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## Distance Matters: A Look at Crime Trip Distances in Flanders

*Most journey-to-crime studies are flawed in two ways: they predominantly rely on local police data; and long trips are deliberately removed from the analysis, although a number of studies hint at the presence of substantially longer crime trips than are commonly reported. Consequently, current journey-to-crime studies limit the scope of their conclusions to local offending, and their empirical design is biased towards studying short trips. This paper demonstrates the need for dedicated criminological research into long crime trips, and provides a preliminary insight into journey-to-crime distances in the greater Ghent area, Belgium. It analyses five-year public prosecutor data on property crimes to assess the length of the journey to crime and the number of long crime trips. The study found a substantial number of long crime trips, with 35% over 10 km. The criminological implications for future journey-to-crime research are discussed.*

## Introduction

Theories that attempt to explain crime generally seek to address one of two questions (Eck & Weisburd, 1995) – why crime occurs, and where it occurs. Up to the late 1970s, most criminology research explored the former question (Clarke, 1980; Smith, Bond & Townsley, 2009). However, interest in the latter question is increasing (Braga & Weisburd, 2010). Although an interest in the crime–place nexus is not new and can be traced back to the early days of contemporary criminology (e.g. Guerry, 1833; Quetelet, 1842), it was not until the advent of the Chicago School of Sociology that a concern with the environment in which crime takes place emerged (Bottoms, 2007). Interest has developed particularly since the early 1980s, within Cohen and Felson's (1979) routine activity theory and with the development of environmental criminology (Brantingham & Brantingham, 1981a). While the advocates of the Chicago School focused on the distribution of criminals and identifying the communities where they live, environmental criminology focuses on how crimes are distributed and the environment in which crime takes place, or where offenders choose to offend (Bernasco & Block, 2009). Studying how this choice is made and the distances criminals travel – the mobility of offenders – is part of environmental criminology and links both strands of environmental criminological research.

This paper explores the mobility of offenders. Its primary concern is the journey an offender makes to commit an offence (the journey to crime), and in particular the distance covered on these trips. A journey to crime can be characterised by both its direction and its distance (Brantingham & Tita, 2008; Eck & Weisburd, 1995). The direction refers to where the trip is headed, and the distance usually refers to the straight-line distance between the two reference points of where they start and their destination. Both reference points require additional clarification since they are key to correctly measuring the distance. The starting point is typically assumed to be the offender's home, and the destination is the place where the offender ultimately commits the crime; this information is obtained from recorded crime data. The length of a crime trip is therefore usually considered to be the Euclidean straight-line distance between the offender's residence and the recorded crime site.

Throughout this paper it is argued that there is a knowledge gap in current journey-to-crime research in terms of the validity of previous findings and a potential underestimation of the length of a journey to crime. There are also a number of specific issues regarding the initial understanding of long crime trips. This knowledge gap warrants continued research into the journey to crime in general, and long crime trips in particular. In order to close this gap it is

essential to broaden the scope of journey-to-crime research and rethink the dominant research design. This paper addresses this knowledge gap theoretically by reviewing the journey-to-crime literature and illustrating why long crime trips require additional dedicated study in contemporary criminology, and empirically by describing the crime trip pattern observed in a Flemish county court district.

**Current debates in journey-to-crime studies**

*Recurrent findings*

A number of previous studies have analysed the mobility of offenders and the length of the journey to crime, and several recurrent findings have emerged. First, although offenders are mobile they generally do not travel far to commit a crime (Chainey & Ratcliffe, 2005; Groff & McEwen, 2006; McIver, 1981; Rossmo, 2000; Wiles & Costello, 2000). In other words, crime trips are usually short. White (1932, p. 507) was one of the first to examine the distance between the criminal's home and the site of the crime. He found the journey to crime in Indianapolis was short, and he reported average distances travelled of 1.35 km for personal offences and 2.77 km for property offences. Results from a vast number of other studies broadly corroborate these early findings (Bichler, Christie-Merral & Sechrest, 2011; Capone & Nichols, 1976; Gabor & Gottheil, 1984; Laukkanen & Santtila, 2006; Lundrigan & Czarnomski, 2006; Phillips, 1980; Pyle, Hanten, Williams, Pearson & Doyle, 1974; Rhodes & Conly, 1981; Snook, 2004; Wiles & Costello, 2000), with reported average distances travelled varying between 0.64 km (Turner, 1969, pp. 13-14) and 5.20 km (Barker, 2000, p. 62).

Second, offenders rarely travel to areas they are unfamiliar with. Most crimes are committed close to the offender's home and the number of offences declines almost exponentially as the distance from home increases (Capone & Nichols, 1975; 1976; Hesseling, 1992a; Phillips, 1980; Rengert, Piquero & Jones, 1999; Rhodes & Conly, 1981; Rossmo, 2000). This crime trip pattern is similar to those exhibited by non-criminal forms of human movement and can be summarised using a distance-decay function (Brantingham & Brantingham, 1984; Brantingham & Brantingham, 1981b). In other words, the likelihood of a particular location being selected as a crime scene decreases the further away it is from the home of the offender. Yet this does not necessarily imply that offenders mainly prey upon their immediate neighbours: a so-called 'buffer zone' exists around a criminal's home. One of the first to observe this buffer zone was Turner (1969, p. 17), who identified an area close to the offender's home in which they are less likely to commit crimes because of the perceived increased risk of recognition by neighbours (Rengert, 2004; Rossmo, 2000). Thus, offenders appear to seek a balance between operating in a familiar area, while minimising the risk of being identified by residents in the target area (Brantingham & Brantingham, 1981b).

*Design problems*

In spite of these recurrent findings, further research on the journey to crime is warranted for several reasons. To begin with, two important reservations about the above findings are rooted in the dominant research design of journey-to-crime studies.

