mentioned in the police report — which, given their evidentiary importance, they generally were.

[13] Because police on-site validation of offenders' home addresses is generally performed at the end of the police investigation (i.e., when the suspect is identified), a significant proportion of these inaccurate PHAs were explicable by the offender's change of residence between crime commission and arrest.

find where you live... but for minor crimes [or low-profile criminals], *forget it, they don't have the time and the money for that,"* (participant #10).

3.4.2 Crime itineraries

Another implicit assumption in journey-to-crime research is that home-to-crime corresponds to the itinerary taken by offenders in most crimes. This presupposes that: a) the offender's home is the most important node in a crime journey; b) the crime journey is direct, without any detours and/or stopovers; and c) the outbound crime journey (i.e., journey-to-crime) largely corresponds to the inbound crime journey (i.e., journey-after-crime).

3.4.2.1 Importance of the offender's home

To what extent is the offender's home an important place in a crime journey? Descriptive statistics summarizing the places where offenders have woken up on the day of the crime, took the decision to commit the crime, and sought refuge after the crime are presented in Table 5. Unsurprisingly, home was the offender's awakening location on the day of most crimes (75.2%). The remainder were crimes perpetrated by people considered NFA (14.4%) or by domiciled offenders who slept elsewhere the night before the crime (10.4%). The proportion of perpetrators starting their day at home was comparable across crime types.

The offender's home was the decision location in less than half (49.0%) of the theft-related crimes in our sample and this proportion was also similar across crime types. Other important places at which offenders decided to start their crime journey included a friend's or a family member's residence (14.9% of crimes), a bar or a drug spot (10.0% of crimes), or a prior crime location (6.0% of crimes). Purely opportunistic crimes (i.e., the decision to commit the crime is taken at the crime location), which represent 11.1% of all the theft-related crimes in this study, were significantly more prevalent in "other theft" than in burglary (20.6% vs. 8.6%; χ^2 [3] = 11.87, p < .01; Cramer's V = .163). In these haphazard crime situations (n = 50), the offender's initial purpose

Table 5. Offenders' awakening location, decision location, and safe-house location, by crime type

Type of place	All crimes		Robbery		Burglary		MV theft		Other theft		χ^2 (3)
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	
Awakening location (*n* = 444)											
Offender's home	**334**	**75.2**	114	70.8	157	80.5	15	71.4	48	71.6	5.24
Friend's or family members' dwelling	**53**	**11.9**	17	10.6	24	12.3	2	9.5	10	14.9	1.00
Motel or hotel	**21**	**4.7**	9	5.6	9	4.6	1	4.8	2	3.0	0.72
Therapy center, community shelter, or hospital	**13**	**2.9**	9	5.6_a	1	0.5_b	—	—	3	4.5	9.22*
Other location	**23**	**5.2**	12	7.5	4	2.1_b	3	14.3_a	4	6.0	9.21*
Decision location (*n* = 449)											
Offender's home	**220**	**49.0**	73	45.1	102	51.5	10	47.6	35	51.5	1.69
Friend's or family members' dwelling	**67**	**14.9**	24	14.8	32	16.2	1	4.8	10	14.7	1.95
Actual crime location (opportunistic crime)	**50**	**11.1**	14	8.6	17	8.6_b	5	23.8	14	20.6_a	11.87**
Prior crime location	**27**	**6.0**	16	9.9_a	6	3.0_b	1	4.8	4	5.9	7.46
Bar or drug spot	**45**	**10.0**	20	12.3	22	11.1	1	4.8	2	2.9	5.66
Other location	**40**	**8.9**	15	9.3	19	9.6	3	14.3	3	4.4	2.58
Safe-house location (*n* = 445)											
Offender's home	**179**	**40.2**	54	33.5	91	46.4	8	38.1	26	38.8	6.23
Friend's or family members' dwelling	**105**	**23.6**	57	35.4_a	33	16.8_b	4	19.0	11	16.4	19.57***
Motel or hotel	**19**	**4.3**	9	5.6	5	2.6	1	4.8	4	6.0	2.59
Other location	**37**	**8.3**	15	9.3	18	9.2	3	14.3	1	1.5	5.48
Unable to reach a safe house (arrested by police)	**105**	**23.6**	26	16.1_a	49	25.0	5	23.8	25	37.3_b	12.16**

Note. MV = motor vehicle. Chi-square test for independence was conducted separately for each type of place among the four crime types. Percentages with different subscripts differ significantly at $p < .05$ based on Bonferroni adjusted z-tests for independent proportions.

*$p < .05$. **$p < .01$. ***$p < .001$.

for traveling was to visit a friend or a relative (24.0%), go shopping (18.0%), buy drugs and/or party in bars (16.0%), head back home (14.0%), or go to work (10.0%). The remainder (18.0%) were typical situations of “manufactured serendipity” (Jacobs, 2010) in which the offender had created a facilitating environment for criminal opportunities (e.g., by wandering the streets, lingering in criminogenic areas, taking a walk with no particular motivation).

Home was the safe-house location for 40.2% of the crimes in our sample. Around one quarter of crime journeys ended abruptly before the offender was able to reach a safe house, either because they were caught red-handed at the crime location (6.7% of crimes) or because they were arrested by the police mid-flight (16.9% of crimes). Such situations were more frequent in “other theft” than in robbery (37.3% vs. 16.1%; χ^2 [3] = 12.16, $p < .01$; Cramer's V = .165). When the offender succeeded in reaching a safe house, home was the place of choice for all crime types except robbery, for which a friend or a family member's residence was slightly preferred. The offender's home was neither a decision location nor a safe-house location in as much as 40.6% of the crimes in our sample.

3.4.2.2 Detours and stopovers

To what extent is the crime journey a direct trip? In our sample, only 32.3% of the crime journeys could be considered to have been realized without any detour or stopover from the decision location, to the crime location, to the safe-house location (or to the arrest location, if the offender was intercepted by the police before reaching a safe house). This proportion was comparable across crime types. That means that in most crime journeys, offenders deviated from their linear path to and/or from the crime in order to accomplish another task, such as the search for a criminal target, the perpetration of another crime, or any other actions they deemed necessary. Descriptive statistics about the nature of the detours and stopovers made by offenders during their crime itineraries are presented in Table 6.

Table 6. Type of detour or stopover during the crime journey, by crime phase and crime type

Type of detour or stopover by crime phase	All crimes (*N* = 449)		Robbery (*n* = 162)		Burglary (*n* = 198)		MV theft (*n* = 21)		Other theft (*n* = 68)		χ^2 (3)
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	
Search for a target (index crime)											
Pre-crime	**163**	**36.3**	40	24.7_a	105	53.0_b	8	38.1	10	14.7_a	47.15***
Commit another crime											
Pre-crime	**62**	**13.8**	24	14.8	29	14.6	1	4.8	8	11.8	1.94
Post-crime	**64**	**14.3**	22	13.6	23	11.6	4	19.0	15	22.1	4.97
Entire crime journey	**115**	**25.6**	45	27.8	45	22.7	5	23.8	20	29.4	1.82
Other											
Pre-crime	**69**	**15.4**	36	22.2_a	25	12.6	3	14.3	5	7.4_b	10.37*
Meet with co-offenders	31	6.9	19	11.7	10	5.1	1	4.8	1	1.5	10.20*
Gear up/buy equipment/find transport	28	6.2	17	10.5	9	4.5	—	—	2	2.9	8.65*
Scout out the crime surroundings	11	2.4	4	2.5	6	3.0	—	—	1	1.5	1.08
Other	20	4.5	8	4.9	7	3.5	2	9.5	3	4.4	1.75
Post-crime	**148**	**33.0**	54	33.3_a	53	26.8_a	15	71.4_b	26	38.2_a	18.37***
Switch mode of transportation	44	9.8	19	11.7_a	12	6.1_a	10	47.6_b	3	4.4_a	40.03***
Sell or stash stolen goods	40	8.9	5	3.1_a	15	7.6_a	2	9.5	18	26.5_b	33.06***
Buy drugs/get intoxicated	34	7.6	18	11.1_a	16	8.1	—	—	—	$—_b$	10.26*
Other	45	10.0	19	11.7	18	9.1	3	14.3	5	7.4	1.670
Entire crime journey	**182**	**40.5**	68	42.0	70	35.4_b	15	71.4_a	29	42.6	10.79*
Any (at least one of the above categories)											
Pre-crime	**227**	**50.6**	75	46.3_a	124	62.6_b	9	42.9	19	27.9_a	27.13***
Post-crime	**184**	**41.0**	69	42.6	66	33.3_b	15	71.4_a	34	50.0	15.30**
Entire crime journey	**304**	**67.7**	106	65.4	139	70.2	17	81.0	42	61.8	3.73

Note. MV = motor vehicle. Chi-square test for independence was conducted separately for each type of stopover among the four crime types. Percentages with different subscripts differ significantly at $p < .05$ based on Bonferroni adjusted z-tests for independent proportions.

*$p < .05$. **$p < .01$. ***$p < .001$.

The search for a target was a fundamental preliminary step in 36.3% of the theft-related crimes in our sample. Criminal foraging to find the right target was much more prevalent in burglary (53.0%) than in robbery (24.7%) or "other theft" (14.7%) (χ^2 [3] = 47.15, $p < .001$; Cramer's V = .324). However, searching time and its translation into effective distance traveled were comparable across crime types. On average, offenders spent 27.9 minutes (*SD* = 27.4) or traveled 8.7 km (*SD* = 10.2) searching for a target. Committing another crime immediately before and/or after the index crime was also an important offender stopover found in 25.6% of the crime journeys. In such situations, the number of other crimes perpetrated ranged from 1 to 6 (*M* = 1.5; *SD* = 1.0), with 51.4% of them having also required a distinct search for a target. Other types of intermediary stops were also made by offenders in 40.5% of the crime journeys, in which case the number of stopovers varied from 1 to 6 (*M* = 1.5; *SD* = 0.9).

3.4.2.3 Outbound versus inbound crime journey

Finally, to what extent does the outbound crime journey (i.e., journey-to-crime) mirror the inbound crime journey (i.e., journey-after-crime)? When exclusively considering crime itineraries in which the offender was able to reach a safe house without being arrested by the police (*n* = 344), 58.0% started and ended at the same location (i.e., the decision and the safe-house locations were the same), but only 17.2% had the exact same itinerary in the pre-crime and post-crime phases (after taking into account detours and stopovers).

Our results highlight several differences in the itineraries undertaken by offenders through the pre-crime and the post-crime phases. During the journey-to-crime, an offender could have diverged from their route, in order to search for a target (36.7% of crimes[14]), to commit another crime (13.8% of crimes), to meet with co-offenders (e.g., make a plan, carpool to crime) (6.9% of crimes), to gear up for the crime (e.g., buy and/or organize equipment, find transportation) (6.2% of crimes), to scout out the crime surroundings (2.4% of crimes), and/or for other reasons (4.5% of crimes). During the journey-after-crime, an offender could get arrested

[14] This includes the search for the index crime and the search for any other target.

by the police (23.6% of crimes) or make a stopover before arriving at the safe house, in order to search for another target (6.7% of crimes), commit another crime (14.0% of crimes), switch their mode of transportation (e.g., change or abandon the getaway car or stolen vehicle, call or wait for a lift) (9.8% of crimes), sell or stash the stolen goods (e.g., professional fence, pawnshops) (8.9% of crimes), buy drugs and/or get intoxicated (e.g., bar, drug house, pusher) (7.6% of crimes), and/or diverge from their route for other reasons (10.0% of crimes).

3.4.3 Journey-to-crime's construct validity

This brings us to our final point, which is to assess the extent to which the traditional measure of journey-to-crime is a valid proxy of: a) the offender's validated home-crime distance; b) the distance traveled by an offender in the pre-crime phase; c) the distance traveled by an offender in the post-crime phase; and d) the total distance traveled by an offender over the entire crime journey.

What is the percentage of crimes in which the offender has in fact taken the direct home-crime and/or crime-home itinerary as assumed by the traditional measure of journey-to-crime? Results by crime type and crime phase are presented in Table 7. First, only 21.8% of all crimes were perpetrated by an offender whose pre-crime itinerary was a direct trip from home (i.e., without any detours or stopovers). This percentage was significantly lower for burglary (15.7%) and robbery (21.0%) than for “other theft” (39.7%) (χ^2 [3] = 17.78, p < .001; Cramer's V = .199). Second, only 19.6% of all crimes were perpetrated by an offender whose post-crime itinerary was a direct trip toward home (i.e., without any detours or stopovers). This time, the percentage was significantly higher for burglary (25.3%) than for “other theft” (7.4%) (χ^2 [3] = 11.86, p < .01; Cramer's V = .163). Finally, only 7.3% of all crimes were committed by an offender whose entire crime itinerary was a direct round trip (i.e., without any detours or stopovers) from his residence. The proportion was significantly higher for robbery (9.9%) than for “other theft” (0.0%) (χ2 [3] = 9.02, p < .05; Cramer's V = .142). If one accepts that the offender's home and crime-location addresses recorded in police data were accurate (as assumed by the traditional

Table 7. Percentage (%) of crimes in which the offender took a direct home-crime and/or crime-home itinerary, by crime type and crime phase

Type of itinerary by crime phase	*N*	Matching rate[a]										χ^2 (3)
		All crimes		Robbery		Burglary		MV theft		Other theft		
		n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	
Pre-crime phase												
Offender's home → Crime[b]	**449**	**98**	**21.8**	34	21.0_d	31	15.7_d	6	28.6	27	39.7_e	17.78***
Offender's home → Crime[c]	**386**	**53**	**13.7**	20	14.8	14	8.2_d	2	11.8	17	26.6_e	13.42**
Post-crime phase												
Crime → Offender's home[b]	**449**	**88**	**19.6**	31	19.1	50	25.3_e	2	9.5	5	7.4_d	11.86**
Crime → Offender's home[c]	**383**	**35**	**9.1**	16	11.9	16	9.5	—	—	3	4.8	4.39
Entire crime journey												
Offender's home → Crime → Offender's home[b]	**449**	**33**	**7.3**	16	9.9_e	17	8.6	—	—	—	$—_d$	9.02*
Offender's home → Crime → Offender's home[c]	**383**	**15**	**3.9**	8	5.9	7	4.2	—	—	—	—	4.74

Note. MV = motor vehicle.

[a]Matching rate refers to the percentage of crimes in which the offender took the home-crime and/or crime-home itinerary. Percentages with different subscripts differ significantly at $p < .05$ based on Bonferroni adjusted z-tests for independent proportions.

[b]Direct trip without any detours or stopovers.

[c]Direct trip without any detours or stopovers with an accurate offender's home and crime location addresses in police data.

*$p < .05$. **$p < .01$. ***$p < .001$

measure of journey-to-crime), as few as 3.9% of all crimes were committed by an offender whose entire crime journey matched the home-crime-home direct itinerary.

What is the impact of the mostly misleading itineraries presumed by the traditional measure of journey-to-crime on estimates of the distances really traveled by offenders? Results of a Kruskal-Wallis non-parametric analyses of variance (ANOVA) on the mean ranks by crime type for five different measures of distance are presented in Table 8. Home-crime distance according to police data was significantly longer for "other theft" (M = 31.0; SD = 27.9) than for robbery (M = 16.9; SD = 20.1) and burglary (M = 18.7; SD = 22.3) ($\chi 2$ [3] = 10.10, $p < .05$). No matter the crime type, the home-crime distance according to police data tended to overestimate the offender's validated home-crime distance. No significant differences were found across the four crime types regarding these home-crime distances. Generally, the traditional measure of journey-to-crime also tended to overestimate the distances actually traveled by offenders during the pre-crime and post-crime phases, no matter the crime type. On average, the total distance traveled by offenders during the entire crime journey was 31.1 km (SD = 36.4) for robbery, 33.0 km (SD = 39.7) for burglary, 46.8 km (SD = 50.7) for motor-vehicle theft, and 47.2 km (SD = 49.1) for "other theft". The mode of transportation used by the offender during their crime journey was usually a motor vehicle that was not stolen (61.7% of crimes), followed by walking (38.8% of crimes), a stolen motor vehicle (10.5% of crimes), a taxi (7.1% of crimes), a bicycle (5.3% of crimes), and/or public transportation (3.1% of crimes). In each of the four categories of theft-related crimes, all five measures of distance followed a distance-decay function at the aggregate level, displaying a disproportionate number of short trips as compared to longer trips.

