Residential burglaries

A comparison between self-report studies of burglars and observational data from Enschede

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Abstract

Residential burglary is a serious crime. In Twente the amount of residential burglaries increased in the period of 2007 till 2011 every year by at least 8%. A burglary has a significant impact on the victims, not only financially but emotionally as well. Once a burglary is committed, a repeat of the crime is very likely.

Some theories try to explain how burglars operate and why. These theories are the rational choice perspective, the routine activities approach, the opportunity theory, the crime pattern theory and crime prevention through environmental design (CPTED).

This study compares the results of self report studies of burglars with observational data from Enschede, a Dutch city with approximately 157.000 citizens. The self report studies are from Macintyre (2001). He interviewed 50 burglars to obtain a list of seventeen cues, which play a role in assessing whether a house is suitable to break in to or not. Some cues attract burglars, while others deter them. In Enschede 851 houses were observed in 2010, 430 of them were burglarized in 2008 and the other 421 were not burglarized the past 5 years. Every house was observed using a checklist, which was used for characteristics of the houses and the direct environment. Every cue of Macintyre is compared with the data from Enschede, to find out whether the cues correspond or not.

The factors dog evidence and people in the street have in agreement with Macintyre a significant lower chance of getting burglarized. Houses with bad window frames or bad maintenance or a corner house are significantly more likely to get burglarized.

Houses with high fences, an alarm system or extra locks are more likely to get burglarized, in contrast with what was expected. The other cues had no significant impact on the chance of getting burglarized.

Further research can take alarm systems and extra locks into account and investigate whether these are effective measures, as well as dead-end streets and take the different types of dead-end streets into account. Finally a replica of Macintyre's study in a Dutch setting with information about the modus operandi could generate more insight in the target selection and breaking and entering of burglars in The Netherlands.

Residential burglaries

Burglary of dwellings is a serious crime, which confronts a lot of Dutch citizens. In 2009 nearly 74.000 burglaries were committed, an increase of 6% compared to 2008 (CBS, 2010). This increase continued in 2010, when the Dutch police registered 10% more burglaries (CBS, 2011). Several police regions reported again an increase in burglaries in the first six months of 2011 (De Waard, 2011). Similarly, the same tendency can be seen in Enschede, a Dutch city with more than 157.000 residents in the region Twente. In 2008 and 2009 the amount of burglaries in the region Twente increased consecutively with 8.5% and 7.7% to 1777 burglaries in 2009 (Politie Twente, 2010). In 2010 the number of residential burglaries increased again with 8% to 1915 burglaries (Politie Twente, 2011). In 2011 the number of burglaries increased even more, 2284 burglaries meant an increase of almost 20% (Politie Twente, 2012). This trend is displayed in figure 1: Burglaries in Twente.

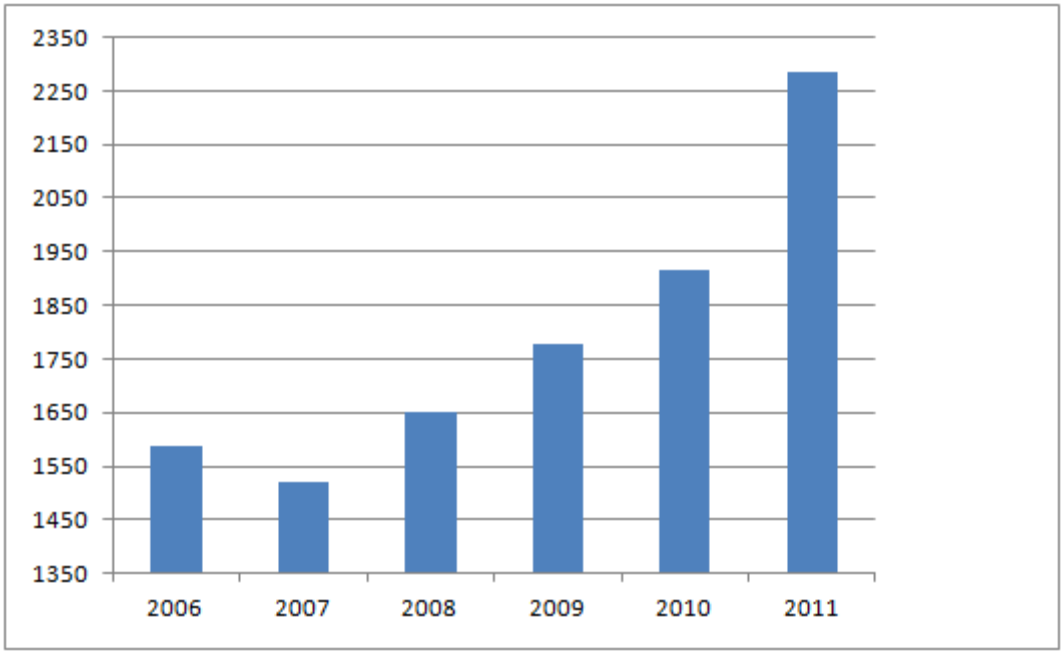

Figure 1: Burglaries in Twente

The number of burglaries did not only increase in absolute terms, it also increased relatively to the population of Enschede. The number of citizens increased from 2006 till 2011 every year on average with 0.45%. Similar, the number of residential spaces increased from 2007 till 2009 with 0.69% on average every year. Detailed information about the number of residential spaces can be seen in Appendix B, table 1.

A burglary has a significant impact on the victims and is therefore a crime feared among many citizens. Besides financial damage there are large consequences for the victims, women in particular (Shover, 1991). Once a dwelling is burglarized, the chance of a repeat of the burglary is relatively higher (repeat victimization). Houses in the nearby area are more at risk of getting burglarized or a burglary attempt due to the fact that burglars are familiar with the area and the characteristics of the houses (Bernasco, 2008). Due to the large impact on victims and the annual increase of burglaries it is important to pay attention to the prevention of burglaries. The social benefits of this research focus on the prevention of burglaries by gaining more and better knowledge about burglaries in Twente.

Some approaches explain how burglars operate and why. In the next section *the rational choice perspective, the routine activities approach, opportunity, the crime pattern theory* and *crime prevention through environmental design (CPTED)* will be discussed.

1. Rational Choice Perspective

The rational choice perspective focuses on the decision-making process of the offender. This approach assumes that an offence is a specific behavior and that the offender will benefit in some way. The word 'rational' in rational choice perspective means that an offender seeks for optimal utilization, just like an economic model. Optimal means that the process differs for every offender. It therefore includes the making of decisions and choices. Time, the cognitive attributes of an offender as well as the accessibility of proper information are important aspects (Cornish & Clarke, 2008; Felson & Clarke, 1998). Burglars consider the costs and benefits for every attempt to burglary. These cons consist not only of the trouble they have to go through the process to commit a burglary, but also of the chances of getting caught. The pros are often cash and/or assets, but it can also be the desire for psychological thrills (Ekblom, 1997; Katz, 1988). These considerations are explained with the rational choice perspective and the opportunity theory (Felson & Clarke, 1998).

The opportunity theory explains that the chance of committing a crime increases when the opportunity is larger. This theory is connected to situational crime prevention. According to advocates of this theory, every form of crime has something to do with opportunity. Even when an offender is motivated, without opportunity there is no crime possible. This theory accounts for almost every type of crime. Felson and Clark (1998) published ten principles of crime opportunity. They are briefly discussed below.

Crime opportunities are always specific, a single opportunity factor cannot account for every type of crime. In case of a burglary a burglar might be looking for specific assets like cash and jewelry, while another burglar might only be looking for expensive art. Opportunities are always concentrated in time and space, there are enough places, people and properties that are not suitable for crime. On the contrary, people that prevent criminal behavior like police officers, receptionists or security officers are unable to be in place everywhere.
Another principle of the opportunity theory is that an offender easily gets involved in other crimes. An example is a burglar who first steals certain goods and later sells the stolen goods or threatens the residents during the burglary (Felson & Clarke, 1998).

Some products are more sensitive to crime than others. Burglars of dwellings often search for cash, jewelry and electronic devices.