First, conclusions have been drawn principally from studies that focus on a limited geographic range and are biased towards finding predominantly local travelling patterns. Some studies (e.g. Barker, 2000; Phillips, 1980) only include local offenders in their analysis and

ignore non-local offenders and the distances they travelled (Stangeland, 1998). Moreover, journey-to-crime studies predominantly use local police data[1] (Bruinsma, 2007), making a study of the full spectrum of crime trips impossible. Although non-local offending can be studied to a certain extent, specific longer crime trips cannot be analysed because they are not included in local data. If local police data from a given city are used, only crime trips starting and ending within that city (local offending) and crime trips starting outside but ending inside that city (inbound offending) can be analysed, and outbound offending or crime trips that start in that city but end outside it are ignored (Wiles & Costello, 2000). This is a result of how local police departments operate, since their range of operation is limited to their assigned jurisdiction. It is also a consequence of the way offences are recorded in local police databases – offences that are committed outside the local jurisdiction are not entered in the police database of the city where the offender started his journey; instead, they are registered in the police database of the city where the offence was committed. This argument can best be demonstrated with a simple example. Suppose that a burglar living in the city of Ghent commits a burglary in the city of Antwerp. Although his home, the assumed starting point of this particular crime trip, falls within the jurisdiction of the Ghent Police Department, this burglary will not normally be investigated and recorded by the Ghent Police Department. Instead, the Antwerp Police Department will investigate the crime and enter it in their local crime database. Although the Ghent Police Department may help in identifying the suspect, the burglary and the offender's address details will not be registered in their database. Therefore, this particular 60 km outbound crime trip could not be studied in journey-to-crime research using data only from the Ghent Police Department. It could, however, be studied in offender mobility research if crime data from the Antwerp Police Department were to be used, when it would be classed as an inbound crime trip.

It is also worth considering to what extent focusing on a limited geographic range allows us to identify non-local travelling patterns. For instance, cities typically contain many crime attractors and generators (Bernasco & Block, 2009; Brantingham & Brantingham, 1995) and have appealing opportunity structures (Pyle et al., 1974). This makes them attractive to offenders, and arguably eliminates the need for urban offenders to travel far, given the abundant opportunities that are close at hand. In contrast, motivated rural offenders may be drawn away from their locality to exploit distant opportunities (cf. Brantingham & Brantingham, 1995, p. 8), whether in an urban area or elsewhere. Myopically focusing on a limited geographic range disallows falsification of these assumptions and might erroneously lead to the conclusion that criminal travelling is predominantly local. However, broadening the scope will bring inter-local movements into the picture. When studying offender mobility and journey-to-crime distances, a more appropriate strategy is therefore to use data that allow the full spectrum of crime trips and broader geographic ranges to be studied (Hesseling, 1992a).

A second important reservation about previous findings is that results from a number of studies that use non-local data and focus on wider geographic ranges hint at the existence of a number of crime trips that are considerably longer than commonly reported (e.g. Capone & Nichols, 1976, p. 209; Gabor & Gottheil, 1984, p. 274; Lundrigan & Czarnomski, 2006, p. 224; Smith et al., 2009, p. 233; Wiles & Costello, 2000, p. 16). Although longer trips are observed, their presence is rarely acknowledged and they are rarely explicitly taken into account in the ensuing analysis (Stangeland, 1998). Long trips are often treated as outliers and intentionally excluded from the analysis in order to avoid ambiguity when interpreting results (e.g. Barker, 2000; Clare, Fernandez & Morgan, 2009; Fritzon, 2001; Hesseling, 1992b; Laukkanen, Santtila,

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[1] For a notable exception, see Smith et al. (2009) and Wiles & Costello (2000).

Jern & Sandnabba, 2008; Lundrigan & Czarnomski, 2006; Townsley & Sidebottom, 2010; Turner, 1969; Wikström, 1991).

It is evident that a research design that excludes long crime journeys would limit the validity and generalisability of the results and potentially lead to an underestimation of the length of the journey to crime. Arguably, the scope of the design and conclusions from these studies are therefore biased towards finding local offending and short journeys to crime, and it is impossible to confirm whether these recurrent findings apply to offenders in general, and mobile offenders in particular. There is, therefore, a clear scientific need for an alternative empirical design that does not solely rely on local crime data and that explicitly includes longer crime trips.

*Limited research on long journeys to crime*

Further study into the length of the journey to crime and long crime trips is also warranted by questions surrounding the initial understanding of long journeys to crime.

A limited number of studies have already looked into highly mobile offenders and their long journeys to crime. These studies' findings suggest that long crime trips are more common than the findings of the bulk of previous journey-to-crime studies indicate. A considerable number of offenders are found to be highly mobile, with figures ranging from a fifth (Hesseling, 1992b, p. 98) to a third of all sampled offenders (Smith et al., 2009, p. 233), and crime trips longer than 200 km have repeatedly been observed (Polisenska, 2008, p. 56; Van Koppen & Jansen, 1998, p. 238). This behaviour seems at odds with the results of other studies and the underlying rational choice framework. This framework suggests that offender mobility in general and the journey to crime in particular are governed by profit maximisation and effort minimisation (Grubesic & Mack, 2008; Pettiway, 1982; Van Koppen & Jansen, 1998). Short crime trips are favoured, first, because travelling further takes more time and money (Brantingham & Brantingham, 1981b; Kleemans, 1996) and might entail a greater risk of getting caught (Lu, 2003, pp. 423-424; Wiles & Costello, 2000), and second, because the principle of least effort (Zipf, 1949) stipulates that individuals will make minimal effort to achieve their goal. Therefore, offenders should, ceteris paribus, select a suitable target as close as possible to their starting point and consequently crime trips should be short.

However, if the expected profits outweigh the efforts associated with travelling further, longer crime trips might be a favourable and reasonable undertaking. For instance, Morselli and Royer (2008) found that longer crime trips were associated with markedly higher criminal earnings. Mobile[2] offenders reported earnings 23 times greater than their non-mobile counterparts (Morselli & Royer, 2008, p. 17). Although their study has some drawbacks[3], their conclusion seems robust. Similar results have been found for commercial robberies in the Netherlands (Van Koppen & Jansen, 1998) and serial burglars in Canada (Snook, 2004). In the same vein, Capone and Nichols (1976, pp. 210-211) found that the longest robbery trips in Miami-Dade County targeted a particular chain of stores with a specific type of retail operation, resulting in a reduced risk of being apprehended.

Other studies have explored the target areas of long crime trips, but their findings remain inconclusive. First, research suggested that long crime trips were directed away from areas low in

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[2] Offenders were considered 'mobile' when they committed offences in more than one city (Morselli & Royer, 2008, p. 9).
[3] For example, the use of 'offending perimeters' instead of traditional distance estimates hampers comparisons with previous journey-to-crime studies and may overestimate offender travel.