Finally, to what extent is the traditional measure of journey-to-crime correlated with the offender's validated home-crime distance, and with the distance actually traveled by offenders during the pre-crime phase, post-crime phase, and entire crime journey? Given the nested structure of our data (crimes nested in individuals), multilevel correlations — also called hierarchical or random-effect correlations — were performed with R (version 4.1.2) using the

Table 8. Kruskal-Wallis non-parametric analyses of variance (ANOVA) on the mean ranks by crime type for five different measures of distance

Measure	Distance in km											χ^2 (3)
	All crimes			Robbery		Burglary		MV theft		Other theft		
	N	***M [Md]***	***SD***	***M [Md]***	***SD***	***M [Md]***	***SD***	***M [Md]***	***SD***	***M [Md]***	***SD***	
Traditional home-crime distance	**396**	**20.1 [9.7]**	**22.9**	16.9_a [7.6]	20.1	18.7_a [8.1]	22.3	18.9 [14.5]	18.6	31.0_b [21.5]	27.9	10.10*
Offender's validated home-crime distance	**448**	**13.6 [6.6]**	**15.7**	12.9 [6.6]	14.8	12.2 [6.2]	14.5	11.7 [7.4]	12.2	20.1 [10.5]	19.8	6.28
Distance traveled in the pre-crime phase	**449**	**16.0 [5.6]**	**20.1**	14.1 [5.4]	18.4	16.8 [5.5]	20.6	12.7 [8.8]	15.9	19.4 [5.9]	23.2	1.27
Distance traveled in the post-crime phase	**441**	**14.4 [6.0]**	**17.3**	14.2 [8.3]	16.3	12.4 [4.4]	16.0	21.1 [14.9]	19.7	19.2 [7.5]	21.4	5.50
Distance traveled in the entire crime journey	**441**	**35.0 [17.0]**	**41.0**	31.1 [17.6]	36.4	33.0 [12.9]	39.7	46.8 [20.3]	50.7	47.2 [24.0]	49.1	3.34

Note. MV = motor vehicle. For each measure of distance, extreme values (>= 90th percentile) were recoded to a common value corresponding to their 89th percentile. Mean with different subscripts differ significantly at $p < .05$ based on Bonferroni corrected post-hoc tests.

*$p < .05$.

"correlations" package from the "easystats suite" (Makowski et al., 2020). This analytical strategy allowed us to account for differences between groups (i.e., each offender) by partializing the group variable entered as a random factor in a mixed linear regression. Results are presented in Table 9.

In factor analysis, the acceptable level of explained variance for a valid construct is 60.0% (Hair et al., 2010). Below that threshold, the analysis is considered to leave too much common variance unexplained, thus limiting its explanatory capabilities and ultimately questioning its usefulness. We draw upon this literature to establish that to be regarded as a valid construct of criminal mobility, the multilevel correlation coefficient (*r*) between the traditional measure of journey-to-crime and the different measures of distance should be at least .774 (i.e., 60.0% of explained variance). Results showed that the home-crime distance according to police data and the offender's validated home-crime distance are highly correlated for robbery ($r = .95$, $p < .001$) and "other theft" ($r = .87$, $p < .001$), but not for burglary ($r = .10$, *n.s.*) or motor-vehicle theft ($r = .37$, *n.s.*). The construct validity of the traditional measure of journey-to-crime varied drastically across crime types. For robbery, the measure could be considered a valid proxy of the distance traveled by offenders during the pre-crime phase ($r = .84$, $p < .001$) and the total distance they traveled during the entire crime journey ($r = .82$, $p < .001$). Similar results were observed for "other theft", with the difference that the home-crime measure was a good proxy of the distance traveled by offenders during the post-crime phase ($r = .81$, $p < .001$), but not of the distance they traveled during the pre-crime phase ($r = .61$, $p < .001$). However, the traditional measure of journey-to-crime was an extremely tenuous indicator of the distances traveled by offenders for burglary (i.e., with *r* coefficients ranging from .03 to .04, *n.s.*) and motor-vehicle theft (i.e., with *r* coefficients ranging from .06 to .33, *n.s.*). The offender's validated home-crime distance was a better proxy of the distances traveled by the offender (pre-crime, post-crime, entire crime journey) for all crime types.

Table 9. Multilevel correlations between both measures of home-crime distance (i.e., traditional and offender's validated) and the distance traveled by offenders during the pre-crime phase, post-crime phase, and entire crime journey.

Measure (in km)	*N* crimes	*N* offenders	Multilevel correlation coefficient (*r*)				
			All crimes	Robbery	Burglary	MV theft	Other theft
Traditional home-crime distance and...							
Traditional home-crime distance	—	—	—	—	—	—	—
Offender's validated home-crime distance	**395**	**95**	**.51*** **	$.95_{a}$***	$.10_{b}$	$.37_{b}$	$.87_{c}$***
Distance traveled in the pre-crime phase	**396**	**95**	**.29*** **	$.84_{a}$***	$.03_{b,c}$	$.33_{b,c,d}$	$.61_{c,d}$***
Distance traveled in the post-crime phase	**389**	**95**	**.39*** **	$.71_{a,c}$***	$.04_{b}$	$.06_{b}$	$.81_{a,c}$***
Distance traveled in the entire crime journey	**389**	**95**	**.40*** **	$.82_{a,c}$***	$.04_{b}$	$.17_{b}$	$.86_{a,c}$***
Offender's validated home-crime distance and...							
Traditional home-crime distance	**395**	**95**	**.51*** **	$.95_{a}$***	$.10_{b}$	$.37_{b}$	$.87_{c}$***
Offender's validated home-crime distance	—	—	—	—	—	—	—
Distance traveled in the pre-crime phase	**448**	**98**	**.62*** **	$.86_{a}$***	$.41_{b}$***	$.95_{a}$***	$.64_{c}$***
Distance traveled in the post-crime phase	**440**	**98**	**.78*** **	$.79_{a,b,c}$***	$.76_{a,b}$***	$.31_{d}$	$.87_{b,c}$***
Distance traveled in the entire crime journey	**440**	**98**	**.81*** **	$.86_{a,c}$***	$.69_{b}$***	$.53_{b}$*	$.92_{a,c}$***

Note. MV = motor vehicle. Multilevel correlations were computed with R software (version 4.1.2) using the "correlations" package from the "easystats suite" (Makowski et al., 2020). Correlation coefficient (*r*) with different subscripts differs significantly at $p < .05$ based on a z-test on Fisher's z-transformed correlation coefficients (Hinkel et al., 1988).

*$p < .05$. ***$p < .001$.

3.5 Discussion and conclusion

This research has addressed an issue that has never been studied before: the extent to which the traditional measure of journey-to-crime is a valid estimation of the trip actually undertaken by offenders during their crime journey. With the support of web-mapping technologies, past crime journeys were reconstructed with theft-related offenders to test some of the key assumptions of journey-to-crime research. As hypothesized, our findings have demonstrated that police data provided researchers with satisfactorily accurate crime location addresses. But contrary to what was hypothesized, such data was characterized by poorly accurate offender home-address information. Police capability to correctly identify where an offender was truly residing on the day of a given crime was limited by issues concerning the definition of the PHA, the standardization of PHA across police forces, police-investigation bias, offenders' high residential mobility, low reliability of police sources about offenders' home addresses, and insufficient police on-site validation of PHAs. Even though offenders' residences were absent from up to 40% of crime journeys, our results have shown that the offender's home could still be considered the most important node in a crime journey, as hypothesized. However, contrary to what was hypothesized, most crime journeys were not a direct endeavor (i.e., included at least one detour and/or stopover) and the outbound itinerary (i.e., journey-to-crime) rarely mirrored its inbound counterpart (i.e., journey-after-crime).

Our last hypothesis has to be discussed by crime type and crime phase. As hypothesized, the traditional measure of journey-to-crime could be considered a valid indicator of the offender's validated home-crime distance, but only for robbery and "other theft". This can be explained by the fact that within these crime types, offenders' home addresses in police data were slightly more accurate, and the fewer misleading addresses were situated closer to their real location than for burglary or motor-vehicle theft. Even if a direct round trip from home was the exact depiction of the criminal itinerary undertaken by offenders in a substantial minority of crimes, the traditional measure of journey-to-crime could still be considered a sufficiently valid indicator of the distance traveled for robbery (pre-crime phase and entire crime journey only) and "other

theft" (post-crime phase and entire crime journey only), as postulated. This suggests that within these crime types, the decision and safe-house locations tended to be situated at or near the offender's home address recorded in police data, and detours and stopovers were likely to be clustered around the home-crime trajectory (i.e., a rather "linear" crime journey).

However, contrary to the hypothesis, the traditional measure of journey-to-crime was not a valid proxy of the distances traveled by offenders for burglary and motor-vehicle theft. In burglary, this could be explained, at least in part, by the substantial difference in distance between the real offender's home address and the inaccurate location in police data, the fact that these mostly misleading addresses were part of the offenders' itinerary in more than half of the crime journeys, and the fact that a large number of such crimes required a search for a target prior to perpetration. In motor-vehicle theft, our interpretation of why the traditional measure of journey-to-crime is not a valid proxy of the distances traveled by offenders is limited by the small sample size (i.e., 21 crimes by 12 offenders). Still, the relatively low accuracy rate of addresses in police data (both for offenders' home addresses and crime locations) and the proportion of drastically different post-crime trips (as compared to pre-crime trips) probably is part of the explanation.

Our findings have numerous implications for criminal mobility research, environmental criminology, and criminological theory. On the one hand, despite its numerous drawbacks, the traditional journey-to-crime measure could still be useful to estimate the total distance really traveled by offenders committing robbery (as it is capable of explaining 67.2% of common variance) and "other theft" (as it is capable of explaining 74.0% of common variance), and therefore, should continue to be used in such research, hopefully with more nuance regarding its validity and prudence concerning its interpretation. Scholars would possibly want, however, to improve the accuracy of their estimation by relying on sources of information other than police data concerning offenders' home and crime-location addresses.

On the other hand, our findings show that the traditional journey-to-crime measure is of little value in estimating the total distance really traveled by burglars (explaining less than 1% of common variance) and motor-vehicle thieves (explaining 2.9% of common variance) during their crime journey. Even when using only accurate offender home and crime-location addresses (i.e., offender's validated home-crime distance), the respective percentages of common variance explained, despite being definitely much better, were still below our acceptable construct validity threshold of 60.0% (except for the distance traveled in the pre-crime phase of motor-vehicle theft). Therefore, we recommend that researchers should avoid relying on the journey-to-crime measure to estimate the distance traveled by offenders who commit burglary and motor-vehicle theft. Caution should also be exercised in interpreting the results of past empirical studies which investigated home-crime distances in such crimes, as our findings suggest it gives no indication of the actual distance traveled by offenders. Moreover, we found that the traditional journey-to-crime indicator was not even capable of accurately estimating the true distance between a burglar's or motor-vehicle thief's home and their crime location. Burglary being one of the most studied crimes in journey-to-crime research, these results are particularly alarming and raise questions about the extent to which our collective understanding of criminal mobility is well founded.

Furthermore, the home-crime distances (computed from police data) found in this study were much longer than those presented in other research investigating offender mobility in theft-related crimes (e.g., Ackerman & Rossmo, 2015). One reason could be that the crimes considered here were not geographically bounded to densely populated cities (like most past research), but were, rather, dispersed over a large territory (i.e., the province of Quebec[15]) that comprises many rural areas. Past research has shown that rural offenders tend to travel more than urban offenders (Chainey, 2021; Townsley et al., 2015). Another reason could be that we have used street-network distances rather than the invariably shorter Euclidean (i.e., as-the-crow-flies) distances used in most past research (according to Ackerman & Rossmo, 2015, street-network

[15] Quebec is the largest province in Canada, with an area of about 1,542,056 km^2 (595,391 sq. mi.) and a population (2019) of approximately 8.5 million. In 2016, 59.6% of Quebec's population lived in large urban population centers (i.e., with a population of 100,000 or more) (Statistics Canada, 2016).

distances are from 18% to 39% longer). A third reason could be that using home-crime distance produces noticeably larger figures than using the distance between the awakening and the offense locations, as suggested by the interview data presented by Wiles and Costello (2000).

Our analyses have enabled us to document a new restrictive deterrence strategy employed by persistent offenders to evade detection, identification or apprehension (Gibbs, 1975). This tactic involves deliberate or indirect actions intended to mislead the police about the real location of a primary home address. It could take various forms, such as lying about a home address in official documents, wittingly “forgetting” to update housing information after moving, falsely claiming to live with a conniving third party, or falsely claiming to be homeless. It should be recalled that almost half of the offenders in our sample confessed to having had a propensity to lie or to be deceitful when asked about where they lived by the police. Offenders' willingness to protect the anonymity of their household, intermingled with the police’s inability, reluctance or indifference to conduct on-site validation of offenders' home addresses, must be considered a major weakness of traditional journey-to-crime research.

The reconstruction of crime journeys with offenders has also allowed us to differentiate strategically driven crimes from opportunistically triggered ones (see Table 10 for a summary by crime type). In our sample, 88.9% of the crimes were committed by crime-led offenders (i.e., those who were driven to commit a crime when embarking on their crime journey) and only 11.1% were perpetrated by opportunistic offenders (i.e., those who were in movement for non-criminal reasons until they were confronted with a high-value desirable criminal opportunity). Therefore, it seems that offenders predominantly travel to commit crime, and rather seldomly commit crime merely while in travel. For theft-related offenses, while daily-routine activities undoubtedly contribute to offenders’ awareness space and knowledge of proximate criminal opportunities (Brantingham & Brantingham, 1981; Cohen & Felson, 1979), the process of committing a crime seems to be overwhelmingly rational and purposive (Cornish & Clarke, 1986). This also suggests that criminal mobility is probably more a crime-specific than an offender-specific phenomenon. Offenders are not strategic or opportunistic by nature. Instead, each of

them perpetrates, to different degrees, a mix of strategic and opportunistic crimes. From a criminal-mobility perspective, studying "offenders-in-crime" rather than crimes or offenders separately could allow researchers to make this distinction — of great theoretical value in criminology — between strategically driven and opportunistically triggered crimes.

Table 10. Summary of the offender's choice of target, by crime type

Choice of target	All crimes (*N* = 449)		Robbery (*n* = 162)		Burglary (*n* = 198)		MV theft (*n* = 21)		Other theft (*n* = 68)		χ^2 (3)
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	
Planned	**236**	**52.6**	108	66.7_a	76	38.4_b	8	38.1	44	64.7_a	34.67***
Searched	**163**	**36.3**	40	24.7_a	105	53.0_b	8	38.1	10	14.7_a	47.15***
Opportunistic	**50**	**11.1**	14	8.6	17	8.6_b	5	23.8	14	20.6_a	11.87**

Note. MV = motor vehicle. Percentages with different subscripts differ significantly at $p < .05$ based on Bonferroni adjusted z-tests for independent proportions.
**$p < .01$. ***$p < .001$.

Finally, the interview data used in this research allowed us to discover that crime journeys were not entirely independent, thus suggesting that there is another level of nesting in the study of crimes. Indeed, we determined that our 98 interviewed offenders (first level of nesting) undertook 334 crime journeys (second level of nesting) which led to the perpetration of a total of 449 official crimes (third level of nesting). In our sample, around one quarter of the crimes (involving 41.8% of the offenders) were characterized by a crime journey involving the commission of more than one crime. Most of the time, these multiple-crime journeys were undertaken by offenders in response to a failed or disappointing initial crime or because they had planned to offend during a given period of time and/or until they reached a certain amount of reward (e.g., goods, money). However, this proportion is likely to be underestimated, given that our interviewed offenders were told not to give information about unofficial crimes while reconstructing their crime journey. At the same time, our sampling procedure probably contributed to an overestimation of the clustering of official crimes within individual offenders, so the impact of this new intermediate level of nesting remains to be more accurately estimated. This finding is particularly relevant for researchers studying near-repeat victimization in burglary or motor-vehicle theft, which are crimes that do not always have a direct witness to confirm the

exact moment of the crime. In these situations, because the date of the crime is recorded as an interval (from this date/time to this date/time), researchers generally used the “committed from” date/time (Chainey, 2021). Without an accurate date/time, how do we ascertain that these proximate targets have not been victimized during the same crime journey by the same offender?

This study has some limitations worth mentioning. To begin with, our sample tends to overrepresent the most prolific offenders (e.g., federally sentenced, high recidivism rates) and their well-recalled official crimes (e.g., recent, lucrative, having led to a quick arrest). Although our overall sample size was fair (98 offenders, 449 crimes), its subdivision into crime types has limited the number of observations, particularly for motor-vehicle theft (12 offenders, 21 crimes), thus increasing the margin of error and limiting the statistical power of our analysis. Even though we regularly refer to the “offender's validated” or “actual” crime journey throughout the article, we do not presume that we were able to unravel the real itinerary taken by each offender in each crime, because some features of the crime journey inevitably had to be surmised. For example, the distance traveled during the search for a criminal target was estimated by presuming that the offender's time estimation was accurate, and that the speed of the journey was constant and faithful to the speed of the mode of transportation established in Google Maps. Also, we assumed that offenders would always take the fastest route available between two points, without traffic or any other unforeseeable circumstances. Finally, given that most offenders could not be considered a trustworthy source by the police regarding their home address (see section 3.1.4), how could we expect them to be a reliable source for the researcher willing to reconstruct their entire crime journey? Because we had limited ways of corroborating offenders’ self-reported itineraries, we relied on other strategies to minimize deception and maximize the accuracy of the information provided. For example, we stuck to crimes the offenders remembered acutely and acknowledged having committed, and for which they had already been convicted. We also told them to avoid giving details about sensitive locations (e.g., unofficial crimes, an active drug house, the residence of an unarrested co-offender), used Google Maps and Google Street View to facilitate recall and improve the precision of addresses, asked validation questions during the interview (e.g., the estimated travel time in the pre-crime phase and in the post-crime phase),

and invited the offenders to provide explanations when discrepancies were found (e.g., when the travel time given by the Google Maps Route Planner function was considerably different than their own estimation).

