Article

Homicide clearance in Western Europe

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Abstract
This study provides an overview of homicide clearance in four West European countries: Finland, the Netherlands, Sweden and Switzerland. Using data from the European Homicide Monitor, employing similar definitions and uniform coding schemes, this study allowed for unique cross-country comparisons in factors influencing differences in homicide clearance rates. Findings based on homicides occurring in the period 2009–14 revealed overall low homicide rates in all countries, with a wide variety in homicide clearance rates, ranging from 77 percent in the Netherlands to 98 percent in Finland. Results further showed that both event-based as well as victim-based characteristics significantly influenced the likelihood of homicide clearance, suggesting that homicide clearance rates can, for a large part, be attributed to the prevalent types of homicide in each of these European countries.

Keywords
Clearance, Europe, homicide, international comparison

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Homicide clearance

Homicide is a rare, but serious form of interpersonal violence, leading to shock and incomprehension in society at large. The societal impact of homicide is exacerbated when cases take a particularly long time to solve or even remain completely unsolved, usually referred to as 'uncleared'. An uncleared homicide typically means police have not identified a suspect or do not have enough evidence for arrest. More generally, police are simply missing essential information about the suspect(s), including the victim–offender relationship, particularly when, for a period of time, the identity of the victim remains unknown (Quinet and Nunn, 2014).

Outside Europe, homicide clearance rates currently range from 96 percent in South Korea (Johnson, 2008), 95 percent in Japan (Roberts, 2008), to 24 percent in Trinidad and Tobago (Maguire et al., 2010). In non-European Western countries, homicide clearance rates vary from 91 percent in New Zealand (New Zealand Crime Statistics, 2015), 87 percent in Australia (Chan and Payne, 2013), to 75 percent in Canada (Mahony and Turner, 2012) and 65 percent in the United States (Roberts, 2008). Prior research in European countries has revealed 98 percent of homicides being solved in Finland (Lehti and Kivivuori, 2012), between 88 and 94 percent in Germany (Polizeiliche Kriminalstatistik, 2014), 87 percent in Switzerland (Bänziger and Killias, 2014), 85 percent in England & Wales (Smith et al., 2012), and about 80 percent in Sweden (Granath, 2011) and in the Netherlands (Van Os et al., 2010).

One may question, however, the validity of these figures when making international comparisons. Linking international homicide clearance rates is hindered by the differential use of definitions. Further, some reports exclude homicides committed in conjunction with a felony or other crime. In these statistics, homicides are coded as a by-product of another felony – for example, a homicide committed in the course of a robbery is coded as a 'robbery gone wrong' rather than a homicide (Finch, 2001). Much of the homicide clearance literature to date relies on data from the United States (Alderden and Lavery, 2007; Davis et al., 2014; Doerner and Doerner, 2012; Jarvis and Regoeczi, 2009; Keel et al., 2009; Litwin and Xu, 2007; Quinet and Nunn, 2014; Regoeczi et al., 2008; Riedel and Boulahanis, 2007; Roberts, 2007; Roberts and Lyons, 2009, 2011; Schroeder and White, 2009; Taylor et al., 2009). So far, it has not been possible to compare homicide clearance rates between European countries, owing to differences in definitions, data sources and criminal justice procedures. To overcome these limitations, for the purpose of this study we will make use of the European Homicide Monitor, a unified data system including information on homicide cases, offenders and victims in four European countries: Finland, the Netherlands, Sweden and Switzerland.

The need to shed light on internationally comparable homicide clearance rates in Europe is at least threefold. First, homicide is the most violent form of crime. The impact and consequences of homicide are severe for the relatives, friends and acquaintances involved. Unsolved homicides cause considerable psychological and emotional damage for the bereaved. The uncertainty and the apparent lack of a motive for their deaths inhibit adequate mourning (Poijula, 2010; Wijk et al., 2013). Unsolved homicides are accompanied by feelings of insecurity, turmoil and injustice.

Second, unsolved homicides – owing to the long duration of investigations, whether or not followed by costly cold case investigations – are associated with high financial costs, without leading to a positive outcome. Poor clearance rates may not only reduce morale among police officers but also lead to diminished public trust in the criminal justice system, including the police (Riedel, 1999).

Additionally, certain homicides – particularly homicides taking place in a criminal setting – that remain uncleared may constitute a risk of initiating new homicides as revenge. Such chain-reactions and connections between certain homicides have been reported in prior studies (Granath, 2011). It is therefore fundamental to gain insight into what factors determine homicide clearance and, in turn, provide the basis for strategies necessary to increase the homicide clearance rate.

Theoretical background

Examining the reasons for homicide clearance has potential policy relevance for improving low clearance rates, and may provide a window into police allocation of investigative effort (Roberts and Lyons, 2009). Several theoretical frames have previously been used in relation to homicide clearance rates. Roughly, these theories can be divided in two groups: Black's theory on discretional factors (Black, 1970) and Gottfredson and Hindelang's theory on non-discretional factors (Gottfredson and Hindelang, 1979). Whereas the first theoretical perspective holds that the police and political forces play a decisive role in the (un)cleared status of a crime, the second perspective suggests that case-specific factors affect the homicide clearance rate. Put simply, is homicide clearance a function of extra-legal factors, such as the likeability of victims and offenders, or is clearance a product of the availability of investigative evidence leading to an arrest?

