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Crime science and crime epidemics in developing countries: a reflection on kidnapping for ransom in Colombia, South America

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Abstract

Commonly, established nations are called upon to deal with crime epidemics in developing countries. This is particularly the case when the outside country has a vested interest in doing something about the foreign nation's problem. One noted example of this is the US funded Plan Colombia operation in South America which targeted organized crime and guerrilla groups through the development of the Colombian government's capacity to carry out direct offensive action, with a reported cost of over $8 billion. Yet, efforts by outside countries to establish and professionalize governmental agencies in underdeveloped countries as a means to combat crime epidemics requires an enormous investment in time and resources, things which are not always feasible. Through a retrospective examination of the kidnapping for ransom epidemic which occurred in Colombia, South America throughout the 2000s, this paper identifies the potential utility of the crime science approach as a cost effective and more direct strategy to deal with crime epidemics in developing countries. Implications and ideas for future applications are discussed.

Keywords: Crime prevention, Crime epidemics, Crime science, International relations, Kidnapping for ransom, Plan Colombia

Background

Developed nations are often called upon to deal with crime epidemics in underdeveloped countries. This is particularly the case when the outside country has a vested interest in doing something about the foreign nation's problem. This interest may be the result of global civic responsibility but it is more likely that the epidemic experienced in the developing country has some direct and detrimental impact on the established nation(s). Yet most preventive programs and policies which take place in developed nation states are carried out within policing and governmental institutions that are comparatively well trained, adequately funded, and otherwise professionalized. For underdeveloped nations this is rarely the case. Efforts by outside countries to establish and

professionalize governmental agencies in underdeveloped countries as a means to combat crime epidemics requires an enormous investment in time and resources, things which are not always feasible.

One noted example of such a scenario was the US backed Plan Colombia operation in Latin America which targeted organized crime and guerrilla groups who were responsible for the kidnapping for ransom epidemic and the illicit narcotics trade. The kidnapping epidemic in Colombia reached its apex by 2000 with 3572 incidents compared to just 44 incidents in 1980 (Moor and Remijnse 2008). After the year 2000, kidnappings were drastically reduced in Colombia ostensibly as a result of the successful implementation of Plan Colombia, a U.S.-Colombian joint military effort that began in 2000. Originally conceived in the late 1990s as a multi-year counter-narcotic, social development and economic stability aid package, the events of September 11, 2011 (9/11) and the "War on Terror" would re-define the strategic aims and flexibility of Plan Colombia. Over the

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12 year period between 2000 and 2012, the United States provided over $8 billion[1] for Plan Colombia operations, with the bulk of the aid, some 80 % focused on counter-narcotics and counterinsurgency (Beittel 2012).

The business of kidnapping and ransom was fine-tuned in Colombia, and it is very likely that it has been studied and imitated by criminal groups globally. Kidnappings for ransom has now become a global industry where an estimated 100,000 incidents occur every year (Christi 2008). In fact kidnappings for ransom is now the main funding source for Islamic extremist groups in the Arabian Peninsula, North Africa, and increasingly war torn Syria and Iraq (Knickmeyer 2014). Further, maritime piracy off the coast of Somalia has funded Al-Shabab, an Islamic extremist group, to some extent (Anyu and Moki 2009). Nearly every country identified as experiencing a kidnapping for ransom epidemic (Christi 2008) is considered a developing country or a failed state[2] and can ill-afford multi-billion dollar operations such as Plan Colombia.

This paper identifies the potential utility of the crime science approach as a cost effective and more direct strategy to deal with crime epidemics in developing countries. The purpose is to provide a discussion, not a deductive causal examination, of why and how crime science could be a useful approach to tackle crime epidemics such as kidnapping for ransom (K&R). To develop this notion, we reflect on Colombia's experience with K&R and utilize the FONDELIBERTAD dataset which provides detailed information on reported kidnappings in Colombia from 2002 to 2011, to underscore a few points. We first lay a foundation by reviewing the literature on K&R and then describe Plan Colombia in greater depth as it was in operation during the years of our dataset. We then discuss the crime science framework and identify how it could have been used to examine K&R incidents in Colombia in order to reduce opportunities which appeared within that K&R epidemic. We use the findings from this examination, and from previous research (Pires et al. 2014), to reveal how the crime science perspective could be useful in addressing similar crime problems globally. Either as a tool used within large scale development initiatives or relied upon solely to target opportunities that enable crime epidemics to flourish within underdeveloped countries.

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[1] Some observers estimate $9 billion was spent on Plan Colombia through State Department and Department of Defense (DoD) appropriations (est. 2000–2014), but we calculated $8 billion was spent from 2000–2012. See NY Times article for $9 billion reference: http://www.nytimes.com/2015/03/10/opinion/hope-for-colombias-peace-process.html

[2] Failed states are unable to perform basic functions such as providing security and education, and therefore, have lost the ability to govern. Often, criminal organizations and terrorist groups proliferate in such environments further exacerbating the loss of control by a central government (Patrick 2007). The Fragile State Index (Fund for Peace 2015) is often used to identify failed states, which is based on twelve indicators consisting of social, economic, and political measures.