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criminal opportunities and towards opportunity-rich areas (Portnov & Rattner, 2003; Rattner & Portnov, 2007), which is also in line with findings from local journey-to-crime studies (Eck & Weisburd, 1995) and opportunity theory (Felson & Clarke, 1998). However, findings from a Belgian study focusing on outbound offenders challenged these conclusions and found the opposite to be true (Van Daele & Vander Beken, 2011b, p. 73) – when outbound offenders undertook longer crime trips, they did not head to areas with numerous criminal opportunities. Second, there is some debate over whether long crime trips are directed towards areas that are relatively unknown to the criminal, as certain studies suggest (e.g. Polisenska, 2008, pp. 55-56; Van Daele & Vander Beken, 2011a, pp. 131-133), or towards areas that have strong ties with the offender's home area and therefore are more familiar (e.g. Wiles & Costello, 2000). The latter finding fits in with the established understanding of short crime trips and crime pattern theory (Brantingham & Brantingham, 2008; Brantingham & Brantingham, 1981b).

Finally, it is possible that long crime trips are a type of observational error caused by incorrectly identifying the starting points of crime trips (Bruinsma, 2007, p. 485; Lundrigan & Czarnomski, 2006, p. 225; Rossmo, 2000, p. 91; Wiles & Costello, 2000, p. 35). For practical reasons[4] it is typically assumed that crime trips start from the offender's registered residence. Although an individual's home location is believed to be of particular importance in his use and understanding of the surrounding environment (Canter & Larkin, 1993; Sarangi & Youngs, 2006), the home need not always be the starting point. Individuals have more than a single reference point from which they undertake their day-to-day activities, including crime, and transient and homeless people rarely have a fixed residence (Brantingham & Brantingham, 1981b, p. 239; Bruinsma, 2007, p. 485; Rengert, 1992, pp. 111-112; 2004, p. 170; Rossmo, 2000, p. 91; Stangeland, 1998, p. 70). In fact, a number of studies report that other nodes, such as a girlfriend's house or a local pub, sometimes act as the starting point for a crime trip (Van Daele, 2009; Wiles & Costello, 2000). Ignoring these insights might lead to crime trip lengths being incorrectly estimated. Consequently, the starting point of long crime trips deserves continued critical attention in future journey-to-crime research.

In summary, results from a limited number of studies indicate that long crime trips might be less exceptional than previously suggested by journey-to-crime studies. This preliminary insight leaves many questions outstanding – more criminological inquiry is needed to broaden our understanding and help resolve some of the current debates.

**Data and method**

The goal of this paper is to add additional empirical weight to the claim that the journey to crime and long crime trips deserve additional criminological scrutiny. The paper describes the pattern that was observed when crime data for a broader geographical area was analysed and when long trips were deliberately included in the analysis. In particular, it provides a preliminary insight into the length of the journey to crime in the greater Ghent area and estimates the number of long crime trips.

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[4] This is related to the dominant use of police recorded crime data. Although such data contain information on offenders' addresses, this is often limited to the registered, official address and excludes information on the actual starting point of the crime trip.

*Data*

This paper purposely selected for analysis crime data recorded by the Ghent public prosecutor's office, instead of local police data. The data include all detected cases of serious property crimes[5] by known offenders for the period 2006 to 2010 inclusive. The full dataset contains a total of 12,332 offender–offence combinations or crime trips. For each criminal event, the database provides information on the anonymised crime reference number, the anonymised offender identifier, the offence type, the date of the offence, the number of suspects involved in the offence, the recording police force, the official address of the offender at the time of the offence, and the city, or in some cases the borough within the city, where the offence was committed. To provide more insight into the detail of the recorded crime data, a mocked-up example of a long crime trip – a burglary committed by two offenders living at different legal addresses – has been provided in table 1. The address information is of particular interest. Only the registered, legal address is listed in the data. The actual or temporary address at which the offender was residing at the time of the offence, which might be of particular interest in the case of foreign offenders, is not listed in the data.

== TABLE 1 ABOUT HERE ==

The jurisdiction of the Ghent public prosecutor's office, the study area, includes a mixture of rural towns, several medium-sized cities and one large city. It has 27 municipalities, including Ghent, the third[6] most populous city in Belgium. Fourteen different police forces operate in the region and three significant motorways run through it, with a large intersection near Ghent. The area contains several large industrial zones, a medium-sized international seaport, and the second-busiest Belgian railway station. It covers a total area of 1,277.45 square kilometres and has a population of 615,636[7].

The use of the public prosecutor's data enabled the study of offender mobility to be improved, and enhanced the dominant empirical design of a journey-to-crime study in two ways. First, the study area is not limited to a single city but covers a broader geographical range (cf. Hesseling, 1992a, p. 111). Second, the data cover the full spectrum of crime trips, enabling local, inbound and outbound offending to be studied[8]. Nevertheless, the current data source has three noteworthy limitations. First, in common with most journey-to-crime studies, only offences for which at least one offender has been identified are included in the analysis; distances can only be

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[5] Robbery, shoplifting, theft in a dwelling, and burglary in a shop and a dwelling.

[6] Strictly speaking, Ghent is the second most populous Belgian city. However, the Brussels-Capital Region is commonly regarded as a single entity with over a million inhabitants, even though it consists of 19 separate municipalities.

[7] This figure excludes approximately 67,000 university and college students that temporarily reside in and around the city of Ghent.