Discretional factors

Black's Theory of Law (1970) suggests that police use discretion in clearing homicide cases: they base their choices on the social characteristics of the victims and the areas in which the homicide took place (Black, 1970, 1976; Litwin, 2004). From a victim-devaluation standpoint, cases with specific victim characteristics receive more 'law', and hence are more likely to be solved, compared with other cases. For example, cases that involve female victims, white victims and younger victims are thought to be more likely to be cleared compared with cases that involve 'less likeable' victims, such as victims with a prior arrest record (Regoeczi et al., 2008; Roberts, 2007; Roberts and Lyons, 2009, 2011; Sturup et al., 2015; Taylor et al., 2009). Similarly, Black (1980) hypothesized that crimes are less likely to be solved when they occur in areas with lower social-economic status, lower educational attainment levels, higher unemployment rates and a smaller percentage of owner-occupied dwelling units (Litwin and Xu, 2007). What follows is that those homicides will get less police attention and therefore are less often solved (Lyons and Roberts, 2014). Later theorists have added that solving crimes, including homicides, is a political process (Davis et al., 2014). From this perspective, the strategy and amount of law available are not determined by the individual police detective but are orchestrated at higher organizational levels. Here, the quantity of law given to

each homicide case is affected by the culture and organization of the police force. In the same line of reasoning, heavy crime workloads are thought to be associated with lower clearance rates (Paré et al., 2007), suggesting that a high homicide rate goes hand in hand with low clearance rates, although empirical findings assessing this premise are mixed (Litwin, 2004; Litwin and Xu, 2007).

Non-discretional factors

Rather than considering discretionary factors or political forces as an explanation for the processes that lead to an (un)successful clearance, Gottfredson and Hindelang (1979) suggest that non-discretional factors, or factors outside police control, predominantly determine the odds of clearance. From this point of view, because homicide is such a unique crime, there is a strong organizational pressure on police always to be equally attentive to solving the case, irrespective of who the victim is or where the crime occurs (Litwin, 2004). From this perspective, only non-discretionary factors constitute essential predictors for clearance status, such as weapon type, location of the victim's body, area population, the relationship between victim and offender, homicide circumstances and simultaneously committed offences (Litwin and Xu, 2007; Lyons and Roberts, 2014). Each of these factors, Hindelang and colleagues (1979) argue, influence the value and amount of information available to the police, which in turn influences the clearance rate. Homicide clearance, according to this perspective, is thus primarily a function of whether investigators have enough evidence to make an arrest and not a choice of how vigorously to investigate (Roberts and Lyons, 2009).

Previous findings

So far, research has not provided strong support for Black's police discretion perspective. It should be noted, however, that Black's theories have mostly been tested in democratic societies where the police force is under the more or less strict control of civil society. Research in other types of societies is scarce at best. Keeping this caveat in mind, some studies find that homicide clearance is equally likely for male and female victims (Addington, 2006; Litwin, 2004), whereas other studies suggest that cases with female victims are more likely to be solved (Lee, 2005; Regoeczi et al., 2000). In terms of age, the literature consistently points out that homicides of children have a high likelihood of being solved, owing to the frequent presence of family members in their company (Regoeczi et al., 2008). Homicides with elderly victims, however, have a lower clearance rate, which is probably because elderly people are more subject to robberies by unknown offenders (Bänziger and Killias, 2014; Litwin, 2004; Regoeczi et al., 2000). Other sociodemographic characteristics, such as marital status, also seem to influence the likelihood of clearance, as previous studies found cases involving divorced or single victims to be among the lowest clearance categories (Riedel, 1999; Silverman and Kennedy, 1987). In terms of ethnic background, some studies find cases with ethnic minority victims more likely to be cleared than those with ethnic majority victims (Regoeczi et al., 2000), whereas other studies identified cases with ethnic minority victims less likely to be cleared (Litwin, 2004; Roberts and Lyons, 2011). Further, the relationship between

economically disadvantaged areas and clearance rate also seems to be mixed. Because the solvability of cases occurring in community areas with greater economic disadvantage seems to be sensitive to temporal context (Litwin and Xu, 2007), so far there is no straightforward support for Black's (1970) discretional factors.

There is some evidence that non-discretional (situational) characteristics may influence the likelihood of homicide clearance, with the availability of physical evidence and information being more decisive factors (Roberts, 2007). Homicides that include victims who were found in public spaces, for example, seem to have a higher clearance rate compared with homicides with victims who were hidden from the public eye, such as homicides that lacked eyewitnesses (Sturup et al., 2015) or homicides that have taken place in alleys (Litwin and Xu, 2007; Lyons and Roberts, 2014). In addition, cases with victims found in private locations (such as homes or apartments) are the most likely to be cleared (Addington, 2006; Litwin and Xu, 2007; Mouzos and Muller, 2001; Wellford et al., 1999), since in those cases the perpetrator is almost always the (estranged) intimate partner or another family member (Litwin and Xu, 2007). Further, in terms of area population, findings are mixed. Some studies find homicides in populated areas to be more likely to be cleared than those in less populated areas, which can be attributed to the willingness of witnesses in densely populated areas to share information (Wellford et al., 1999). Others, conversely, find homicides occurring in a small town or sparsely populated area more likely to be cleared (Litwin, 2004). Also, US studies find that homicides committed with a firearm are less likely to be cleared compared with cases involving other types of weapons (Litwin and Xu, 2007; Sturup et al., 2015), related to less forensic evidence being left at the scene and the accompanying greater physical distance between victim and perpetrator (Geberth, 1996; see Roberts, 2007). Findings on the influence of alcohol intoxication are mixed: whereas some studies find alcohol intoxication to be associated with lower clearance rates (Regoeczi et al., 2008), others report that cases are more likely to be solved if the victim is intoxicated with alcohol (Granath, 2011; Sturup et al., 2015). Finally, research shows that homicides are less likely to be cleared when there is a concomitant felony, or when the homicide is drug-related or gang-related, compared with homicides where a general altercation constitutes the main motive (Litwin and Xu, 2007; Regoeczi et al., 2000). This can be attributed to the fact that such homicides tend to be committed in areas with a lower likelihood of willing witnesses. Also, as Roberts (2007) pointed out, these homicides tend to have a random 'hit and run' nature and are therefore harder to investigate effectively. In addition, such drug and felony homicides typically involve strangers, which may further complicate the investigation because it is harder to identify a suspect (Jarvis and Regoeczi, 2009; Roberts, 2007). Again, the vast majority of these prior studies have been conducted in the United States. So far, it is not known to what extent these findings are also applicable to homicide clearance in Western Europe.