Social and technological changes lead to new crime opportunities. On the other hand, a lot of products are no longer interesting for criminals, for example is a video recorder. Items like these will hardly be stolen anymore, because they are no longer produced and barely used or because their resale value is very low (Felson & Clarke, 1998).

Crime can be prevented when the opportunity is removed. Most people do this every day, for example locking the door and putting away your money. Nevertheless, taking the opportunity away does not automatically lead to displacement of crime.

Specific reduction of opportunity can reduce crime in space. An example is that the environment can profit from certain safety measures. For example when a burglar alarm is installed in a dwelling, burglars can evade dwellings in the direct neighborhood (Felson & Clarke, 1998). There is a diffusion of prevention measures in the sense that the reduction covers a larger area than originally expected.

Another approach within Crime Science is the Routine Activities Approach. This approach originates from the 70's and states that when these three elements coincide the chances of a crime are significant:

- A potential offender;
- A suitable target;

- The absence of protection.

The first requirement, a potential offender, means a motivated offender who is willing to commit a crime.

The second requirement, a suitable target, can be a person, object or place. There are two acronyms to describe these, VIVA and CRAVED. VIVA stands for value, inertia, visibility, access. Inertia is the weight of the object and whether an offender is able to take it with him. In case of a person as a target it is about whether the offender can deal with him or not. CRAVED stands for concealable, removable, available, valuable, enjoyable and disposable.

The third requirement, absence of guardianship, means there is no possibility of intervention. This can be a police officer, but also a citizen, a neighbor or someone else who is around. It can even be CCTV, provided that someone monitors it.

The Routine Activities Approach is in the USA and Europe the best explanation for the increasing number of burglaries of dwellings in the 60's and 70's. This approach explains on both micro and macro level how crime increases (Felson, 2008; Felson & Clarke, 1998).

2. Crime pattern

The crime pattern theory states that crime consists of certain patterns. Central elements are how people and others who are involved move in time and space. This theory is connected to the Routine Activities Theory. Three elements are important at the crime pattern theory, namely nodes, paths and edges.

Nodes are the places to where people travel and return. This can contain places that cause crime or where crime is present. Every offender seeks opportunities for crime in or around his personal nodes. This can be his own or a friend's house, school or places to go out. Crime occurs on the paths that are used for this. When these two are combined one can generate crime maps.

The third element of the crime pattern theory, edges, contains the edges of areas in which people live and move. Crime often occurs at these edges, where people meet each other. Mapping certain patterns and information makes it possible to reduce some forms of crime. Burglaries of dwellings have different patterns, because offenders chose a specific dwelling and neighborhood to commit their crime. Many offenders live in the neighborhood of their victims and repeat victimization often occurs. This can occur

to a house that is already burglarized, but also dwellings in the direct environment. Offenders already know the area and layout of the dwelling (Felson & Clarke, 1998).

CPTED

These theories led to the existence of Crime Prevention Through Environmental Design (CPTED). This is a method for crime prevention which is often based on the physical environment. CPTED is derived from Newman's model from the 70's of defensible space. Defensible space was about the adjustment of the physical environment in order to control the living area. CPTED has a methodology with clear basic rules about how the built on environment should be designed. The point of origin is that crime should decrease and the feelings of safety should increase. CPTED can be applied at every place. The adjustments according to CPTED can be best applied at the development stage, but existing constructions can also be adjusted according to CPTED principles.

CPTED consists of six core values that fade over, there are no concrete mutual boundaries. The six core values are territorial reinforcement, natural surveillance, natural access control, activity support, image/space management and target hardening. By optimizing opportunities for surveillance, marking areas and possessions out and creating and maintaining a positive image, the design and active management can prevent unwanted behavior. Offenders are more visible for others and take greater risks. For example, a well kept garden with clear boundaries is proof for offenders that the owners attend to their assets and are more likely to intervene in case of unwanted behavior (Centrum voor Criminaliteitspreventie en Veiligheid, 2008; Cozens, 2008).

There are several ways to prevent a burglary, which can be combinations of measures like good quality locks and motion detectors (Hirschfield, Newton, & Rogerson, 2010). According to Buck and his colleagues (1993) a combination of the presence of a car on the driveway, a sign of the presence of an alarm and interior- and exterior lighting is an effective barrier for burglars. In the Netherlands Nauta (2005) verified that the Politiekeurmerk Veilig Wonen (PKVW) reduces the risk of a burglary. The PKVW is a quality mark from the police for both individual houses and neighborhoods and consists of architectural concepts and urban planning measures. Unfortunately Nauta did not take all factors into account, like the large part of PKVW houses in newly-built quarters. These houses differ from existing structures, which can led to overestimating the effect of the PKVW (Nauta, 2005; Vollaard, 2009b). The English version of the PKVW is *Secured by Design* (SBD). Armitage (2000) proved that in neighborhoods build according to the SDB principles the chances of a burglary are 50% lower. However, repeat

burglaries occur often after a first burglary, which suggests that once a security leak is discovered it is exploited to the maximum (R. Armitage, 2000; Vollaard, 2009a).

Limitations

The various studies on burglary up to the present have some limitations:

1. Design

Most studies are surveys, where relationships are identified afterwards. A lack of information about the time sequence makes it difficult to interpret data. An example is whether or not a burglar alarm is linked to a higher or smaller chance of a burglary.

2. Information source

Many previous studies about the decision making process of burglars are offender interviews (Bennett & Wright, 1984; Bureau Van Dijk, 1991; Handel, Nauta, Soomeren, & Amersfoort, 2009; Macintyre, 2001; Nee & Meenaghan, 2006; Rengert & Wasilchick, 1985; Repetto, 1974; Vermeulen & Overbeeke, 1992). These studies often report about motives of burglars, the selection of dwellings and the procedure of breaking into a house (modus operandi). However, the statements of burglars cannot be accepted doubtless because they can hold information back, they cannot exactly know their own mode of operation or they can feed unreliable information. Also, Coupe and Blake (2006) say that due to the low apprehension rates, such as those of burglary, offender samples are not representable. Therefore, conclusions of offender interviews should be treated with caution (Handel, et al., 2009; Junger, 1989).

3. Scale

Another limitation is the fact that some studies aim at the individual level. Nevertheless, the effects at individual level do not translate well to a higher level. When prevention measures limit the chance of a burglary of a dwelling, it does not imply the same at national level. Prevention at individual dwellings can have mixed results for the direct environment. 'Upscaling' of results should be done with caution (Vollaard, 2009b). In the Netherlands a few spacial analyses are done at the level of individual houses. The available studies (Bernasco & Luykx, 2003; Kleemans, 2001) are done at the level of neighborhoods, which led to less stronger conclusions.

Macintyre

The rational choice perspective and the routine activities approach are the two theories lying at the base of the research of Macintyre (2001). Macintyre has performed a comprehensive research of burglars and how they select a dwelling and perform a burglary. The purpose of his research was to get a better understanding of the considerations of the offender, the process of burgling and the way it was executed. Macintyre worked according to the basic rule of Ekblom (1997), who suggested that the best way to prevent a crime is to think like a thief. This means it is critical to study how burglars explore a potential area, assess information, make decisions and select a target ('*think burglar'*). Macintyre specifically focused on the process of burglars selecting a dwelling. By interviewing 50 offenders he obtained a list of seventeen cues. These cues are factors which play a role in assessing whether a dwelling is suitable to break in to or not. Some cues frighten burglars off (for example a burglar alarm), while others attract burglars (for example many trees and bushes around a dwelling). All the cues were provided by the participants. The cues dog evidence, alarm, people in the street and inside information were the most popular cues.

A unique aspect of Macintyre's study was the use of combinations of cues. In the second part of the research a new group of 96 burglars had the choice to select more or less cues for the consideration whether or not to burglarize the 20 dwellings of the case study. Macintyre also weighted experience and age, something which was often excluded in earlier research. Previous research often ignored the combination of cues. An example is if the effect of an alarm is undone by the presence of many attractive cues and whether a burglar commits a burglary or not.

Method

The goal of the present study is to investigate whether the results of Macintyre, based on self reports, can be corrobated with observational data. In Enschede 851 houses were observed in 2010, 430 of them were burglarized in 2008 and the other 421 houses were not burglarized in the past 5 years. All the houses were observed using a checklist (see appendix A). The checklist was used for characteristics of the houses and the direct environment.