Kidnapping for ransom literature and the Colombian context

Some have suggested that K&R offenders have a predisposition to commit such crimes (for specification of those see Marongiu and Clarke 1993) or that K&R is a product of a political struggle between the central government, guerrilla groups, and militias (Rubio 2004; Topel 2009). However, the preponderance of the literature views K&R as a "rational" crime (Briggs 2001; Marongiu and Clarke 1993; Michaud et al. 2008; Nax 2008; Pires et al. 2014; Tzanelli 2006; Vannini et al. 2012; Yang et al. 2007; Yun and Roth 2008). The crime is rational because offenders make a cost-benefit calculation that the hostage will be ransomed quickly[3] (Marongiu and Clarke 1993) and apprehension is unlikely (Briggs 2001; Christi 2008). Often, extensive planning is involved from the preparation stage (i.e. choosing a suitable area, time, and target), to the transfer, custody, negotiation, and outcome stages (i.e. release or death) (Marongiu and Clarke 1993). Because many stages are involved in the K&R process, even the most opportunistic offenders require some planning on where, when, and who will be kidnapped, and how they will be handled afterwards (Yang et al. 2007).

Many types of kidnappings exist and recent efforts have begun to typologize such variations. According to Pharoah (2005), kidnappings can be divided into three main categories—political, for ransom, and abductions. Along the same lines, Turner (1998) created four categories consisting of: ransom and political, ransom and not political, political and no ransom, not political and no ransom. While Turner's (1998) typology is more comprehensive than the previous one, a variety of kidnappings are lumped together under the category of 'not political and no ransom' which are unrelated to each other (e.g. parental abduction and kidnapping for rape) (Noor-Mohamed 2014). The most recent typology of kidnappings is the most comprehensive to date and classifies 19 unique types of kidnappings and abductions (Noor-Mohamed 2014).

Related to the South American context, there are five types of kidnappings for ransom relevant to the present study: (1) single; (2) group; (3) express; (4) political; and (5) virtual. Single kidnappings involve one person held for ransom while group kidnappings involve more than one person. Group kidnappings often occur in rural areas of Colombia where guerrilla groups employ a road stop checkpoint and indiscriminately kidnap all individuals from their vehicles (Christi 2008). Express kidnappings, otherwise known as ATM kidnappings, occur when offenders force victims to withdraw as much money as possible from ATM machines (Moor and Remijnse 2008). Express kidnappings incidents do not last very long, occur more often in urban areas and are suspected of being committed by more inexperienced offenders such as common

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[3] Ransom includes political concessions in this context.

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criminals (Moor and Remijnse 2008; Pires et al. 2014). Political kidnappings have the ultimate purpose of obtaining political concessions or releasing a fellow comrade from imprisonment. Typically, such kidnappings are employed by politically motivated groups and not common criminals. Finally, virtual kidnappings have become a growing phenomenon in Latin America where victims are falsely told over the phone a loved one has been kidnapped (Moor and Remijnse 2008).

Each type of kidnapping is unique and involves different offenders, victims, and methods, while taking place in different settings and possibly at different times. The reasons why offenders are attracted to committing specific types of kidnappings, also known as the choice structuring properties (Cornish and Clarke 1987), will vary between each other, and this variation can explain the popularity of one type of kidnapping over another. Group kidnappings, for example, were the most popular type of kidnapping in the 1990s and early 2000s within Colombia because of the ease, access to multiple individuals, potential for multiple ransoms, and the unlikelihood of being apprehended by authorities. Each type of kidnapping must be analyzed independently from one another to better understand patterns of where, when, how, and who is victimized and who is perpetrating the crime (Pires et al. 2014).

Perpetrators of K&R in Colombia are largely limited to four groups. The first*National Liberation Army* two groups, the FARC (*Revolutionary Armed Forces of Colombia*) and the ELN (*National Liberation Army*), were born out of the aftermath of *La Violencia*[4] and were created to overthrow the democratic government in Bogotá. They were both formed in the early 1960s as Marxist/Leninist guerrilla forces that operated in rural Colombia. Both groups began to utilize kidnappings for ransom as an income generating activity around the late 1970s, along with the use of extortion, drug taxing and trafficking to fund their organization (Beittel 2012). Soon, other Colombian organizations began to use the tactic of kidnapping for ransom along with common criminals. One such organization was the AUC (*United Self-Defense Forces of Colombia*), a right-wing paramilitary self-defense force that practiced extortion, drug trafficking, and 'dirty war'[5] opera-

tions on behalf of the Colombian Armed Forces (Miller Llana 2010). Together, the FARC, ELN, AUC and common criminals account for over 97 % of known perpetrators of kidnappings since 2002 (Pires et al. 2014).

Plan Colombia and kidnapping for ransom

During the late 1990s the necessity for greater US involvement in Colombia was precipitated on three factors; Colombia had become the main source of cocaine entering the country, Colombia's democracy was under threat from leftist guerillas, and the long-term stability of the region was at risk (Rathbone 2012). The Clinton Administration lobbied the U.S. Congress to support the broader Plan Colombia mission and with bipartisan support appropriations were authorized. While limited to combating narcotics production, trafficking, and to a lesser extent alternative development, the events of the September 11, 2001 terrorist attacks in the United States had a dramatic effect on Plan Colombia's aims. The Bush administration's declared "War on Terror" found a very enthusiastic partner in the new Colombian president, Alvaro Uribe, in his declaration to combat "narco-terrorism". Soon after President Uribe was sworn into office in August of 2002, the U.S. Congress expanded the flexibility of US assistance to strengthen Colombia's fight against terrorism and narcotics (Oehme 2010; Embassy of the United States 2015).