Aim

The aim of this study is at least twofold. First, by making use of a unique, homogeneous monitoring system, we seek to provide a very first overview of differences in homicide clearance in four West European countries: Finland, the Netherlands, Sweden and

Switzerland. Second, we aim to assess which factors influence differences in homicide clearance both within and between these European countries. Studying homicide clearance allows us to better understand the factors that influence clearance and helps provide insight into how clearance rates might be improved (Roberts, 2007).

Methodology

The European Homicide Monitor

Cause of death statistics, police statistics and other types of homicide data can be used to assess the frequency of homicides in different countries, but their comparability is not without problems owing – among other factors – to differential inclusion criteria. Further, whereas some datasets include only victim-based information, other data sources are mostly perpetrator-based, hampering the matching and comparability of figures derived from these datasets. Detailed national data on the characteristics of homicides are even less comparable owing to legal and definitional differences. To overcome these limitations, we have constructed a joint homicide database entitled the European Homicide Monitor (EHM), enabling comparisons and analyses among European countries (for a detailed overview, see Granath et al., 2011; Liem et al., 2013).

The EHM consists of 85 variables and includes victim, offender and incident characteristics. There are differences in the degree to which countries possess detailed information on each homicide. In the EHM, homicide is defined as an intentional criminal act of violence by one or more human beings resulting in the death of one or more other human beings. This definition covers similar legal codes for homicide in each of the four countries studied and roughly covers the definition used in other multisite datasets such as the National Violent Death Reporting System (Centers for Disease Control and Prevention, 2016). In Finland, the Netherlands and Sweden, the definition covers the legal codes of murder, manslaughter, infanticide and assault leading to death. Attempted homicides, suicides, abortion, euthanasia and assistance with suicide are not included in the data. Neither are cases of involuntary manslaughter by, for example, drunk driving, nor cases of intentional but (by court decision) legally justified killings – for example, police officers shooting an individual in self-defence. Switzerland uses a slightly different definition, which leads to the exclusion of assaults leading to death and the inclusion of killings from legitimate self-defence.[1] For this study, we will apply the EHM framework to provide an overview of all homicides that took place in the Netherlands, Sweden and Switzerland in the period 2009–14 and in Finland in the period 2003–14 and had become known to the authorities by 31 December 2015.

Homicide data sources

Finnish homicide data in the period 2003–14 have been maintained by the Institute of Criminology and Legal Policy at the University of Helsinki (ICLP) and have been added into the Finnish Homicide Monitor (FHM). The FHM is based on information produced during preliminary police investigations, and collected directly by the chief investigator on a compulsory standard electronic form. For crimes that are not cleared within

a reasonable amount of time, the available data are registered about one year after the initiation of the investigation, provided that the case is still being investigated as a probable homicide. The FHM contains a great number of detailed variables related to victim, offender and case characteristics, including external data on prior criminal court convictions of perpetrators and victims, and on court rulings. Owing to the extremely small number of unsolved cases in Finland during the period studied (nine cases), the outcome variable was differentially defined in Finland. Cases whose clearance took less than 30 days constituted the outcome. These formed 93 percent of all homicides during the period in the country. Additionally, the observation period was extended to cover the years from 2003 to 2014.

Homicide data from the Netherlands for the period 2009–14 stem from three sources: media reports, police data and court files. Media reports on homicides are retrieved from the Dutch Associated Press and LexisNexis. These reports are completed and verified with digitalized national police data on homicide events. Third, homicide data are completed and verified by assessing hard-copy court files, which include the criminal proceedings of the case, interview excerpts with suspects, relatives and witnesses and, in several cases, forensic mental health reports.

Homicide data from Sweden for the years 2009–13 are collated by the Swedish National Council for Crime Prevention. The data include all cases known to the authorities as committed in 2009–13, with the clearance status (solved or as yet unsolved) registered in over 99 percent of all cases. All assessments of cases are based on police files, the verdicts from the court (if a trial has been carried out) and records of a forensic psychiatric examination when such an examination had been carried out. In short, the data contain a large number of variables with individual-level information on case, victim and offender factors, providing possibilities for disaggregated analyses of clearance trends. For detailed case, victim and offender analyses, data were available for the period 2009–13.

Homicide data from Switzerland stem from the Swiss Homicide Project, which contains a database covering all intentional, completed homicides in Switzerland in the time period 2005–14. This project is conducted by the University of St. Gallen and financed by the Swiss National Science Foundation. Homicide cases are identified by the cantonal departments of public prosecution, which additionally provided information about exceptionally cleared cases. Data on homicides with perpetrators undergoing a court procedure stem from court files. For detailed case, victim and offender analyses, homicide data were available for the years 2009–14.