In addition to estimating the validity of the traditional journey-to-crime measure, this study has provided researchers with an innovative and promising — albeit work-intensive — research procedure to finally allow the analysis of something closer to the real travel undertaken by offenders. Web-mapping technologies such as Google Maps offer great advantages over the typical data-gathering instruments used by environmental criminologists such as hand-drawn sketch maps and conventional cartographic maps (for a review, see Vandeviver, 2014), and we believe they should be used to a greater extent in criminological research. This study should also be replicated with other samples, in other countries, and with other types of crimes. In particular, the validity of the traditional measure of journey-to-crime remains to be assessed in crimes of interest in geographic offender profiling, such as murder and sexual assault. While the police will probably want to use more investigative resources to solve such crimes, thus potentially contributing to more accurate addresses (as compared to theft-related crimes), the seriality (implying a notion of time), delayed reporting (e.g., mostly in sex crimes), and/or extended investigations that may characterize some of these crimes could possibly increase the risk of a police-investigation bias regarding the offender's home address (i.e., police data's tendency to record the address at the time of arrest rather than at the time of crime). Also, journey-to-crime's failure to take into consideration the multiple crime sites typically observed in such crimes (e.g., encounter location, attack location, crime location, victim/body release location; see Rossmo, 2000) may distort the resulting estimation of the overall distance traveled. To conclude, our surprising finding that offenders' home addresses were inaccurately recorded in police data in more than 50% of the crimes investigated should be regarded as a serious warning to researchers relying exclusively on police arrest records. Police data are rarely collected for research purposes, are generally not recorded using a standardized research procedure, and involve "subjects" (i.e., offenders) that may have — as we found in this study — strong incentives to be misleading and/or to distort the data. At the dawn of the Big Data era, it is more necessary than ever to make sure

our research is based on valid and reliable information, particularly when it comes from third-party sources such as police forces.

Chapitre 4 - Criminal nomadism: A neglected dimension of spatial mobility in sex offending

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4. Criminal nomadism: A neglected dimension of spatial mobility in sex offending

The last 30 years have witnessed a proliferation of legislation dealing with the monitoring and tracking of men convicted of sex crimes and who return to the community. Through the enactment of sex offender registry and notification (SORN) laws, many countries around the world, including the United States and Canada, have made the prevention of sexual crimes a public safety and criminal justice priority (Thomas, 2011). By collecting up-to-date information about individuals convicted of sex offenses, including place of residence, prohibiting them from residing near locations where children congregate, and/or notifying neighbors of their presence, these policies are intended to reduce the risk of sexual reoffending.

Thus far, empirical research, mainly conducted in the United States, has failed to provide any convincing evidence that the implementation of SORN laws has contributed to a reduction of sexual recidivism (see Savage & Windsor, 2018, for a review). Moreover, these laws have been associated with several negative collateral consequences for men convicted of sex offenses; these include increased isolation, limited housing options, ghettoization in socially disorganized neighborhoods, personal victimization, psychosocial repercussions, and problems for family members (see for instance Barnes et al., 2009; Socia, 2011; Tewksbury & Lees, 2006; Tewksbury & Levenson, 2009). All these restrictions and undesired negative impacts not only hinder the reintegration of these post-convicted individuals into society, but also drive them to be residentially mobile, transient, and homeless, or even to go underground (e.g., Levenson, 2018; Tewksbury, 2007). Thus, it has been argued that men convicted of sex crimes represent a very mobile group (Murray et al., 2013; Mustaine et al., 2006).

The high *residential* mobility exhibited by persons convicted of sex offenses in SORN studies contrasts with their mostly local and geographically bounded *criminal* mobility reported in traditional journey-to-crime research (see Beauregard et al., 2005, for a review). Seemingly contradictory, these results suggest that one could display relatively low mobility at a microspatial or intraurban level (such as committing crimes mostly near one's home) while being

highly mobile at a mesospatial or macrospatial level (such as committing crimes in different neighborhoods, cities, states, or even countries, due to residential mobility). This hypothesized dual nature of spatial mobility has been overlooked in previous studies, which are mostly dominated by analyses of the distance traveled by individuals from their home to the location of their crimes. This study sought to address this knowledge gap by bringing criminal nomadism into the field of environmental criminology and by relying on this new concept to analyze, over the entire criminal career, the mesospatial or interurban mobility of men convicted for sex offending.

4.1 Literature review

4.1.1 Interurban spatial patterns of men convicted of sex offenses

At the mesolevel of spatial resolution, research on the *criminal* spatial patterns of men convicted of sex offenses is scarce. There is some anecdotal evidence that some persons engage in extensive and long-range travel to commit their crimes. Clifford Olson, the infamous Canadian found guilty of numerous sexual murders, once traveled over 5,569 km in two weeks in his search for a suitable victim (Rossmo, 2000). In the United States, Israel Keyes flew from the West Coast to Chicago and then drove around 1,000 miles to Essex, Vermont, to commit two murders and one sexual assault (Peters, 2012). While these narratives are informative and prototypical of the extremely mobile “interurban” individual, they have no scientific value for drawing any conclusions about the spatial patterns of men convicted of sex offenses. Some journey-to-crime studies have reported a small number of persons who traveled over a hundred miles to commit a single sexual crime against unrelated adults (e.g., Davies & Dale, 1996; Warren et al., 1998). Recently, Chopin et al. (2020) noted that 13.9% of the 173 extrafamilial sexual homicides they studied from France had been committed more than 50 km away from the perpetrator's residence. Similarly, Martineau and Beauregard (2016) observed that some Canadians found guilty of sexual murders had been willing to travel considerable distances from home to commit their crime, with the maximum distance being 890 km. It has been suggested that White males (e.g., Warren et al., 1998), motivated by deviant and/or sadistic sexual fantasies (e.g., Dietz et al.,

1990), tend to travel longer distances from their residence to commit their crimes. Nevertheless, there is a strong consensus in the journey-to-crime literature that most individuals tend to commit their crimes in relatively close proximity to their home. Because criminal-mobility research has almost exclusively focused on intraurban crime trips over a short period (from minutes to hours), it is not surprising to observe so few interurban spatial patterns among men convicted of sex offenses. In chapter 2, we have proposed that a better understanding of criminal mobility requires developing alternative measures that consider the multidimensionality of the concept of spatial mobility (i.e., which are not limited to the question of distance traveled) and go beyond the home, the criminal event, and the microlevel of spatial resolution.

On the other hand, research on the mesolevel *residential* spatial patterns of men convicted of sex offenses is more abundant, although it is limited to analyses of the residential mobility of registered sex offenders (RSOs) in the United States. SORN laws in general, and residence restriction policies in particular, have contributed to substantially reducing housing options for RSOs, amplifying their residential instability, transience, and homelessness. When released from prison, many RSOs are unable to return to their home as a consequence of these restrictions, and thus are forced to move. Studies have shown that this is a fallout experienced by 25% to 42% of RSOs (e.g., Levenson, 2008; Levenson & Cotter, 2005a). Another study showed that in two thirds (64%) of cases, the census tract of the address reported by RSOs at the time of registration differed from the one reported at the time of arrest for a sexual crime (Mustaine et al., 2006). Moreover, it has been estimated that 2-3% of RSOs in the United States are homeless or transient, mostly due to residence-restriction policies (e.g., Harris et al., 2014). Studies have suggested that younger RSOs (Levenson, 2008), minority RSOs and RSOs with a “predator” risk status (Levenson et al., 2015), RSOs not under supervision and RSOs with failure-to-register convictions (Socia et al., 2015), and child-molester RSOs (Rydberg et al., 2014) are more inclined to transiency and residential mobility.

Several concerns and limitations can be raised about existing research on the residential spatial patterns of men convicted of sex offenses. First, most studies have analyzed such patterns as an

undesirable corollary of SORN laws rather than as a main subject of interest. The focus has been to show to what degree residential mobility was prevalent and detrimental in RSOs' post-registration life, not to understand or unravel particular spatial patterns. In addition, many studies arguing that SORN laws have caused more residential mobility and transiency among RSOs lack rigorous randomized experimental design with pre-registration and post-registration measurements. It is still unclear to what extent such residential instability was present among men convicted of sex offenses before the enactment of SORN laws. Also, most of the information used in these studies is drawn from public registries that are afflicted by several problems that can affect the quality of the data, such as double-counting, administrative errors, incomplete or inaccurate residential addresses, data-entry inconsistencies, delays in updating registry information, and missing data on the homeless (Ackerman et al., 2012). RSOs freely acknowledge that information listed about them on registries is often inaccurate or missing (e.g., Tewksbury, 2002). It has been estimated that approximately 16% of all American men convicted of sex offenses and required to register are noncompliant and thus are missing from public registries (Levenson et al., 2010). Finally, these registries emphasize where RSOs sleep, with little or no regard to where they socialize or commit subsequent crimes. Indeed, many questions remain regarding the origin, destination, direction, and range of their intercity trips. Given that so little is known about the mesolevel spatial patterns of men convicted of sex offenses, we are in need of an analytical framework that will deepen our understanding of this phenomenon, such as criminal nomadism.

4.1.2 Defining criminal nomadism

Spatial mobility can be defined as a change of place from one point to another in a given geographical space. This geographical space can be at the micro- (intraurban), meso- (interurban / intranational) or macro- (international) level of spatial resolution. Some scholars (Canzler et al., 2008; Flamm & Kaufmann, 2006) have suggested dividing the concept of spatial mobility into two dimensions: motility (or mobility potential) and movement (or mobility performance). From their perspective, motility is the abstract and unmappable part of spatial mobility. It characterizes

one's capacity (accessibility, networks, resources), ability (knowledge, perceptions, skills), and motivations to move through space (Flamm & Kaufmann, 2006). Owning a car, speaking many languages, being in good aerobic shape, and having a good sense of direction are examples of measurable indicators of motility. On the other hand, movements are the tangible and mappable part of spatial mobility, with an origin, a direction, and one or several destinations. The distances traveled to a workplace, the number of bus stops on the way to school, the area covered during daily-routine activities, and the number of different cities visited in a given trip are examples of quantifiable indicators of movement. Incorporating a temporal dimension to these movements allows for the appreciation of more complex phenomena such as speed and acceleration (Ratcliffe, 2006), rhythm, tempo, and timing (Hawley, 1950), and transiency and nomadism.

Transiency and nomadism are semantically related words describing the propensity to engage in frequent and extensive movements through a given geographical space. In sex-offending research, transiency is regularly conflated with homelessness, and both terms are often employed interchangeably to describe the considerable housing instability of RSOs (Levenson & Vicencio, 2016). Nomadism, for its part, is a word loaded with historical and cultural connotations depicting a much more complex form of movement. Its formal meaning has evolved from a primitive mode of *group subsistence* to include a distinctive modern *individual lifestyle*.

Prehistoric hunter-gatherer tribes and pastoralist communities had to travel regularly to find the necessary resources to ensure their survival. This nomadism was a form of ecological adaptation in which movement patterns were influenced by climate, terrain, pasture for livestock herding, and the availability of water and food (Khazanov, 1994). The development of agriculture contributed to the sedentarization of many of these nomadic societies and, much later, the rise of industrialization circumscribed this form of survival nomadism to the most remote parts of the world (Reyes-García & Pyhälä, 2017). In modern days, there is a resurgence of nomadism as a way of life. Globalization, the democratization of travel, and the proliferation of communication technologies have unarguably promoted human spatial mobility. Moving from place to place has never been so easy and has even become an increasingly popular way of life, a phenomenon

Duncan et al. (2013) call “lifestyle mobility.” Global nomads (also known as neo-nomads or lifestyle travelers) are the epitome of this emergent perspective (D'Andrea, 2006; Kannisto, 2016). These individuals choose a mobile and boundless life, making their living along the way in the various cities, states, and countries in which they transitionally stay. Nomadism can also be considered an important dimension of other lifestyles, such as the one endorsed by digital nomads working remotely (Thompson, 2019), grey-nomad retirees caravanning across the country (Davies, 2011), urban nomads having opted for a life on the streets (Spradley, 1970), backpackers and hitchhikers (O'Regan, 2013), kinetic elite workers (Costas, 2013), circus performers (Terranova-Webb, 2010), and sailors (Koth, 2013).

In lifestyle mobility, the way of life is chosen, but the inherent mobility is not always planned or desired, given its reliance on opportunities and available resources. One could move following a deliberate volition, but also after a constrained decision, or simply because of an absence of options. Nomads' movements are directed and purposeful; they know where they are going and why (Barfield, 1993). Whether it serves to escape a bitter reality, to look for an alternative existence, to find new or better possibilities, to embark on a quest for independence and self-discovery, and/or to engage in the pursuit of freedom and happiness, mobility still has undeniable adaptative and coping particularities. Nomadism does not preclude a “homing desire” (Blunt & Dowling, 2006), but surely challenges the conception of home as something rooted in one physical, geographical, place. Some people have multiple transitionary anchor points (e.g., an apartment, a friend's house, a parent's residence) in various places, which allow them to feel at home everywhere. Even though nomads tend to move on, rather than move back, revisiting and/or returning to previous “moorings” remains a possibility (Cohen et al., 2015). These location-independent individuals can also develop an ability to be at home in their mobility; in this “home-on-the-move” (Germann Molz, 2008), the act of travel provides a form of stability allowing the creation of a sense of belonging similar to home. Lifestyle mobility is distinguished from permanent migration, which occurs at a specific moment in a lifetime and involves a complete and long-lasting relocation of a main residence. It also differs from more temporary forms of spatial mobility such as those exhibited by seasonal migrants and temporary workers,

for whom movements do not represent a transition in the life course and are contingent upon returning to the original home.

Criminal nomadism is a new concept that fits well into the perspective of lifestyle mobility. Choosing the criminal lifestyle comes with a set of attributes, motivations, and behaviors in which ongoing spatial mobility occupies a prominent place. Men who persist in crime are characterized by traits—such as impulsivity and low self-control (Gottfredson & Hirschi, 1990), sensation seeking and risky behaviors (Zuckerman, 2007), and present-centeredness (Cornish & Clarke, 2008)—that make them more prone to short-term and "thrilling" nomadism than to long-term and "boring" sedentariness. In addition, a criminal career is typically punctuated by a succession of incarcerations and releases, and/or of long sentences of incarceration, which might induce alienation and stigmatization (Pager, 2003; Schnittker & John, 2007), weaken conventional social ties (Sampson & Laub, 1995), and create a dynamic of carceral impoverishment (Marchetti, 2002). Besides increasing the risks of condition such as poverty, homelessness, drug addiction, and mental health issues, this impedes one's rooting potential and overall stability.

Individuals convicted of sexual offenses in general, and sexual offenses against children in particular, are one of the most hatred and vilified group of people in society (Seto, 2008). A contagious moral panic has resulted in their symbolizing a contemporary form of "folk devils" that nobody wants in their backyard (Cohen, 2011). The hardships associated with the sex-offender label may be a strong motivation to travel to another city in the hope of rebecoming an anonymous citizen. For the criminally driven men wanting to continue committing crimes, being spatially mobile could be a beneficial restrictive deterrence strategy to avoid detection and recognition, and thus limit further apprehensions and convictions (Lammers & Bernasco, 2013). It can also be a tactic to evade police enforcement (Rossmo, 1987; Schwaner et al., 1998), expand their criminal network or prospect for new opportunities (Morselli & Royer, 2008), and/or escape harassment and victimization from other offenders, gangs, or organized crime (Marvell & Moody, 1998). In many ways, ongoing spatial mobility might not only characterize but even serve individuals who persist in crime. In keeping with that line of thought, we define criminal

nomadism as an individual's propensity to engage in continuous or intermittent interurban travels as a way of coping with the consequences of their criminal lifestyle and/or as a strategy to adapt to the challenging reality of being a “career criminal.”