Research questions

The study will make a comparison between the cues of Macintyre and the burglaries in Enschede and has the following main research question:

Are factors that are presented by burglars as 'attractive' in self-report studies related to burglaries in an observational study?

The main research question will be answered with the following specific research questions:

1. *Are houses in Enschede with unattractive cues significantly less burglarized and houses in Enschede with attractive cues significantly more burglarized?*

2. *Which combinations of cues are related to a higher or lower chance of a burglary in Enschede?*

Cues

The next section shows the cues and the expectations for the observational data from Enschede.

Cue 1: Evidence of a dog

According to many burglars a dog is an important factor which decides whether a burglary will succeed or fail. In Macintyre's study a dog is one of the four most important deterrent factors. Many other researchers agree with this finding (Bennett & Wright, 1984; Centrum voor Criminaliteitspreventie en Veiligheid, 2008; Rebscher, 1990; Wright & Decker, 1994). Some studies found that a dog has little or no effect on burglars (Hakim & Buck, 1992; Hough, 1987). The expectation is that in Enschede houses with evidence of a dog present are significantly less burglarized.

Cue 2: Lightning around the house

Lighting around a house should deter burglars, according to Macintyre. Poyner (1993) reviewed 122 evaluations of crime prevention project and found that there is some evidence that lighting prevents residential burglaries. Street lighting is available at nearly every house in Enschede and too general to test. In Enschede this cue is tested on houses with motion sensing lights. Lighting in a niche is also tested. The expectation is that houses with motion sensing lights and lighting in a niche are less burglarized.

Cue 3: Signs of an alarm

A burglar alarm is one of the most relevant cues of Macintyre. Burglars indicate they usually avoid houses with an alarm. Multiple studies confirm the preventive operation of a burglar alarm (Buck, et al., 1993; Budd, 1999; Hakim, Shachmurove, & Fishman, 1998; Hearnden & Magill, 2004; Lee, 2008). The expectation is that houses in Enschede with a burglar alarm are less burglarized.

Cue 4: Lighting, radio or TV turned on in house

The fourth cue of Macintyre is that the lights, radio or TV are turned on in the house, also called signs of presence. Several studies endorse the opinion of the burglars and support that signs of presence are a deterrent for burglars (Bennett & Wright, 1984; Hakim & Buck, 1992). Unfortunately the consequences of signs of presence cannot be tested in this study, because these factors were not included in the checklist.

Cue 5: Car at the driveway

A car in the driveway is often seen as a deterrent. For burglars it is a sign that someone is home (Bennett & Wright, 1984; Hakim & Buck, 1992; Hough, 1987; Rebscher, 1990). This cue cannot be tested for this study, because the houses in Enschede were only checked for having a driveway.

Cue 6: Luxury

The participants of Macintyre indicated that they weigh the degree of luxury in their decision making process whether to burglarize a house or not. An expensive looking house is more often burglarized than an average looking house. Usually it is not only about the house, but for example a well kept garden is an indicator as well. Other studies support this cue, some conclude it is a very important cue for the decision making process of burglars (Bennett & Wright, 1984; Hough, 1987; Rebscher, 1990; Taylor & Nee, 1988; Wright & Decker, 1994). Wright, Logie and Decker (1995) found no significant influence for this cue. The expectation is that in Enschede expensive houses and houses with a well kept garden are more burglarized.

Cue 7: Doors and windows

The seventh cue is the quality of doors and windows. The participants indicated that houses with bad maintained doors and windows are more attractive to burglarize. It makes it easier to force a door or

window. This cue belongs to target hardening, one of the strategies of CPTED. Target hardening is the stopping or reducing of access to a target. This is done with physical barriers as locks, gates and surveillances (Cozens, 2008). In Enschede the expectation is that houses with one or many signs of deferred maintenance are more burglarized than houses with well maintained doors and windows.

Cue 8: Locks

The eight cue concerns having good and multiple locks on doors and windows. Like cue seven this belongs to target hardening. In the literature there is no consensus about the effect of locks. Some studies show that locks have little effect (Bennett & Wright, 1984; Wright & Decker, 1994), while other studies found evidence for certain locks (Hakim & Buck, 1992; Tilley & Webb, 1994). The expectation is that houses in Enschede with multiple locks are significantly less burglarized than houses with fewer locks.

Cue 9: Garage

The ninth cue concerns the quality of locks from garages. This cue is not often discussed in the literature, because of the concentration on habitats of households and not individual households. The participants of Macintyre indicated they often stole something from garages, when they were not locked properly. A garage often contains assets that can be sold easily, like a scooter. When houses are occupied the garage can be an alternative, but in addition a garage can also be used to gain access to a house, provided there is a passage to the house. The participants stated that new looking garages with proper locks are deterrent while old and poorly sealed garages are more attractive. During the study in Enschede houses were only coded as having a garage, not what the quality of locks was. Therefore this cue cannot be tested.

Cue 10: Fence

The tenth cue concerns the fence around a house and garden. The participants stated that they prefer not to burglarize a house with a high and closed fence (1.80m). Breaking the fence or climbing over the fence is too much effort in combination with the chance of getting caught. Burglars prefer houses with a small fence (30 to 50 cm maximum). The expectation is that houses with a high and closed fence are less burglarized than houses with a small fence or no fence at all.

Cue 11: Garden

Most participants stated they have a strong preference for a house with a garden surrounded by trees and bushes. This makes them less visible for other people during the burglary. Studies from Bennet and Wright (1984) and Rebscher (1990) share this view, while Taylor and Nee (1988) found no evidence for this preference. The expectation is that in Enschede houses with a high border, consisting of stinging or non-stinging bushes, are more burglarized than houses with a small border and without bushes.

Cue 12: Location house

This cue concerns the type of house. The participants of Macintyre's study stated they prefer breaking into a corner house than a terraced house. There are many clues in the literature about corner houses being more vulnerable to a burglary (Hakim & Buck, 1992; Repetto, 1974; Taylor & Nee, 1988). The main reason is that corner houses have more retrieval capabilities. The expectation is that in Enschede corner houses suffer more burglaries than terraced houses.

Cue 13: People in the street

This cue concerns the physical attendance of people in the street. This can be groups of loitering people, but also neighbors mowing the grass or just being present outside. In Macintyre's study the presence of people is a strong deterrent and the other way around absence is very conducive. Therefore the expectation is that houses with people in the street are less burglarized than houses without people present in the street.

Cue 14: Neighborhood watch

The fourteenth cue concerns houses in an area with neighborhood watch. In these neighborhoods citizens invigilate in their own neighborhood, in order to prevent burglaries and other crimes. Not many participants presented this cue, but it is seen as a deterrent. The expectation is that in Enschede in neighborhood watch areas less burglaries are committed.

Cue 15: Weather

Little is known about the factor weather conditions in relation to burglaries in the literature. Nevertheless some of Macintyre's participants brought this cue to attention. They state they prefer a burglary when it is windy weather, because the noise of a burglary is harder to hear. The expectation is that in Enschede more burglaries are performed at windy weather than at normal weather conditions.

Cue 16: Inside information

Having 'inside information' is still a common used cue for burglaries. Besides the findings of Macintyre's participants, Wright and Decker (1994) reported that one fifth of the burglars break in to a house of people they know. Another study found that 17% of the burglars occasionally knows the victims of their burglaries and 34% knows them very well (Budd, 1999). Unfortunately this cue cannot be tested in this study, because information of burglars was not used.

Cue 17: Street type

The last cue concerns the street type of houses. Bennet and Wright (1984) and Taylor and Nee (1988) state that a house is more attractive when it has more retrieval capabilities. Macintyre's participants state they prefer not to break into houses in a cul-de-sac, this makes them too much visible during the burglary. Some burglars indicated they perform a burglary when there is proper access to the back. This can be a footpath or a bicycle path behind the house. Furthermore they prefer busy and medium streets regarding traffic intensity, this makes them less visible when committing a burglary. The expectation is that (a) houses in a dead end street are less burglarized than houses with another street type, (b) houses with a bicycle- and/or footpath at the back are more burglarized than houses without a path at the back and (c) houses in a medium or busy street are more burglarized than houses in a quiet street.