Definitions of variables

EHM homicide incident characteristics include the homicide location, which is regarded as public when the event took place in a location such as a park, forest, recreational area, shop, restaurant, bar, street, public transportation or the workplace. A private location includes the home of the victim or offender, a hotel, motel, dormitory or car. The modus operandi was determined by the cause of death of the victim based on external causes of morbidity, according to the World Health Organization ICD 10 (International Classification of Disease) list of 'Assaults'. In applying this system, the EHM employs the same

definition as the International Classification of Crimes for Statistical Purposes of the United Nations Office on Drugs and Crime. Here, causes of death include firearms, blunt instruments, sharp instruments, strangulation, hitting/kicking or other modus operandi, such as dying of poisoning, explosives, drowning, fire or motor-vehicle-related injuries. Homicide types include domestic homicides (partner, child and other family killing), criminal milieu homicides (rip deals, narcotics affairs and homicides taking place between perpetrator and victim who are both involved in criminal activities, the homicide having to do with such activities), robbery killings (commercial businesses, private homicides and street robberies), homicides in nightlife violence, sexual homicides and other homicides. It should be noted that, because these homicide types are partially based on a known victim–offender relationship, this variable is often missing in uncleared cases. For this project, we use the following homicide victim and offender characteristics: gender, age and ethnicity. Whereas in US literature, race (White, Black, Latino) (Litwin, 2004; Regoeczi et al., 2000; Roberts and Lyons, 2011) has been used to denote majority and minority groups, we distinguish between ethnic majority ((parents or individual) same country of birth) and ethnic minority groups ((parents or individual) other country of birth). In other words, individuals born in the same country where the homicide took place, but with parents born in another country, are classed as ethnic minority.

In the EHM, a homicide is deemed to be solved if the police considered the case cleared with the arrest of a suspect or considered it as exceptionally cleared. Exceptionally cleared cases involve a suspect or perpetrator who is known to the police but for some reason cannot be (lawfully) arrested. Examples include charges being rejected by the prosecutor, perpetrators who committed suicide or perpetrators who left the country and therefore the jurisdiction area (Riedel and Boulahanis, 2007). Exceptional clearances are also sometimes referred to as 'administrative closures' (Maguire et al., 2010).

Analyses

In order to determine differences between cleared and uncleared cases, ANOVA and chi-squared tests were used. To estimate the probability of a homicide being solved or remaining unsolved, or, in Finland, being solved in less than 30 days or not being solved in this time frame, and to further assess the marginal effect of both discretional and non-discretional variables, multivariate analyses were conducted. Since our main outcome was dichotomous (a homicide being solved or not; in Finland, solved in less than 30 days or in 30 days or more), we employed binomial logistic regression, using the enter method and reporting the odds ratio (OR). Analyses used SPSS version 23.

Results

Descriptive analyses

In the period 2009–14, a total of 617 homicides took place in Finland, 896 in the Netherlands, 490 in Sweden and 225 in Switzerland. Table 1 reflects the victimization rates for each of these countries in the time period studied. Throughout the study period, the homicide rate in three West European countries declined, from 2.24 to 1.63 per

Table 1. Homicide victimization rates (per 100,000) and homicide clearance rates (percent) by country, 2009–14.

Year	Finland		The Netherlands		Sweden		Switzerland	
	Rate	Clearance	Rate	Clearance	Rate	Clearance	Rate	Clearance
2009	2.24	98.3%	1.08	77.5%	0.96	87.2%	0.50	97.3%
2010	2.21	98.3%	1.04	80.0%	0.97	88.9%	0.47	88.2%
2011	2.04	99.1%	0.96	79.6%	0.85	73.7%	0.49	100.0%
2012	1.64	97.8%	0.86	80.7%	0.71	81.5%	0.41	94.4%
2013	1.65	98.9%	0.88	74.1%	0.90	80.2%	0.57	96.3%
2014	1.63	96.6%	0.81	69.9%	0.89	—[a]	0.38	93.8%
Average	1.90	98.2%	0.94	77.1%	0.88	82.6%	0.47	95.0%

Note:
a. Clearance rates for homicides in Sweden are not assigned until all cases are individually followed up, which for 2014 was not entirely done at the time of writing.

100,000 in Finland, from 1.08 to 0.81 in the Netherlands, and from 0.96 to 0.88 in Sweden. In Switzerland, in this period the homicide rate fluctuated around 0.50 per 100,000. In the period under study, on average 98 percent of homicides were cleared in Finland, 77 percent in the Netherlands, 83 percent in Sweden and 95 percent in Switzerland. The median number of days for cases to be solved was one day in Finland, one day in the Netherlands, one day in Sweden and zero days (the same day the homicide took place) in Switzerland.

Considering homicide event characteristics, results showed that in Finland, the Netherlands and Sweden, homicides taking place in a public setting were significantly more difficult to clear compared with homicides taking place in a private setting (see Table 2). In Finland, 88 percent of 'public' homicides were cleared in less than 30 days versus 95 percent of 'private' homicides, in the Netherlands the clearance rate of 'public' homicides was 68 percent versus 81 percent of 'private' homicides, and in Sweden 73 percent versus 89 percent of homicides occurring indoors. In Switzerland, because of the very small proportion of unsolved cases, the difference in clearance rate between private and public homicides remained non-significant. In terms of geographical location, in most countries no significant differences in clearance were found in homicides occurring in urban versus in rural areas. The Netherlands constituted an exception, with a significantly higher likelihood of homicide clearance in rural areas (79 percent) versus urban areas (73 percent). Further, although in all countries but Sweden, the percentage of single-victim homicides being solved seemed to be somewhat lower than the percentage of multiple-victim homicides being solved, this finding remained non-significant in all of the countries. Regarding the modus operandi, results indicated various patterns: First, there were significant differences in the clearance speed among Finnish homicides in terms of the method used in the homicide. A closer look at the results showed that homicides committed by 'other' methods, such as drowning, smoke, fire, explosives or by motor vehicle, were harder to clear (81 percent) as compared with other categories, including homicides committed by firearms (95 percent). Second, results indicated quite

Table 2. Characteristics of cleared versus uncleared homicides by country, 2009–14.