4.1.3 Theorizing criminal nomadism

Notwithstanding the novelty of our formulation of criminal nomadism, crime pattern theory (Brantingham & Brantingham, 1993) could provide a relevant and valuable framework for measuring and analyzing this concept. Crime pattern theory is a meta-theory in environmental criminology that combines features from the routine activity approach (Cohen & Felson, 1979; Eck, 2003; Felson, 2006; Felson & Boba, 2010), the geometry of crime (Brantingham & Brantingham, 1981, 2016), and the rational choice perspective (Cornish & Clarke, 1986, 2014). It postulates that each offender has an activity space (i.e., a physical environment) in which most of their customary trips and activities are carried out. This activity space is circumscribed by edges (or physical and perceptual boundaries) and contains routinely frequented nodes (or centers of activity) interconnected by habitually traveled paths (or routes), thus composing an offender’s awareness of space (i.e., what they know about their physical environment).

Crime pattern theory suggests that crimes are most likely to occur in areas familiar to the offender — where they have better practical knowledge — than in comparable unexplored or foreign environments. Functional awareness of a given area allows offenders to minimize the effort required to locate desirable criminal opportunities and to reduce the risks associated with criminal involvement (e.g., familiarity with routes, better knowledge of opportunities, ability to stay inconspicuous), thus representing a more cost-effective decision. Spatial exploration, where an offender ventures into unknown territories to commit crimes or to search for new opportunities, is believed to be a rare phenomenon (Rengert & Wasilchick, 2000). Crime pattern theory also argues that instances of crime are not randomly geographically distributed but rather tend to cluster in certain places (Brantingham & Brantingham, 1995). Some of these areas are called *crime generators* because the large number of people (criminally motivated or not) who

converge there contributes to a high volume of criminal opportunities (e.g., shopping malls, sports stadiums, transportation hubs). Other areas are considered *crime attractors* because they draw motivated offenders due to their reputation for providing opportunities for crime (e.g., bar districts, drug-selling spots, prostitution areas). By allowing the awareness of space of offenders to intersect with that of potential victims, these places facilitate the creation of crime hot spots and crime corridors (Brantingham et al., 2020). In contrast, *crime detractors* are places that discourage offenders and offending; these include areas with few attractions or easy natural surveillance (Kinney et al., 2008).

Crime pattern theory emphasizes the short-term (daily, weekly) intrapersonal stability of activity nodes and paths at an urban level of spatial resolution. It has been demonstrated that everyday human movements exhibit a high degree of uniqueness (de Montjoye et al., 2013) and spatial and temporal regularity (Gonzáles et al., 2008; Song et al., 2010). Day after day, people tend to visit the same places and travel along the same routes to perform the same idiosyncratic routine activities. Recently, the mostly atemporal application of crime pattern theory in empirical research has been criticized and suggestions have been made to make it more time specific (Newton & Felson, 2015; van Sleeuwen et al., 2021). Indeed, usual travel patterns are dynamic and eventually change, even for the most predictable individual (Mannering et al., 1994). Sooner or later, nodes will disappear, others will emerge, and paths will be redrawn. In certain circumstances, such as moving to another city, changing jobs, or starting an affective relationship, a complete change of activity space can take place, thus compelling the creation of a brand new set of nodes and paths. Awareness of space will adjust as time passes, fading away for the abandoned environments and progressively improving for the newfound territories. Generally, the old routine will continue to influence the new one, at least for some time (Bernasco, 2010a; Bernasco & Kooistra, 2010).

However, to analyze criminal nomadism, crime pattern theory needs to be adjusted to a lower level of spatial resolution (from the urban/city scale to the country scale) and a longer observation period of the spatial patterns (from daily/weekly routines to lifetime variations). As

suggested by Brantingham and Brantingham (1984), cities as a whole can be considered nodes if they act as the origin or destination of intercity trips. Within this perspective, cities represent distinct and temporary activity spaces in an offender's lifetime itinerary, and paths become the routes taken during these intercity trips. The distance between the two most distant cities defines the diameter of an offender's range of operation throughout his life, broadening the microlevel notion of home range (Canter & Larkin, 1993). Metropolises or highly urbanized municipalities, with their abundance of attractive criminal opportunities (Felson, 1987), can be considered crime generators. Conversely, small towns or more rural areas, with their few attractions and limited possibilities for anonymity, can be conceived of as crime detractors. This extension of crime pattern theory can be interpreted as a temporal and geographical "zoom out" of its traditional conception and application.

4.2 Current study

The current state of research on the interurban spatial patterns of men convicted of sex offenses is deficient. Existing studies on this topic have provided data that are anecdotal, on outliers (i.e., criminal-mobility research), or limited to the population of RSOs in the United States (i.e., residential-mobility research). The aim of this study is to contribute to the field of environmental criminology by analyzing criminal nomadism during the criminal career of men convicted of sex offenses. In doing so, we look for answers to the question of why some individuals exhibit a propensity to travel at a mesolevel (interurban level) of spatial resolution. Our study stands out by its: 1) proposal of an innovative concept (criminal nomadism) capable of overcoming some of the limitations of previous research; 2) analysis of this new construct in a large sample of men convicted of sex offenses; and 3) consideration of spatial patterns across all of Canada and over the entire criminal career. Specifically, the study seeks to answer the following questions: What is the prevalence of criminal nomadism in the criminal career of men convicted of sex offenses? What are the individual factors associated with criminal nomadism? What are the predictors of interurban travel among men convicted of sex offenses?

4.3 Method

4.3.1 Participants

The original sample included 587 adult males who were sentenced to imprisonment for two years or more for at least one sexual crime. These men were interviewed between April 1994 and June 2000 while they were incarcerated at a federal maximum-security correctional institution located in the province of Quebec, Canada. Inmates were detained at this institution for a period of approximately six weeks, during which they underwent various evaluations (e.g., criminological, psychological, psychiatric) before being transferred to another correctional institution better suited to their risk level and criminogenic needs.

For this study, a subsample of 448 men convicted of sex offenses was drawn from the original sample. Since we were interested in the criminal nomadism of these individuals during their entire criminal career, the 139 persons (23.7%) sentenced only once were removed. At the time of interview, participants were between the ages of 18 and 78 years (M = 38.3 years; SD = 11.1). Excluding those incarcerated for a life or indeterminate sentence, they were serving an average prison sentence of 4.2 years (SD = 2.9). Although everyone in the sample had been sentenced on at least two occasions—including at least once for crimes of a sexual nature—only half (49.8%) had accumulated two or more sentencing occasions for a sex-related offense. Among the 448 individuals in the sample, 119 (26.6%) had committed their sexual offense(s) exclusively against children (i.e., one or more victims aged 11 or younger); 85 (19.0%) had committed their sexual offense(s) exclusively against adolescents (i.e., one or more victims aged 12 to 17); 151 (33.7%) had committed their sexual offense(s) exclusively against adults (i.e., one or more victims aged 18 or older); 89 (19.9%) had committed their sexual offenses against victims of at least two of these categories (i.e., “mixed” sexual offenses); and 4 (0.9%) had exclusively committed non-contact sexual offense(s) such as voyeurism, exhibitionism, frotteurism, fetish burglary, or sexually motivated arson. It should be noted that 44 participants (9.8%) could also be considered to have committed a sexual murder, according to the criteria developed by Ressler et al. (1988).

4.3.2 Procedures

The participation in this study was voluntary. Individuals were informed they would not receive any compensation and/or preferential treatment as a result of taking part in this research project. Still, the participation rate was quite high (93.5%). Once the consent form was signed, participants were met individually for a semi-structured interview lasting approximately three hours. A computerized questionnaire was used to collect information on a wide range of socio-demographic, psychological, psychiatric, criminological, sexological and victimological variables. The mean kappa of this questionnaire is .87, which corresponds to a very strong inter-rater agreement. The information gathered during the interview was then compared to official documents (e.g., police reports, court transcripts, specialized assessments, correctional files). When disparities were noted between the information disclosed by the participant and that found in the official documents, official information was opted for.

In 2007, a geographic component was added to the original database. The fingerprint-based criminal record of each of the 448 participants was provided by the Royal Canadian Mounted Police (RCMP). Each file contains current information about the individual's criminal history in Canada, including all sentencing occasions, dates of convictions, criminal charges, locations of hearings, and court decisions. For each sentencing occasion, the municipality in which the case was heard was considered to be the municipality in which the related crimes were committed. According to the 2016 Canadian census geographic boundaries (Statistics Canada, 2017), there are 5,162 municipalities (also called census subdivisions) in Canada. About 606 of these (11.7%) have a courthouse, a service point or an itinerant court location allowing them to hear criminal cases. These “judicial municipalities” are strategically dispersed throughout the country, to be able to serve all population settlements in Canada. If a crime is committed in a municipality that does not offer such court services, the case will generally be heard in the nearest judicial municipality within the same judicial district. It is these 606 judicial municipalities that can be found in the fingerprint-based criminal records provided by the RCMP. The level of spatial

aggregation analyzed in this study is therefore less detailed than a census tract or a municipality, but finer than a census division or a judicial district. With dates and locations, it was possible to reconstruct the criminal career itinerary across Canada of each individual at a mesolevel of spatial resolution (i.e., inter-judicial municipalities).

As a group, the 448 participants have been sentenced 3,427 times in 122 distinct judicial municipalities across Canada. These sentencing occasions occurred between 1946 and 2006, and involved a total of 10,108 criminal convictions, among which 1,923 (19.0%) were of a sexual nature. The fact that more than 80% of the convictions were for non-sexual offenses is another indication that men convicted of sex offenses are much more similar to the general offending population than formerly believed (Lussier & Healey, 2009; Lussier et al., 2005). In Canada, the Sex Offender Information Registration Act (SOIRA) (L.C. 2004, ch. 10), requiring all men convicted of sex offenses to register with the National Sex Offender Registry (NSOR), came into force on December 15, 2004. In our sample, only 84 sentences (2.5%) were pronounced after this date, and of these, only 13 (0.4%) involved sexual crimes. Therefore, the majority of interurban spatial patterns investigated by the current study describe the period *before* the enactment of SORN laws in Canada. This allowed for the appraisal of criminal nomadism without the potential effects of such policies, thus providing a base rate estimate of spatial mobility not influenced by the specific legislative context of Canada.

4.3.3 Variables

4.3.3.1 Dependent variable

We conceived of criminal nomadism as a continuous rather than a dichotomous construct. Accordingly, a scale was created to analyze the interurban spatial patterns of men convicted of sex offenses during their criminal career. The five variables that led to the composition of this scale were inspired by the theoretical framework of the crime pattern theory and are illustrated in an example in Figure 1.

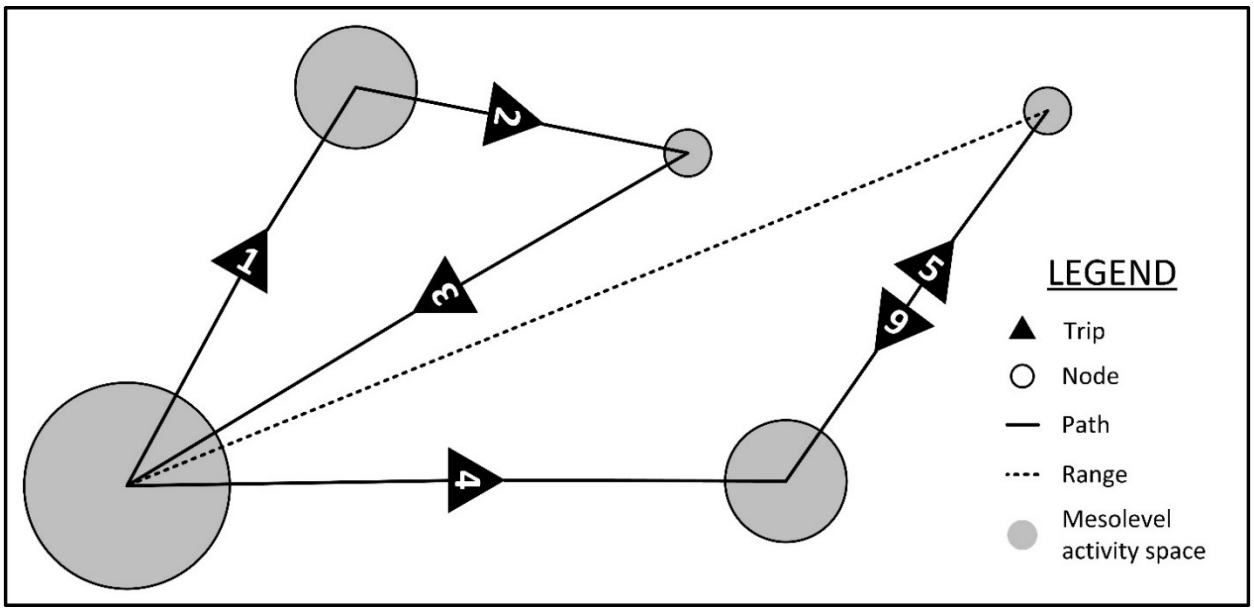

Figure 1. Five components of the criminal-nomadism scale

The first component is the number of *trips*, which is the number of times an individual has been convicted of crimes in a judicial municipality different from that of the previous sentencing occasion. This variable gives an indication of the movements of individuals during their criminal career: the higher the score, the more often a person has traveled to another judicial municipality to commit his crimes.

The second component is the number of *nodes*, which corresponds to the total number of different judicial municipalities in which an individual has committed crimes during his criminal career. Although this variable shares some similarities with trips, it differs in several ways by: 1) capturing the diversity of the individual's hunting grounds; 2) incorporating a strategic dimension corresponding to the desire to avoid the municipalities already visited (i.e., detection-avoidance strategy); and 3) exposing an ability to explore or prospect for new territories. Having numerous nodes inevitably implies having at least as many trips, but the opposite is not necessarily true. For example, a man may commit his crimes by repeatedly traveling back and forth between two judicial municipalities he knows well. In this pattern, there are many trips but few nodes.

The third component is the length of the *paths* (or routes), which corresponds to the sum of the distances traveled during the trips made by an individual during his criminal career. The distances were measured in kilometers using Microsoft Streets and Trips software, from the center to the center of each pair (origin-destination) of judicial municipalities, following the street network's quickest temporal path.

The fourth component is the *range* (or range of operation), which corresponds to the as-the-crow-flies distance between the two most distant judicial municipalities in which an individual has committed crimes during his criminal career. Again, distances were measured in kilometers using Microsoft Streets and Trips software from the center of both judicial municipalities.[16] While both paths and range are measures of distance, the latter also gives an indication of the geographical concentration of nodes within an offender's mesolevel activity space. The higher the score, the more geographically dispersed across Canada are the judicial municipalities (nodes) in which a person has committed his crimes.

The fifth and final component is the *mesolevel activity space*, which is the sum of the area (in km²) of each of the judicial municipalities (nodes) in which an individual has committed crimes during his criminal career. Activity space is also an indication of the size of the nodes in which an individual has committed his crimes, and by extension, their pool of available criminal opportunities. A high activity-space score means that a person has operated in one or more densely populated cities, whereas a low score indicates that they have committed their crimes in one or more small-sized towns. This component is also a way to take into account a form of intraurban nomadism that may be available to offenders in larger cities, but not in smaller towns. Indeed, intraurban movements between neighborhoods of large cities may be treated as criminal nomadism in the same way that interurban travel between smaller towns is. Because our methodology was able to take into account only the latter (i.e., interurban travel), the *mesolevel*

[16] For individuals who committed all their crimes in the same judicial municipality (single node), the range corresponds to the radius (in km) of this municipality calculated from its area (in km²) according to the formula $r = \sqrt{(area / \pi)}$.

activity space component also acts as a measure of the possibilities associated with the former (i.e., intraurban travel).

To have a more realistic measure of the activity space of individuals in each judicial municipality, the *population center*, rather than the overall area of the territory (which may include forests, mountains, bodies of water, agricultural fields), was used. According to Statistics Canada (2012), a population center (which replaced the term "urban area" in 2011) refers to an area with a population of at least 1,000 and no fewer than 400 people per square kilometer. All areas outside population centers are considered rural areas, and the combination of population centers and rural areas cover the entire territory of Canada. Unlike the land area, which is the same from year to year, population centers are dynamic and can increase or decrease as time elapses. To assess the extent of these changes, we compared the area of the population center of 860 municipalities in 1991 and 1996, using their Statistics Canada Census Profile. The results showed that 63.1% of these municipalities had the exact same area of population center in 1991 as in 1996 (i.e., no change). For the others, the average variation over five years was ±3.5 km² (*SD* = 6.6). The area of the population centers was considered "fixed" during the period in which the spatial patterns of men convicted of sex offenses were studied (1946 to 2006), since: 1) Statistics Canada only began to codify the area covered by urban areas or population centers in 1991; 2) the yearly changes in these areas appeared relatively trifling; and 3) having extremely precise data was not of paramount importance in the measurement of this variable. Data from the Statistics Canada Census Profile of 1991 was used in this study.[17]

Criminal-nomadism scale. Since our five components of criminal nomadism have different metrics and variance, they were transformed into z-scores for the purposes of standardization and comparison. Each z-score was then summed and divided by five to create the criminal-nomadism composite scale. At one end of the scale continuum, there is the typical "sedentary" offender, who committed all his crimes during his criminal career in a single, small, judicial

[17] It should be noted that 50.5% of the sentencing occasions have occurred within a range of ±5 years from 1991 (1986-1996), and 87.9% within a range of ±15 years from 1991 (1976-2006).

municipality. At the other end of the scale continuum, there is the typical “nomadic” offender, who traveled often and over long distances during his criminal career to commit his crimes in numerous highly urbanized judicial municipalities geographically dispersed across Canada. Our criminal-nomadism scale exhibited strong internal consistency, with a Cronbach's alpha (α) value of .837.