Methods

This section explains the used methods and techniques for the study and explains how validity is dealt with.

Sample

The sample is drawn in Enschede, a Dutch city with approximately 131.500 citizens. 851 houses were observed in 2010, 430 of them (the cases) were burglarized in 2008 and the other 421 houses (the control group) were not burglarized in the last 5 years. The list of burglarized houses was obtained from the police region Twente. The non burglarized houses were selected with a random, disproportionate sample. This was also performed by the police region Twente. Only houses and apartments on the ground floor are part of the study, all other buildings are excluded. The checklist was not suitable for other buildings and apartments, which were hard to observe due to the physical design. Due to practical reasons only houses in the city of Enschede were chosen, it was not feasible to involve surrounding houses in the municipality Enschede in this study.

Data collection

All the houses are observed using a checklist, based on similar research in England. This checklist is based on a list of the University of Huddersfield, developed by Rachel Armitage (2007). This checklist has been adjusted to the Dutch situation and enlarged with extra characteristics (see appendix A). It was used to check on characteristics of the houses and the direct environment. The checklist consists of nine parts: housing type, network of the roads, accessibility, perception for others, parking area, surveillance, social climate, signs of security measures and information about the rear side of the house.

The observing was done by a team of six students of the University of Twente. The observations were done from the street and/or bicycle- and footpaths. All the observations took place from February till May 2010. The observations were only performed on workdays from 10:00 AM till 3:00 PM, conforming to the times and days of Armitage to increase the reliability.

Concepts

The cues from Macintyre were measured with several characteristics from the observational data from Enschede. The table below (table 2: Operationalizations) displays how every cue is measured and coded. References are made to the corresponding items of the checklist (see Appendix A).

Table 2: Operationalizations

Cue	*What is measured*	*Item*
Evidence of a dog	*Seeing or hearing a dog or a sticker with a sign of a dog*	53
Lighting around the house	*Motion sensing lights*	54
	Lighting in a niche	36
Signs of an alarm	*Presence of an alarm: sticker, camera or flashing light*	54
Luxury	*Value of each house aggregated to neighborhood level*	-
	Level of maintenance of the front garden	13
	Comparison front garden with the neighbors	14
	Level of maintenance of the back garden	59
	Comparison back garden with the neighbors	60
Doors and windows	*State of the window-frames*	50
	State of the maintenance of the site	49
Locks	*Multiple locks*	55
Fence	*Type of front fence: wall of wood, metal or concrete*	16
	Height of the front enclosure	15
	Type of back fence: wall of wood, metal or concrete	67
	Height of the back enclosure	69
Garden	*Type of front fence: stinging or non-stinging bushes*	16
	Height of the front enclosure	15
	Type of back fence: stinging or non-stinging bushes	67
	Height of the back enclosure	69
Location house	*Corner house or terraced house*	2
People in the street	*The presence of people in the street*	32
Neighborhood watch	*Neighborhood watch*	47
Street type	*Dead end street*	7
	Dead end street with or without exit	8
	Footpath at the back	11, 61
	Bicycle path at the back	65

The observational data did not provide information about the values of the houses. The website Buurtmonitor Enschede[1] provided the WOZ values of the houses at neighborhood level. The data did neither include information about the weather conditions at the time of the burglaries. Brunninkhuis (2010) performed a study[2] in Enschede to investigate if burglaries are related to weather conditions. This study will be used as a reference for this cue.

Before the observations took place, every student observed the same 20 random selected houses as pilot. As the sample, half of these houses were burglarized. This was done to increase the reliability with a reliability analysis: Cohen's kappa coefficient.

Cohen's kappa is a statistical measure of inter-rater agreement. It can be used to measure the degree of agreement between two observers (or more). The scores of kappa are corrected for being created at random. A score of '0' means no agreement, '1' is almost complete agreement (Tseloni, Wittebrood, Farrell, & Pease, 2004). See appendix C, table 3 for a commonly used distribution.

Some items of the checklist were subjective and/or time specific. They were not taken into account when kappa was calculated. For example the traffic intensity is very time specific. 60% of the checklist items were sufficient with a score of 0.20 or higher. 30% of the checklist items scored higher than 0.40. These scores led to extra meetings to tighten and/or rephrase definitions.

Analysis

Most cues are dichotomous variables and therefore analyzed with cross tabular statistics and the Pearson Chi Square. The values of houses are continuous variables and therefore an independent sample t-test is used. A multiple logistic regression analyses is used for all the cues to predict the probability of houses getting burglarized. A variance inflation factor (VIF) was calculated for every cue, all values were below 10, which shows no collinearity in the data (Field, 2005).

[1] http://www.enschede.buurtmonitor.nl

[2] Brunninkhuis, K. (2010). *Invloed van weersomstandigheden op het aantal woninginbraken in de periode 2004 t/m 2008 in de gemeente Enschede*. Enschede, University of Twente.

Results

Table 4: Summary burglarized and non burglarized houses, in %, divided into the core values of CPTED

Observed	Burglarized % (N total)	Not burglarized % (N total)	Consistent with Macintyre?
Natural Surveillance			
People in the street*	11.9 (430)	17.4 (420)	Yes
Neighborhood watch	3.0 (429)	2.9 (420)	No
Car traffic volume (medium & high)	18.3 (415)	18.4 (402)	No
Pedestrians (medium & high)[a]	5.7 (426)	3.8 (419)	Yes
Bicycles (medium & high)	11.9 (427)	14.3 (419)	No
Wind speed	-	-	No
Natural Access Control			
High front fence*	14.8 (426)	13.2 (418)	No
High back fence*	70.9 (422)	68.7 (412)	No
High border garden with bushes	14.8 (425)	13.2 (418)	Yes
Footpath at the rear	46.2 (426)	46.2 (420)	No
Bicycle path at the rear	4.7 (422)	4.5 (418)	Yes
Corner house***	26.3 (430)	95.0 (420)	Yes
Terraced house***	30.2 (430)	36.9 (420)	Yes
Dead-end street	14.7 (430)	13.6 (420)	No
Dead-end street without exit	2.4 (421)	2.9 (419)	No
Dead-end street with exit	10.5 (422)	10.5 (419)	No
Image/space Management			
Special front garden	7.5 (429)	11.5 (419)	No
Front garden nicer than neighbors	4.7 (429)	4.1 (419)	Yes
Back garden nicer than neighbors	1.2 (429)	0.5 (421)	Yes
Condition of window frames (deferred)*	15.2 (428)	9.3 (420)	Yes
Maintenance site or house (bad)*	21.2 (430)	14.5 (421)	Yes
Value houses (high) [a]	-	-	No
Target Hardening			
Presence of a dog*	2.8 (427)	5.2 (420)	Yes
Burglar alarm*	7.6 (382)	4.2 (403)	No
Motion sensing light	8.4 (427)	10.5 (419)	Yes
Lighting in the niche[a]	16.6 (422)	17.8 (415)	Yes
Multiple locks visible*	4.8 (417)	1.7 (412)	No

[a] *p<.1*

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

Table 4 summarizes the results of the performed analyses of the cues. The last column refers to whether the results are consistent with Macintyre's cues or not. All the cues are classified into four of the six core values of CPTED. Territorial reinforcement and activity support are excluded; no cues could be assigned to these values of CPTED.

Houses with evidence of a dog seem to have a lower risk at getting burglarized, as well as houses with deficient window frames or deferred maintenance of the house or property in general. Corner houses have a higher risk of getting burglarized than terraced houses. Houses with the presence of people in the street seem to have a lower risk of getting burglarized. Houses with a high or normal number of pedestrians seem to have a higher chance of getting burglarized. Houses with lighting in the niche have a lower risk of getting burglarized. These findings all seem to agree with the statements of burglars.

On the contrary, houses with a burglar alarm and houses with multiple locks have a higher chance of getting burglarized. Houses with a high fence at the front or the back have a higher risk of getting burglarized. These cues do not agree with the statements of Macintyre's burglars.