Characteristics	Finland[a]				The Netherlands				Sweden				Switzerland			
	Cleared		Uncleared		Cleared		Uncleared		Cleared		Uncleared		Cleared		Uncleared	
	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
Location	1183	93.4***	84	6.6	550	76.3***	171	23.7	332	84.2**	62	15.8	152	96.2a	6	3.8
Public	309	88.3	41	11.7	185	68.0	87	32.0	84	73.0	31	27.0	39	95.1	2	4.9
Private	874	95.3	43	4.7	365	81.3	84	18.7	248	88.9	31	11.1	113	96.6	4	3.4
Missing	3	–	6	–	141	–	34	–	1	–	8	–	0	–	2	–
Area location	1185	93.2	87	6.8	663	76.5*	204	23.5	331	83.8	64	16.2	152	95.6a	7	4.4
Urban	964	92.7	76	7.3	264	72.5	100	27.5	236	83.1	48	16.9	57	91.9	5	8.1
Rural	221	95.3	11	4.7	399	79.3	104	20.7	95	85.6	16	14.4	95	97.9	2	2.1
Missing	1	–	3	–	28	–	1	–	2	–	6	–	0	–	1	–
Number of victims	1186	92.9a	90	7.1	691	77.1	205	22.9	333	82.6	70	17.4	152	95.0a	8	5.0
Single victim	1131	92.8	88	7.2	657	76.8	198	23.2	287	83.2	58	16.8	138	94.5	8	5.5
Multiple victims	55	96.5	2	3.5	34	82.9	7	17.1	46	79.3	12	20.7	14	100.0	0	0.0
Missing	0	–	0	–	0	–	0	–	–	–	–	–	0	–	0	–
Modus operandi	1180	93.2***	86	6.8	533	78.7***	144	21.3	332	83.4 ***	66	16.6	150	94.9a	8	5.1
Firearm	177	94.7	10	5.3	141	56.2	110	43.8	57	58.8	40	41.2	49	96.1	2	3.9
Blunt instrument	101	91.0	10	9.0	21	95.5	1	4.5	26	86.7	4	13.3	13	100.0	0	0.0
Sharp instrument	518	96.5	19	3.5	224	91.1	22	8.9	162	92.6	13	7.4	59	95.2	3	4.8

Table 2. (Continued)

Characteristics	Finland[a]				The Netherlands				Sweden				Switzerland			
	Cleared		Uncleared		Cleared		Uncleared		Cleared		Uncleared		Cleared		Uncleared	
	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
Strangulation	113	97.4	3	2.6	60	98.4	1	1.6	34	85.0	6	15.0	18	85.7	3	14.3
Hitting/kicking	188	88.3	25	11.7	46	95.8	2	4.2	31	91.2	3	8.8	8	100.0	0	0.0
Other	83	81.4	19	18.6	41	83.7	8	16.3	22	100.0	0	0	3	100.0	0	0.0
Missing	6	–	4	–	158	–	61	–	4	–	1	–	2	–	0	–
Type of homicide	1113	93.8[b]	73	6.2	437***	83.1	89	16.9	327	85.4***	56	14.6	151	99.3[b]	1	0.7
Domestic	413	95.2	21	4.8	228	95.4	11	4.6	145	96.0	6	4.0	99	100.0	0	0.0
Criminal milieu	23	88.5	3	11.5	45	45.9	53	54.1	31	47.7	34	52.3	15	100.0	0	0.0
Robbery	36	87.8	5	12.2	30	75	10	25	16	72.7	6	27.3	7	100.0	0	0.0
Nightlife	32	88.9	4	11.1	5	100	0	0	18	90.0	2	10.0	7	87.5	1	12.5
Sexual	7	100.0	0	0.0	20	80	5	20	4	100.0	0	0	0	100.0	0	0.0
Other	602	93.8	40	6.2	109	91.6	10	8.4	113	93.4	8	6.6	23	100.0	0	0.0
Missing	73	–	17	–	254	–	116	–	6	–	14	–	1	–	7	–

Notes:

a. Incidence-based analysis for the years 2003–14, where 'cleared' means the homicide was cleared in less than in 30 days, and 'uncleared' means the homicide was not cleared in less than 30 days.

b. χ^2 test cannot be estimated because at least one cell has an expected count less than 5.

***p = < .001; **p = < .01; *p = < .05.

the opposite in both the Netherlands and Sweden, where homicides committed by firearm had overall much lower clearance rates (56 percent in the Netherlands and 57 percent in Sweden) compared with homicides committed by other means. In Switzerland, with an overall high clearance rate, the modus operandi did not influence the clearance rate, insofar as all homicides committed with a blunt instrument, by hitting or kicking, or by other methods were solved (100 percent). What all four countries had in common was a relatively high clearance rate (in Finland, fast clearance speed) among homicides committed by blunt or sharp instruments and by so-called 'hands-on' methods, such as strangulation and hitting or kicking, with overall percentages ranging from 85 percent to 100 percent. Although there were no significant differences in terms of the type of homicide in both Finland and Switzerland, in the Netherlands and Sweden the type of homicide did influence the likelihood of clearance. In both countries, homicides committed in a criminal milieu (46 percent in the Netherlands and 48 percent in Sweden) and homicides in the context of a robbery (75 percent in the Netherlands and 73 percent in Sweden) had overall much lower clearance rates compared with other types of homicide, such as domestic homicides, nightlife homicides or sexual homicides.