[8] The data contain movements within (local trips) and between municipalities (local in- and outbound trips) within the study area. There are also a number of trips that are into and out of the study area (regional in- and outbound offending). Registration and processing practices of offences at the public prosecutor's office, however, limit the presence of regional outbound trips in the data. As a general rule, the location of the crime scene decides which of the 27 Belgian public prosecutor's offices processes the recorded offence. However, there are exceptions – for example, trips committed outside the study area but detected by a police force operating inside the study area will be processed by the Ghent public prosecutor's office. Regardless, the full spectrum of crime trips is present at the local level and can potentially be studied. Moreover, regional in- and outbound offending can also be studied to a certain, albeit unknown, degree.

computed for crime trips that can be linked to an offender's address. This might limit the generalisability of the results of the current paper. Some authors (e.g. Lu, 2003, pp. 423-424; Wiles & Costello, 2000) suggest that mobile offenders might have a higher risk of being caught, resulting in an overestimation of crime trip distances, while others (e.g. Bruinsma, 2007, p. 485; Eck & Weisburd, 1995, p. 16; Lammers & Bernasco, 2013; McIver, 1981, p. 43; Rhodes & Conly, 1981, p. 177) suggest that mobile offenders are less at risk of getting caught, which might result in an underestimation. However, using methodological triangulation Wiles and Costello (2000, p. 44) conclude that recorded crime data allows researchers to identify the general travelling pattern of criminals. Therefore, the use of recorded crime data does not jeopardise the goal of the current paper. Second, and more importantly, the use of the public prosecutor's data potentially introduces a bias towards over-representing adult offenders. In turn, this could result in crime trip distances being overestimated, since juvenile offenders tend to lack the means to travel further (Bernasco & Block, 2009; Bichler et al., 2011). In Belgium, juvenile offenders are diverted towards an alternative youth sanctioning system. Their offences are processed by the youth section of the public prosecutor and recorded in an alternative database, which was not accessed for the current paper. Third, the current geographical range might still be too limited to allow for a comprehensive understanding of long crime trips. This is especially true in light of some of the results of previous studies that reported crime trips of over 100 km (e.g. Lundrigan & Czarnomski, 2006, p. 224; Polisenska, 2008; Townsley & Sidebottom, 2010, p. 905). Nationwide data, if available, is therefore preferred. However, failure to obtain approval for the use of nationwide recorded crime data meant this study was not able to address that drawback.

*Method*

The length of the crime trip is estimated by computing the Euclidean straight-line distance between the Google Maps centroids of the city or borough in which the offender was residing at the time of the offence and the city or borough where the offence was committed. Although other distance measures (e.g. Manhattan distances, shortest travel path distances, quickest travel time) have been used in previous journey-to-crime studies, Kent et al. (2006) found the Euclidean straight-line distance to be the optimal distance measure available. Moreover, Euclidian distances are believed to be best suited to the layout of European areas (Smith et al., 2009). Whenever a crime trip starts and ends within the same city or borough, the Euclidean straight-line distance equals zero. This is commonly resolved by equating the distance of the trip to half the square root of the surface area of the city or borough (Bernasco, 2006, p. 147; Bernasco & Nieuwbeerta, 2005, p. 307; Van Daele, Vander Beken & Bruinsma, 2012, p. 293). This matches the distance between two randomly chosen points within that city or neighbourhood. When computing distances, co-offending was ignored and the distance of the crime trip was computed as if the offence was committed individually. While this approach might not be wholly correct (cf. Bernasco, 2006; Bernasco & Block, 2009), it is a pragmatic solution that overcomes the difficulty of deciding on the correct starting point of the crime trip and computing the exact crime trip distance.

In order to be able to compute the straight-line distances, the offender addresses and offence locations were automatically geocoded on the basis of the municipality or, when available, the borough. Whenever automatic geocoding failed, the addresses were manually geocoded using Google Maps. Even though the exact address-point for the offender's legal address is available, such detailed information is not available for the offence location. It was decided to aggregate the address-point data for the offender address to the lowest level of

aggregation that could be identified using the offender address information provided (either the city or borough) and estimate approximate crime trip distances (city or borough centroid distances). This approach was deemed more consistent, since both the offender address and offence location are measured with the same level of measurement error (cf. Bernasco, 2006, p. 147; Bernasco & Elffers, 2010, p. 704).

Prior to analysis, the full dataset was subject to data cleaning. First, offender–offence combinations for which no home address (8.78%; N=1,083) or an invalid home address (3.21%; N=396) was listed were omitted from further analysis. Invalid home addresses include correctional facilities, psychiatric institutes, local courthouses and 'postbus' addresses (an address provided by local social services departments to allow individuals with no fixed residence to have a mailing address for official correspondence). Second, a limited number of offender–offence combinations (0.79%; N=98) had no offence location listed. These were omitted for obvious reasons. Third, for a very limited number of entries (0.09%; N=11) the home address or offence location could not be identified unambiguously, and these were also dropped. Fourth, a small number of offender–offence combinations (2.60%; N=321) actually fell outside the time window of the study and were not included in the final analysis. In total, 1,854 offender–offence combinations (15.03%) were omitted. The final sample totalled 10,478 crime trips.

Throughout this paper, the primary unit of analysis is the crime trip or the offender–offence combination. This unit of analysis has already proved to be insightful in previous studies (cf. Bernasco & Block, 2009; Hodgson & Costello, 2006; Van Daele et al., 2012). Although this paper aims to gain insight into the number of long crime trips in the greater Ghent area, the full spectrum of crime trip distances is initially explored to overcome the potential critique that the approach adopted is biased towards finding long crime trips. Following this, long crime trips are explored more thoroughly, and a clarification of what is meant by 'long' crime trips is therefore desirable to avoid ambiguity. Similar to Wiles and Costello (2000, p. 10), a quantitative criterion is adopted and crime trips are considered 'long' when they are at least 10 km in length.

**Results**

A total of 10,478 crime trips were undertaken between 2006 and 2010 inclusive. These trips correspond to 7,975 different criminal events and were undertaken by 6,574 unique offenders.

The majority of offences were committed by offenders operating alone (78.43%; N=6,252), while one in five (21.57%; N=1,719) were committed by two or more offenders[9]. This is similar to what has been reported in previous research (Andresen & Felson, 2010, p. 73; Hodgson & Costello, 2006, p. 117; Wiles & Costello, 2000, p. 11). Figure 1 shows that shoplifting makes up almost half (45.64%; N=3,640). One in five (20.10%; N=1,603) is a shop burglary, and robbery makes up 12.31% (N=982). Theft and burglary in a dwelling correspond respectively to 11.26% (N=898) and 10.68% (N=852) of all offences.