Motion sensing lights, having a special front garden or nicer garden than the neighbors, a high border garden with bushes and a neighborhood watch seem not to differ in the risk of getting burglarized. A dead-end street and a footpath or bicycle path at the rear seem unrelated to getting burglarized. No evidence was found for a higher risk of burglaries with high or normal car traffic volume or bicycles. These findings are not in accordance with the statements of Macintyre's burglars.

Value houses

No evidence was found for expensive houses having a higher chance of getting burglarized (see appendix D, table 17). This finding is not in agreement with the burglar's statements.

Weather

Brunninkhuis (2010) performed a study for the municipality Enschede. Her study was done with burglary and weather information from 2004 till 2008. She studied the influence of nine weather conditions, including wind speed. From the nine weather conditions only air pressure and precipitation seemed significant predictors for burglary. Wind speed was not associated with a higher chance for burglary. This finding is not in agreement with the burglars.

Combinations

Besides the individual cues Macintyre tested the effect of combinations of cues. His main findings were that a barking dog has more effect in a busy street that a quiet street, the deterring effect of a busy street decreases when a potential house is accessible via a bicycle path or footpath at the rear and a house in a busy street works as a deterrent when there is a neighborhood watch.

These symbiotic combinations of cues are also tested in this study. Table 5: Expectation of combinations of cues) gives an overview of the combinations that and the expected outcome:

Table 5: Expectation of combinations of cues based on Macintyre

More burglaries/high risk	Less burglaries/protective effect
1. Barking dog + quiet street	Barking dog + busy street
2. Alarm + quiet street	Alarm + busy street
3. Busy street + access to the rear	Busy street + no access to the rear
4. Busy street + no neighborhood watch	Busy street + neighborhood watch

For the first combination there is no evidence of a barking dog being more effective in a busy street in Enschede. Due to the low number of houses with dog evidence (n = 5) in busy streets, the result is marginally statistically significant (p = 0,074). See appendix E, table 19 for an overview. This combination is displayed as a 3D chart in figure 2. In accordance with the expectations, no dog presence shows a (slightly) more likely chance of getting burglarized and traffic volume does not differ much in the chance of getting burglarized.

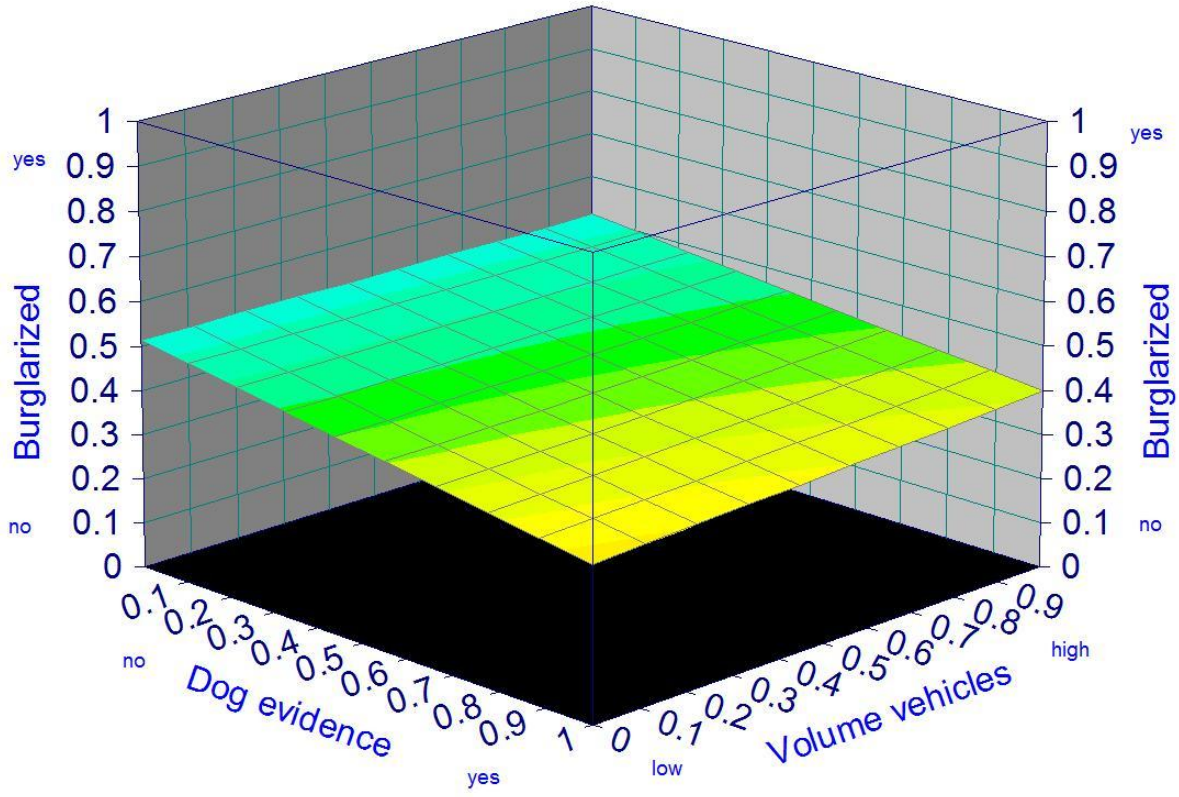

Figure 2: Effect of dog evidence and traffic volume on getting burglarized

The second combination suffers the same predicament. Due to the low number of alarms in busy streets (n = 5) there is no reliable statement possible for this combination. See appendix E, table 20 for an overview.

The third combination shows the opposite of what was expected. Houses in busy streets with no access to the rear were more burglarized (22,6%) than houses with access to the rear (12,6%). See appendix E, table 21 for an overview.

The fourth combination was not possible to test. There were 25 houses located in a neighborhood watch area and unfortunately none of them were located in a busy street.

Table 6: Multiple Logistic Regression

	S.E.	Exp(B)	S.E.	Exp(B)
		DAY		*NIGHT*
Natural surveillance				
People in the street	0,327	0,465*	0,232	0,695
Volume vehicles high	0,307	1,491	0,25	1,562[a]
Volume pedestrians high	0,393	1,46	0,325	1,877[a]
Volume bikes high	0,367	0,613	0,309	0,506*
Natural access control				
Fence over 1.80m	0,025	1,102***	0,021	1,059**
Back fence over 1.80m	0,033	0,986	0,026	0,988
Path at the rear	0,205	1,556*	0,193	1,313
Bike path at the rear	0,17	0,907	0,084	1,112
Terraced house	0,253	0,514**	0,192	0,712[a]
Corner house	0,328	1,96*	0,312	0,832
Dead end street	0,317	0,876	0,238	1,141
Image/space management				
Front garden special or nicer	0,318	0,736	0,243	0,727
Back garden nicer	0,037	0,915*	0,03	0,926*
Bad condition window frames	0,377	0,809	0,333	0,631
Baid maintenance site/house	0,319	0,577[a]	0,293	1,125
Target hardening				
Dog evidence	0,562	0,706	0,53	0,475
Light in the niche	0,03	0,993	0,024	1,01
Interaction effects				
Path at the rear by Volume vehicles high	0,263	0,713	0,332	0,565[a]
Dog evidence by Volume vehicles high	1,221	2,129	-	-
Alarm evidence by Volume vehicles high	1,13	0,429	0,889	3,06
Wald	108.58		23.45	
Nagelkerke R Square	0.164		0.081	
Chi Square	60.874***		39.324**	
Houses included	513		637	

[a]p<.1

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

The multiple logistic regression displays a model with predictions of the probability of houses getting burglarized. A distinction is made between houses that are burglarized during the day

and during the night. This distinction is based on real sunrise/sunset data. Multiple locks and burglar alarms are excluded from the model, because they both show a reversed association.

The daytime model can predict 74,6%, while the nighttime can only predict 63,8%. The odds ratio for every cue are displayed, for example houses with a path at the rear are during the day 1,56 times more likely to be burglarized and during the night 1,3 times more likely to be burglarized. Other interesting findings are that houses with a high volume of vehicles or pedestrians are more likely to be burglarized during the night than during the day. Corner houses are more vulnerable during the day ($p<.05$) than at night. Houses in a dead end street have a higher chance of getting burglarized during the night than during the day. Houses with bad maintenance are less likely to get burglarized during the day than the night.