In terms of victim characteristics (Table 3), in neither Finland nor Switzerland did gender seem to be associated with differences in homicide clearance, as both male (93 percent in Finland and 95 percent in Switzerland) and female homicides (93 percent in Finland and 95 percent in Switzerland) were cleared by a similar rate. In the Netherlands and Sweden, in contrast, homicides involving a female victim had significantly higher clearance rates (90 percent in the Netherlands and 96 percent in Sweden) compared with homicides involving a male victim (71 percent in the Netherlands and 76 percent in Sweden). Significant differences between cleared and uncleared cases in terms of victim age were found in all countries except Switzerland. Whereas in Finland the cases hardest to clear were those with young victims under the age of 6 (81 percent) and with old victims over 65 (88 percent), different patterns were observed in the Netherlands and Sweden. Here, the lowest clearance rates were found among victims aged between 25 and 39 (71 percent in the Netherlands and 69 percent in Sweden). Finally, bivariate analyses for Finland, the Netherlands and Switzerland revealed no significant differences in homicide clearance rates between events involving an ethnic minority victim compared with cases involving an ethnic majority victim. In Sweden, these groups differed significantly, with cases involving an ethnic minority victim having a lower clearance rate (65 percent) compared with cases with an ethnic majority victim (91 percent).

Multivariate analyses

In line with the results from the binary analysis, multivariate analyses (see Table 4a) showed that the likelihood of fast homicide clearance in Finland decreased significantly when young victims (OR = 0.306) or elderly victims (OR = 0.427) were involved. The analysis further showed that homicides occurring in a public location decreased the odds of being solved quickly (OR = 0.346).

In the Netherlands, homicides involving a female victim were on average twice as likely to be cleared compared with homicides involving a male victim (OR = 2.431) (see Table 4b). Further, whereas not significant in bivariate analyses,

Table 3. Victim characteristics of cleared versus uncleared homicides by country, 2009–14.

Characteristics	Finland[a] Cleared N	Percent	Uncleared N	Percent	The Netherlands Cleared N	Percent	Uncleared N	Percent	Sweden Cleared N	Percent	Uncleared N	Percent	Switzerland Cleared N	Percent	Uncleared N	Percent
Gender	1186	92.9	90	7.1	656	76.5***	202	23.5	333**	82.6	70	17.3	152	95.0a	8	5.0
Male	837	92.9	64	7.1	421	70.5	176	29.5	206	76.0	65	24.0	70	94.6	4	5.4
Female	349	93.1	26	6.9	235	90	26	10	127	96.2	5	3.8	82	95.3	4	4.7
Missing	0	–	0	–	35	–	3	–	–	–	–	–	0	–	0	–
Age	1186	92.9a	90	7.1	659	76.8***	199	23.2	322***	82.4	69	17.6	152	95.0a	8	5.0
≤ 6	35	81.4	8	18.6	33	80.5	8	19.5	14	100.0	0	0	7	100.0	0	0.0
7–17	20	95.2	1	4.8	36	100	0	0	16	88.9	2	11.1	9	90.0	1	10.0
18–24	92	92.9	7	7.1	86	86.9	13	13.1	46	83.6	9	16.4	15	100.0	0	0.0
25–39	313	93.2	23	6.8	204	70.8	84	29.2	76	69.1	34	30.9	38	95.0	2	5.0
40–64	627	94.3	38	5.7	229	73.2	84	26.8	127	84.1	24	15.9	59	92.2	5	7.8
≥ 65	99	88.4	13	11.6	71	87.7	10	12.3	43	100.0	0	0.0	24	100.0	0	0.0
Mean	43.32 ± 22.17		43.50 ± 16.56		41.19 ± 25.08		39.12 ± 15.00		41.12 ± 24.45		36.78 ± 12.88		42 ± 20.91		41 ± 12.09	
Missing	0	–	0	–	32	–	6	–	11	–	1	–	0	–	0	–
Ethnicity	1186	92.9	90	7.1	691	77.1	205	22.9	312**	81.5	71	18.5	142	95.3a	7	4.7
Ethnic majority	1116	92.8	87	7.2	183	81	43	19	210	91.3	20	8.3	89	97.8	2	2.2
Ethnic minority	70	95.9	3	4.1	508	75.8	162	24.2	102	66.7	51	33.3	53	91.4	5	8.6
Missing	0	–	0	–	0	–	0	–	24	–	0	–	10	–	1	–

Notes:

a. Incidence-based analysis for the years 2003–14, where 'cleared' means the homicide was cleared in less than in 30 days, and 'uncleared' means the homicide was not cleared in less than 30 days.

b. χ^2 test cannot be estimated because at least one cell has an expected count less than 5.

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

Table 4a. Logistic regression odds ratio predicting the likelihood of homicides being solved in less than 30 days in Finland (*N* = 1266), 2003–14.

Predictor variables	Logistic coefficient	S.E.	Odds ratio
Discretional factors			
Female victim	−0.006	0.266	0.994
Ethnic majority victim	−0.606	0.612	0.545
Young victim	−1.185	0.409	0.306**
Elderly victim	−0.851	0.340	0.427*
Multiple victims	0.736	0.756	2.088
Non-discretional factors			
Firearm homicide	0.147	0.361	1.159
Public location	−1.062	0.234	0.346***
Urban area	−0.552	0.341	0.576

Note: Owing to the extremely small number of unsolved cases in Finland during the studied period, the outcome variable refers to cases whose clearance took less than 30 days. These formed 93 percent of all homicides during the period in the country.

Table 4b. Logistic regression odds ratio predicting the likelihood of homicides being solved or unsolved in the Netherlands (*N* = 634), 2009–14.