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[9] This information was missing for four offences.
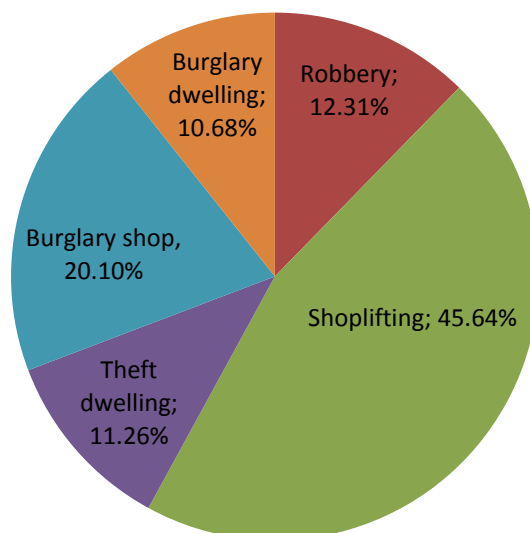
# Number of offences per offence type



**Figure 1 Number of offences per offence type (N=7,975)**

Table 2 shows that the overwhelming majority (96.87%; N=6,368) of offenders were living in Belgium at the time of their offence. A total of 1.14% (N=75) were living in France and 0.81% (N=53) lived in the Netherlands. The remainder of the offenders mainly lived in countries within the European Union[10]. A limited number of offenders lived in countries outside the EU[11].

== TABLE 2 ABOUT HERE ==

Table 3 presents descriptive results for the pattern of crime trip lengths. For all crime trips, regardless of offence type, the lengths range from 4.68 m to 4,704.87 km. The mean length is 39.41 km, which is considerably longer than is commonly reported in journey-to-crime studies. The median distance travelled for all crime trips is 6.25 km. In combination with the mean length, this signals a positively skewed journey-to-crime distribution. Even though short trips are more common than long trips in the data, these initial results indicate that long trips are present, and they have an effect on the commonly observed mean distance of crime trips.

When crime journeys per crime type are assessed, robbery trip lengths vary between 14.70 m and 2,646.86 km, with a mean length of 31.44 km. For shoplifting, distances travelled range between 14.70 m and 4,704.87 km. The average shoplifting trip length is 47.54 km. The length of the crime journey for theft in a dwelling varies between 4.68 m and a maximum of 2,439.77 km, and averages 16.40 km. For shop burglaries, trip lengths range between 14.70 m

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[10] Austria, Bulgaria, Czech Republic, Estonia, Germany, Hungary, Italy, Lithuania, Poland, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.
[11] Albania, Armenia, Croatia, Georgia, Morocco and Serbia.

and 2,501.44 km, with a mean trip length of 38.09 km. For burglaries in a dwelling, trip lengths vary between 14.70 m and 4,704.87 km, and average 44.98 km. For all offence types the mean trip length is markedly longer than the median trip length, indicating that the distributions are highly positively skewed and that long crime trips are present in the data.

== TABLE 3 ABOUT HERE ==

The aggregate distance-to-crime distributions were estimated and plotted using kernel density estimation. When inspecting the top half of Figure 2 the typical distance-decay curve can be discerned, although several small peaks in offence frequency can be distinguished around the 20 km, 60 km and 75 km marker. Moreover, a buffer zone can be observed[12]. The plot shows that most crime trips are short but there are a number of very long crime trips. The bottom half of Figure 2 shows clear distance decay for the aggregate distance-to-crime distributions for all five crime types.
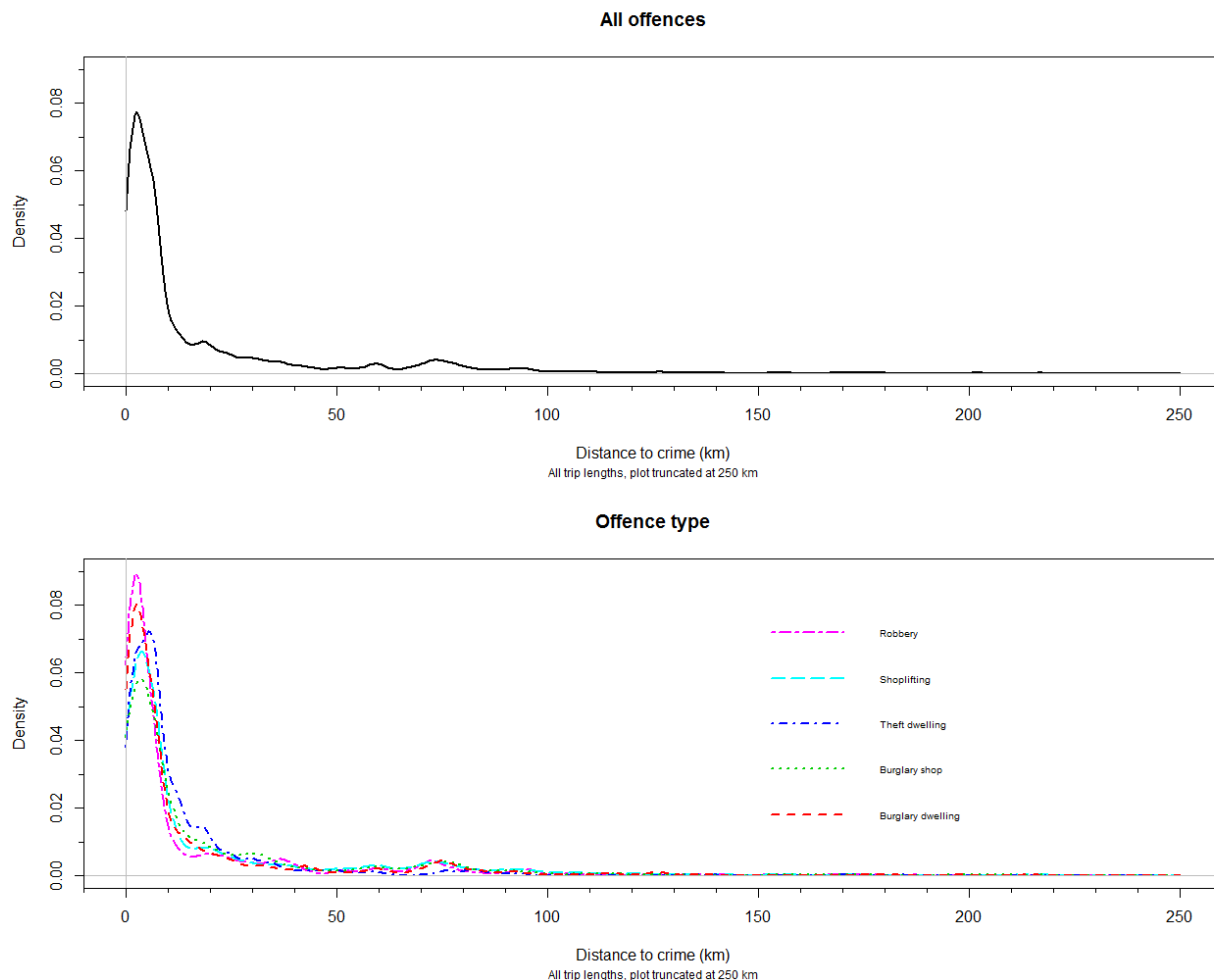