At the end of the 1990s it was clear that to avoid *failed state* status, Colombia's national security would be dependent on the success of Plan Colombia. While the initial aims of fighting narcotics production and trafficking had ancillary effects on the state's central adversaries, President Uribe's strategic re-alignment of fighting a war on "narco-terrorism" would successfully realize itself in a post 9/11 environment. No single element can take credit for the reduction in the rates of kidnapping and ransom (K&R) over the 12 year period between 2000 and 2012, but it can be argued that through a combination of Plan Colombia funded programs, which included strengthening the Colombian security forces' capacity (air mobility, logistics, increased manpower, superior arms), intelligence gathering and dissemination, and training and mentoring its special forces in counter terrorism to include anti-kidnapping[6], the environment would become less conducive for illegal armed groups (IAGs) and criminal gangs (*bandas criminales* or BACRIM) to successfully engage in K&R (Beittel 2012). Non-military assistance was also a key component, carried out principally by the United States Agency for International Development (USAID) focusing

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[4] *La Violencia* was a de facto civil war in Colombia between 1948 and 1958.

[5] "Dirty War" comes from the events of the 1960s–1980s during which South American (Brazil, Argentina, Chile, Bolivia, Paraguay, Uruguay) military and security forces and right-wing death squads hunted down and killed left-wing guerrillas, political dissidents, and anyone believed to be associated with socialism. In Colombia, the security forces have been accused of aiding right-wing paramilitary groups in numerous dirty war operations, such as the Mapiripán Massacre and the El Aro Massacre. The Mapiripán took place in Mapiripán, Department of Meta, Colombia between July 15 and 20, 1997 with the murder of approximately 30 civilians by AUC paramilitaries . According to intelligence gathered by the US Embassy, the Colombian Army provided "travel, logistics, intelligence and security" (George Washington University 1997). The El Aro Massacre took place in the municipality of Ituango, Department of Antioquia, Colombia. 15 civilians accused of being leftist supporters of the FARC were murdered by the AUC paramilitary group with support from members of the Colombian Army (Revista Semana 2008).

[6] In 2003, GAULA (*Grupos de Acción Unificada por la Libertad Personal,* is the Colombian military's elite anti-kidnapping unit) and U.S. security forces began training together under the Anti-Terrorism Assistance Program (Santareno 2014).

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on institution building, judicial oversight, and socio-economic development in rural areas (Oehme 2010).

Equally, the key strategic decisions taken by Colombian leadership that improved security and lowered rates of K&R were realized by carrying out military offensives, targeted assassinations of guerilla leaders, eliminating large cadres of guerrillas through attrition warfare, disarming the paramilitary AUC, and expanding the presence of the state in areas that had long been under IAG influence and control (Beittel 2012). Through such strategic decisions, recent kidnappings totals have been at their lowest levels since the early 1980s (Fig. 1). From 2000 to 2011 alone, the kidnapping drop amounted to a 91 % decrease.

Countries like Colombia were fortunate to receive substantial aid to combat terrorist groups that employed K&R as a tactic to generate income. However, it is highly unlikely countries experiencing similar K&R or other crime epidemics will receive such aid. If aid is received, it will be comparatively smaller and will likely emanate from developed countries' foreign ministries and non-governmental organizations (NGOs) foreign development grants instead of military assistance. Within that framework of assistance, the crime science approach can be a useful alternative to approaches like Plan Colombia where it can target opportunities for crime efficiently and effectively where the resources do not permit overhauls of governmental capacities. In the case that a large scale operation already exists, crime science principles can be used in tandem to increase the effectiveness of short- and long-term crime reduction objectives.
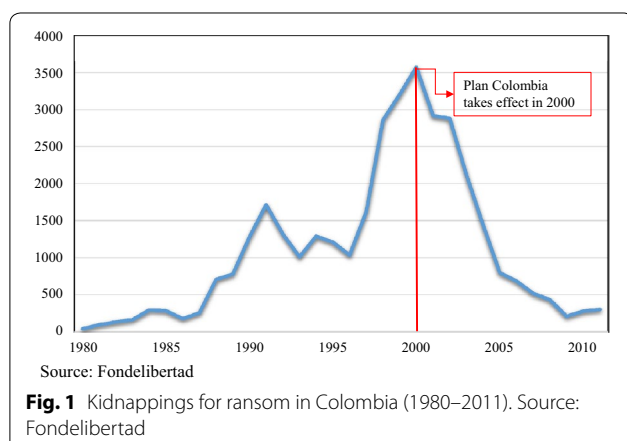
Crime science framework

The crime science approach (Smith and Tilley 2013), with its primary foundation as situational crime prevention (Cornish and Clarke 2003), focuses on understanding the nature and pattern of crime events in an effort to identify the underlying opportunities responsible for crime concentrations. The approach emanates from the opportunity crime theories, that being the routine activities theory (Cohen and Felson 1979), rational choice theory (Cornish and Clarke 1986), and crime pattern theory (Brantingham and Brantingham 1993), which place little emphasis on trying to remove criminal dispositions and instead focuses on addressing the places, times, and victim characteristics which promote offending opportunities. While criminal dispositions are not focused upon, the motivations which drive offenders to commit specific crime types are considered insofar as they help to identify potential methods for discouraging offending through alteration of the situational landscape (Cornish and Clarke 1986).