4.3.3.2 Independent variables

Twelve independent variables were used in our statistical analyses. These variables were selected on the basis of their theoretical relevance to the explanation of human mobility and their methodological quality (i.e., absence of multicollinearity and redundancy, few missing values, good ecological validity, sufficient base rate). The variables can be divided into four distinct blocks: 1) control variable; 2) individual factors; 3) criminal-career factors; and 4) sex-offending factors. Descriptive statistics of the 12 independent variables are presented in Table 11.

Control variable. Our criminal-nomadism scale was created from data associated with each individual sentencing occasion. Consequently, the fewer occasions on which an individual has been sentenced, the less information we had about him and his spatial behaviors, and thus the more likely he was of scoring low on the criminal-nomadism scale. Controlling for the *total number of criminal sentences* variable was crucial to avoid generating misleading or biased results. Analyses were carried out using the natural log transformation of this variable to correct for its highly positively skewed distribution.

Individual factors. Five variables composed the block of individual factors. We dichotomized race as *White* (0 = no; 1 = yes) and language spoken as *Mother tongue is French* (0 = no; 1 = yes). Canada is a bilingual country with two official languages: English and French. Quebec is the only province that is predominantly French speaking, whereas the other provinces

Table 11. Descriptive statistics of the 12 independent variables

Independent categorical variables	***n***	**%**
White		
Yes	400	89.3
No	48	10.7
Mother tongue is French		
Yes	406	90.6
No	42	9.4
Type of sexual offenses		
Exclusively against children	119	26.6
Exclusively against adolescents	85	19.0
Exclusively against adults	151	33.7
Mixed	89	19.9
Non-contact	4	0.9

Independent continuous variables	***M***	***SD***
Total number of criminal sentences	7.5	5.0
Number of years of schooling	8.6	3.1
Longest work experience (in months)	66.2	58.5
Longest intimate relationship (in months)	82.1	61.6
Age of onset — first crime	19.7	7.7
Duration of criminal career (in years)	16.2	9.3
Prison time (in years)	2.9	2.8
Specialization in sex offending	.36	.27
Total number of sex crime victims	2.9	2.3

are essentially English speaking. Given that the participants in the present study were recruited in Quebec (and were therefore overwhelmingly francophone), we wanted to assess the possible impact of a language barrier on their mesolevel spatial behaviors across Canada. A third variable is the *number of years of schooling* and corresponds to the number of completed years in school, as declared by the participant. The last two variables of this block are the *longest work experience (in months)* and the *longest intimate relationship (in months),* and are intended to shed light on the stability of the individual's conventional social ties and/or of formal social controls. For the last three variables, multiple imputation (fully conditional specification method with 10 iterations) was used to impute 28, 22, and 21 missing data, respectively.

Criminal-career factors. Three variables constitute the block of criminal-career factors. Early onset of antisocial activities, extensiveness of criminal careers, and severity of incarceration are well-known particularities of individuals endorsing a criminal lifestyle. *Age of onset — first crime* refers to the age at which the participant claimed to have committed his very first crime (official or self-reported), whatever its type and regardless of its legal consequences. *Duration of criminal career (in years)* is the number of years elapsed between the date of the first sentence and the date of the last sentence received by the individual, according to their fingerprint-based criminal record. Finally, *prison time (in years)* is the number of years a participant had been incarcerated during his criminal career. This variable was appraised manually for each of the 448 men included in the sample, after analyzing the court decisions associated with each sentencing occasion in their criminal record. This task was done by hand to identify overlapping prison sentences and distinguish concurrent terms from consecutive ones. For each prison sentence, the time served inside walls (i.e., prison time) and the time on parole was estimated on the basis of the following general principles: 1) sentences of less than 180 days were considered to have been served entirely inside walls (no parole); 2) sentences of 180 days or more for exclusively nonviolent crimes or administration of justice offenses (e.g., failure to comply with conditions, unlawfully at large, failure to appear, breach of probation) were considered to have been served in prison for one third of the term and on parole for the rest; and 3) sentences of 180 days or more involving violent crimes, sex crimes, firearms-related crimes or drug-related crimes were considered to have been served in prison for two thirds of the term and on parole for the rest.

Sex-offending factors. Three variables make up the last block of sex-offending factors. The level of *specialization in sex offending* was computed by dividing the number of criminal sentences involving at least one sexual conviction by the total number of criminal sentences. The closer the resulting ratio is to 1, the more sexual offending is a part of the criminal dynamic of an individual's offense history. A common characteristic of these "specialists" in sex offending is the presence of deviant and/or sadistic sexual fantasies (Hanson & Bussière, 1998; Quinsey et al., 1995), something that has also been associated with longer crime trips (Davies & Dale, 1996; Dietz et al., 1990). *Total number of sex crime victims* tallies all official child, adolescent, and adult

victims who had been sexually assaulted by the individual in his criminal career. The last independent variable was dummy-coded to correspond to the types of sexual offenses committed by the participants: *sexual offenses exclusively against children* (0 = no; 1 = yes), *sexual offenses exclusively against adolescents* (0 = no; 1 = yes), and *sexual offenses exclusively against adults* (0 = no; 1 = yes). The category *mixed* sexual offenses (0 = no; 1 = yes) was considered the reference group.

4.3.4 Analytical strategy

The study followed a three-step approach to analyze the mesospatial or interurban mobility of men convicted of sex offenses during their criminal career. Descriptive statistics are presented first to reveal the range of scores of the participants on the five components of the criminal-nomadism scale. A hierarchical multiple linear regression analysis was subsequently performed to predict the score on the criminal-nomadism scale from several variables measured at the end of the criminal career. Finally, in order to deepen our understanding of the mesolevel spatial patterns of men convicted of sex offenses, we focused on a more fine-grained and short-term conception of interurban travel. Given the nested structure of our data (sentencing occasions nested in individuals), multilevel modeling was undertaken, to avoid inference and aggregation problems (i.e., the ecological fallacy).

4.4 Results

Descriptive statistics pertaining to the five components of the criminal-nomadism scale are presented in Table 12. Results show that around 29.7% of individuals committed all their official crimes in a single judicial municipality during their criminal career. Only a few (10.9%) engaged in criminal activities in five or more judicial municipalities. Among those who traveled at least once between nodes (n = 315), 47.3% had done so only once or twice. On average, the range of operation of their criminal activities was 257.8 km (SD = 532.2), with the bulk of activities (60.4%) occurring within a range of less than 100 km. It is noteworthy that 12.1% of individuals had

Table 12. Descriptive statistics of the five components of the criminal-nomadism scale

	n	%
Number of trips		
0 trips	133	29.7
1-2 trips	149	33.3
3-4 trips	89	19.9
5-7 trips	48	10.7
8+ trips	29	6.5
Number of nodes		
1 node	133	29.7
2 nodes	131	29.2
3 nodes	92	20.5
4 nodes	43	9.6
5+ nodes	49	10.9
Length of paths		
0 km	133	29.7
1-249 km	135	30.1
250-999 km	101	22.5
1000-1999 km	44	9.8
2000+ km	35	7.8
Range		
1-9 km	56	12.5
10-24 km	88	19.6
25-99 km	127	28.3
100-499 km	102	22.8
500+ km	75	16.7
Mesolevel activity space		
0-49 km^2	43	9.6
50-499 km^2	96	21.4
500-1499 km^2	199	44.4
1500-1999 km^2	80	17.9
2000+ km^2	30	6.7

perpetrated official crimes in more than one Canadian province during their criminal career. The average mesolevel activity space of individuals, as computed by the sum of the areas of population center of all the judicial municipalities in which they had committed official crimes,

was 1,038.1 km^2 (*SD* = 755.0).[18] Such a high mean mesolevel activity space is mainly attributable to the fact that 55.8% of the participants had committed crimes at least once in Quebec's biggest municipality, Montreal (area of population center = 1,364.5 km^2; Statistics Canada, 1992).

At first glance, there seems to be an inclination toward sedentariness in our sample of men convicted of sex offenses. The standardized scores on the criminal-nomadism scale translate into a positively skewed distribution displaying a higher proportion of low scores (skewness = .897; *SE* = .117). However, it is important to keep in mind that some of our criminal nomadism indicators, namely nodes and trips, are substantially influenced by the number of observations (i.e., total number of criminal sentences). For example, men who were convicted on only two different occasions (14.3% of the sample) can have a maximum of 2 nodes and 1 trip; those who were convicted on only three different occasions (10.7% of the sample) can have a maximum of 3 nodes and 2 trips, etc. With the variable *total number of criminal sentences* also exhibiting a positively skewed distribution, it is not surprising to observe the same pattern in the criminal-nomadism scale. Clearly, our scale tends to overestimate sedentariness and underestimate nomadism among less-frequently-convicted individuals. Further multivariate analyses were therefore needed to control for this bias and to better understand criminal nomadism.

A hierarchical multiple linear regression analysis was conducted to predict the score on the criminal-nomadism scale from several predictors while taking into account the total number of criminal sentences. The assumptions of linearity, no multicollinearity, and normally distributed residuals were verified and fulfilled.[19] However, the assumption of the constant variance in the

[18] To contextualize this result, we computed the mean area of population centers for 860 municipalities in Canada as a function of their size (Statistics Canada, 1992). For small population centers (i.e., population of 1,000 to 29,999), the mean area is 8.0 km² (*SD* = 7.7). For medium population centers (i.e., population of 30,000 to 99,999), the mean area is 67.4 km² (*SD* = 36.2). For large urban population centers (i.e., population of 100,000 to 999,999), the mean area is 287.0 km² (*SD* = 172.7). For metropolises (i.e., population of over a million), the mean area is 1,352.3 km² (*SD* = 339.2).

[19] All variables have a tolerance value above .35 and a variance inflation factor (VIF) below 3.0, which suggests that there is no problem of multicollinearity (Hair et al., 2010). Even though the criminal-nomadism scale (dependent variable) displayed a positively skewed distribution (pre-regression), the distribution of the post-regression standardized residual approximates a normal distribution. The four men with non-contact sexual offenses and five outliers (i.e., regression standardized residual < -3 or > 3) were excluded from the analysis.

errors was not met. To correct for heteroscedasticity, we carried out a weighted least-squares regression using a standard-deviation function to construct weighted observations (Garson, 2013). Four models were tested, and variables were entered incrementally in four different blocks. Results are presented in Table 13.

Model 1 is intended to account for the effects of the *total number of criminal sentences* on the prediction. When this variable was entered alone, it unsurprisingly predicted the score of the criminal-nomadism scale (F[1,437] = 231.62, p < .001; R^2 = .346). The addition of the five individual factors in Model 2 significantly improved the prediction (R^2 change = .030; F[5,432] = 4.23, p = .001), as did the insertion of the three criminal-career factors in Model 3 (R^2 change = .025; F[3,429] = 6.09, p < .001). However, the inclusion of the last three sex-offending factors in Model 4 did not significantly improve the prediction (R^2 change = .005; F[5,424] = 0.76, p = .577). Overall, the four models significantly predicted the score on the criminal-nomadism scale. The full model (Model 4) has the best predictive power (F[14,424] = 20.85, p < .001; R^2 = .408), which corresponded to a large effect size according to Cohen (1988). The beta weights suggest that the two best predictors (excluding the control variable) were *prison time in years* (Beta = 0.19; p < .001) and *mother tongue is French* (Beta = -0.13, p < .001). Sex-offending factors such as *specialization in sex offending*, *total number of sex crime victims*, and all types of sexual offenses (i.e., exclusively against children, exclusively against adolescents, exclusively against adults, mixed) were not considered significant predictors.

To this point, criminal nomadism had been analyzed using variables measured or aggregated at the end of the criminal career. However, many of these variables unfold over time. For example, an individual can remain sedentary for several years and then become nomadic. Similarly, he can be very active in sex offending at the beginning of his criminal career and then choose to diversify his criminal activities. In order to take into account the dynamic and longitudinal nature of the criminal lifestyle and its inherent spatial mobility, we focused on the prediction of three components of criminal nomadism — namely trips, nodes, and paths — at multiple points in time (i.e., between each sentencing occasion). The last two components (range and mesolevel activity

Table 13. Results of hierarchical multiple linear regression analysis with weighted observations for several characteristics of men convicted of sex offenses predicting the score on the criminal-nomadism scale (*N* = 439)

Predictors	Criminal-nomadism scale											
	Model 1 (weighted) R^2 = .346			Model 2 (weighted) R^2 = .377			Model 3 (weighted) R^2 = .402			Model 4 (weighted) R^2 = .408		
	B	*SE*	*Beta*	*B*	*SE*	*Beta*	*B*	*SE*	*Beta*	*B*	*SE*	*Beta*
Total number of criminal sentences (log)	0.47	0.03	0.59***	0.45	0.03	0.57***	0.34	0.04	0.43***	0.34	0.06	0.43***
White (0/1)	—	—	—	0.14	0.06	0.09*	0.12	0.06	0.08*	0.13	0.06	0.09*
Mother tongue is French (0/1)	—	—	—	-0.32	0.09	-0.14**	-0.30	0.09	-0.13**	-0.30	0.09	-0.13**
Number of years of schooling	—	—	—	0.01	0.01	0.09*	0.01	0.01	0.09*	0.01	0.01	0.09*
Longest work experience (in months)	—	—	—	0.00	0.00	-0.05	0.00	0.00	-0.03	0.00	0.00	-0.02
Longest intimate relationship (in months)	—	—	—	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.02
Age of onset — first crime	—	—	—	—	—	—	0.00	0.00	-0.06	0.00	0.00	-0.08
Duration of criminal career (in years)	—	—	—	—	—	—	0.00	0.00	0.01	0.00	0.00	0.01
Prison time (in years)	—	—	—	—	—	—	0.05	0.01	0.19***	0.05	0.01	0.19***
Specialization in sex offending	—	—	—	—	—	—	—	—	—	0.01	0.12	0.01
Total number of sex crime victims	—	—	—	—	—	—	—	—	—	0.00	0.01	0.01
Sexual offenses exclusively against children (0/1)	—	—	—	—	—	—	—	—	—	0.07	0.06	0.07
Sexual offenses exclusively against adolescents (0/1)	—	—	—	—	—	—	—	—	—	0.13	0.07	0.09
Sexual offenses exclusively against adults (0/1)	—	—	—	—	—	—	—	—	—	0.06	0.06	0.05

*p < .05. **p < .01. ***p < .001

space) were not considered in these subsequent analyses, given that their theoretical contribution becomes less meaningful and rather extraneous when measured over the short term (i.e., between each sentencing occasion) as compared to the long term (i.e., the entire criminal career). Given the nested structure of the data (i.e., 3,427 sentencing occasions nested in 448 individuals), which violated the ordinary least-squares regression assumption of the independence of observations, multilevel modeling was conducted.

As a first step, our database had to be rearranged in long form to have one row per lower-level unit (i.e., sentencing occasions). Because we focused on the prediction of spatial behaviors between a sentencing occasion A (SO-A; origin) and a sentencing occasion B (SO-B; destination), the row of the last sentencing occasion of each individual was removed. Hence, the 3,427 sentencing occasions become 2,979 origin-destination pairs. As a second step, our independent variables had to be adapted to the multilevel analyses. Regarding the predictors associated with the individual (level-2 variables), we selected only 4 of the 12 independent variables used in the previous hierarchical multiple linear regression analysis, namely *White (0/1)*, *mother tongue is French (0/1)*, *number of years of schooling*, and *age of onset — first crime*. These variables were chosen based on the certainty that they had been measured before the first sentencing occasion and because of their stability over time. As for the predictors associated with each sentencing occasion (level-1 variables), seven variables were created. *Age at SO-A* and *progression (in %) of criminal career at SO-A* were computed for each sentencing occasion. The progression of the criminal career was calculated by dividing our repeated-measure variable (i.e., the rank of the sentencing occasion in an individual's criminal career) by the total number of sentencing occasions. If the sentencing occasion A (origin) involved one or more convictions for sexual crimes, the variable *SO-A involved a sexual conviction (0/1)* was coded 1. The judicial municipality related to each sentencing occasion was translated into two dummy-coded variables. *Judicial municipality of SO-A has a population > 1,000,000 (0/1)* is intended to observe the effect of crime generators such as metropolises or highly urbanized cities on the spatial behaviors of individuals. Similarly, *judicial municipality of SO-A has a population < 30,000 (0/1)* looks at the effect of crime detractors such as small towns or more rural areas.