**Figure 2 Kernel density estimation for aggregate distance-to-crime distributions for all trip lengths (Gaussian smoothing kernel, bandwidth selected using Silverman's (1986, p. 48) rule-of-thumb). The upper part shows the distribution**

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[12] In part, this is also a side effect of applying kernel density estimation to obtain a smoothed empirical probability density histogram for a censored variable (as is the case with distance, since no distances smaller than zero can occur).

Table 4 provides more detail on the number of long crime trips. The table shows that 64.53% (N=6,762) of all crime trips are shorter than 10 km in length. Conversely, 35.47% (N=3,716) of all crime trips are longer. Interestingly, 4.65% (N=488) of all crime trips are even longer than 100 km and 87 trips (0.83%) cover distances of 1,000 km and longer. This finding supports the initial claim that long crime trips are less exceptional than the results of previous journey-to-crime studies suggest.

== TABLE 4 ABOUT HERE ==

Finally, the aggregate distance-to-crime distribution of long crime trips has also been visualised using kernel density estimation. Figure 3 shows the smoothed distance-to-crime distributions for crime trips that are at least 10 km in length. The upper part of Figure 3 displays the distribution regardless of offence type, and the lower part shows the distributions for each offence type. Although less distinct, Figure 3 suggests that the distance-decay principle helps to describe the pattern of long crime trips. The number of crime trips decline steadily as the distance from the home to the crime site increases. Similar results are observed for the distance-to-crime distributions according to offence type. The most pronounced distance decay pattern can be observed for theft in a dwelling. Although the other offence types also exhibit a distance decay pattern, it is less pronounced.
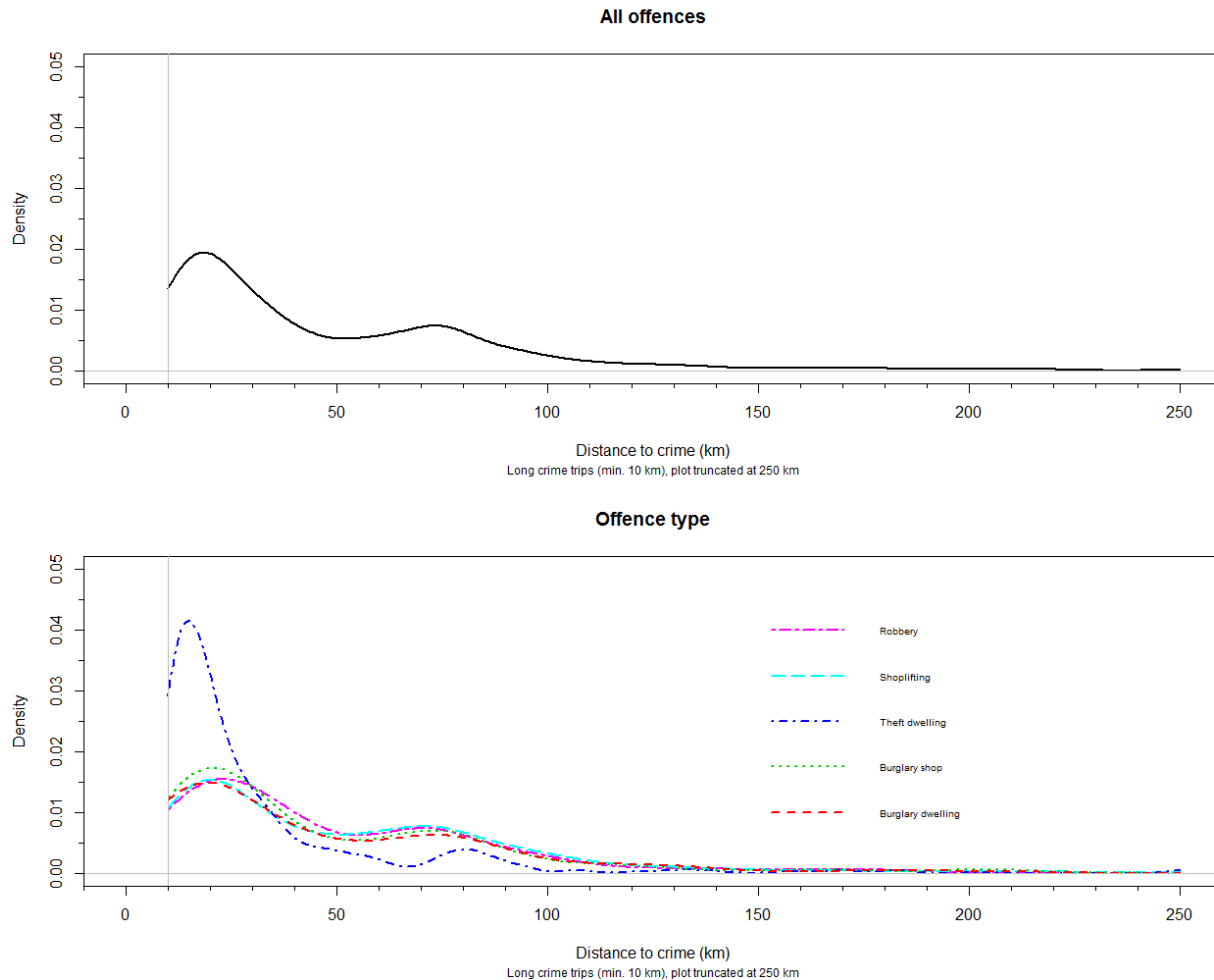
**All offences**



**Offence type**



**Figure 3 Kernel density estimation for aggregate distance-to-crime distributions for trips at least 10 km in length (Gaussian smoothing kernel, bandwidth selected using Silverman's (1986, p. 48) rule-of-thumb). The upper part shows the distribution disregarding offence type. The bottom part shows the distribution according to offence type. Reference line added to show 10 km cut-off. Note: the distance-decay plot was truncated at 250 km for legibility.**

## Discussion

This paper explored an existing knowledge gap in current journey-to-crime research and measured journey-to-crime distances in the greater Ghent area. It has argued that further research into the journey to crime in general and long crime trips in particular is warranted for several reasons. On the one hand, the validity of findings from previous journey-to-crime studies is questionable and long crime trips are often deliberately excluded from further analysis to prevent them from clouding interpretations. On the other hand, a limited number of studies suggest that long crime trips might be more common than the results from studies drawing on local data would suggest. Although this resulted in a preliminary understanding of long crime trips, it is partial and many questions remain to be answered.