Predictor variables	Logistic coefficient	S.E.	Odds ratio
Discretional factors			
Female victim	0.888	0.347	2.431**
Ethnic majority victim	0.076	0.255	1.079**
Young victim	1.940	1.050	6.961
Elderly victim	0.356	0.523	1.427
Multiple victims	0.137	0.578	1.146
Non-discretional factors			
Firearm homicide	−1.901	0.235	0.149**
Public location	−0.159	0.226	0.853
Urban area	−0.278	0.217	0.757

homicides involving an ethnic majority victim were found to be slightly more likely to be cleared (OR = 1.079) compared with homicides involving an ethnic minority victim. Finally, homicides committed by a firearm decreased the likelihood of being cleared significantly (OR = 0.149) compared with homicides committed by other methods.

The likelihood of homicide clearance in the Netherlands showed many similarities with homicide clearance in Sweden (see Table 4c), with female victims significantly increasing the likelihood of a case being solved more than eight times (OR = 8.142), and ethnic majority victims increasing the likelihood of clearance more than four times (OR = 4.440). The use of firearms in a homicide, however, significantly decreased the likelihood of homicides being solved (OR = 0.171).

Table 4c. Logistic regression odds ratio predicting the likelihood of homicides being solved or unsolved in Sweden (N = 366), 2009–13.

Predictor variables	Logistic coefficient	S.E.	Odds ratio
Discretional factors			
Female victim	2.097	0.493	8.142*
Ethnic majority victim	1.480	0.306	4.440*
Young victim	1.524	0.801	4.718
Elderly victim	Too few cases	–	–
Multiple victims	−0.720	0.413	0.499
Non-discretional factors			
Firearm homicide	−1.764	0.288	0.171*
Public location	−0.562	0.298	0.570
Urban area	0.231	0.309	1.259

***p = < .001; **p = < .01; *p = < .05

Table 4d. Logistic regression odds ratio predicting the likelihood of homicides being solved or unsolved in Switzerland (N = 145), 2009–14.

Predictor variables	Logistic coefficient	S.E.	Odds ratio
Discretional factors			
Female victim	1.605	1.140	4.978
Ethnic majority victim	1.062	0.982	2.891
Young victim	−1.099	1.229	0.333
Elderly victim	Too few cases	–	–
Multiple victims	Too few cases	–	–
Non-discretional factors			
Firearm homicide	0.238	1.209	1.269
Public location	−0.087	1.019	0.932
Urban area	−0.842	0.999	0.431

***p = < .001; **p = < .01; *p = < .05

Owing to the very high clearance rate in Switzerland across all categories (Table 4d), similar to the bivariate analyses, no significant differences were found between cleared and uncleared cases in terms of victim or event characteristics.

Discussion and conclusion

Findings

This is the first study assessing the differences in homicide clearance in a multitude of European countries using the same inclusion criteria, coding and data analyses, allowing for detailed comparisons between these countries. Overall, findings showed that the clearance rate in Finland and Switzerland in the years of analysis was very high, in some

years of the analysis even reaching 100 percent. Internationally, these rates are extraordinary high, even in comparison with other European countries such as Italy (67 percent and, later, 78 percent) (Preti and Macciò, 2012), Estonia (80 percent) (Salla et al., 2012), England & Wales (85 percent) (Smith et al., 2012) and France (80 percent) (Mucchielli, 2012). Because of the very high clearance rate in these countries, few differences were found in homicide clearance in both bivariate and multivariate comparisons.

Results showed that the country homicide rate does not seem to have a straightforward relationship with the clearance rate in any of the years under analysis, Finland is a case in point. With its relatively high homicide rate in the European context, Finnish homicide clearance rates are among the highest. The lack of such a relationship rejects to some extent the assumption that a greater homicide caseload limits police resources and makes cases inherently more difficult to clear (Paré et al., 2007). This also raises questions, as Litwin and Xu (2007) point out, about whether country homicide rates are a valid measure of police workload. One should, however, note that, although the Finnish homicide rates are high in Europe, in the global context they are among the lowest; thus even Finland is not a very good case to test the workload hypothesis.

From Black's (1970) theoretical perspective, it would further be expected that discretional factors, such as the 'likeability' of the victim, would provide an explanation for homicides being solved or remaining unsolved. Based on Gottfredson and Hindelang's (1979) theory, however, non-discretional, case-specific factors would play a key role in explaining why some homicides are solved while others remain unsolved. The results did not provide overwhelming support for either of the two theoretical approaches, because, in all countries except Switzerland, differences in homicide clearance were found in both discretional (victim-based) and non-discretional (case-based) characteristics. Rather than these theoretical perspectives providing explanations for the likelihood of a homicide being cleared, we believe that, for these four European countries, the answer lies in the characteristics of the most prevalent types of homicide per country.

Perhaps not surprisingly, homicides that take place in the private realm overall had the highest clearance rates. Not only are victims killed in a private location most likely to be killed by a family member or someone they know (Litwin, 2004), making the number of suspects limited, such homicides are also frequently followed by the suicide of the perpetrator. Prior studies show homicide–suicide rates in Finland and Switzerland to be considerably higher than in other European countries, with rates in Finland ranging from 0.17 to 0.20 per 100,000 (Kivivuori and Lehti, 2003; Saleva et al., 2007) and rates in Switzerland hovering around 0.09 per 100,000 (Liem et al., 2011) compared with rates of 0.07 in Sweden (Regoeczi et al., 2016) and 0.05 per 100,000 (Liem et al., 2011) in the Netherlands, respectively. The relatively high prevalence of homicide–suicide in Finland and Switzerland could partly explain the relatively high clearance rate in these countries compared with the Netherlands and Sweden.

From a different point of view, the low clearance rates in the Netherlands and Sweden could be explained by the relatively high prevalence of criminal milieu related homicides in these countries and the low clearance rates associated with these types of crimes. Factors associated with such criminal homicides, such as male victims, victims with an ethnic minority background and the use of firearms, were found to be significant predictors of homicide clearance in both countries. Among such homicides, even though victim

and perpetrator may know each other, witnesses are not likely to share information (Litwin, 2004). Similarly, owing to the lack of physical contact between victim and perpetrator, firearms used in these homicides leave little physical evidence to work with (Alderden and Lavery, 2007) and hence, in line with findings reported in prior US studies (Roberts, 2007), result in lower clearance rates.