Discussion

This study examined the level of similarities between statements of burglars and observational data from Enschede. Several cues were compared and six factors were in complete agreement with Macintyre and four factors were the opposite of what was expected. Another seven factors were in agreement with Macintyre, but not significant and ten factors were not in agreement with Macintyre, but not significant as well.

In agreement with Macintyre the chances of a burglary are lower at houses with evidence of a dog and people in the street. The chances of a burglary are higher at houses with bad window frames or bad maintenance of the house or property in general. As expected corner houses have a higher chance of getting burglarized than terraced houses. These findings are all in accordance with other various studies and confirm that these cues are related to burglary.

Some cues did not differ much in the risk of getting burglarized. The factors motion sensing lights, a bicycle path at the rear, having a nicer garden than the neighbors, a high or medium number of pedestrians crossing and a high border with bushes were in agreement with Macintyre, but not significant.

Not in agreement with Macintyre but not significant were a dead-end street and a footpath at the rear, high or medium car and bike traffic volume, having a special front garden, high wind speed and a neighborhood watch.

Houses in a dead-end street were expected to be less burglarized than houses in other street types. In Enschede no evidence was found for houses in a dead-end street being less vulnerable to burglary. However, houses in a dead-end street without an exit are slightly less likely to be burglarized than houses in a dead-end street with an exit, which is in accordance with Macintyre's participants. The result is however not significant and is not in line with other research (R. Armitage, 2007; Johnson & Bowers, 2010).

Houses with a footpath or bicycle path at the rear were expected to have more burglaries, but no evidence was found for both these factors. Houses with a bicycle path were slightly more burglarized, but the result is not significant. A possible explanation can be that burglars in Enschede make less use of escape routes.

Macintyre's participants stated they prefer busy streets, which makes them less visible when committing a burglary. Regarding traffic intensity, only houses with a high number of pedestrians were more burglarized, the result is marginally significant.

Not in agreement with Macintyre but significant are the higher chances of a burglary at houses with an alarm and houses with multiple locks, as well as houses with a high fence at the front or the back. The value of burglarized houses was also not in agreement with Macintyre. The values of the burglarized houses were slightly lower than the values of the non burglarized houses.

Like stated before, the number of burglaries at houses with an alarm showed an opposite association, houses with an alarm were more burglarized than houses without an alarm. An explanation can be that an alarm indicates that there are valuable goods inside or that victims or a burglary fit an alarm after they are burglarized. This is called the 'Paris Hilton effect' according to Vollaard (2010). Without having experienced a burglary, people often fail to implement security measures that prevent burglaries. After they are burglarized they take a lot of measures, like multiple locks. This can explain why these houses were more burglarized. Another possible explanation is the time effect. The data of the burglarized

houses is from 2008, the observations were performed in 2010. Over the years residents could have moved somewhere else, reconstruct their dwelling or experience a burglary or another crime and take measures. Macintyre's participants stated they do not prefer high fences. Houses with a high fence at the front or the back also showed an opposite association. A possible explanation is that burglars in Enschede used a different point of entry for the houses or the fences were not closed (properly) and easy to move past. According to Krainz (1988), burglars might also be attracted to a residence when a high fences blocks the neighbors views.

Limitations

Offender interviews should be treated with caution. Nevertheless, offenders are a wide source of information and with the right methodology and maximizing the validity a lot of information of offenders can be learned. Maximizing validity for using information of offenders is the biggest challenge. This can be done in various ways (Field, 2005). Macintyre took this into account by selecting the offenders in a non threatening environment, where they were beyond the reach of the law. The first group of 50 offenders came from a drug treatment center and had no connection the police or the court of Justice. The second group of 96 offenders was selected via a private centre for released prisoners. These offenders served their time in prison and had no connection to the law anymore. All offenders were experienced burglars; some committed a few burglaries while others committed more than 100 burglaries. The burglars from the first study were still active or recently active as a burglar (Macintyre, 2001).

Some cues are time sensitive. For example, the cues people in the street and traffic volume of cars, bikes and pedestrians can differ at any time. This study did not take the times in which the burglaries occurred into account, which could influence the reliability of the results.

The study of Macintyre is performed in Australia, which can raise concern about the generalizability of cues to the Netherlands, which is in another continent. Study one of Macintyre took place in Bisbane, a city located in the east of Australia. This part of Australia has a subtropical climate and the climate can have windstorms during the rainy season, which is from January till April. The generalizability of the cue 'weather' is therefore less, because in the Netherlands these windstorms are less likely to occur. This can also be an explanation why no evidence was found for wind speed and burglary. Other research

discovered that variables about burglary can have a significant effect in the same direction in other countries (Tseloni, et al., 2004).

The WOZ value was used to analyze whether expensive houses were more burglarized than less expensive houses. This is the value the municipality assigns for taxes purposes to a property including the parcel, with the garden and garage. A limitation of using this value for analyses is for example a small apartment in an expensive neighborhood, which can potentially cost the same as a medium house on a very large parcel. A burglar could see the difference between those houses by using other cues, but the WOZ value would not reflect this difference. Using building values only could solve this issue. The WOZ value was only available at neighborhood level and not at individual level. This makes this outcome less reliable.

Suggestions for further research

Suggestions for further research could be a study of burglar alarms and other target hardening measures. Further research can go into detail about alarm systems and whether they are installed before or after a crime, which can gain useful information about the effect of alarm systems. This can apply to other target hardening measures as well, like multiple locks. The effect of both measures is unclear at this moment.

Another suggestion for further research is a study for houses in a dead-end street. This study made no difference between the type of street, only whether there was an exit. A new study can take the types of cul-de-sacs (linear in geometry and more sinuous) into account and analyze whether the risk of burglary is higher in a certain type.

A final suggestion for further research would be a replica of Macintyre's study in The Netherlands. This requires a comprehensive research and should be combined with an investigation about the modus operandi of a burglary. This can give new insights in the selection of a target in Dutch cities and the way how breaking and entering is performed.

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Appendix A

Checklist t.b.v. observaties – Februari - maart 2010

INVULLEN of CIRKEL BIJ VAN TOEPASSING

Adres:	**Dag:**	**Tijd:**
Waargenomen door bewoner (bv.opengaande gordijnen) (ja) (nee)	**(1)bewoner**	**(2)Buurman/-vrouw/-kind**
Bevraagd/geconfronteerd door bewoner (ja) (nee)		
Woontype		
1) Bouwjaar woning (schatting): (1) ouder dan 1930 (2) 1930 (3) 1950 -1960 (3) 1970-1980 (4) 1990 of later		
2) Type woning **(1) 2 ond. 1 kap (2) Hoekwoning (eind van blok) (3) Vrijstaand (4) Tussenwoning (5) Flat (beneden woning)**		
3) Soort woning [ja] Bungalow [ja] Eind v.d. straat woning [ja] Geschakelde woning (aan elkaar)		
4) Hoeveel huizen om het targethuis heen zijn er hetzelfde als het target huis? **(0) huizen (1) huis (2-5) huizen (6+) huizen**		
5) Aantal vrije zijdes (2) zijdes (3) zijdes (4) zijdes		
6) Aantal vrije zijdes met deuren of/en ramen (2) zijdes (3) zijdes (4) zijdes		
Wegennet		
7) Doodlopende straat (1) Ja (0) Nee (*NAAR VRAAG 9*) (9) n.v.t. **8) (1) met doorgang (0) zonder doorgang**		
9) Doorgaande weg (1) Ja (0) Nee (9) n.v.t.		
10) Toegang tot woongebied afgebakend door symbolische of werkelijke barrière (1) Ja (0) Nee		
Toegankelijkheid		
11) Aanwezigheid van een voetpad (1) Ja (0) Nee		
12) Voortuin (1) Ja (0) Nee *(NAAR VRAAG 17)*		
13) Voortuin met een speciaal ontwerp of extra verzorgd (2) Ja (1) Beetje (0) Nee		
14) Voortuin is 'mooier' dan de tuinen van de buren (2) Ja (1) Beetje (0) Nee		
15) Hoogte van de hoogste deel van de afscheiding (1) <1.00m (taille hoogte) (2) ong. 1.00-1.80m (3) ong. 1.8m+		
16) Voortuin is afgescheiden door: **[ja] Muur uit beton, metaal of hout [ja] Niet prikkende struiken [ja] Prikkende struiken** **[ja] Afscheiding met bovenop afrastering (prikkeldraad, pinnen) [ja] Niets [ja] Anders: namelijk: _____**		
17) Zie je aan de zij of aan de <u>voorkant</u> van het huis <u>OF binnen 100 m</u>.: **[ja] Winkels [ja] Open land [ja] Netwerk van andere voetpaden [ja] Plein/hof [ja] School [ja] Kerk**		

[ja] Andere woongebieden [ja] Bedrijven [ja] Industriegebied [ja] Anders, namelijk: _____

18) Zijingang naar tuin (1) Ja (0) Nee *(NAAR VRAAG 21)* (9) n.v.t.