Finally, we calculated the number of days in prison and the number of days of freedom between each sentencing occasion. If the difference between the number of days in prison and the total number of days between sentencing occasion A and B was 0 or negative (i.e., no freedom time), the observation was removed.[20] These cases were considered situations in which the participant was incarcerated while receiving his new sentence(s), either because his arrest and eventual conviction made him available for the police to lay pending charges or because he committed crimes while in prison. A biased estimation of the time the individual truly served in prison versus the time on parole could also be a possible explanation of these "no-freedom" situations. Overall, 516 cases (17.3%) were excluded from further analysis, thus giving a final sample of 2,463 observations. We natural log-transformed the variables *days in prison between SO-A and SO-B* and *days of freedom between SO-A and SO-B* to correct for the highly positively skewed distributions. These seven level-1 predictors and four level-2 predictors were used to predict the odds of traveling (related to the notion of trips), the odds of exploration (related to the notion of nodes), and the street-network distance in kilometers (related to the notion of paths) between each individual's sentencing occasions. Three distinct generalized linear mixed models (GLMMs) with a repeated-measures design were performed, using IBM SPSS Statistics version 22.0. GLMM was preferred over other analyses given: 1) its flexibility in dealing with an unbalanced number of observations per participant (in our study, the number of sentencing occasions per individual ranged from 2 to 40); and 2) its capacity to fit non-linear models with outcomes resulting from various probability distributions such as binomial and gamma (Heck et al., 2012). The results are presented in Table 14.

[20] However, the number of days in prison was added to the next observation. For example, if we had: 1) sentencing occasions 1-2 (prison = 100 days; freedom = 0 day); 2) sentencing occasions 2-3 (prison = 50 days; freedom = 0 day), and 3) sentencing occasions 3-4 (prison = 200 days; freedom = 500 days), the first two observations were removed, and the third observation was considered to correspond to 350 days in prison and 500 days of freedom.

Table 14. Results of generalized linear mixed models with repeated-measure design predicting the odds of traveling, the odds of exploration and the distance traveled by men convicted of sex offenses between each sentencing occasion

Predictors	Model 1[a] Travel or not? (0/1)		Model 2[a] Explore or not? (0/1)		Model 3[b] Distance traveled (km)	
	Coefficient[c]	*SE*	*Coefficient*[c]	*SE*	*Coefficient*[c]	*SE*
Fixed effects[d]						
Intercept (α_{00})	-0.52	0.27	0.66*	0.33	5.31***	0.19
Level 1: Sentencing occasions (SO)						
Age at SO-A	-0.02*	0.01	-0.01	0.01	-0.02*	0.01
Progression (in %) of criminal career at SO-A	0.66*	0.27	-1.93***	0.35	0.39*	0.20
SO-A involved a sexual conviction (0/1)	-0.04	0.12	0.77***	0.19	0.04	0.07
Judicial municipality of SO-A has a population > 1,000,000 (0/1)	-0.73***	0.12	0.49*	0.19	-0.21***	0.06
Judicial municipality of SO-A has a population < 30,000 (0/1)	0.36*	0.16	0.18	0.17	0.16*	0.06
Days in prison between SO-A and SO-B (log)	0.07**	0.02	-0.03	0.03	0.00	0.01
Days of freedom between SO-A and SO-B (log)	0.14***	0.03	0.18***	0.05	0.04	0.02
Level 2: Individuals						
White (0/1)	0.76**	0.26	-0.32	0.34	0.17	0.20
Mother tongue is French (0/1)	-0.49*	0.23	-0.11	0.24	-0.75***	0.18
Number of years of schooling	0.05*	0.02	0.04	0.02	0.02	0.02
Age of onset — first crime	-0.03*	0.01	0.04*	0.02	0.00	0.01
Random effects[e]						
Repeated measures						
Within-sentencing occasion variance	0.88***	0.03	0.96***	0.05	0.72***	0.07
Between-sentencing occasion covariance (rho)	0.29***	0.03	-0.10*	0.05	0.56***	0.05
Between-subject variance (μ_{0j})	0.70***	0.15	0.13	0.12	0.40***	0.09
Goodness of fit						
-2 log-likelihood (unconditional mean model)	10852.96		4143.65		2609.92	
-2 log-likelihood (conditional repeated-measure model)	10666.04		4279.76		2509.78	
Fit improvement χ^2 (d.f.)	186.92*** (13)		---		100.14*** (13)	
N of sentencing occasions	2463		965		965	
N of individuals	448		319		319	

[a] Model uses a binomial distribution with a logit link (binary logistic regression).

[b] Model uses a gamma distribution with a log link (gamma regression).

[c] Robust covariances are presented.

[d] Continuous predictors were grand-mean centered.

[e] The repeated covariance uses a first-order autoregressive (AR1) structure and the random effect covariance uses a variance component structure.

*p < .05. **p < .01. ***p < .001 (two-tailed).

The first model predicts the odds of traveling (0/1) between sentencing occasion A (origin) and sentencing occasion B (destination). We considered that a trip occurred (= 1) when the judicial municipality of origin was different than that of the judicial municipality of destination. Among the 2,463 observations, 39.2% involved traveling. The unconditional-mean model (also called random-intercept-only model) revealed that there was a significant nesting among individuals in the *travel or not (0/1)* variable, which justified the use of multilevel modeling. The intraclass correlation coefficient (ICC) of the empty model suggested that 23.3% of the odds of traveling between sentencing occasions is explained by between-subject differences and, conversely, that 76.7% was explained by within-subject particularities.[21] The addition of the seven level-1 and four level-2 fixed predictors, along with a repeated-measure variable (i.e., the rank of the sentencing occasion in an individual's criminal career), significantly improved the model fit. A likelihood ratio chi-square suggested that the difference of 186.92 (*df* = 13) in the -2 log-likelihood of the two models was significant at $p < .001$. A look at the fixed predictors revealed an interesting finding about the dual nature of two time-related variables: the probability of traveling *decreases* as the person ages (log odds = -0.02; $p < .05$), and *increases* as the criminal career progresses (log odds = 0.66; $p < .05$). These seemingly contradictory findings mean that young people tend to travel more frequently than old people and that those in the early stages of their criminal career tend to travel less frequently than those in the later stages. Individuals convicted for crimes in a metropolis (i.e., with a population of more than 1,000,000) were (1 - exp{-.73}) = 51.8% less likely to travel to another judicial municipality. On the other hand, men convicted for crimes in a small town (i.e., with a population of less than 30,000) were (exp{.36} - 1) = 43.3% more likely to travel. Results also indicate that the likelihood of traveling was positively influenced not only by the log number of days of freedom between sentencing occasion A and sentencing occasion B (log odds = 0.14; $p < .001$), but also by the log number of days in prison (log odds = 0.07; $p < .01$). It is noteworthy that a conviction for one or more sex crimes did not seem to impact the propensity to travel to another judicial municipality (log odds = -0.04; $p = .73$). At the individual level, we observed that more educated, White, individuals who are native English speakers and who

[21] To calculate the ICC for binomial distributions, we used the equation proposed by Sommet and Morselli (2017): $\mu_{0j} / \mu_{0j} + (\pi^2 / 3)$.

exhibited an early onset tended to travel more often than did their counterparts. As for random effects, adjacent sentencing occasions (e.g., 1 and 2, 2 and 3, 3 and 4, etc.) exhibited a mean correlation of .29 (Wald Z = 10.05, p < .001), suggesting that the contribution of autoregression is significant and must be considered in the model's random-effect covariance structure. Finally, results from Model 1 showed that despite representing an improvement from the null model, there was still a large amount of variability to be explained both within sentencing occasions (variance = .88; Wald Z = 26.04, $p < .001$) and between subjects ($\mu_{0j} = .70$; Wald Z = 4.65, $p < .001$).

The second model attempts to predict the odds of exploration (0/1) among the situations in which a trip takes place. We considered that an exploration took place (= 1) when a participant was sentenced in the judicial municipality of sentencing occasion B (destination) for the first time in his criminal career. Among the 965 observations featuring a trip, 62.8% involved the exploration of a "new" judicial municipality. Contrary to model 1, the ICC (0.013) of the unconditional mean model did not provide evidence of significant clustering among individuals with regards to the variable *explore or not (0/1)*. Some authors argue that when the ICC is below the conventional threshold of .05 and the design effect (1 + [average group size – 1] * ICC; see Muthén & Satorra, 1995) is < 2, nesting can be ignored and researchers should consider running traditional one-level regression analysis (Kenny et al., 2006; Heck et al., 2012). However, given the unbalanced number of observations per participant and the non-linearity of our outcome variable, we decided to stick with multilevel logistic modeling. The addition of the fixed effects and the repeated-measure variable did not significantly improve the fit of the model, suggesting that it could be underspecified and/or lacking relevant predictors. Still, two results are of particular interest. First, when a participant was convicted of a sexual crime and decided to travel to another judicial municipality after release, he had (exp{.77} - 1) = 116% greater odds of choosing a judicial municipality in which he had never been convicted. Second, as criminal career progressed, individuals became less adventurous and tended to stick to the same judicial municipalities (log odds = -1.93; $p < .001$). This means that places visited are not infinite and tended to reach a point of saturation. Even among the most criminally active and spatially mobile individuals, there seems to have been a certain predisposition to stay in known territories.

The third model seeks to predict, among the situations in which a trip took place (i.e., 39.2% of time), the distance (in km) between the judicial municipality of sentencing occasion A (origin) and the judicial municipality of sentencing occasion B (destination). The average distance traveled by individuals between sentencing occasions was 172.2 km (*SD* = 180.9). Even though this dependent variable had a continuous outcome, a GLMM was preferred to a conventional linear mixed model, because of the highly-positively skewed distribution that required the use of a gamma regression. Consequently, coefficients were interpreted as log means rather than conventional β. The unconditional-mean model showed substantial nesting in our data with regards to the distance traveled by individuals between sentencing occasions, as suggested by the ICC of .460.[22] The inclusion of the fixed predictors and the repeated-measure variable significantly improved the model fit (χ^2 = 100.14, p < .001). Some predictors exhibited the same pattern as in Model 1. For example, the distance traveled between sentencing occasions *decreased* as the person aged (log means = -0.02, p < .05), while it *increased* as the criminal career unfolded (log means = 0.39, p < .05). This means that young people tended to travel over longer distances, just like those in the latter stages of their criminal career. As with Model 1, being sentenced in a metropolis was negatively associated with the outcome variable (log means = -0.21, p < .001), while being sentenced in a small rural town showed a positive relationship (log means = 0.16, p < .05). A noteworthy finding in Model 3 was that having French as a mother tongue decreased the log arithmetic mean outcome by 0.75 (p < .001), which implies that native English speakers tended to travel over longer distances across Canada than native French speakers. Again, the contribution of autoregression is significant in the model (rho = .56, Wald Z = 10.86, p < .001) and a substantial amount of variability remained within sentencing occasions (variance = .72; Wald Z = 10.24, p < .001) and between subjects (μ_{0j} = .40; Wald Z = 4.64, p < .001).

4.5 Discussion

[22] To calculate the ICC for gamma distributions, we used the equation proposed by Nakagawa et al. (2017): $\sigma^2_\alpha / (\sigma^2_\alpha + \ln(1 + 1 / \nu)$.

This study provides supporting evidence that, in men convicted of sex offenses, an extensive criminal career is generally associated with a geographically scattered and nomadic lifestyle. Our analyses showed that the younger someone starts committing crimes, the more their criminal career progresses, the more criminal convictions they accumulate, the more time they spend in prison, and the higher their propensity for intercity travels. These findings link criminal nomadism to important criminal career parameters such as age of onset, persistence, frequency, and incapacitation (Piquero et al., 2003). Specialization and sex-offending variables did not contribute significantly to the prediction of criminal nomadism, suggesting that this is more a general offending phenomenon than specific to sex offending.

Some persons are more "motile" or have higher mobility potential than others. Our results showed that criminal nomadism was more prevalent among participants who were White, young, educated, and native English-speakers. Unlike Levenson et al. (2015), who observed that non-White RSOs were more residentially mobile than White RSOs, we found that White participants displayed a higher propensity for criminal nomadism than non-Whites. This could be attributable to cultural differences in the cognitive structure of space (which may affect their awareness of space and what they know about their environment) and/or to an overall tendency for minorities to become sedentary in certain neighborhoods or in gateway cities (Bauder & Sharpe, 2002). The association between spatial mobility and younger people has been reported in some other studies which linked this to this group's greater impulsivity, lack of financial resources, higher propensity for homelessness, and fewer conventional social ties (Clarke & Eck, 2003; Levenson, 2008). Research conducted on the general population indicates that the level of education is a significant correlate of individual migration. It has been suggested that a higher level of education not only increases the pool of potential jobs, but also makes someone more efficient in their search for legitimate career opportunities, thus facilitating their decision to move (e.g., David, 1974; Schwartz, 1973). Therefore, it seems that intersectionality matters with respect to spatial patterns of offending (see Paik, 2017, for critical perspectives on intersectionality and criminology). Social inequalities due to differences in race, class, and educational level have been found to limit the propensity of offenders for intercity travel, thus

contributing to their sedentariness and possibly also to their ghettoization in socially disorganized neighborhoods.

The finding that native English speakers have a greater predisposition for criminal nomadism than native French speakers must be interpreted cautiously with the particular cultural context of Canada in mind. French is the mother tongue of around 80% of residents of the province of Quebec (where the participants in the present study had been recruited) but only 3% of residents of the other provinces in Canada (Statistics Canada, 2007). This result could be the consequence of a methodological bias specific to this study, which considered people from all Canada (mostly native English speaking) who were sentenced in Quebec, while at the same time neglecting people from Quebec (mostly native French speaking) who were convicted elsewhere in Canada. It is also possible that native French-speakers are confronted with a language barrier which causes their criminality to be geographically bounded to the only predominantly French-speaking province in Canada. This would suggest that the propensity for intercity travel may also be cultural. For an offender, not speaking the main language of a new environment may limit the number of desirable criminal opportunities.

Even though participants were not questioned directly on their motivation to adopt a nomadic lifestyle, our results suggest that those doing so were not wandering freely and randomly but rather seemed to be looking for opportunities and privacy. It has been shown that metropolises (i.e., with a population of more than 1,000,000) tend to *pull* individuals toward the city, and that small towns (i.e., with a population of less than 30,000) tend to *push* them away. Indeed, participants convicted of crimes in a metropolis were less likely to travel to another judicial municipality to commit their next crimes, while those convicted in small towns were more likely to travel elsewhere. Our analysis also suggests that those who moved from a metropolis tended to stay rather close to this important node while those moving from a small, possibly remote, rural town may be inclined to travel over longer distances. These results point toward a gravitational-attraction effect of large and populous cities on individuals' criminal behavior: the bigger the mass (i.e., size of the city), the stronger the attractive force, and the farther a person

moves from this mass, the weaker its attraction. To our knowledge, this is the first time the magnetic effect of cities on the criminal behavior of individuals has been empirically supported.

Our study has also demonstrated that a conviction for one or several sexual crimes does not significantly increase the overall odds of traveling. Nevertheless, among the men who decided to move after a sexual conviction, there was a strong inclination to head toward "new" judicial municipalities — rather than already visited ones — to commit their next crime(s). This result suggests that a proportion of individuals may be looking for enhanced privacy in a virgin environment after being officially labelled as a "sexual offender" (Levenson & Cotter, 2005b). Moreover, the criminal career of most men is not a linear trajectory of unrelenting illegal activities. It is rather a succession of periods of activity and inactivity that coexists with their fluctuating motivation for crime (Laub & Sampson, 2001). While this study suggests that nomadic offenders are looking for opportunities and privacy, it fails to clarify to what extent this is a need of those inclined to pursue their criminal activities and of those hoping to desist from crime. Despite this study's focus on the nomadic behaviors of those who persist in crime, the results do not preclude the possibility that participants may have tried at some point to desist by moving to another municipality — even though they ultimately failed by committing a new crime.

The routine-activity approach (Cohen & Felson, 1979; Eck, 2003; Felson, 2006; Felson & Boba, 2010) provides explanations for the attractiveness of large urban cities and the deterrence of small towns for both criminally active and desisting offenders. Metropolises abound with opportunities (both criminal and legitimate) that are linked together by an efficient and ramified street network—what Felson (1987) calls "the sociocirculatory system" of the modern metropolis. This street network provides fast and easy access to opportunities by car or through the use of diverse, accessible, and relatively inexpensive modes of transportation (walking, bicycling, bus, train, subway). Indeed, the high permeability of metropolitan areas facilitates movement between places (Groff et al., 2014). Capable guardianship may also differ depending on the size of the city (Reynald, 2009, 2010; Hollis & Hankhouse, 2019). As compared to smaller rural towns, large cities have quantitatively more guardians against crime, but these guardians

may be qualitatively less capable or willing to intervene due to a lack of social cohesion or limited visibility in relevant areas (i.e., the built environment of densely populated cities may hamper a potential guardian's view of what is going on outside their homes) (Avery et al., 2021). Metropolises are also places of high population density, due to residents and visitors (Andresen, 2006; Boivin & Felson, 2018; Felson & Boivin, 2015). This large number of unrelated people clustered in a relatively small geographical area contributes to anonymity and the formation of a significant pool of potential victims and motivated offenders. This spatiotemporal convergence of criminal and legitimate opportunities makes metropolises an optimal place both for active offenders to maintain a prolific criminal career and for desisting offenders to find alternatives.