It should be noted that the relationship between homicide clearance and the use of firearms was not present in either Finland or Switzerland. In neither of these countries did the use of a firearm have an impact on the homicide clearance rate. In Finland, about 40 percent of households own at least one firearm. They are mainly hunting rifles and shotguns; handgun ownership is rare as in other West European countries. For Switzerland, as Bänziger and Killias (2014) have pointed out, the lack of such a relationship may be attributed to some specificities of gun possession in Switzerland. Because of the militia system and a widespread tradition of hunting and collecting firearms, roughly one in four Swiss households owns at least one firearm. The situation is in many ways similar in Finland. In both countries these firearms are relatively often involved in cases of domestic homicide (Markwalder and Killias, 2012; Lehti, 2016), which by their very nature have a high clearance rate.

Firearm homicides in the Netherlands and Sweden, however, appear to be solved at a significantly lower rate (see Tables 2, 4b and 4c). This can be explained by the nature of firearm ownership in these countries. Legal gun ownership is relatively high in Sweden, as roughly one in eight households possesses at least one gun (Granath, 2015). In the Netherlands, less than 5 percent of all households own a firearm (Van Kesteren, 2013). What these countries have in common is that firearm use in homicide is mainly concentrated in the use of illegal firearms in homicides in the criminal milieu or other urban 'street' homicides (Granath, 2015), and seldom in domestic settings.

Further, based on the finding that homicides in the private realm were easier to solve, one would also expect that homicides involving women, children and elderly victims would be cleared at high rates, because these victims are typically killed in the private realm rather than in public places. Although, for the most, this held true in terms of homicides with female victims, we did not find straightforward support for higher clearance rates among very young or very old victims. One explanation could lie in the fact that neonaticides – the killing of a new-born – are included among very young victims. Because of the hidden nature of the pregnancy and the killing itself, such cases often remain unsolved (Brookman and Nolan, 2006). The greater difficulty of clearing cases involving elderly victims have previously been reported elsewhere (Addington, 2006; Puckett and Lundman, 2003), suggesting that victim age may not have a linear relationship with homicide clearance (Regoeczi et al., 2008). Elderly victims, particularly elderly victims living alone, may be killed in robbery homicides without witnesses, which are generally known for a lower clearance rate (Bänziger and Killias, 2014; Regoeczi et al., 2008).

Another explanation may lie in the nature of victimization and lifestyle. In a prior study on unsolved homicides in Switzerland, Bänziger and Killias (2014) found a strong nexus between homosexuality and clearance rate. Accounts of similar cleared cases revealed that (older) homosexual men often take other men to their homes with the purpose of having paid sex. The authors stated it was not possible to examine whether the

victims died in the circumstances including paid sex. However, homicides occurring in contexts where men without known ties operate are extremely difficult to solve.

Methodological considerations

This is the first study to provide an overview of homicide clearance in four West European countries. Using similar definitions and a uniform coding scheme, this study allowed for unique cross-country comparisons in factors influencing differences in homicide clearance. In spite of our consistent, standardized methodological approach, this study is not without flaws. First, this study did not include cases of missing persons where no body was found. In all four countries, such cases are usually labelled as a disappeared person, even if the police strongly suspect a homicide. Following other studies (Sturup et al., 2015), because of the unknown nature of these cases (including potential suicides or voluntary disappearances), these cases have not been included in the study. This may have resulted in a general under-count of the total number of homicides, including an under-count of unsolved homicides.

Further, whereas some countries have homicide monitoring systems available with a great level of detail, which allows for the assessment of factors such as alcohol intoxication in victims and perpetrators (Lehti and Kivivuori, 2005; Sturup et al., 2015), criminal record of victims and perpetrators (Sturup et al., 2015), or sexual orientation of victims (Bänziger and Killias, 2014), this level of detail was not available in all participating countries. This level of detail would allow us to assess a third theoretical perspective, in addition to the victim devaluation (discretional) and event characteristics (non-discretional) points of view, namely the lifestyle perspective (Rydberg and Pizarro, 2014). Lifestyle theory posits that particular lifestyle choices, such as going out at night and spending time away from the home, may contribute to future (homicide) victimization by facilitating convergence in time and space with potential offenders and other risky situations (Rydberg and Pizarro, 2014). Homicides taking place between individuals equally enmeshed in a deviant lifestyle may significantly complicate the clearance of such cases. In our work on the EHM, we continue to optimize the degree and level of detail of information to test these and other hypotheses.

Also, even though we are able to apply the same EHM coding scheme to our national datasets, allowing for exceptionally high internal validity, owing to national data protection acts we were not able to merge raw, potentially identifiable data from our national datasets into one dataset for this study. We hope that future endeavours to meet these legal ramifications will allow us to combine our data and to conduct multivariate analyses across countries.

Finally, prior research suggests that much is to be learned from shifting the conceptualization of clearance from the traditional dichotomy of cleared/uncleared to an examination of the length of time to clearance (Regoeczi et al., 2008). Based on the findings presented in this paper, this may be particularly relevant for Switzerland. An alternative modelling decision (that is, one based on time-to-solve) might have been more productive because of the very small number of uncleared homicides during the examined time period. In terms of future research, the inclusion of time-to-solve and other data such as the density, structure, expertise and operations of police departments may help improve our understanding of homicide clearance.

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Note

1. For the years included in this study, five cases of legitimate self-defence were included.

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