Sociological and political understandings of crime epidemics are useful for understanding crime patterns on macro levels, but their implications for strategies to reduce or prevent crime invariably calls for changing the broader societal or political frameworks (often through the creation of policies or programs to do so) within which the epidemic exists (Levitt and Rubio 2005). While these ideas may be valid they are often ambitious, as even if they could be accomplished it would take many years or generations to achieve along with considerable expense. The crime science approach offers a much more surgical, micro level strategy to identify crime concentrations and the opportunity structures which facilitate their presence, in order to identify immediately actionable prevention activities (Pires et al. 2014).

Critics of the situational approach contend that it fails to address the so called root causes for crime since the macro level influences may remain unchanged (Young 2003). While the crime science approach does not attempt to influence macro level forces it does offer an expedient and efficient way to reduce crime problems in the immediate term. The crime science approach may also be used in collaboration with the implementation of a larger program and policy agenda which seeks to alleviate macro factors over longer periods of time. Yet even in the absence of such programs (and the resources to carry them out) focusing on situational landscapes can result in meaningful and sustainable reductions in crime. This is because much crime is caused by the presence of easy opportunities and when those opportunities are removed some portion of offenders will desist from participating in crime altogether (Felson and Clarke 1998). Only chronic highly motivated offenders, which make up a small proportion of overall offenders, will seek out new crimes when faced with blocked opportunities from previous offending (Guerette 2009).

Another important benefit of the crime science approach is that it offers a platform for the efficient deployment of limited resources since it identifies

Fig. 1 Kidnappings for ransom in Colombia (1980–2011). Source: Fondelibertad

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concentrations to which prevention tactics can be targeted and stand to have the greatest impact. It also allows for constant reappraisal of shifting or changing crime patterns in response to altered opportunity structures in order to address the dynamic nature of crime epidemics over time. Previous criminological research has clearly identified the various ways in which crime tends to cluster, which includes target selection (Cornish and Clarke 1986), among victims (Pease 1998), among geographic areas (Sherman et al. 1989), across space and time (Brantingham and Brantingham 1981), across homogenous facility types (Eck et al. 2007), and among offending populations (Wolfgang and Figlio 1972). While most of these crime concentrations have been found among conventional domestic crime types (burglary, robbery, aggravated assaults, etc.) more recent research applying the crime science perspective has found similar patterning among a variety of transnational and alternative crime types. This includes wildlife crime (Lemieux 2014; Lemieux and Clarke 2009; Pires and Clarke 2012; Petrossian and Clarke 2014; Petrossian 2015; Petrossian et al. 2015), terrorism (Behlendorf et al. 2012; Braithwaite and Johnson 2015; Freilich and Newman 2009; Gibbs 2010), maritime piracy (Marchione and Johnson 2013; Shane and Magnuson 2014), migrant deaths (Guerette 2007), cybercrime (Hinduja and Kooi 2013) and identity theft (White and Fisher 2008).

One recent study, a precursor to the effort here, applied the situational crime prevention framework to kidnappings for ransom in Colombia, South America in an attempt to determine whether aggregated incidents of kidnappings revealed patterns that would support the appropriateness of future applications of the situational crime prevention framework to identify opportunities for prevention (Pires et al. 2014). The idea was that if concentrations and other patterns existed among incidents of kidnappings for ransom which are similar to those found in commonly studied crime types, then much more could be done to systematically prevent kidnappings and other crime epidemics in developing countries globally. The findings revealed several concentrations among the kidnapped sample which occurred in Colombia over nearly a decade. The concentrations were found to be pronounced geographically, temporally, across victim types and across offender groups. In the current study we extend those previous findings by assessing further the utility of the crime science approach as an efficient and effective method for addressing crime epidemics in developing nations. While the previous study (Pires et al. 2014) identified aggregated concentrations and potential opportunities for prevention, the focus here is to assess whether these patterns changed over time thereby necessitating

the continued application of a crime science approach to guide and refine prolonged prevention tactics.

Data

The study utilized data from the Fondo Nacional para la Defensa de la Libertad Personal (National Fund for the Protection of Individual Liberty), a Colombian governmental organization known in short as FONDELIBERTAD. FONDELIBERTAD was established in 1996 by law and has been responsible for collecting detailed information on kidnappings since 2002.[7] All information is reported to the Colombian Ministry of Defense and the legal mandate of the program ended in 2011. Thus, all reported victims of kidnappings that occurred between January 1st, 2002 and December 31st, 2011 are included in the dataset. Additional data were collected for each incident pertaining to when, where, who (both victim and perpetrator), duration in captivity and the outcome of each event. Concerning locations of crime, events were documented by locale (i.e. urban or rural) and to two different administrative jurisdictions of Colombian departments (n = 32) and municipalities (n = 1120). As Colombia is a unitary republic, departments are similar to 'states' in the United States. Departments are formed by a grouping of municipalities, which are the smallest administrative unit of analysis, similar to counties within the United States.

ArcGIS software was utilized to aggregate incidents to administrative units such as departments and municipalities so that spatial variation can be examined. Recoding the 'occupations' of kidnapped victims is a necessity in understanding victimization risk. Common occupation types had similar jobs grouped together (see Pires et al. 2014). Separate analyses are required for examining the frequency for the three subtypes of kidnappings (express, group, and political)[8] occurring in Colombia (Pires et al. 2014). Express kidnappings are poorly documented in our dataset as research has found many such kidnappings are recorded as robberies instead (Christi 2008). Therefore, we defined express kidnappings as the proportion of victims who were taken captive for 0–1 days. This definition would include K&R incidents that were express in nature as well as incidents that resulted in ransoms being paid very quickly. Group kidnapping information was not included in the data set, so we codified group kidnappings by identifying victims that were taken by the same criminal actor and occurring on the same day and in the same municipality (Pires et al. 2014). Political kidnappings, unlike the other subtypes of kidnappings, are

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[7] FONDLIBERTAD also provides legal and psychological assistance to families affected by kidnappings and advises the government on K&R policies.