Interestingly, analysing recorded crime data from the Ghent public prosecutor's office established the presence of a considerable number of long crime trips – up to 35% of all crime trips were over 10 km. Although differences in conceptualisation and operationalisation hamper

clear-cut comparisons between the results of the current study and those of previous journey-to-crime studies, it seems that similar proportions of long crime trips have been found in previous studies. An Israeli study reports that in Tel Aviv just under half of all property crimes were committed by offenders living at least 10 km from their selected crime site (Rattner & Portnov, 2007, p. 682). Moreover, the results point to the presence of a number of offenders who were typically travelling distances of 10 to 40 km before committing their preferred property crime; a few travelled over 100 km. In the Netherlands, Van Koppen and Janssen (1998, p. 242) found that 39.6% of their sample of commercial robbers travelled at least 6 km, and 21.7% travelled more than 20 km. Interestingly, the longest observed crime trip was 267 km (Van Koppen & Jansen, 1998, p. 238). Although exceptional, trips of a similar length have also been found in the Czech Republic (Polisenska, 2008, p. 54) and in Belgium (Van Daele et al., 2012, p. 297). Gabor and Gottheil (1984, p. 274) were particularly interested in identifying mobile offenders and their involvement in offences in Ottawa. They found that nearly a quarter of all offenders could be classified as mobile, since they were either not residing in Ottawa and communities directly bordering the city or had no fixed address. All in all, their results suggest that approximately one in four crime trips can be considered long. Looking at the mobility of property offenders in Belgium, Van Daele and Vander Beken (2009, p. 50) found that 39% of all property crimes are committed further than 10 km from the offender's home.

Combined, these results suggest that similar proportions of long crime trips have been found in other studies using different data sources from different countries. Moreover, the results of the current study tie in with those of previous studies and point to the presence of a substantial number of long crime trips, suggesting that considerable travelling is associated with crime. By providing a preliminary insight into the length of the crime trips in the greater Ghent area, this study provides additional empirical evidence for a burgeoning journey-to-crime research field that advocates the dedicated study of long crime trips. In light of these results, it is striking that other journey-to-crime studies have omitted long crime trips from further analysis, especially since this results in a considerable amount of variation in crime trip lengths being lost. The implication of the current research is that long crime trips cannot be viewed as an unexpected, random result found in unlinked journey-to-crime studies. Long crime trips should no longer be treated as if they are an irritating distraction, disturbing the more commonly observed crime trip patterns and making straightforward interpretations of research results more difficult. Although only small distances are covered in the majority of crime trips, longer trips do occur, much more commonly than most journey-to-crime research would suggest.

However, it remains doubtful whether some of the more extreme crime trip distances – perhaps those over 100 km but certainly those over 1,000 km – reflect the actual distances travelled, since crime trips of these lengths are not reported in other research, with the exception of Santtila, Laukkanen, Zappala and Bosco (2008, p. 350). Further exploration is needed into how to assess the correct starting point of crime trips, since it is likely that offenders living abroad and those associated with extremely long journey-to-crime distances have other, temporary anchor points closer by. A particular problem for this study is the use of the offender's legal address as the assumed starting point of the crime trip – in addition to the doubts that have already been mentioned regarding the veracity of the claim that the offender's home address acts as the starting point of the crime trip, there are theoretical and empirical arguments that challenge its validity. At the theoretical level, there is a widely held view within criminology that much travelling associated with crime is not premeditated but rather is a corollary of opportunities that criminals come across during routine daily activities (e.g. going to work or shopping) and temporary migration (e.g. holidays) (Wiles & Costello, 2000). This would imply that these extremely long

crime trip distances should be revised down, since part of the currently observed distances is likely to be a journey to family or work rather than a journey made only to commit a crime. At the empirical level, a previous case file analysis has indicated that offenders associated with such extreme journey-to-crime distances begin their crime trips from temporary residences in their preferred country (Van Daele, 2009). If it is the case that criminals do not like to travel far to commit crime, this suggests that the registered residence is not the most appropriate starting point to consider. However, these temporary residences and secondary anchor points are seldom registered by the recording police force and were not present in the data obtained for this study from the public prosecutor's office.

This paper is only a first step towards a comprehensive study of long crime trips, and many questions remain to be answered by future research. These include the utility of prolonged criminal travelling, and the travel efforts associated with long crime trips. The first question has partly been touched upon by several authors who established that longer crime trips are associated with higher criminal profits (Morselli & Royer, 2008; Snook, 2004; Van Koppen & Jansen, 1998) or a reduced risk of apprehension (Capone & Nichols, 1976). However, it remains unclear to what extent mobile offenders can anticipate these higher criminal earnings, since longer crime trips seem to be directed towards unknown areas (Polisenska, 2008; Van Daele & Vander Beken, 2011a) low in criminal opportunities (Van Daele & Vander Beken, 2011b). Future research could therefore address this puzzling paradox by simultaneously looking into the opportunity structure of departure and target areas, as well as the profits that are realised, at the crime trip level. A potential conclusion might be that target areas exhibit unattractive opportunity structures in an absolute sense but are appealing choices in relation to the departure area. Similarly, travelling farther and targeting seemingly unattractive areas might be compensated by increased criminal activity during a single crime trip.