Privacy is a universal human need that allows people to cope with both social interactions and personal activities (Pedersen, 1997). In the criminal world, two specific forms of privacy are of particular importance, namely reserve (i.e., the reluctance to disclose personal features of self to others) and anonymity (i.e., the state of being among others without drawing their attention and/or being monitored by them). While these are self-explanatory prerequisites for active offenders, whose “survival” is ensured by their ability to avoid detection, the role of privacy and its importance in the post-release life of desisting offenders has been overlooked in criminological studies. In sex-offending research, the desire for anonymity has mostly been associated with the offense-supportive cognitions of individuals who commit online sexual offenses (Paquette & Cortoni, 2021). However, anonymity and reserve have been found to perform an important psychological function of recovery, and are hypothetically related to the types of privacy chosen in response to greater social injuries (Pedersen, 1997) such as the consequences of criminal actions. There is some empirical evidence that, in the absence of privacy, the more someone who has committed a sexual offense fears being devalued, stigmatized and/or discriminated against, the more likely he is to avoid prosocial activities that could help his rehabilitation (Mingus & Burchfield, 2012). Unarguably, the quest for opportunities and the preservation of privacy are among the most important challenges a person convicted of sex crimes will have to face throughout their criminal career. From a rational choice perspective

(Cornish & Clarke, 1986, 2014), adopting a nomadic lifestyle could be an accessible and efficient strategy to help overcome these struggles.

4.6 Conclusion

The paradigm of mobility is shifting. The ontology of sedentarism and its implicit quest for a settled life is no longer the norm, as the valued behavior or the intrinsic life ambition of individuals inhabits our contemporary societies. Being on the move is no more uniquely the unfortunate fate of the disadvantaged or the luxurious privilege of the prosperous. Indeed, nomadism is resurging as a distinctive feature of alternative lifestyles endorsed by a growing minority of pluralistic individuals seeking a better existence or simply coping with the challenges of life. The present study has shown that those who persist in offending or who are “career criminals” are among those for whom ongoing spatial mobility characterizes — voluntarily or involuntarily — their onerous criminal lifestyle. Despite the obvious drawbacks of choosing “routes over roots,” criminal nomadism must be considered a rational behavior with undeniable coping and adaptative capabilities for both active and desisting offenders.

This study has several limitations worth mentioning. To begin with, our sample of men convicted of sex offenses tends to overrepresent the most problematic cases (e.g., federal sentence, high recidivism rate, longer criminal career, high proportion of sexual murders). Also, the reliance on individuals' criminal records for the analysis of their spatial behaviors has engendered some biases. First, these documents only recorded crimes having led to a court judgment of guilt, thus overlooking all the crimes that did not end with an official conviction. Second, we presumed that the judicial municipality in which a person was convicted of a crime was necessarily the judicial municipality in which this crime was committed. Even though the Criminal Code of Canada (R.S.C., 1985, c. C-46) and the Code of Penal Procedure (C-25.1) stipulate that the legal proceedings have to take place in the judicial district where the alleged offenses were committed,

a few exceptions exist.[23] Third, we presupposed that the chronology of the sentencing occasions was the same as the chronology of the crimes. However, late denunciations, long and complex investigations, and interminable legal proceedings may create situations in which an individual sentenced for a crime is later convicted of an offense committed earlier. Fourth, the level of spatial aggregation given by the judicial municipalities (i.e., around 606 judicial municipalities in Canada) was rather coarse and may hide many interurban trips occurring at a finer level of aggregation (e.g., between the 5,162 municipalities in Canada). This tends to underestimate the prevalence of criminal nomadism in our sample. Despite these limitations, the reliance on individuals' criminal record allowed us to have access to consistent, reliable, and exhaustive longitudinal data that would have been hardly obtainable otherwise. Like many other studies investigating geographic mobility, this research also had to deal with the jurisdictionally bounded nature of our spatial data. By studying the mobility within Canada only of men having been convicted of a federal sentence in Quebec, our data took into account people from all Canada having been sentenced in Quebec, but neglected people from Quebec having been convicted elsewhere in Canada (which represents a highly mobile subpopulation). Finally, the fact that we were unable to control for the location of the offender's residence at each sentencing occasion and did not question participants directly about their motivations for interurban traveling has constricted the range and the strength of our conclusions.

This research has some implications for public policies. Our results showed that there is a nomadism inherent to the criminal lifestyle that is unaffected by laws intending to control the spatial behaviors of men convicted of sex offenses. While SORN laws have undoubtedly contributed to exacerbating the housing instability of RSOs in the United States (Murray et al., 2013; Mustaine et al., 2006; Turley & Hutzel, 2001; Zandbergen & Hart, 2006), they have manifestly not created the "problem." Our study also suggests that men convicted of sex offenses may be spatially mobile for many other reasons than the strictures and/or the lack of options

[23] For example, cases involving indictable offenses that proceeded before a judge and jury, such as murder and treason, are heard by the Superior Court in a limited number of judicial municipalities. Other crimes having received extraordinary media coverage may have to be transferred to another judicial district to preserve the independency of the legal proceedings. Crimes having been committed by the same individual in numerous different judicial municipalities may end up being heard in a single judicial municipality for practical and efficiency purposes.

caused by these laws. Scholars have considered the residential mobility of these individuals an obstacle to their rehabilitation, without considering the possibility it may actually help them by fulfilling their need for an anonymous “new beginning” and/or by being a desirable component of their nomadic lifestyle. This study highlights the importance of having more pragmatic and evidence-based legislation that puts fewer restrictions on where a person should reside and more constraints on where he should travel or socialize. An indirect collateral consequence of current SORN laws in the United States is the ghettoization of men convicted of sex offenses in socially disorganized neighborhoods (Socia, 2011). This not only creates a false sense of security in “RSO-free” neighborhoods, by underestimating the travel capabilities of those who are motivated to commit sex crimes, but also provides such individuals with nearby criminal opportunities (fewer guardians, many other offenders, more vulnerable victims) while depriving them of accessible legitimate possibilities (licit work, prosocial relationships). Finally, our results suggest that denying the need for privacy of men convicted of sex offenses with notification laws may increase their propensity for intercity travel. Current and upcoming legislation should be adapted to better circumscribe the criminal nomadism of men convicted of sex offenses rather than push them to sedentarize into undesirable and criminogenic neighborhoods.

Future studies should investigate post-convicted individuals' quest for opportunities and need for anonymity through the lens of rehabilitation rather than in terms of a prerequisite for reoffending. This could be accomplished through in-depth qualitative interviews with offenders during which questions should be asked about their motivations for traveling, as well as about how their propensity for interurban travel is influenced by age, race, social class, and criminal stigma. Criminal nomadism should also be studied in other samples — from various countries and different offending populations — to unambiguously confirm the remarkable association we found between an extensive criminal career and a nomadic lifestyle. Once that has been accomplished, it may be time to start to think about nomadism as a new criminal-career parameter.

Chapitre 5 - Conclusion générale et implications

5- Conclusion générale et implications

L'objectif principal de cette thèse était de contribuer à l'avancement des connaissances sur la mobilité géographique des personnes qui commettent des crimes. Dans notre chapitre d'introduction, nous avons démontré que notre compréhension de la mobilité criminelle se limitait quasi exclusivement à la distance que l'on croit que les délinquants parcourent à partir de leur résidence pour commettre leurs délits. Afin de pallier cette lacune, nous nous sommes attardés à trois objectifs spécifiques: 1) raffiner notre compréhension de la mobilité criminelle; 2) repenser la façon de conceptualiser et d'opérationnaliser le phénomène; et 3) proposer de nouvelles méthodes de recherche sur la question. Voici un sommaire de nos principaux résultats avec ses implications pour la criminologie en général et pour la mobilité criminelle en particulier.

5.1 Raffiner notre compréhension de la mobilité criminelle

Tout d'abord, nous avons démontré au chapitre 2 que la mesure traditionnellement utilisée par les scientifiques pour quantifier les déplacements des délinquants (c.-à-d., le *journey-to-crime*) est affligée de nombreuses limites pouvant potentiellement mettre sa validité en péril. En effet, les chercheurs qui s'appuient sur cet indicateur pour estimer la distance parcourue par les délinquants lors de la commission de leurs crimes doivent notamment présumer que tous les auteurs: 1) partent de leur résidence pour commettre un crime; 2) empruntent un itinéraire vers le crime et à partir du crime qui est direct et sans détour; 3) effectuent la recherche d'une cible, s'il y a lieu, lors du trajet résidence-crime (c.-à-d., sans nécessiter de distances supplémentaires); 4) commettent un seul crime par itinéraire; 5) ne se déplacent pas pendant le crime (c.-à-d., le crime se déroule à un seul endroit / dans un seul lieu); et 6) reviennent se réfugier à leur domicile après le crime. Or, aucune de ces présuppositions n'a jusqu'à maintenant été testées empiriquement. Nous ignorons toujours jusqu'à quel point celles-ci sont conformes à la réalité et décrivent de façon juste les déplacements des délinquants lors de leurs crimes. De plus, la quasi-totalité des études sur la mobilité criminelle a utilisé des données policières. Les chercheurs

doivent donc tenir pour acquis que les adresses de résidence du délinquant et du lieu du crime enregistrées par les policiers sont valides (il s'agit du bon endroit) et exactes (il s'agit de la bonne adresse), sans possibilités efficaces de le contre-vérifier. Après plus de 50 ans de recherche sur le *journey-to-crime*, nous sommes d'avis qu'il est plus que temps d'évaluer la pertinence de cette mesure dans l'estimation de la mobilité criminelle des délinquants.

C'est pourquoi nous avons décidé au chapitre 3 de reconstruire l'itinéraire détaillé emprunté par 98 délinquants incarcérés lors de 449 crimes de vol. Pour y parvenir, nous avons réalisé des entrevues de 4-5 heures (en moyenne) avec chaque délinquant pendant lesquelles nous revisitions chacun des crimes officiels commis par ceux-ci, avec le support de Google Maps et de Google Street View. Nos résultats sont à la fois surprenants et troublants. Qualitativement, la mesure de *journey-to-crime* décrit correctement l'itinéraire emprunté par le délinquant dans une infime minorité de crimes de notre échantillon. En fait, seulement 7.3% des crimes ont été perpétrés par un délinquant qui allègue avoir fait un aller-retour direct et sans détour entre son lieu de résidence et le lieu de son crime. Si on ajoute la condition que les adresses de ces deux endroits devaient être exactes selon les données policières, c'est seulement environ 1 crime sur 25 pour lequel le *journey-to-crime* correspond à l'itinéraire véritablement emprunté par son auteur. Plusieurs des présuppositions du *journey-to-crime* se sont donc révélées fausses lorsque testées empiriquement. Un sommaire des principaux résultats est présenté au Tableau 15.

Même si la mesure de *journey-to-crime* ne décrit pas correctement l'itinéraire emprunté par les délinquants lors de la majorité de leurs crimes de vol, nos résultats ont démontré qu'elle pouvait quand même être utilisée pour estimer de façon satisfaisante la distance réellement parcourue par les auteurs de vols qualifiés et de vols simples (p. ex., vols à l'étalage, vols dans les voitures, vols à la tire, etc.). Toutefois, nos analyses ont révélé que la mesure de *journey-to-crime* était complètement inutile pour estimer la distance véritablement parcourue par les délinquants lors d'introductions par effraction et de vols de voiture. La capacité de la mesure de *journey-to-crime* d'estimer justement la distance véritablement parcourue par les délinquants varie donc en

Tableau 15. Justesse des différentes présuppositions associées à la mesure de *journey-to-crime* au sein d'un échantillon de 449 crimes de vol

Présuppositions associées à la mesure de *journey-to-crime*	**Crimes de vol**		
	N	**n**	**%**
1) Le délinquant part de sa résidence pour commettre son crime	449	220	**49.0**
2) L'itinéraire vers le / à partir du crime est direct et sans détour	449	145	**32.3**
3) Aucune distance supplémentaire pour chercher/trouver une cible	449	286	**63.7**
4) Le délinquant commet un seul crime par itinéraire	449	334	**74.4**
5) Aucun déplacement pendant le crime (crime commis dans un seul lieu)	449	429	**95.5**
6) Le délinquant revient se réfugier à sa résidence après le crime	445	179	**40.2**
7) L'adresse de résidence du délinquant selon la police est valide et exacte	396	197	**49.7**
8) L'adresse du lieu du crime selon la police est valide et exacte	428	414	**96.7**
9) L'itinéraire emprunté par le délinquant = Résidence → Crime → Résidence[a]	449	33	**7.3**
10) L'itinéraire emprunté par le délinquant = Résidence → Crime → Résidence[b]	449	15	**3.9**

[a] Aller-retour direct et sans détour entre le lieu de résidence du délinquant et le lieu du crime.

[b] Aller-retour direct et sans détour entre le lieu de résidence du délinquant et le lieu du crime, avec les données policières qui identifient correctement l'emplacement géographique de ces deux endroits (c.-à-d., le bon endroit avec la bonne adresse).

fonction du type de crimes commis. De façon générale, nos résultats ont montré que les déplacements des délinquants lors de la commission de leurs crimes de vol étaient beaucoup plus complexes que le simple trajet résidence-crime. De plus, les données policières sur la résidence des délinquants se sont avérées beaucoup moins rigoureuses et fiables que ce qui avait été initialement présumé dans la littérature scientifique. Une absence de standardisation entre les différents corps de police quant à la définition de « résidence principale », la propension au nomadisme des délinquants, le biais temporel de la codification de l'adresse de résidence du délinquant induit par la durée de l'enquête criminelle (*criminal investigation bias*), le manque de fiabilité des différentes sources policières au sujet de la résidence des délinquants et le manque de validation physique de ces emplacements au cours de l'enquête criminelle peuvent tous être considérés comme des facteurs explicatifs. La presque totalité des études sur la mobilité criminelle ayant eu recours à une mesure de *journey-to-crime*, ces résultats nous amènent à nous questionner non seulement sur la pertinence de cet indicateur, mais également sur la façon dont notre compréhension du phénomène de la mobilité criminelle a été affectée par ces nombreux biais. C'est pourquoi nous incitons les chercheurs à une grande prudence s'ils désirent continuer à utiliser la mesure traditionnelle de *journey-to-crime* pour estimer la mobilité des délinquants.

Deux constats principaux émanent de cette thèse. Le premier est que nous avons de la difficulté à identifier où les délinquants habitent vraiment (voir le chapitre 3). Le second est que la carrière criminelle d'un délinquant est généralement caractérisée par une propension à se déplacer / changer de villes (voir le chapitre 4). Ces deux phénomènes, possiblement interreliés, ont des implications importantes en matière d'enquêtes policières et de surveillance des délinquants dans la collectivité. D'abord, la priorisation des suspects sur la base de l'endroit où ils habitent présumément pourrait être bonifiée en favorisant plutôt les endroits qu'ils ont l'habitude de fréquenter. Un délinquant qui est connu pour fréquenter un secteur d'intérêt pourrait potentiellement s'avérer un « meilleur » suspect qu'un délinquant simplement fiché comme un résident du secteur en question.[24] Compte tenu de la propension des délinquants à se déplacer, nous aurions probablement intérêt à investir moins d'effort à identifier l'endroit où ils habitent qu'à comprendre et/ou surveiller où ils vont. C'est pourquoi nous croyons que des dispositifs électroniques de géolocalisation ou de surveillance comme les bracelets anti-rapprochement devraient être utilisés davantage, et ce, même si ceux-ci ne sont pas eux-mêmes exempts de problèmes et de défis (voir notamment Guay et al., 2022). Finalement, les registres d'interpellation des policiers pourraient s'avérer un outil fort pertinent pour suivre les déplacements de certains délinquants et ainsi améliorer l'efficacité des enquêtes policières.