[8] No data is provided on virtual kidnappings as no kidnapping actually occurred.

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documented in the dataset accurately and thus require no recoding.

Of the few studies that have utilized the FONDELIB-ERTAD dataset (Rubio 2004; Di Tella et al. 2010; Pshisva and Suarez 2010), none have mentioned reporting or accuracy issues. Often, reported crime data suffers from selectivity bias. Some areas or groups of individuals may be less likely to report crime due to a variety of reasons. While this may hold true in Colombia, no evidence documents selectivity bias in reporting crime in the Colombian context. One issue with the FONDELIBERTAD dataset that has been mentioned is the lack of clarity on how kidnapped victims are counted. Outsiders have claimed that the numbers in captivity had vastly changed between a 2 year period suggesting that the methodological criteria had suddenly changed or the data had been purposefully manipulated for political purposes (Revista Semana 2010). As a result of FONDELIBERTAD organization no longer existing, we do not know why there were discrepancies in kidnapping incidents numbers between two different time periods.

Applying crime science to the problem of K&R
Geographic distribution
We use location, time, perpetrator and victim information to identify patterns of K&R incidents in three different time periods (2002, 2006, 2011). Figure 2 presents municipalities where victims of K&R have been targeted in Colombia. Not all municipalities have experienced a kidnapping. Of the municipalities that have experienced a kidnapping, a small proportion account for the majority of K&R victims (Fig. 3). For example, in 2002, 20 %

of municipalities account for 88 % of K&R victims. By 2011, just 12 % of municipalities account for 100 % of K&R victims. Over time, K&R occurred less often and became more concentrated in fewer municipalities. In examining the spatial changes over the three time periods, it's evident that both persistent and temporary hot areas exist (Fig. 2). An example of a persistent hot area is the municipality of Cundinamarca, which includes the city of Bogotá. This hot area has consistently experienced a high concentration of kidnappings in all three periods. Though there is also evidence of temporary hot areas in Colombia as many municipalities that experienced kidnappings in 2002 no longer did in 2011. For instance, 115 victims were kidnapped in Valledupar in 2002, but no victims were reported in this municipality in 2011.

Descriptive statistics on K&R incidents
Table 1 gives further information on patterns of K&R over time by examining the characteristics of incidents. The majority of K&R victims (72 %) in 2002 were targeted in rural areas of Colombia as most victims were part of group kidnappings (57 %) at that time. Once the military established law and order in rural Colombia, the popularity of group kidnappings decreased after 2002 and with it overall kidnappings perpetrated by guerrilla groups and militias. As a result, urban areas became the setting for most kidnappings, and common criminals were the leading perpetrators by 2011. Common criminals most frequently operate from within urban areas in major cities such as Bogotá, Medellin, and Cali (Fig. 2).

Victim demographics shifted as well. Approximately 23 % of individuals under the age of 18 were targeted
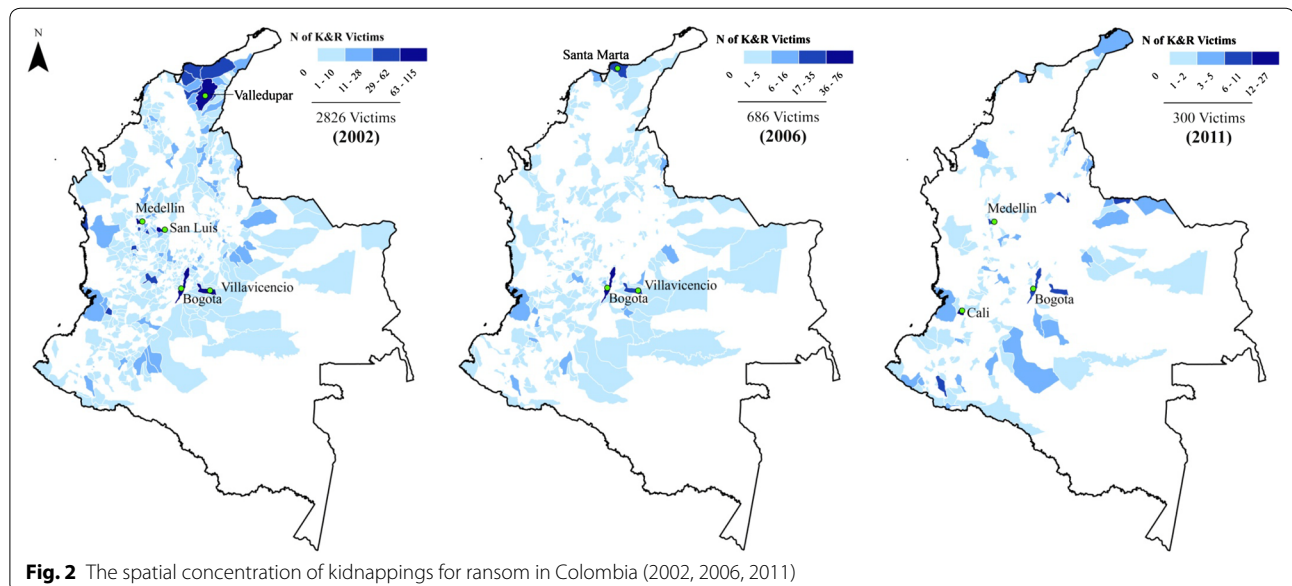