However, the current study has an important limitation that could be improved in future research. The paper did not take into account the nested nature of journey-to-crime data, albeit that this does not substantially affect its conclusions. Typically, journey-to-crime data exhibits a hierarchical structure, with multiple crime trips committed by a single offender (Townsley & Sidebottom, 2010, pp. 901-903) and multiple offenders living in the same neighbourhood or city (Bichler, Orosco & Schwartz, 2012, p. 84). This nested structure introduces statistical dependency in the data and violates a critical assumption of many statistical techniques (Hox, 2010). In other words, this implies that the distances travelled by offenders from the same neighbourhood will be more alike than distances travelled by offenders from different neighbourhoods. Similarly, trips undertaken by the same offender will be more alike than trips undertaken by different offenders. If these trends are ignored, standard errors will be incorrectly estimated and results will be spuriously significant. The unit of analysis should also be clearly stated in order to avoid making the ecological fallacy, since several authors (Rengert et al., 1999; Van Koppen & De Keijser, 1997) have demonstrated that distance decay patterns observed at the aggregate level do not necessarily reflect travelling behaviour exhibited by individual offenders. Closely related to the ecological fallacy is the modifiable areal unit problem (MAUP) (Oberwittler & Wikström, 2009; Openshaw, 1984), a non-systematic bias in spatial studies whereby different aggregations give rise to different results. Although it has been demonstrated that the MAUP affects results in spatial analysis and, by extension, could affect results of journey-to-crime studies, Bernasco and Block (2009, p. 105) assert that effects in the context of crime tend to be fairly robust across different levels of aggregation. Moreover, Ratcliffe (2005, p. 105) argues that the MAUP prohibits, in particular, reliable inference. Nevertheless, one should be aware of the MAUP and its potential effects in journey-to-crime studies.

However, this paper's aim was to provide a preliminary analysis of the length of crime trips in the greater Ghent area. The results were not discussed in terms of statistical significance, nor were any claims made regarding mobility or distance decay at the level of the individual offender. An alternative is to take into account the nested nature of the data by applying multilevel models, and mobility at the individual level can be assessed by computing individual standardised skewness scores for prolific offenders only (cf. Smith et al., 2009; Townsley & Sidebottom, 2010; Van Daele, 2010). Regardless of this, the analytical approach taken was deemed appropriate to achieve the paper's aims.

It should be explicitly pointed out that this paper does not assert that established knowledge on the journey to crime is incorrect. Instead, it echoes Smith et al.'s (2009, p. 234) pertinent assertion that the accepted insights on the journey to crime stem from methodologically flawed research. In order to advance our understanding of the journey to crime, these methodological problems need to be addressed and the findings replicated in an appropriate way.

This paper has established a need to continue studying the journey to crime in general and long crime trips in particular. It is evident that the dominant empirical design needs to be rethought to further the understanding of offender mobility and that many questions remain, to be addressed in future research into long crime trips. By gauging the length and number of long crime trips, this study has provided additional empirical evidence that long crime trips occur and are less exceptional than is commonly believed. When crime trips are studied at a regional level the number of long trips is substantial, and the common finding of short crime trip distances therefore needs to be adjusted.

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**Table 1 Mocked-up example of a long journey to commit a burglary**

| Crime reference number | Offender identifier | Offence type | Date of offence (1) | Date of offence (2) | Number of suspects | Recording police force | Official address (street) | Official address (city) | Offence location |
|---|---|---|---|---|---|---|---|---|---|
| GE14.L3.1234-56 | 1234567 | Burglary | 01/01/2006 | 03/01/2006 | 2 | Local Police Meetjesland Centrum | Univeristeitstraat 4 | 9000 Gent | 9900 Eeklo |
| GE14.L3.1234-56 | 7654321 | Burglary | 01/01/2006 | 03/01/2006 | 2 | Local Police Meetjesland Centrum | Sint-Pietersnieuwstraat 25 | 9000 Gent | 9900 Eeklo |

**Table 2 Offenders by country of residence at time of offence**

| Country of residence at time of offence | % | N |
|---|---|---|
| Albania | 0.02 | 1 |
| Armenia | 0.03 | 2 |
| Austria | 0.02 | 1 |
| Belgium | 96.87 | 6,368 |
| Bulgaria | 0.06 | 4 |
| Croatia | 0.02 | 1 |
| Czech Republic | 0.02 | 1 |
| Estonia | 0.03 | 2 |
| France | 1.14 | 75 |
| Georgia | 0.02 | 1 |
| Germany | 0.05 | 3 |
| Hungary | 0.03 | 2 |
| Italy | 0.11 | 7 |
| Lithuania | 0.09 | 6 |
| Morocco | 0.02 | 1 |
| Netherlands | 0.81 | 53 |
| Poland | 0.18 | 12 |
| Romania | 0.27 | 18 |
| Serbia | 0.02 | 1 |
| Slovakia | 0.05 | 3 |
| Slovenia | 0.02 | 1 |
| Spain | 0.09 | 6 |
| Sweden | 0.02 | 1 |
| United Kingdom | 0.06 | 4 |
| *Total* | *100.00* | *6,574* |

**Table 3 Journey-to-crime distances (km)**

|  | Mean | Median | Min. | Max. | S.D. | N |
|---|---|---|---|---|---|---|
| **All offences** | 39.41 | 6.25 | 0.00[a] | 4,704.87 | 206.29 | 1,0478 |
| **Offence type** |  |  |  |  |  |  |
| *Robbery* | 31.44 | 4.54 | 0.01[b] | 2,646.86 | 170.35 | 1,492 |
| *Shoplifting* | 47.54 | 6.25 | 0.01[b] | 4,704.87 | 245.04 | 4,285 |
| *Theft dwelling* | 16.40 | 6.25 | 0.00[a] | 2,439.77 | 75.79 | 1,151 |
| *Burglary shop* | 38.09 | 6.25 | 0.01[b] | 2,501.44 | 176.06 | 2,366 |
| *Burglary dwelling* | 44.98 | 5.96 | 0.01[b] | 2,718.10 | 233.32 | 1,184 |

[a] actual length is 4.68 m; [b] actual length is 14.70 m

Table 4 Length of crime trips

**Table 4 Length of crime trips**

| Length of crime trip | % | N |
|---|---|---|
| <10 km | 64.53 | 6,762 |
| 10–99.99 km | 30.81 | 3,228 |
| 100–999.99 km | 3.83 | 401 |
| ≥1,000 km | 0.83 | 87 |
| *Total* | *100.00* | *10,478* |

Table 4 Length of crime trips