5.2 Repenser la façon de conceptualiser et d'opérationnaliser le phénomène

Jusqu'à maintenant, la recherche sur la mobilité criminelle s'est presque exclusivement intéressée aux distances parcourues par les délinquants pour commettre leurs crimes, contribuant du même coup à simplifier à l'extrême la conceptualisation et l'opérationnalisation de ce concept (c.-à-d., mobilité criminelle = *journey-to-crime*). Cela a confiné la mesure de la mobilité criminelle à une simple estimation de distance entre deux points se trouvant à un niveau

[24] Rappelons que dans notre échantillon, environ 50% des adresses de délinquant étaient erronées. Parmi ces adresses erronées, environ la moitié situait la résidence du délinquant dans une ville qui n'était pas la bonne (voir section 3.4.1).

de résolution microspatial au cours de la phase précrime d'un événement criminel. Or, comme nous l'avons vu dans cette thèse, la distance entre deux points ne représente qu'un aspect de la mobilité géographique.

Des travaux en sociologie urbaine, en biologie et en physique et science des réseaux (Bray, 2000; Canzler et al., 2008; Flamm & Kaufmann, 2006; Schneider et al., 2013) ont inspiré notre réflexion afin de proposer une nouvelle façon de penser la mobilité criminelle. Trois principales dimensions du concept général de mobilité criminelle ressortent de notre analyse. Celles-ci sont illustrées à la Figure 2, avec des exemples d'indicateurs objectifs nous permettant de les mesurer. La première dimension est celle qui distingue les mouvements (*mobility performances*) de la motilité (*mobility potentials*). D'une part, les mouvements sont la partie visible (ou concrète) de la mobilité. Ils ont une origine, une direction, une ou plusieurs destinations, et sont mesurables sur une carte. La distance parcourue pour commettre un crime et la superficie couverte par un polygone de mobilité (voir Andresen et al., 2012) sont des exemples d'indicateurs mesurables de mouvements. D'autre part, la motilité est la partie invisible (ou abstraite) de la mobilité. Elle est non directionnelle et ne peut pas être mesurée sur une carte. Elle représente les habiletés (compétences, perceptions, connaissances), les capacités (réseaux, accessibilité, ressources), les motivations et les décisions d'un acteur à se déplacer dans l'espace (Flamm & Kaufmann, 2006). Parler plusieurs langues, disposer de ressources financières importantes, avoir une voiture et être capable de s'adapter rapidement à des changements sont des exemples d'indicateurs mesurables de motilité.

La deuxième dimension du concept de mobilité criminelle précise le niveau d'agrégation spatiale d'intérêt. Au niveau microspatial, on étudie la mobilité intraurbaine, ce qui inclut la plupart des déplacements pour commettre des crimes (Ackerman & Rossmo, 2015). Au niveau mesospatial, on s'intéresse à la mobilité entre les différentes villes à l'intérieur d'un même pays, alors qu'au niveau macrospatial, on se penche sur la mobilité internationale. La troisième dimension du concept de mobilité criminelle distingue finalement le laps de temps auquel on s'attarde.

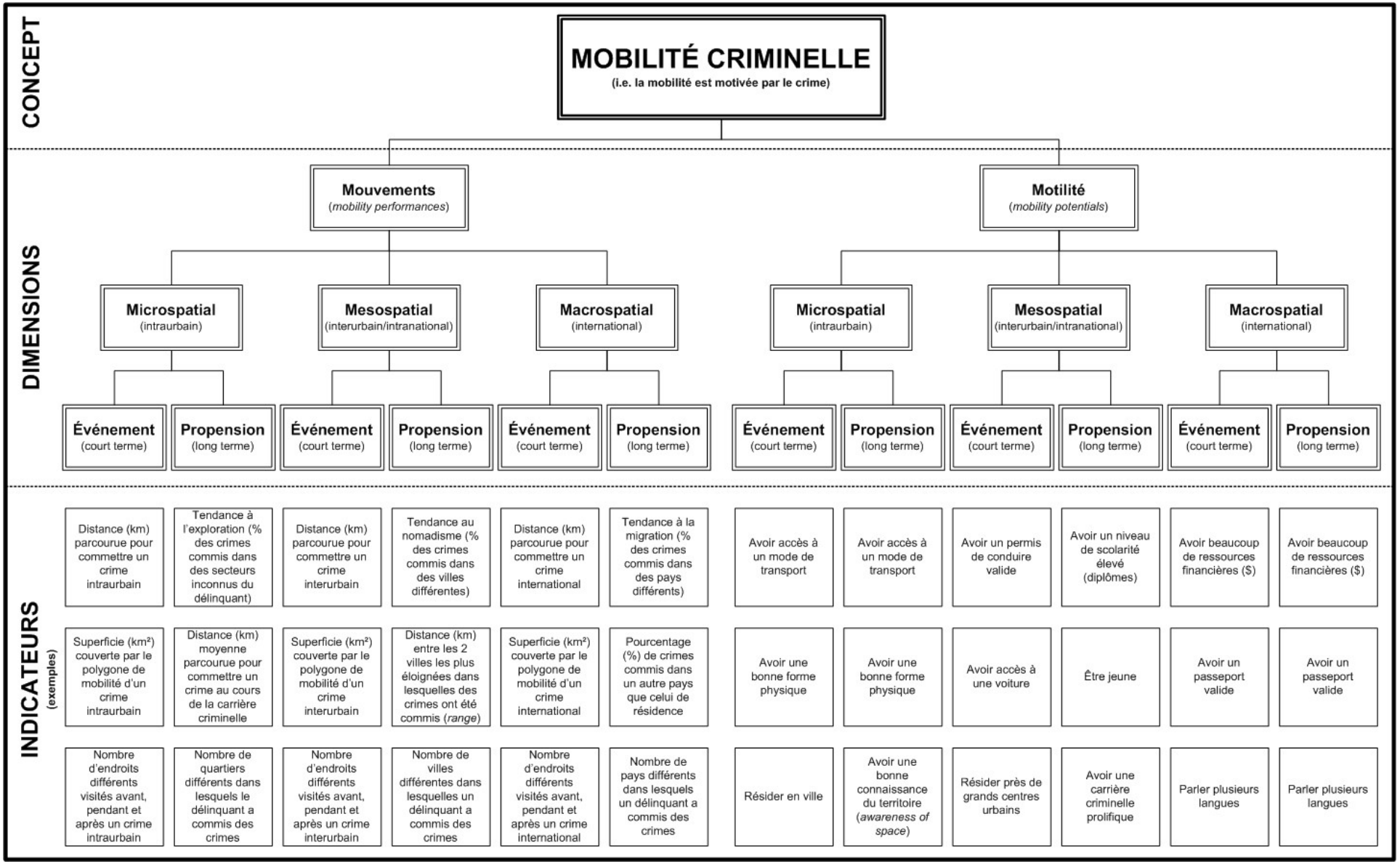

Figure 2. Dimensions et exemples d'indicateurs du concept général de mobilité criminelle

Sommes-nous dans l'analyse de la mobilité qui caractérise un événement ponctuel limité dans le temps (p. ex. la commission d'un crime)? Ou bien sommes-nous intéressés par l'étude de la mobilité observée à différents moments au cours d'une longue période (p. ex. la propension au nomadisme criminel, voir le chapitre 4)?

En repensant le concept de mobilité criminelle sur la base de ces trois dimensions, de nouvelles avenues de recherche se révèleront, ce qui nous mènera ultimement à une meilleure compréhension des comportements spatiaux des délinquants. Nous avons besoin de mieux comprendre les liens qui unissent les différentes dimensions de la mobilité criminelle et leurs interactions (p. ex. comment le potentiel de mobilité d'un délinquant agit-il sur ses performances? À quel point sa mobilité au niveau microspatial influence-t-elle sa mobilité au niveau mesospatial? Est-ce qu'une grande mobilité à court terme est un bon indicateur d'une future propension à long terme? Etc.). Les logiciels statistiques de plus en plus sophistiqués et la démocratisation des analyses multiniveaux (voir Sommet & Morselli, 2017) contribuent à simplifier l'analyse de phénomènes spatiaux avec des variables mesurées à différents niveaux d'agrégation (p. ex. micro/meso/macro; délinquant/trajet/crime). Nous incitons également les scientifiques à développer de nouvelles façons de mesurer la mobilité criminelle. L'exploration spatiale (niveau microspatial), le nomadisme (niveau mesospatial) et la migration (niveau macrospatial) représentent de nouvelles idées avec un fort potentiel théorique en criminologie qui mériteraient d'être davantage étudiées.

Par exemple, le nomadisme criminel apporte selon nous deux bénéfices théoriques importants à l'étude de la mobilité des délinquants. Premièrement, cela permet de bonifier la principale théorie utilisée en criminologie environnementale, à savoir le *crime pattern theory*. Jusqu'à maintenant, cette théorie avait essentiellement une portée et/ou des applications microspatiales (intraurbain) et microtemporelles (minutes/heures). Avec notre proposition du nomadisme criminel, nous faisons la démonstration que le *crime pattern theory* peut également avoir une portée et/ou des applications mesospatiales (interurbain/intranational) et macrotemporelles (mois/années), et cela, tout en gardant les mêmes principes fondamentaux. Selon nous, il s'agit

d'une extension importante à une théorie dominante en criminologie environnementale. Deuxièmement, le nomadisme criminel permet d'étudier la mobilité des délinquants sous un autre angle. Jusqu'à maintenant, la mobilité des délinquants avait exclusivement été étudiée sous l'angle d'une « performance » ponctuelle qui est limitée dans le temps et l'espace (ex. une distance parcourue lors d'un crime donné). Or, le nomadisme criminel introduit un nouveau concept qui nous permet d'étudier la mobilité sous l'angle d'une « propension » qui n'est plus limitée dans le temps et l'espace. Cela favorise l'étude de nouveaux sujets de recherche, comme par exemple le rôle joué par la mobilité géographique dans la carrière criminelle des délinquants.

5.3 Proposer de nouvelles méthodes de recherche sur la question

Les chercheurs s'intéressant à la mobilité criminelle ont toujours dû composer avec une difficulté à avoir accès à des données spatiales de qualité sur les délinquants et sur les crimes qu'ils commettent. Les obstacles inhérents au recrutement et à la rencontre de participants délinquants (voir Bernasco, 2010b), combinés à l'efficacité mitigée des instruments généralement utilisés en entrevue pour collecter des données spatiales sur ces derniers (p. ex. cartes géographiques 2D, *sketch maps*, etc. — voir Canter & Hodge, 2008; Summers et al., 2010) ont en quelque sorte « condamné » les scientifiques à se rabattre sur les données policières pour mener leurs recherches. Toutefois, comme nous l'avons vu dans cette thèse, les données policières procurent des informations généralement peu détaillées et pas nécessairement fiables sur les comportements spatiaux des délinquants.

Nous sommes d'avis que des mécanismes pourraient être mis en place en amont afin d'améliorer la qualité des données policières. Puisque les policiers sont toujours les premiers « codificateurs » des crimes et de leurs auteurs, nous devons les amener à comprendre qu'ils ont un rôle crucial à jouer dans la recherche scientifique. Sans policier, il n'y a pas de crimes d'enregistrés, ni de suspects fichés. La qualité de la codification initiale faite par le policier est donc d'une importance capitale, car la justesse des données en amont influencera directement la qualité de la recherche

en aval. Par conséquent, nous croyons qu'il serait pertinent d'inclure dans la formation policière de base des cours de méthodologie de recherche, non pas pour en faire des policiers-chercheurs, mais pour en faire des « agents de recherche » de première ligne sensibilisés et outillés. Comment codifier telle information? Quelles sont les bonnes pratiques à adopter? Quels sont les pièges à éviter? Etc. Les différents corps de police auraient également intérêt à utiliser des méthodes et des outils de codification standardisés. Les informations que l'on demande aux policiers de colliger devraient être claires et explicitées afin de ne pas faire l'objet d'une interprétation de leur part (du moins, le moins possible). On devrait miser sur la qualité des informations recueillies plutôt que sur leur quantité, ce qui impliquerait de faire un travail d'épuration dans les outils de codification actuellement utilisés par les policiers. Enfin, les formulaires de codification devraient avoir des catégories exhaustives et mutuellement exclusives, tout en prévoyant un endroit pour que les policiers puissent préciser/commenter au besoin certaines informations (p. ex. *Cette adresse qui figure sur le permis de conduire du suspect a été vérifiée et n'est plus valide*).

Les récents développements en géomatique (*geographic information system* - GIS) et dans les technologies numériques de cartographie (Google Maps, Google Street View, Google Earth, etc.) procurent aussi une panoplie de nouveaux outils aux chercheurs afin de leur permettre de colliger efficacement de l'information spatiale de la bouche même des délinquants. Au chapitre 3, nous avons démontré la pertinence et la faisabilité d'une nouvelle méthodologie qui intègre Google Maps et Google Street View à des entrevues avec des délinquants incarcérés au sujet des crimes qu'ils ont commis. En plus de permettre la collecte de données riches et inédites sur la mobilité criminelle, le recours à ces technologies numériques de cartographie a contribué à dynamiser nos entretiens, à favoriser l'intérêt et la collaboration des délinquants au processus de recherche, et à renforcer le lien de confiance entre le participant et le chercheur.

D'autres approches novatrices sont également à la portée des scientifiques qui désirent collecter des données originales sur les déplacements des criminels. Par exemple, les informations en provenance de dispositifs de surveillance GPS (p. ex., bracelet électronique) installés sur des délinquants en libération conditionnelle pourraient être analysées afin de mieux comprendre

leurs déplacements routiniers. À notre connaissance, une seule étude a entrepris à ce jour une telle démarche au sein d'un échantillon de 17 délinquants en libération conditionnelle (Rossmo et al., 2012). Les données de géolocalisation des téléphones intelligents (*smartphones*) représentent également une mine d'informations pertinentes sur la mobilité de ses usagers. Toutefois, l'accès à ces données est complexifié par des questions éthiques et de vie privée.

Une façon de contourner ces obstacles pourrait être d'utiliser les informations publiques de géolocalisation disponibles sur certaines plateformes de réseaux sociaux. Au cours des dernières années, quelques études se sont intéressées à l'analyse spatio-temporelle des points chauds ou *hot spots* du crime à l'aide de données issues de Twitter (p. ex., Da Silva et al., 2019; Gerber, 2014; Wang et al., 2012). Ce type de données publiques de géolocalisation pourraient être utilisées pour suivre, au cours d'un laps de temps donné, les déplacements de certaines personnes identifiées comme ayant commis un crime. Les chercheurs sur la mobilité criminelle sont encouragés à s'inspirer davantage de ces nouvelles méthodologies et technologies prometteuses. Enfin, nous sommes d'avis que l'avenir de la recherche sur la mobilité criminelle passe par une plus grande compréhension des motivations et des décisions des délinquants à se déplacer ou non dans l'espace. Actuellement, celles-ci sont souvent présumées sur la base de théories criminologiques générales et nous aurions probablement intérêt à discuter davantage de mobilité criminelle avec les principaux intéressés.

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Annexe 1

Table 16. Offenders' last city of residence prior to incarceration

Population (approx.)	Last city of residence prior to incarceration	Number of offenders
Large population centers (over 100,000)	Montréal	40
	Québec	9
	Longueuil	5
	Sherbrooke	4
	Laval	3
	Trois-Rivières	3
	Saguenay	2
	Gatineau	1
	Lévis	1
Medium population centers (30,000 - 99,999)	Granby	2
	Repentigny	2
	Saint-Jérôme	2
	Val d'Or	2
	Victoriaville	2
	Dollard-des-Ormeaux	1
	Pointe-Claire	1
	Rimouski	1
	Saint-Jean-sur-Richelieu	1
	Sainte-Julie	1
	Salaberry-de-Valleyfield	1
	Shawinigan	1
Small population centers (29,999 or less)	Saint-Lin-Laurentides	2
	Brownsburg-Chatham	1
	Chute-aux-Outardes	1
	Île-Perrot	1
	Joliette	1
	Mont-Joli	1
	Prévost	1
	Saint-François-de-la-Rivière-du-Sud	1
	Saint-Paul-d'Abbotsford	1
	Sainte-Adèle	1
	Sainte-Marguerite-du-Lac-Masson	1
	Sherrington	1
	Total	98

Note. Offenders who claimed to have been no fixed abode (NFA) prior to incarceration (n = 19) were classified according to the city they woke up on the day of their last crime.

Annexe 2

Table 17. Percentage (%) of crimes for which offenders claimed to have kept an "excellent" or "almost perfect" recall, by function of the number of years elapsed since the time of crime commission

Number of years between the time of crime commission and the time of research interview	Total number of crimes committed	Number of crimes for which offenders claimed to have kept an excellent or almost perfect recall	
	N	n	%
Less than 3 years	270	209	77.4
From 3 to 5 years	198	142	71.7
From 5 to 7 years	93	45	48.4
More than 7 years	81	53	65.4
Total	642	449	69.9

Note. Crimes offenders claimed they did not commit (i.e., alleged wrongful convictions) were removed from this analysis (n = 38).

Annexe 3

Table 18. Number of offenders for each crime count

Total number of crimes committed during the study period and included in our sample	Number of offenders
1	21
2	12
3	16
4	8
5	13
6	4
7	4
8	4
9	7
10+	9
Total	98