Fig. 2 The spatial concentration of kidnappings for ransom in Colombia (2002, 2006, 2011)

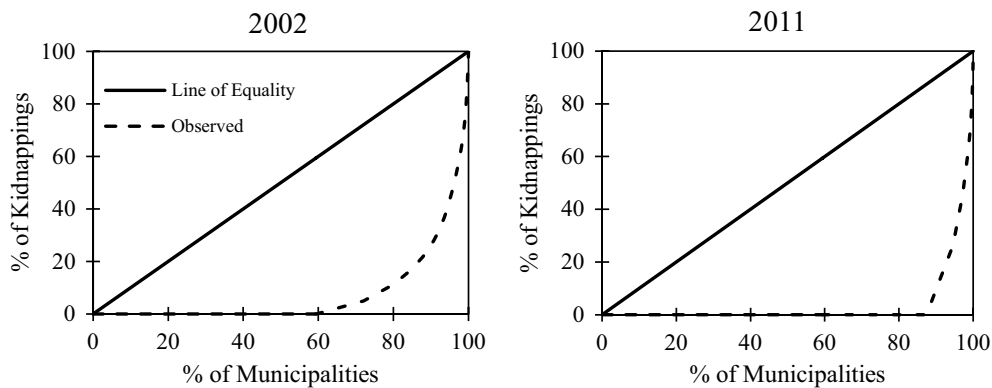Stubbert *et al. Crime Sci* (2015) 4:23

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Fig. 3 The inequality of kidnappings across Colombian municipalities in 2002 (*left panel*) and 2011 (*right panel*). We plotted the cumulative percentage of kidnappings across municipalities (1–1120) against the cumulative percentage of total municipalities for two separate years. If kidnappings were evenly distributed throughout each and every municipality, the observed line (*dotted*) would run parallel with the line of equality (45-degree angle). If, however, the observed line (*dotted*) deviates significantly from the line of equality, then kidnappings are highly concentrated in just a small percentage of municipalities. In both years, kidnappings significantly deviate from the line of equality

in 2002, but slowly declined to 14 % by 2011 (Table 1). This decline was offset by an increase of kidnappings in the 18–30 age group. Targeted occupations were businessmen, professionals, and minors, though fluctuation between periods are evident. Businessmen and university students experienced significant increases between 2002 and 2011. This increase may be a consequence of kidnappings occurring more often in urban areas where most universities are located and many more businessmen may reside. Other occupations, such as agricultural and tradesmen, experienced fluctuations between periods. In 2006, tradesmen, such as drivers and carriers, were twice as likely to be kidnapped compared to 2002 figures.

Temporal distribution

Temporal analysis is limited to days of the week and months as no specific time is recorded for these incidents. More individuals were kidnapped in the beginning of the week in the years 2002 and 2011. Although in 2006, K&R occurred more often between Thursday and Saturday. Interestingly, Sunday consistently experienced a lower than average number of kidnappings in all three time periods. This may be the result of Colombian tradition to spend time with family and extended family at home on Sundays instead of traveling within cities and outside of cities (Discover Colombia 2015). As a result, the opportunity to kidnap individuals on Sundays is less likely as fewer people are outside. Analysis of monthly data alludes to unique hot times in each time period. Each hot period lasts about 2–3 months. In 2002, it was April, May, and June; in 2006, August and September; and in 2011, May, June, and July.

Geographic distribution of FARC kidnappings

Data can be further disaggregated by perpetrator groups to identify unique patterns that could aid law enforcement strategy. One such way is to map incidents by each perpetrator over time as illustrated in Fig. 4 with the FARC. The FARC had been the leading perpetrator of kidnappings in Colombia for over three decades. In 2011, the FARC was responsible for less than half of the kidnappings common criminals conducted (Table 1). A 92 % decrease in FARC-perpetrated kidnappings occurred between 2002 and 2011 and this dramatic reduction is also seen geographically (Fig. 4). In 2002, the FARC kidnapped at least one individual from 258 municipalities, but by 2011, their kidnappings were reduced to 46 municipalities. In 2011, FARC kidnappings had virtually disappeared in northern Colombia and instead occurred in central and south-west Colombia, possibly reflecting shifting strongholds of the guerrilla organization.

Discussion

The crime science approach can improve efficiency since it is able to identify the multiple concentrations in which problem behavior occurs thereby allowing for the most effective delivery of tactics within a prevention strategy. For small scale crime problems, such as street corner hotspots, an initial analysis is usually sufficient to orient prevention activities and bring the problem under control. For large-scale problems, such as crime epidemics, the continued analysis and understanding of shifting patterns of opportunity structures will be necessary as national level epidemics are more dynamic than micro-level concentrations and perhaps change more readily as strategies are deployed. As such the continued deployment of

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Table 1 Descriptive statistics on K&R incidents (2002, 2006, 2011)