19) (1) met deur (2) zonder deur *(NAAR VRAAG 21)*

Deur naar tuin is geplaatst op de hoogte van (dus tot waar gaat een pad langs het huis)

20) (1) op hoogte van de voorgevel (2) Tussen voor en achtergevel (3) Achtergevel (4) Nog verder

21) Rolluiken op begane grond (1) Ja (2) Nee

Woning waarneembaar voor anderen?

22) Woning zichtbaar vanaf <u>VERKEERSLICHTEN</u> (1) Ja (0) Nee (9) n.v.t.

23) Verkeersvolume bij de VERKEERSLICHTEN (voertuigen stoppen binnen 3 min.)

(1) 0-5 (2) 6-10 (3) 10+

24) Fietsersvolume bij de Verkeerslichten (fietsers stoppen binnen 3 minuten)

(1) 0-5 (2) 6-10 (3) 10+

25) Woning zichtbaar vanaf een <u>KRUISPUNT</u> (1) Ja (0) Nee (9) n.v.t.

26) <u>Verkeersvolume</u> bij het KRUISPUNT (voertuigen stoppen binnen 3 min.)

(1) 0-5 (2) 6-10 (3) 10+

27) <u>Fietsersvolume</u> bij het Kruispunt (fietsers stoppen binnen 3 minuten)

(1) 0-5 (2) 6-10 (3) 10+

28) Gemiddelde snelheid verkeer aan de <u>VOORKANT</u> van woning

(1) lager dan 30 (2) 30 (3) 50 (4) 70 (5) 70+ (9) n.v.t. (geen straat aan de voorkant, *NAAR VRAAG 30*)

29) <u>Verkeersvolume</u> aan de VOORKANT van de woning (voertuigen komen voorbij binnen 3 min.)

(1) 0-5 (2) 6-10 (3) 10+

30) <u>Verkeersvolume</u> (voetgangers) aan de VOORKANT van de woning (voetgangers komen voorbij 3 minuten)

(1) 0-5 (2) 6-10 (3) 10+

31) <u>Verkeersvolume (fietsers)</u> aan de voorkant van de woning (fietsers komen voorbij binnen 3 minuten)

(1) 0-5 (2) 6-10 (3) 10+

32) Rondhangende mensen in de nabijheid van de woning (1) Ja (0) Nee

Surveillance

33) Voordeur aan de straatzijde	(1) Ja	(0) Nee
34) Ingang woning zichtbaar vanaf de straat	(1) Ja	(0) Nee
35) Voordeur in een nis	(1) Ja	(0) Nee (*NAAR VRAAG* 37)
36) Verlichting in de nis	(1) Ja	(0) Nee (9) n.v.t.

37) Straatverlichting aanwezig (1) Ja (0) Nee
38) Woning ligt aan een plein/hof (1) Ja (0) Nee
39) Naar binnen kijken (2) Ja (1) Beetje (0) Nee (bijv.: gordijnen dicht)
40) Zijn er buren aan de overkant van de straat (1) Ja (2) Nee *(NAAR VRAAG 43)* **41) (1) Alleen afstand *(NAAR VRAAG 43)* (2) Alleen schuin *(NAAR VRAAG 43)* (3) Direct** **42) Buren direct aan de overkant (1) Ja, gordijnen open (2) Ja, maar gordijnen dicht**
Parkeergelegenheid
43) Oprit (1) Ja (0) Nee
44) Garage (1) Ja (0) Nee
45) Gemeenschappelijke parkeerplaats (1) Ja (0) Nee
46) Parkeren aan de straat (1) Ja (0) Nee
Sociaal klimaat
47) Aanwezigheid van buurtwachten (buurtpreventie) (1) Ja (0) Nee
48) Algemene staat van onderhoud van de buren: tekenen van achterstallig onderhoud **(0) Geen tekenen (1) Enkele tekenen (2) Ja veel**
49) Algemene staat van onderhoud van het perceel of woning: tekenen van achterstallig onderhoud **(0) Geen tekenen (1) Enkele tekenen (2) Ja veel**
50) Algemene staat van kozijnen (1) Goed (2) Enkele tekenen van achterstallig onderhoud (3) Niet goed
51) Tekenen van kortdurige afwezigheid (1) Ja (0) Nee
52) Tekenen van langdurige afwezigheid (1) Ja (0) Nee
Tekenen van
53) Aanwezigheid van een hond waarneembaar [ja] Blaffende of lopende hond [ja] Sticker [ja] Niets
54) Aanwezigheid van een inbraakalarm waarneembaar **[ja] Sticker [ja] Camera [ja] Bewegingsmelder (lamp) [ja] Niets**
55) Aanwezigheid van meerdere sloten waarneembaar (voordeur) (1) Ja (0) Nee
56) Open raam/deur op een kier (1) Ja (0) Nee **57) [ja] Op begane grond [ja] Kan volledig open**
Achterkant
58) Zie je de achtertuin? (1) Ja (0) Nee (achtertuin is dicht) *(NAAR VRAAG 61)*
59) Achtertuin met een speciaal ontwerp of extra verzorgd (2) Ja (1) Beetje (0) Nee (9) n.v.t.
60) Achtertuin is mooier dan de tuinen van de buren (2) Ja (1) Beetje (0) Nee (9) n.v.t.

61) Voetpad loopt aan de achterzijde van het huis (1) Ja (0) Nee *(NAAR VRAAG 65)* (9) n.v.t.
62) Woning is zichtbaar vanaf het voetpad (1) Ja (0) Nee (9) n.v.t.
63) Aantal gebouwen tussen voetpad en woning (0) (aangrenzend) (1) 1-5 (2) 6-10 (9) n.v.t.
64) Poort/hekwerk tussen voetpad en achtertuin (1) Ja (0) Nee (9) n.v.t.
65) Fietspad aan de zij of achterkant van het huis (1) Ja (0) Nee (9) n.v.t.
66) Zie je de afscheiding van de achtertuin? (1) Ja (0) Nee *(NAAR VRAAG 70)* (9) n.v.t.
67) Achtertuin is afgescheiden door: **[ja] Muur uit beton, metaal, steen of hout [ja] Niet prikkende struiken [ja] Prikkende struiken** **[ja] Afscheiding met bovenop afrastering (prikkeldraad, pinnen) [ja] Niets [ja] ANDERS, namelijk _____**
68) Afscheiding (1) met deur (0) zonder deur
69) Hoogte van de hoogste deel van de afscheiding (1) <1.00m (taille hoogte) (2)ong. 1.00-1.80m (3) ong. 1.80m+
70) Zie je aan de achterkant van het huis (binnen 100 m): **[ja] Winkels [ja] Open land [ja] Netwerk van andere voetpaden [ja] Plein/hof [Ja] School [Ja] Kerk** **[ja] Andere woongebieden [ja] Bedrijven [ja] Industrie(gebied) [ja] Anders, namelijk: _____**
71) Zijn er buren aan de overkant van de achterkant (1) Ja (2) Nee *(VUL NR. 72 en 73 NIET)* **72) (1) Alleen afstand *(VUL NR. 73 NIET)* (2) Alleen schuin *(VUL NR. 73 NIET)* 3) Direct 9) n.v.t.** **73) Buren direct aan de overkant (1) Ja, gordijnen open (2) Ja, maar gordijnen dicht (9) n.v.t.**