	2002	2006	2011		2002	2006	2011
Setting				*Victim gender*			
Rural	72.4	44.4	32.5	Female	20.6	24.1	18.4
Urban	27.6	54.3	66.9	Male	79.4	75.9	81.6
Top 4 perpetrators				*Victim age* (known)			
FARC	34.2	17.6	25.2	Under 18	22.7	18.9	13.8
ELN	28.1	9.6	11.1	18–30	16.3	20.6	26.3
Common criminal	14.5	39.2	59.0	31–50	42.0	38.7	38.4
AUC/BACRIM[a]	5.8	1.5	4.6	51+	19.0	21.8	21.5
Type				*Day of week*			
Group kidnapping %	56.7	26.1	24.6	Monday	17.5	13.9	16.1
Express (0–1 days)[b]	33.2	43.2	34.1	Tuesday	16.7	12.3	14.4
Political	4.0	0.0	0.0	Wednesday	13.6	12.9	16.1
				Thursday	13.2	15.8	15.7
				Friday	13.5	16.0	13.1
Victim occupation				Saturday	14.1	15.8	13.1
Agriculture	5.9	12.2	9.5	Sunday	11.5	13.2	11.5
Businessman	12.4	14.9	29.2				
Employee of company	6.8	8.3	6.2	*Month*			
Govt official	6.1	4.1	3.0	January	6.9	8.0	8.9
House wife	1.5	3.2	2.3	February	6.1	9.3	5.6
Law enforcement/military	1.9	0.1	1.3	March	7.5	8.0	9.5
Minor	12.5	15.8	12.1	April	10.3	8.4	7.2
Other	0.8	0.3	5.6	May	10.6	9.3	15.1
Politician	0.1	0.0	1.0	June	10.4	8.4	11.1
Professional	9.8	10.0	12.1	July	8.6	6.5	10.8
Retiree	1.1	1.0	0.7	August	9.8	11.5	9.8
Student	2.0	2.9	8.5	September	7.3	10.9	5.2
Tourist	1.1	0.7	0.0	October	7.3	8.1	4.3
Tradesman	6.3	13.6	8.2	November	7.1	7.0	8.5
Unknown	31.7	12.7	0.3	December	8.3	4.6	3.9

[a] The AUC no longer existed after 2006. However, many of its members became part of the BACRIM organization years later
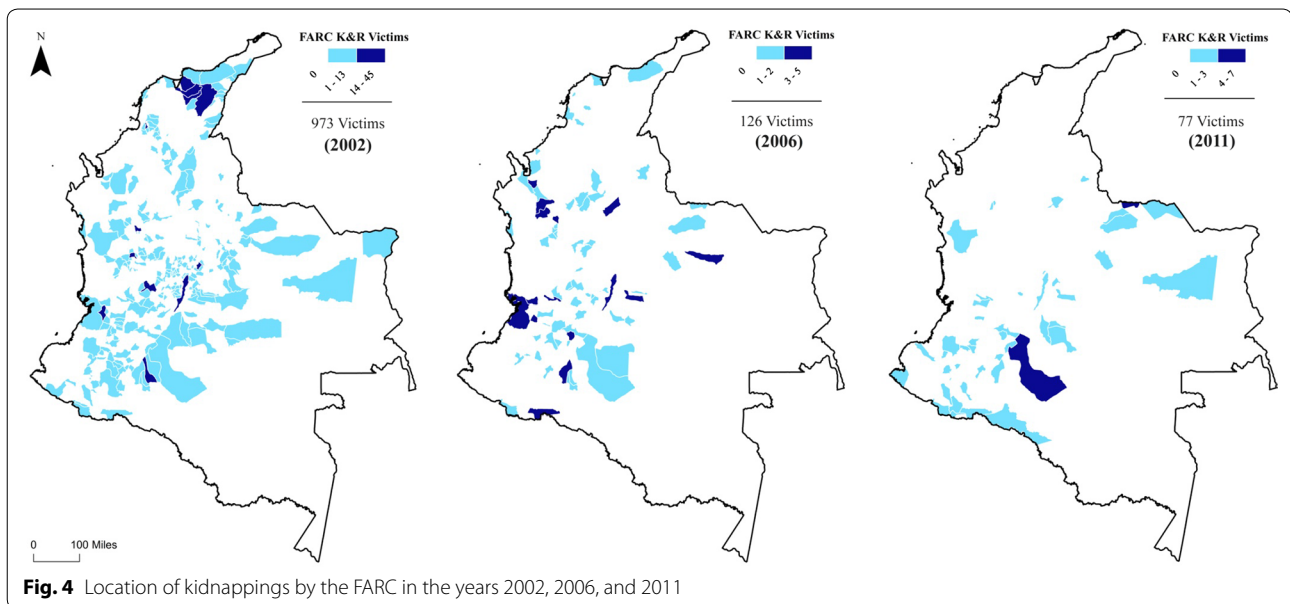
[b] Express kidnappings are rarely identified in the database. Instead, we examine the proportion of kidnappings that last up to 1 day as a proxy measure for express kidnappings (Pires et al. 2014)

the crime science approach could prove useful to guide and refine prolonged prevention tactics.