Appendix B

Table 1: Citizens, residential spaces and burglaries in Twente

Year	Number of citizens in Enschede*	Increase citizens Enschede every year in %	Residential spaces in Enschede*	Increase residential spaces in Enschede every year in %	Burglaries every year in police region Twente	Increase in burglaries in police region Twente every year in %
2006	154.331	0.42%	74.590	-	1587	-
2007	154.455	0.08%	74.913	0.43%	1521	-4.3%
2008	154.745	0.19%	75.297	0.51%	1650	8.48%
2009	156.089	0.87%	76.138	1.12%	1777	7.69%
2010	157.076	0.63%	-	-	1915	7.77%
2011	157.848	0.49%	-	-	2284	19.3%

- = data unknown

*Citizens and residential spaces source: http://enschede.buurtmonitor.nl

Appendix C

Table 3: Cohen's kappa

kappa			agreement
	κ	< 0.00	negative
0.00 ≤	κ	< 0.20	few to none
0.21 ≤	κ	< 0.40	mediocre
0.41 ≤	κ	< 0.60	reasonably
0.61 ≤	κ	< 0.80	significant
0.81 ≤	κ	< 1.00	(almost) full

Appendix D

Presence of a dog

		Burglarized		
		Yes	No	Total
Presence of a dog:	Yes	12	22	34
		2,8%	5,2%	4,0%
	No	415	398	813
		97,2%	94,8%	96,0%
	Total	427	420	847
		100,0%	100,0%	100,0%

Table 7: Presence of a dog (chi-square = 6,384; df = 2; p = 0,041*)

Lighting in a niche

		Burglarized		
		Yes	No	Total
Front door in niche:	With lighting	70	74	144
		66,7%	77,9%	72,0%
	Without lighting	35	21	56
		33,3%	22,1%	28,0%
	Total	105	95	200
		100,0%	100,0%	100,0%

Table 8: Lighting in the niche (chi-square = 3,119; df = 1; p = 0,077)

Burglar alarm

		Burglarized		
		Yes	No	Total
Alarm	Yes	29	17	46
		7,6%	4,2%	5,9%
	No	353	386	739
		92,4%	95,8%	94,1%
	Total	382	403	785
		100,0%	100,0%	100,0%

Table 9: Alarm present (chi-square = 4,045; df = 1; p = 0,044*)

Condition of window frames

		Burglarized		
		Yes	No	Total
Condition of window frames is:	Good	363	381	744
		84,8%	90,7%	87,7%
	Medium	53	35	88
		12,4%	8,3%	10,4%
	Poor	12	4	16
		2,8%	1,0%	1,9%
	Total	428	420	848
		100,0%	100,0%	100,0%

Table 10: Condition of the window frames (chi-square = 8,043; df = 2; p = 0,018*)

Maintenance site or house

		Burglarized		
		Yes	No	Total
Level of deferred maintenance:	No signs of disrepair	339	360	699
		78,8%	85,5%	82,1%
	Some signs of disrepair	77	56	133
		17,9%	13,3%	15,6%
	Many signs of disrepair	14	5	19
		3,3%	1,2%	2,2%
Total		430	421	851
		100,0%	100,0%	100,0%

Table 11: Maintenance of the site or house (chi-square = 8,116; df = 2; p = 0,017*)

Multiple locks visible

		Burglarized		
		Yes	No	Total
Multiple locks visible	Yes	20	7	27
		4,8%	1,7%	3,3%
	No	397	405	802
		95,2%	98,3%	96,7%
	Total	417	412	829
		100,0%	100,0%	100,0%

Table 12: Multiple locks visible (chi-square = 6,309; df = 1; p = 0,012*)

Fence at the front

		Burglarized		
		Yes	No	Total
Fence:	Low	185	246	431
		43,4%	58,9%	51,1%
	High	63	55	118
		14,8%	13,2%	14,0%
	No front garden or fence	178	117	295
		41,8%	28,0%	35,0%
	Total	426	418	844
		100,0%	100,0%	100,0%

Table 13: Fence at the front (chi-square = 21,715; df = 2; p < 0,001)

Fence at the back

		Burglarized		
		Yes	No	Total
Fence:	Low	13	4	17
		3,1%	1,0%	2,0%
	High	299	283	582
		70,9%	68,7%	69,8%
	No fence or back garden	110	125	235
		26,1%	30,3%	28,2%
	Total	422	412	834
		100,0%	100,0%	100,0%

Table 14: Fence at the back (chi-square = 6,043; df = 1; p = 0,049)

Type of property

		Burglarized		
		Yes	No	Total
Type of property:	Corner house	113	95	208
		26,3%	22,6%	24,5%
	Terraced house	130	155	285
		30,2%	36,9%	33,5%
	Semi-detached	97	115	212
		22,6%	27,4%	24,9%
	Detached house	68	51	119
		15,8%	12,1%	14,0%
	Flat ground floor	22	4	26
		5,1%	1,0%	3,1%
Total		430	420	850
		100,0%	100,0%	100,0%

Table 15: Type of property (chi-square = 20,054; df = 4; p < 0,001)

People in the street

		Burglarized		
		Yes	No	Total
People present in the street	Yes	51	73	124
		11,9%	17,4%	14,6%
	No	379	347	726
		88,1%	82,6%	85,4%
	Total	430	420	850
		100,0%	100,0%	100,0%

Table 16: People present in the street (chi-square = 5,197; df = 1; p = 0,023*)

Pedestrians

		Burglarized		
		Yes	No	Total
Number of pedestrians crossing in 3 minutes:	0-5	402	403	805
		94,4%	96,2%	95,3%
	6-10 (medium)	16	15	31
		3,8%	3,6%	3,7%
	10+ (high)	8	1	9
		1,9%	,2%	1,1%
	Total	426	419	845
		100,0%	100,0%	100,0%

Table 17: Number of pedestrians crossing (chi-square = 5,420; df = 2; p = 0,067)

Value of houses

	Burgled	N	Mean	Std. Deviation	Std. Error Mean
WOZ_1k	No	414	174,0797	67,21975	3,30367
	Yes	416	166,7115	50,92289	2,49670

Table 18: Average value of houses (Independent Samples Test: Not Burglarized (M=174, SD= 67,2) and Burglarized (M=166, SD=50,9); t=1,780, p = 0,075)

Appendix E

Dog evidence * Traffic volume

Traffic Volume			Burglarized yes/no		
			Yes	No	Total
Quiet	Dog evidence	Yes	10	19	29
			3,0%	5,8%	4,4%
		No	326	308	634
			97,0%	94,2%	95,6%
	Total		336	327	663
			100,0%	100,0%	100,0%
Busy	Dog evidence	Yes	2	3	5
			2,6%	4,1%	3,3%
		No	74	71	145
			97,4%	95,9%	96,7%
	Total		76	74	150
			100,0%	100,0%	100,0%

Table 19: Dog evidence x Traffic Volume (chi-square = 3,183; df = 1; p = 0,074)

Alarm evidence * Traffic volume

Traffic Volume			Burglarized yes/no		
			Yes	No	Total
Quiet	Alarm evidence	Yes	24	24	48
			7,1%	7,4%	7,3%
		No	312	302	614
			92,9%	92,6%	92,7%
	Total		336	326	662
			100,0%	100,0%	100,0%
Busy	Alarm evidence	Yes	3	2	5
			3,9%	2,7%	3,3%
		No	73	72	145
			96,1%	97,3%	96,7%
	Total		76	74	150
			100,0%	100,0%	100,0%

Table 20: Alarm evidence x Traffic Volume (chi-square = 0,012; df = 1; p = 0,913)

Traffic volume * Access to the rear

Access to the rear			Burglarized yes/no		
			Yes	No	Total
Yes	Traffic Volume	Quiet	166	159	325
			87,4%	83,7%	85,5%
		Busy	24	31	55
			12,6%	16,3%	14,5%
	Total		190	190	380
			100,0%	100,0%	100,0%
No	Traffic Volume	Quiet	171	168	339
			77,4%	80,0%	78,7%
		Busy	50	42	92
			22,6%	20,0%	21,3%
	Total		221	210	431
			100,0%	100,0%	100,0%

Table 21: Busy Traffic Volume x Access to the rear (chi-square = 0,442; df = 1; p = 0,506)