The opportunity for kidnapping and ransom to proliferate is dependent on weak government authority and institutions. Preventing K&R is often up to foreign aid organizations and NGOs. These outside groups are key in carrying out the necessary data collection and investigative process to confront the epidemic. Foreign grant money can also be contingent on meeting these requisites. Security forces, be they military or police, might also be asked to follow similar obligations in order to obtain anti-kidnapping foreign aid. The situational crime prevention approach could also be strengthened by utilizing collaborative partnerships across sectors, to include intergovernmental, NGOs, corporations, and community

foundations/groups. The convergence of knowledge, transparency, accountability, and mutual will to tackle the problem could increase the probability of success. In order for the crime problem to be targeted using the situational crime prevention (SCP) approach, patterns of a crime problem must be identified and understood. Through data collection and analysis, the SCP process allows policy makers and law enforcement to strategically target crime incidents (see Pires et al. 2014).

The present analysis of K&R incidents in Colombia reveals different patterns of concentrations in each year examined in relation to space, time, type, victims, and perpetrators. Up to date data analysis and crime maps could foster more effective policing strategy, such as Problem-Oriented Policing (Braga 2008) or "hot spot"

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Fig. 4 Location of kidnappings by the FARC in the years 2002, 2006, and 2011

policing (Braga 2005), as resources can be targeted in areas and times where K&R is disproportionately occurring. The findings of this paper suggest that K&R is concentrated in a small percentage of Colombian municipalities and occur slightly more often in the summer months. Some individuals are at higher risk, namely older males who are businessmen or professionals; although shifts in occupational risk are noticeable between time periods.

Protecting high risk victims could involve alerting and educating particular individuals, targeted media awareness campaigns, encouraging expanding citizen-instigated alert systems that utilize roadway alarms and/or cell phone text messaging, such as an Amber Alert (Flores 2014), building coalitions with governmental, educational, corporate and transportation groups to aid in modifying policies and practices to reduce kidnapping risks, and establishing GPS loaner systems (Pires et al. 2014). These methods would extend guardianship, as well as strengthen formal surveillance (Cornish and Clarke 2003).

Methods for targeting offenders by utilizing the SCP process could include implementing tip line rewards leading to the liberation of a victim (i.e. assisting natural surveillance), broadening prosecution beyond individual offenders to include groups so criminal gangs as a whole are prosecuted (i.e. removal of excuses), and facilitating greater employment opportunities to at-risk communities prone to joining criminal gangs (i.e. neutralize peer pressure and disrupt markets) (Pires et al. 2014).

Several approaches employing the SCP process at the spatial level to target kidnapping could also include greater resources from national and international aid budgets to the high-risk areas. Such interventions could include utilizing CCTV, barriers, aerial drones (UAVs), defensible space designs along with improved street lighting/visibility, and targeted patrols on roadways. These methods would strengthen natural and formal surveillance, and target harden public spaces (Pires et al. 2014).

Analyzing the types of kidnappings occurring at a given time could further aid policing strategy. In the early years of our dataset, group kidnappings had been the most popular method as military and law enforcement presence was absent in the majority of rural areas of Colombia. The decline in group kidnappings was not offset by an increase in other types of kidnappings, such as express kidnappings, but led to overall reductions in all kidnappings. The fact that displacement did not occur spatially or to other targets (Clarke and Eck 2005; Guerette and Bowers 2009) suggests offenders were highly reliant on particular opportunities that made groups kidnappings highly attractive. Once the government was able to reduce kidnappings in rural areas by guerrilla groups and militias, the kidnapping problem shifted to traditional urban kidnappings predominantly conducted by common criminals.

Limitations of our analysis serve as a reminder of the type of data that is needed to have the greatest effect on crime reductions. Our analysis was limited to aggregating data to the smallest administrative units of analysis, which are municipalities in Colombia. Geo-coding incidents to physical addresses or geo-coordinates is more optimal, as hot-spot density maps could be created to identify micro hot spots (Braga et al. 2010; Groff et al.

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2010; Yang 2010) within municipalities such as a neighborhood, major road, or even a precise location where kidnappings have re-occurred in the past. Temporal analyses of K&R incidents should also examine the precise time of day, as crime research shows substantial variation throughout the day (Felson and Poulsen 2003). Even if data cannot be obtained for the exact time of an incident, start time and date and an end time and date would prove useful for police units. Collecting such data can enable 'aoristic analysis' of kidnapping events, which "generates a crime occurrence probability at any given time that can be mapped or visualized graphically" (Ratcliffe 2002, p. 23). Future research should gather intelligence on specific places and times which could further guide policing efforts to focus on hot-spots at hot times minimizing the probability of future incidents. In addition, practitioners should apply situational crime prevention interventions to crime epidemics in developing nations and evaluate if and how interventions were able to reduce crime and if displacement was evident.

Conclusions

Kidnappings for ransom is a growing problem in the world that is fueling guerrilla and terrorist movements from the FARC in Colombia, to Al-Qaeda in Mali and Yemen (Forest 2012; Nossiter 2012), and ISIL/ISIS in Syria (CBS News 2014). Al-Qaeda and its affiliated organizations, for example, have been extremely successful using this tactic, acquiring at least $125 million since 2008 (Callimachi 2014). Colombia was fortunate enough to avoid becoming a failed state in large part to the US backed Plan Colombia operation. Though most countries with serious crime problems will not be as fortunate to receive billions of dollars in aid from another country in the form of military assistance. Moreover, reforming and modernizing the criminal justice apparatus in a developing country is extremely challenging. Crises such as the K&R epidemics that are flourishing in nations mentioned above require immediate action. In such cases, nations could be prudent in using a crime science perspective to identify patterns of crime concentration as it relates to space, time, targets, offenders, and victims. In doing so, specific crimes can be immediately reduced without costing nations a tremendous amount of money or political capital.

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